CA Inter Financial Management

SUPER 100 QUESTIONS MARATHON

Your One Stop Solution

By

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"ASWANI HAI TOH ASAAN HAI"

FM Super 50

Questions Marathon

1. **Important Queries**
   - Super 100 v/s Super 50
   - What type of questions covered in Super 50?
   - Only questions or concepts as well?
   - The right way to watch Super 50 Marathon
   - Is it enough?
   - Where will you get the PDF?

2. **Sequence of Chapters**
   - Leverages
   - Cost of Capital
   - Investment Decisions
   - Dividend Decisions
   - Capital Structure
   - Working Capital
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3. References

O - Overview solutions with some Calculations on Calci

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Super 100 Contents:

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Chapter 1 – Leverages

➢ All Leverages Combined

⭕ Question 1 (Vault Q. 11)   **(Nov 20 – 10 Marks)**

The following data is available for Stone Ltd.:

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

Using the concept of leverage, find out

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

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

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

Also verify the results in each of the above case.

Solution

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

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

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) $= \dfrac{₹\,10,000}{₹\,75,000} \times 100 = \textbf{13.333\%, hence verified}$

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

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 $= \dfrac{₹\,30,000}{₹\,1,00,000} \times 100 =$ **30%, hence verified.**

(iii) Degree of Combined Leverage $= \dfrac{\text{Contribution}}{\text{EBT}} = \dfrac{₹\,3,00,000}{₹\,75,000} =$ **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) $= \dfrac{₹\,30,000}{₹\,75,000} \times 100 =$ **40%, hence verified**

Question 2 (Vault Q. 25)   (RTP May 24)

From the following financial data of Company A and Company B, PREPARE their Income Statements.

	Company A (₹)	Company B (₹)
Variable Cost	88,000	50% of Sales
Fixed Cost	26,500	-
Interest Expenses	14,000	11,000
Financial Leverage	5 : 1	-
Margin of Safety	-	0.25
Income Tax Rate	30%	30%
EBIT	-	14,000

Solution

Income Statements of Company A and Company B

	Company A (₹)	Company B (₹)
Sales	1,32,000	1,12,000
Less: Variable cost	88,000	56,000

Contribution	44,000	56,000
Less: Fixed Cost	26,500	42,000
Earnings before interest and tax (EBIT)	17,500	14,000
Less: Interest	14,000	11,000
Earnings before tax (EBT)	3,500	3,000
Less: Tax @ 30%	1,050	900
Earnings after tax (EAT)	2,450	2,100

Working Notes:

Company A

(i) Financial Leverage $= \dfrac{\text{EBIT}}{\text{EBT i.e EBIT - Interest}}$

So,   5 $= \dfrac{\text{EBIT}}{\text{EBIT} - 14,000}$

Or,   5 (EBIT – 14,000) = EBIT

Or,   4 EBIT   = 70,000

Or,   EBIT   = ₹ 17,500

(ii) Contribution   = EBIT + Fixed Cost = ₹ 17,500 + ₹ 26,500 = ₹ 44,000

(iii) Sales   = Contribution + Variable cost = ₹ 44,000 + ₹ 88,000 = ₹ 1,32,000

Company B

(i) Operating Leverage = 1/Margin of Safety $= \dfrac{\text{Contribution}}{\text{EBIT}}$

1 / 0.25 $= \dfrac{\text{Contribution}}{₹\,14,000}$

4            $= \dfrac{\text{Contribution}}{₹\,14,000}$

Contribution   = ₹ 14,000 × 4 = ₹56,000

(ii) Fixed Cost   = Contribution – EBIT = 56,000 – 14,000 = ₹ 42,000

(iii) Contribution   = 50% of Sales (as Variable Cost is 50% of Sales)

Sales   = 56,000 × 2 = ₹1,12,000

Question 3 (Vault Q. 27)   **(MTP Nov 22 – 5 Marks)**

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, 10,000 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.

Solution

Break Even Sales = ₹ 68,00,000 × 0.75 = ₹ 51,00,000

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Income Statement   (Amount in ₹)

</div>

	Original	Calculation of Interest at BEP (backward calculation)	Now at present level
Sales	68,00,000	51,00,000	68,00,000
Less: Variable Cost	40,80,000	30,60,000	40,80,000
Contribution	27,20,000	20,40,000	27,20,000
Less: Fixed Cost	16,32,000	16,32,000	16,32,000
EBIT	10,88,000	4,08,000	10,88,000
Less: Interest (EBIT-PBT)	?	**3,93,714**	**3,93,714**
PBT	?	14,286 (10,000/70%)	6,94,286
Less: Tax @ 30% (or PBT-PAT)	?	4,286	2,08,286
PAT	?	10,000 (Nil+10,000)	4,86,000
Less: Preference Dividend	10,000	10,000	10,000
Earnings for Equity share holders	?	**Nil (at BEP)**	4,76,000
Number of Equity Shares	1,50,000	1,50,000	1,50,000
EPS	?	-	3.1733

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

Question 4 (Vault Q. 30)   **(Nov 21 – 10 Marks)**

Information of A Ltd. is given below:

•   Earnings after tax: 5% on sales

•   Income tax rate: 50%

•   Degree of Operating Leverage: 4 times

•   10% Debenture in capital structure: ₹ 3 lakhs

•   Variable costs: ₹ 6 lakhs

Required:

(i)   From the given data complete following statement:

Sales	XXXX
Less: Variable costs	₹ 6,00,000
Contribution	XXXX
Less: Fixed costs	XXXX
EBIT	XXXX
Less: Interest expenses	XXXX
EBT	XXXX
Less: Income tax	XXXX
EAT	XXXX

(ii)   Calculate Financial Leverage and Combined Leverage.

(iii)   Calculate the percentage change in earning per share, if sales increased by 5%.

Solution

(i) **Working Notes**

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

So, EBT is 10% of Sales

Since Interest Expenses is ₹ 30,000,

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

Now Degree of operating leverage = 4

So, $\dfrac{\text{Contribution}}{\text{EBIT}} = 4$

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

$$\textbf{So, Sales} = \dfrac{₹\,7,20,000}{60\%} = ₹\,\textbf{12,00,000}$$

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

$$\textbf{EBIT} = \dfrac{₹\,6,00,000}{4} = ₹\textbf{1,50,000}$$

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 $= \dfrac{\text{EBIT}}{\text{EBT}} = \dfrac{1,50,000}{1,20,000} = \textbf{1.25 times}$

Combined Leverage = Operation Leverage × Financial Leverage

= 4 × 1.25 = 5 times

Or,

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

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

(iii)   Percentage Change in Earnings per share

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

∴ % Change in EPS = 25%

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

➢ Ratios & Trading on Equity

Question 5 (Vault Q. 34)   **(Nov 19 – 10 Marks)**

The Balance Sheet of Gitashree Ltd. is given below:

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

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

Calculate:

(i)   (a)   Degree of Operating leverage.

         (b)   Degree of Financial leverage.

         (c)   Degree of Combined leverage.

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

Solution

Working Notes:

Total Assets   = ₹ 6,00,000

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

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

Computation of Profits after Tax (PAT)

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

(i)   **(a)   Degree of Operating Leverage**

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

(b)   Degree of Financial Leverage

$$= \frac{\text{EBIT}}{\text{EBT}} = \frac{₹\,9,60,000}{₹\,7,60,000} = 1.033 \text{ (approx.)}$$

(c)   Degree of Combined Leverage

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

$$= \frac{₹\,9,60,000}{₹\,7,60,000} = 1.304 \text{ (approx.)}$$

Or

$$= \text{DOL} \times \text{DFL} = 1.263 \times 1.033 = 1.304 \text{ (approx.)}$$

(ii)   **(a)   If EPS is Re. 1**

$$\text{EPS} = \frac{(\text{EBIT} - \text{Interest})(1 - \text{tax})}{\text{No of equity shares}}$$

$$\text{Or, } 1 = \frac{(\text{EBIT} - ₹\,24,000)(1 - 0.30)}{18,000}$$

Or, EBIT = ₹ 49,714 (approx.)

(b)   If EPS is ₹ 2

$$2 = \frac{(\text{EBIT} - ₹\,24,000)(1 - 0.30)}{18,000}$$

Or, EBIT = ₹ 75,429 (approx.)

(c)   If EPS is ₹ 0

$$0 = \frac{(\text{EBIT} - ₹\,24,000)(1 - 0.30)}{18,000}$$

Or, EBIT = ₹ 24,000

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

Question 6 (Vault Q. 37)   **(RTP May 25)**

Details of Kshitij Limited are given below for the year ended 31st March 2025 –

Particulars	Details
Sales	₹ 180 lakhs
Fixed Cost (Excl Interest)	₹ 45 lakhs
B.E.P Sales	₹ 120 lakhs
Equity Share Capital of ₹ 100 Each	₹ 150 lakhs
Income Tax Rate	25%
Cost Of Debt (Kd)	9%
Debt	₹ 90 lakhs

Required to CALCULATE -

(A)   Operating, Financial, Combined Leverage & P/V Ratio

(B)   Return on Capital Employed and EPS

(C)   Does Kshitij Limited have favorable Financial Leverage?

(D)   % Change in EPS, if EBIT increases or decreases by 15%

(E)   At what level of Sales, the EBT of the firm will be equal to zero

(F)   At what level of Sales, the PAT will be equal to 3/4th of its current value.

Solution

Particular		Amount (₹)
Sales		180 lakhs
Contribution (180 x 37.5%)	WN – 1	67.50 lakhs
(-) Fixed Cost		(45.00) lakhs
EBIT		22.50 lakhs
(-) Interest Exp	WN – 2	(10.80) lakhs
EBT		11.70 lakhs
(-) Tax @ 25%		(2.925) lakhs
EAT		8.775 lakhs
No of Equity Shares		1.50 lakhs
EPS		₹ 5.85

(A)   Calculation of OL, FL, CL & P/V Ratio

   WN 1 – Calculation of P/V Ratio

   $\text{B.E.P Sales} = \dfrac{\text{Fixed Cost}}{\text{PV Ratio}}$, So PV Ratio = 45 / 120 = 37.5%

   WN 2 – Calculation of Interest Exp

   Kd   = Interest (1 – t)

   9   = Interest (1 – 0.25)

   Interest = 12%

   Interest Exp = 90 Lakhs x 12% = ₹ 10.8

$$\text{OL} \quad = \frac{1}{\text{Margin of Safety (MOS)}}$$

$$\text{MOS} \quad = \frac{\text{Actual Sales-BEP Sales}}{\text{Actual Sales}} = 60 \ / \ 180 = 0.3333$$

$$\text{OL} \quad = \frac{1}{0.33333} = 3$$

    OR

$$\text{OL} \quad = \frac{\text{Contribution}}{\text{EBIT}} = 67.50 \ / \ 22.50 = 3$$

$$\text{FL} \quad = \frac{\text{EBIT}}{\text{EBT}} = 22.50 \ / \ 11.70 = 1.9231$$

$$\text{CL} \quad = \text{OL} \times \text{FL} = 3 \times 1.9231 = 5.7693$$

(B)   ROCE & EPS

   EPS   = ₹ 5.85 (From income statement above)

$$\text{ROCE} \quad = \frac{\text{EBIT}}{\text{Capital Employed}} = \frac{22.50}{240} = 9.375\%$$

   Capital Employed = Equity + Debt = 150 + 90 = 240 lakhs

(C)   Since ROCE = 9.375% < Interest (12%), Kshitij Limited doesn't have a favorable financial leverage.

(D)   Financial leverage measures the relationship for % change in EPS due to changes in EBIT

$$\text{FL} \quad = \frac{\% \text{ change in EPS}}{\% \text{ change in EBIT}}$$

$$1.9231 \quad = \frac{\% \text{ change in EPS}}{15}$$

$$= 28.8465\%$$

   Therefore, EPS will increase or decrease by 28.8465%, if EBIT increases or decreases by 15%

(E)   Since the combined Leverage is 5.7693, sales have to drop by 100/5.7693 i.e. 17.33% to bring EBT to Zero

   Accordingly, New Sales = ₹ 180 Lacs × (1 - 0.1733)

                 = ₹ 180 Lacs × 0.8267 = ₹ 148.806 Lacs (approx)

   Hence at ₹ 148.806 Lacs sales level EBT of the firm will be equal to Zero.

(E)   Current PAT   = 8.775 lakhs

   3/4th of current PAT   = 6.58125 lakhs

   So, it means PAT decreases by 25%

   Combined leverage measures the relationship for % change in PAT due to changes in sales

$$\text{CL} \quad = \frac{\% \text{ change in PAT}}{\% \text{ change in Sales}}$$

$$5.7693 \quad = \frac{25}{\% \text{ change in Sales}}$$

   % Change in Sales   = 4.333%

   New Sales level   = 180 lakhs - 4.33%

New Sales level   =₹172.20 Lakhs

Question 7 (Vault Q. 43)   **(RTP Sep 24)**

Following data of PC Ltd. under Situations 1, 2 and 3 and Financial Plan A and B is given:

Installed Capacity (units)	3,600
Actual Production and Sales (units)	2,400
Selling price per unit (₹)	30
Variable cost per unit (₹)	20
Fixed Costs (₹): Situation 1	3,000
Situation 2	6,000
Situation 3	9,000

Capital Structure:

Particulars	Financial Plan	
	A	**B**
Equity	₹ 15,000	₹ 22,500
Debt	₹ 15,000	₹ 7,500
Cost of Debt	12%	12%

Required:

(i)   CALCULATE the operating leverage and financial leverage.

(ii)   FIND out the combinations of operating and financial leverage which give the highest value and the least value.

Solution

(i)   Operating Leverage

	Situation 1 (₹)	Situation 2 (₹)	Situation 3 (₹)
Sales (S) (2,400 units @ ₹ 30 per unit)	72,000	72,000	72,000
Less: Variable Cost (VC) @ ₹ 20 per unit	48,000	48,000	48,000
Contribution (C)	24,000	24,000	24,000
Less: Fixed Cost (FC)	3,000	6,000	9,000
EBIT	21,000	18,000	15,000
Operating Leverage $= \dfrac{C}{EBIT}$	$\dfrac{₹24,000}{₹21,000}$ = 1.14	$\dfrac{₹24,000}{₹18,000}$ = 1.33	$\dfrac{₹24,000}{₹15,000}$ = 1.60

Financial Leverage

	Financial Plan	
	A (₹)	B (₹)
Situation 1		
EBIT	21,000	21,000
Less: Interest on debt	1,800 (₹ 15,000 × 12%)	900 (₹ 7,500 × 12%)
EBT	19,200	20,100
Financial Leverage = $\dfrac{\text{EBIT}}{\text{EBT}}$	$\dfrac{₹\,21,000}{₹\,19,200} = 1.09$	$\dfrac{₹\,21,000}{₹\,20,100} = 1.04$
Situation 2		
EBIT	18,000	18,000
Less: Interest on debt	1,800	900
EBT	16,200	17,100
Financial Leverage = $\dfrac{\text{EBIT}}{\text{EBT}}$	$\dfrac{₹\,18,000}{₹\,16,200} = 1.11$	$\dfrac{₹\,18,000}{₹\,17,100} = 1.05$
Situation 3		
EBIT	15,000	15,000
Less: Interest on debt	1,800	900
EBT	13,200	14,100
Financial Leverage = $\dfrac{\text{EBIT}}{\text{EBT}}$	$\dfrac{₹\,15,000}{₹\,13,200} = 1.14$	$\dfrac{₹\,15,000}{₹\,14,100} = 1.06$

(ii)   Combined Leverages

CL = OL × FL

		Financial Plan	
		A (₹)	B (₹)
(a)	Situation 1	1.14 × 1.09 = 1.24	1.14 × 1.04 = 1.19
(b)	Situation 2	1.33 × 1.11 = 1.48	1.33 × 1.05 = 1.40
(c)	Situation 3	1.60 × 1.14 = 1.82	1.60 × 1.06 = 1.70

The above calculations suggest that the highest value is in Situation 3 financed by Financial Plan A and the lowest value is in the Situation 1 financed by Financial Plan B.

Chapter 2 – Cost of Capital

➤ Cost of Debentures

Question 1 (Vault Q. 6) **[MTP 2 May 21 – 3 Marks]**

Development Finance Corporation issued zero interest deep discount bonds of face value of Rs. 1,50,000 each issued at Rs. 3,750 & repayable after 25 years. COMPUTE the cost of debt if there is no corporate tax.

Solution

Here, Redemption Value (RV) = Rs.1,50,000

Net Proceeds (NP) = Rs. 3,750

Interest = 0

Life of bond = 25 years

Using trial & error method:

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

$1,50,000 = 3,750 \times (1 + r)^{25}$

$40 = (1 + r)^{25}$

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

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

Here:

L = 15%; H = 16%

$NPV_L = 32.919 - 40 = -7.081$

$NPV_H = 40.874 - 40 = +0.874$

$$IRR = L + \frac{NPV_L}{NPV_L - NPV_H}(H - L) = 15\% + \frac{-7.081}{-7.081 - (0.874)} \times (16\% - 15\%) = \mathbf{15.89\%}$$

Question 2 (Vault Q. 7) **[ICAI SM]**

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

Solution

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

First year: (₹5,000 × 0.08)   = ₹ 400;

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

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

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

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

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

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

First year: ₹1,000 + ₹ 400   = ₹1,400;

Second year: ₹1,000 + ₹ 320   = ₹1,320;

Third year: ₹1,000 + ₹ 240   = ₹1,240;

Fourth year: ₹1,000 + ₹ 160   = ₹1,160; and

Fifth year: ₹1,000 + ₹80   = ₹ 1,080

The above cash flows of all five years will be discounted with the cost of capital.

Here, cost of capital will be the minimum expected rate of return of investor i.e. 6%.

Value of the bond is calculated as follows:

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

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

$$= ₹\,1.320.75 + ₹\,1.174.80 + ₹\,1.041.14 + ₹\,918.88 + ₹\,807.05 = ₹\,5,262.62$$

➢ Cost of Equity

Question 3 (Vault Q. 15)   [ICAI SM]

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

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

Solution

Yield for last 4 years:

$1 + Y_1 = \frac{D_1 + P_1}{P_0}$

$1 + Y_2 = \frac{D_2 + P_2}{P_1} = \frac{1 + 11.50}{9.75} = 1.2821$

$1 + Y_3 = \frac{D_3 + P_3}{P_2} = \frac{1.2 + 11}{11.5} = 1.0609$

$1 + Y_4 = \frac{D_4 + P_4}{P_3} = \frac{1.25 + 10.60}{11} = 1.0772$

Geometric mean:

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

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

➢ Combination of Multiple Sources

Question 4 (Vault Q. 21)   [ICAI SM]

A company issues:

• 15% convertible debentures of ₹ 100 each at par with a maturity period of 6 years. On maturity, each debenture will be converted into 2 equity shares of the company. The risk-free rate of return is 10%,

market risk premium is 18% and beta of the company is 1.25. The company has paid dividend of ₹ 12.76 per share. Five years ago, it paid dividend of ₹ 10 per share. Flotation cost is 5% of issue amount.

• 5% preference shares of ₹ 100 each at premium of 10%. These shares are redeemable after 10 years at par. Flotation cost is 6% of issue amount.

Assuming corporate tax rate is 40%.

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

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

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

Rate	1%	2%	3%	4%	5%	6%	7%	8%	9%
FVIF $_{i, 5}$	1.051	1.104	1.159	1.217	1.276	1.338	1.403	1.469	1.539
FVIF $_{i, 6}$	1.062	1.126	1.194	1.265	1.340	1.419	1.501	1.587	1.677

Solution

(i)   Calculation of Cost of Convertible Debentures:

Given that,

R_F = 10%, $R_m - R_f$ = 18%, β = 1.25, D_0 = 12.76, D_5 = 10

Flotation Cost = 5%

Using CAPM,

$K_e = R_f + \beta (R_m - R_f) = 10\% + 1.25 (18\%) = 32.50\%$

Calculation of growth rate in dividend

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

$1.276 = (1+g)^5$

$(1 + 0.05)^5 = 1.276$. Thus, from FV Table, g = 5%

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

$P_6 = \dfrac{12.76 \times 1.407}{0.275} = 65.28$

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

NP   = 95; n = 6

$K_d = \dfrac{I(1 - t) + \frac{(RV - NP)}{n}}{\frac{(RV - NP)}{2}} \times 100 = \dfrac{15(1 - 0.4) + \left(\frac{130.56 - 95}{6}\right)}{\frac{(130.56 + 95)}{2}} \times 100 = \dfrac{9 + 5.93}{112.75} \times 100$

K_d = 13.24%

(ii)   Calculation of Cost of Preference Shares:

Net Proceeds = 100 (1.1) – 6% of 100 (1.1) = 110 – 6.60 = 103.40

Redemption Value = 100

Year	Cash flows	PVF @ 3%	Present Value	PVF @ 5%	Present Value
0	103.40	1	103.40	1	103.40
1-10	-5	8.530	-42.65	7.722	-38.61

10	-100	0.744	-74.40	0.614	-61.40
			-13.65		**3.39**

$$K_p = 3\% + \frac{-13.65}{-13.65 - (3.39)} \times (5\% - 3\%) = 3\% + \frac{13.65}{17.04} \times 2\% = 4.60\%$$

Question 5 (Vault Q. 23)   **[May 24 – 6 Marks]**

The capital structure of Shine Ltd. as on 31.03.2024 is as under:

Particulars	Amount (₹)
Equity share capital of ₹ 10 each	45,00,000
15% Preference share capital of ₹ 100 each	36,00,000
Retained earnings	32,00,000
13% Convertible Debenture of ₹ 100 each	67,00,000
11% Term Loan	20,00,000
Total	2,00,00,000

Additional information:

(A)   Company issued 13% Convertible Debentures of ₹ 100 each on 01.04.2023 with a maturity period of 6 years. At maturity, the debenture holders will have an option to convert the debentures into equity shares of the company in the ratio of 1 : 4 (4 shares for each debenture). The market price of the equity share is ₹ 25 each as on 31.03.2024 and the growth rate of the share is 6% per annum.

(B)   Preference stock, redeemable after eight years, is currently selling at ₹ 150 per share.

(C)   The prevailing default-risk free interest rate on 10-year GOI treasury bonds is 6%. The average market risk premium is 8% and the Beta (β) of the company is 1.54.

Corporate tax rate is 25% and rate of personal income tax is 20%.

You are required to calculate the cost of:

(i)   Equity Share Capital

(ii)   Preference Share Capital

(iii)   Convertible Debenture

(iv)   Retained Earnings

(v)   Term Loan

Solution

(i)   Cost of Equity Share capital

As per CAPM Model K_e = $R_f + \beta (R_m - R_f)$

Rf = 6% ; β = 1.54; Rm-Rf = 8%

Ke = 6% +1.54 (8%)

Ke = **18.32%**

(ii)   Cost of Preference Share Capital

N	= 8
Net Proceeds (NP)	= 150
Redemption Value (RV)	= 100
Preference Dividend (PD)	= 15

$$K_p = \frac{PD + \dfrac{(RV - NP)}{n}}{\dfrac{(RV + NP)}{2}} = \frac{15 + \left(\dfrac{100 - 150}{8}\right)}{\left(\dfrac{100 + 150}{2}\right)} = \textbf{7\%}$$

(iii)   Cost of convertible debenture

Cash Redemption Value (RV)   = 100

Share Redemption Value (RV):

Value of share after 5 years   = 25 × (1.06)^5 = 33.46

Share Redemption Value (RV)   = 33.46 × 4   = 133.82

Therefore, investor will choose share redemption.

Redemption Value (RV)   = 133.82

Net Proceeds (NP)   = 100

n   = 5

Interest (I)   = 13

Tax (t)   = 25%

$$K_d = \frac{I(1 - t) + \dfrac{(RV - NP)}{n}}{\dfrac{(RV + NP)}{2}} = \frac{13(1 - 0.25) + \dfrac{(133.82 - 100)}{5}}{\dfrac{(133.82 + 100)}{2}} = \textbf{14.13\%}$$

(iv)   Cost of Retained Earnings

$K_r = K_e (1 - t_p) = 18.32\% \times (1 - 0.20) = \textbf{14.66\%}$

We can also take cost of equity as cost of retained earnings,

Accordingly, $K_r = K_e = \textbf{18.32\%}$

(v)   Cost of Term Loan

= 11% x (1 - 0.25) = **8.25%**

➢ WACC (without new capital)

Question 6 (Vault Q. 36)   **[RTP Jan 25]**

The Capital Structure of Samyaktva Limited is as follows:

Sources	Amount (in ₹)
12% Debentures	3,50,000
14% Pref. Shares	4,50,000
Equity shares (Face value of ₹ 10 each)	8,50,000
	16,50,000

Additional Information:

1.   ₹ 100 per debentures redeemable at premium of 6% with floatation cost of 5% & 5 years of maturity. The current market price of the debenture is ₹ 115

2.   ₹ 100 per preference shares redeemable at a premium of 10%, issued at discount of 2% with a floatation cost of 5% on the issue price. The current market price per preference share is ₹ 108. It has maturity of 10 years

3.   An equity share has a floatation cost of ₹ 5 with a market price per share currently quoted at ₹ 30.

Samyaktva Limited paid a last dividend of ₹ 4 and the company is expected to give an annual growth rate of 9% on the dividends. The company has a practice of paying all the earnings in the form of dividends.

4.   Corporate Taxation rate is at 25%

CALCULATE WACC using market value weights

Solution

WN 1: Calculation of Cost of Debt

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

RV   = 100 + 6% = 106

n   = term = 5 years

t   = tax = 0.25

NP   = Issue Price – Floatation cost

        = 115 – 5% (Issue price will be at Market price and not Face Value)

        = 109.25

$$Kd = \frac{12(1 - 0.25) + \frac{(106 - 109.25)}{5}}{\frac{(106 + 109.25)}{2}} = \mathbf{7.76\%}$$

WN 2: Calculation of Cost of Preference Shares

$$Kp = \frac{PD + \frac{(RV - NP)}{n}}{\frac{(RV + NP)}{2}}$$

RV   = 100 + 10% = 110

n   = term = 10 years

NP   = Issue Price – Floatation cost

Issue Price   = (108 – 2%) = 105.84

Net Proceeds   = 105.84 (-) 5% = 100.55

$$Kp = \frac{14 + \frac{(110 - 100.55)}{10}}{\frac{(110 + 100.55)}{2}} = \mathbf{14.19\%}$$

WN 3: Calculation of Cost of Equity

Since growth rate is given, Ke is to be calculated by using Gordon's formula

As per Gordon, Ke = $\frac{D_1}{P_0}$ + g

Where, D1   = Expected dividend at the end of Year 1

        Po   = Current Market Price (–) Floatation cost

        G   = growth rate in dividends

$Ke = \dfrac{4 \times 1.09}{30 - 5} + 0.09 = \textbf{26.44\%}$

Calculation of WACC using Market Value Weights

Source of Capital	Amount (₹)	Weights	Cost (%)	WACC (Ko)
Debentures (3,500 x 115)	4,02,500	0.1171	7.76 (WN1)	0.9087
Preference shares (4,500 x 108)	4,86,000	0.1413	14.19 (WN2)	2.00
Equity shares (85,000 x 30)	25,50,000	0.7416	26.44 (WN3)	19.6079
Total	34,38,500			Ko = **22.52%**

Question 7 (Vault Q. 37)   [ICAI SM]

DETERMINE the cost of capital of Best Luck Limited using the book value (BV) and market value (MV) weights from the following information:

Sources	Book Value (₹)	Market Value (₹)
Equity shares	1,20,00,000	2,00,00,000
Retained earnings	30,00,000	-
Preference shares	36,00,000	33,75,000
Debentures	9,00,000	10,40,000

Additional information:

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

II.   Dividend: During the previous 5 years, dividends have steadily increased from ₹ 10.60 to ₹ 14.19 per share. Dividend at the end of the current year is expected to be ₹ 15 per share.

III.   Preference shares: 15% Preference shares with face value of ₹ 100 would realise ₹105 per share.

IV.   Debentures: The company proposes to issue 11-year 15% debentures but the yield on debentures of similar maturity and risk class is 16%; flotation cost is 2%.

V.   Tax: Corporate tax rate is 35%. Ignore dividend tax.

        Floatation cost would be calculated on face value.

Solution

(i)   ***Cost of Equity (Ke)*** $= \dfrac{D_1}{P_0 - F} + g = \dfrac{15}{125 - 5} + 0.06^* = 0.125 + 0.06 = 0.185 = 18.5\%$

        Calculation of g:

        $10.6 (1 + g)^5 = 14.19$ or $(1+g)^5 = \dfrac{14.19}{10.6} = 1.338$

        Table (FVIF) suggests that ₹1 compounds to ₹1.338 in 5 years at the compound rate of 6 percent. Therefore, g is 6 %

(ii)   ***Cost of Retained Earnings (Kr)*** $= \dfrac{D_1}{P_0} + g = \dfrac{15}{125} + 0.06 = 0.18$

(iii)   ***Cost of Preference Shares (Kp)*** $= \dfrac{PD}{P_0} = \dfrac{15}{105} = 0.1429$

(iv) **Cost of Debentures (Kd)** $= \dfrac{I(1-t) + \left(\frac{RV - NP}{n}\right)}{\frac{RV + NP}{2}} = \dfrac{15(1-0.35) + \frac{(100 - 91.75^*)}{11}}{\frac{100 + 91.75^*}{2}}$

$$= \dfrac{(15 \times 0.65) + 0.75}{95.875} = \dfrac{10.5}{95.875} = 0.1095$$

*Since yield on similar type of debentures is 16 per cent, the company would be required to offer debentures at discount.

Market price of debentures (approximation method) = 15 ÷ 0.16 = 93.75

Sale proceeds from debentures = 93.75 – 2 (i.e., floatation cost) = 91.75

(Alternatively, market value (P_0) of debentures can also be found out using the present value method:

P_0 = Annual Interest × PVIFA (16%, 11 years) + Redemption value × PVIF (16%, 11 years)

P_0 = (15 × 5.029) + (100 × 0.195)

P_0 = 75.435 + 19.5 = 94.935

Net Proceeds = 94.935 – 2% of 100 = 92.935

Accordingly, the cost of debt can be calculated)

Total Cost of capital [BV weights and MV weights]

Amount in ₹ Lacs

Source of capital	Weights		Specific Cost (K)	Total cost	
	BV	MV		(BV × K)	(MV × K)
Equity Shares	120	160*	0.1850	22.2	29.6
Retained Earnings	30	40*	0.1800	5.4	7.2
Preference Shares	36	33.75	0.1429	5.14	4.82
Debentures	9	10.4	0.1095	0.986	1.139
Total	195	244.15		33.73	42.76

*Market Value of equity has been apportioned in the ratio of Book Value of equity and retained earnings i.e., 120:30 or 4:1.

Weighted Average Cost of Capital (WACC):

Using Book Value $= \dfrac{33.73}{195} = 0.1729$ or 17.29%

Using Market Value $= \dfrac{42.76}{244.15} = 0.1751$ OR 17.51%

➢ WACC (with new fund raise)

Question 8 (Vault Q. 46)   **[Nov 23 – 10 Marks]**

Z Ltd. wishes to raise additional fund of ₹ 25,00,000 for meeting its investment plan. It has ₹ 5,25,000 in the form of retained earnings available for investment purposes. Further details are as following:

Combination of debt and equity   2:3

Cost of debt

    Upto ₹ 2,50,000   8% (before tax)

    Above ₹ 2,50,000 and upto ₹ 5,00,000   10% (before tax)

    Beyond ₹ 5,00,000   12% (after tax)

Earning of company   ₹ 50,00,000

Retention Ratio	40%
Expected growth of dividend	15%
Market price per share	₹ 500
Number of outstanding equity shares	1,00,000
Tax Rate	30%

You are required to calculate:

i.   Cost of debt

ii.   Cost of retained earnings and cost of equity

iii.   Weighted average cost of capital

Solution

| Equity | 60% of ₹ 25,00,000 | = ₹ 15,00,000 |
| Debt | 40% of ₹ 25,00,000 | = ₹ 10,00,000 |

The capital structure after raising additional finance:

Sources		(₹)
Shareholders' funds		
Equity Capital	(₹ 15,00,000 – ₹ 5,25,000)	9,75,000
Retained earnings		5,25,000
Debt (Interest at 8% p.a.)		2,50,000
(Interest at 10% p.a.)	(₹ 5,00,000 – ₹ 2,50,000)	2,50,000
(Interest at 12% p.a.)	(₹ 10,00,000 – ₹ 5,00,000)	5,00,000
Total Funds		25,00,000

(i)   Determination of post-tax average cost of additional debt:

$K_d = I (1 - t)$

Where,

     I = Interest Rate

     t = tax-rate

On ₹ 2,50,000	= 8% (1 – 0.3)	= 5.6% or 0.056
On ₹ 2,50,000	= 10% (1 – 0.3)	= 7% or 0.07
On ₹ 5,00,000	= 12% or 0.12	

Average Cost of Debt

$$= \frac{(₹\,2,50,000 \times 0.056) + (₹\,2,50,000 \times 0.07) + (₹\,5,00,000 \times 0.12)}{₹\,10,00,000} \times 100 = 9.15\%$$

(ii)   Determination of cost of retained earnings and cost of equity by applying Dividend growth model:

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

Where,

   D_0 = Dividend paid = 60% of EPS = 60% x ₹ 50 = ₹ 30

G   = Growth rate = 15%

P₀   = Current market price per share = ₹ 500

So, **Kₑ or Kᵣ** = $\dfrac{₹30(1+0.15)}{₹500}$ + 0.15 = 0.069 + 0.15 = 21.9%

(iii)   Computation of overall weighted average after tax cost of additional finance:

Source	Amount (₹)	Weight	Cost (%)	WACC (%)
Equity (including retained earnings)	15,00,000	0.60	21.9%	13.14
Debt	10,00,000	0.40	9.15%	3.66
WACC	25,00,000			**16.80**

Alternative Presentation

Particulars	Amount (₹)	Cost (%)	Total Cost
Equity (including retained earnings)	15,00,000	21.9%	3,28,500
Debt	10,00,000	9.15%	91,500
Total	25,00,000		4,20,000

WACC = (Product / Total book value) x 100 = (4,20,000 / 25,00,000) x 100 = **16.8%**

➢ Marginal Cost of Capital

Question 9 (Edge Q. 10, Similar Vault Q. 50)   **[RTP May 24]**

Totto Ltd. has following capital structure as on 31st December 2023, which is considered to be optimum:

	(₹)
12% Debenture	4,50,000
10% Preference share capital	1,50,000
Equity shares capital (2,00,000 shares)	24,00,000

The company's share has a current market price of ₹ 30.25 per share. The expected dividend per share in next year is 50 percent of the 2023 EPS. The EPS of last 10 years is as follows. The past trends are expected to continue:

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
EPS (₹)	1.180	1.311	1.456	1.616	1.794	1.99	2.209	2.452	2.723	3.023

The company can issue 14 percent new debenture and 12 percent new preference share. The company's debenture is currently selling at ₹ 99. The new preference issue can be sold at a net price of ₹ 9.90, paying a dividend of ₹ 1.25 per share. The company's marginal tax rate is 50%.

(i)   CALCULATE the after-tax cost (a) of new debts and new preference share capital, (b) of ordinary equity, assuming new equity comes from retained earnings.

(ii)   CALCULATE the marginal cost of capital for the new funds raised.

(iii)   How much can be spent for capital investment before new ordinary share must be sold? Marginal cost of capital remains to be constant. (Assuming that retained earnings available for next year's investment is 50% of 2023 earnings.)

(iv)   What will be marginal cost of capital (cost of fund raised in excess of the amount calculated in part (iii) if the company can sell new ordinary shares of ₹ 22 per share? Assuming both the cost of debt and of preference share capital to be constant.

Solution

(i)   Calculation of after-tax cost of the following:

(a)   New 14% Debentures (K$_d$) $= \dfrac{I(1-t)}{NP} = \dfrac{₹14(1-0.5)}{₹99} = 0.0707$ or 7.07%

New 12% Preference Shares (K$_p$) $= \dfrac{PD}{NP} = \dfrac{₹1.25}{₹9.90} = 0.1263$ or 12.63%

Where,

I = Interest; t = Tax rate; PD = Preference dividend; NP = Net proceeds

(b)   Equity Shares (Retained Earnings) (K$_e$)

$= \dfrac{\text{Expected dividend}(D_1)}{\text{Current market price}(P_0)} + \text{Growth rate}(G)$

$= \dfrac{50\% \text{ of } ₹3.023}{₹30.25} + 0.11^* = 0.16 \text{ or } 16\%$

* Growth rate (on the basis of EPS) is calculated as below :

$\dfrac{\text{EPS in current year} - \text{EPS in previous year}}{\text{EPS in previous year}} = \dfrac{₹3.023 - ₹2.723}{₹2.723} = 0.11$ or 11% approx.

(Students may verify the growth trend by applying the above formula to last three or four years. Growth Rate is rounded off)

(ii)   Calculation of marginal cost of capital (on the basis of existing capital structure)

Sources	Weights	Cost (%)	WACC (%)
14% Debenture	0.15	7.07	1.0605
12% Preference shares	0.05	12.63	0.6315
Equity shares	0.80	16.00	12.800
Total	1		**14.492**

(iii)   The company can spend for capital investment before issuing new equity shares and without increasing its marginal cost of capital:

Retained earnings can be available for capital investment

= 50% of 2023 EPS × equity shares outstanding

= 50% of ₹ 3.023 × 2,00,000 shares = ₹3,02,300

Since, marginal cost of capital is to be maintained at the current level i.e. 14.492%, the retained earnings should be equal to 80% of total additional capital for investment.

Thus, investment before issuing equity $\left(\dfrac{₹3,02,300}{80} \times 100 \right)$ = ₹ 3,77,875

The remaining capital of ₹ 75,575 i.e. ₹ 3,77,875 – ₹ 3,02,300 shall be financed by issuing 14% Debenture and 12% preference shares in the ratio of 3 : 1 respectively.

(iv)   If the company spends more than ₹ 3,77,875 as calculated in part (iii) above, it will have to issue new shares at ₹ 22 per share.

The cost of new issue of equity shares will be:

$$K_e = \frac{\text{Expected dividend}(D_1)}{\text{Current market price}(P_0)} + \text{Growth rate}(g) = \frac{50\% \text{ of } ₹ 3.023}{₹ 22} + 0.11 = 0.1787 \text{ or } 17.87\%$$

Calculation of marginal cost of capital (assuming the existing capital structure will be maintained):

Sources	Weights	Cost (%)	WACC (%)
14% Debenture	0.15	7.07	1.0605
12% Preference shares	0.05	12.63	0.6315
Equity shares	0.80	17.87	14.296
Total			**15.988**

➢ Miscellaneous

Question 10 (Vault Q. 53)   **[MTP 1 Sep 24 – 5 Marks]**

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	K_d	K_e
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.

Solution

(i)   **Calculation of slab wise Overall Cost of Capital**

Project Cost	Capital Source	Weights (w)	Cost (k)	WACC (w × k)
Upto 5 Lakhs	Debt	0.3	10	3
	Equity	0.7	12	8.4
	Total		K_o	**11.4**

Above 5 lakhs upto 10 lakhs	Debt	0.3	12	3.6
	Equity	0.7	13.5	9.45
	Total		K_o	**13.05**
Above 10 lakhs upto 20 lakhs	Debt	0.3	13	3.9
	Equity	0.7	15	10.5
	Total		K_o	**14.4**
Above 20 lakhs	Debt	0.3	14	4.2
	Equity	0.7	16	11.2
	Total		K_o	**15.4**

Cost of Raising funds for Project I

Total Capital	K_o (%)	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	K_o (%)	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 (%) = 3,58,650 / 26,00,000 × 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 Intrapolation)

At 15 Lakhs K_o = 12.95%

At 26 Lakhs K_o = 13.79%

By intrapolation, maximum value of Project at 13% will be

15 Lakhs + {(0.05 x 11)/0.84} = **15.6548 lakhs**

Question 11 (Vault Q. 54)   **[Modified RTP May 25]**

Paramhans Limited has a capital structure that consists of Equity share capital, Reserves & Surplus, Bank term

loan, Debentures which are redeemable at a premium of 5% and Preference share capital redeemable at premium of 5%. The coupon rate on debentures is 1.5 times of that of bank term loan coupon rate whereas the preference dividend rate is 1.5 times of debentures' interest rate. Tenure for the bank term loan, debentures and preference share capital is 3 years, 5 years and 7 years respectively.

The current book value of the capital structure is as follows –

Particulars	Amount (₹)
Equity Share Capital (FV = ₹ 100)	25,00,000
Reserves And Surplus	10,00,000
Bank Term Loan	10,00,000
Debentures (FV = ₹ 100)	15,00,000
Preference Share Capital (FV = ₹ 100)	20,00,000
TOTAL	**80,00,000**

Tax rate applicable to the company is 25%.

Debentures are currently selling at a price of ₹ 96 whereas Preference shares are currently selling at ₹ 102. The equity shares of the company are quoted at ₹ 150 per share. The ongoing P/E ratio for the shares of Paramhans Limited is at 6.667 times. Paramhans Limited belongs to a risk class where the overall capitalization and discounting rate of the company is at 20%

CALCULATE –

(A)   Rate of Interest on Bank term Loan & Debentures

(B)   Rate of Preference dividend

Solution

(A)   **Calculation of Interest rate on Bank term Loan & Debentures**

Let the rate of interest on bank term loan be 'X'

Therefore, Rate of Interest on debentures = 1.5X

Rate of Preference dividend = 1.5 × 1.5X = 2.25X (1.5 times of debentures interest rate)

Now, lets calculate K_d (term loan), K_d (debentures), K_p (Pref. shares) & K_e

K_d (Term loan)   = Int (1 – t) = X × (1 – 0.25)

Kd (Term loan)   = 0.75X

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

Where, RV   = 100 + 5% = ₹ 105

NP   = Issue Price / Market price = ₹ 96

$$\textbf{Kd (Debentures)} = \frac{150X(1 - 0.25) + \frac{(105 - 96)}{5}}{\frac{(105 + 96)}{2}} = \frac{112.5X + 1.8}{100.5}$$

$$K_p = \frac{PD + \frac{(RV - NP)}{n}}{\frac{(RV + NP)}{2}}$$

RV	= 100 + 5% = ₹ 105	
NP	= Issue price / Market price = ₹ 102	

Therefore **Kp** $= \dfrac{225X + (105 - 102 / 7)}{(105 + 102) / 2} = \dfrac{225X + 0.4286}{103.5}$

Ke $= \dfrac{1}{PE\,Ratio} = \dfrac{1}{6.667} = $ **15%**

Kr = Ke = 15% (In absence of information on opportunity cost)

Overall Capitalization rate (Ko) = 20% (given)

Source of Capital	Amount (₹)	Weights (W)	Cost (K)	WACC (W × K)
Equity share capital	25,00,000	0.3125	15	4.6875
Reserves & surplus	10,00,000	0.1250	15	1.8750
Bank term loan	10,00,000	0.1250	0.75X	0.09375X
Debentures	15,00,000	0.1875	$\dfrac{112.5X + 1.8}{100.5}$	$\dfrac{21.094X + 0.3375}{100.5}$
Preference share capital	20,00,000	0.2500	$\dfrac{225X + 0.4286}{103.5}$	$\dfrac{56.25X + 0.1072}{103.5}$
Total	80,00,000	1.0000	**Ko /WACC**	**20%**

So, $20 = 4.6875 + 1.8750 + 0.09375X + \dfrac{21.094X + 0.3375}{100.5} + \dfrac{56.25X + 0.1072}{103.5}$

On solving the above equation,

$13.4375 = 0.09375X + \dfrac{(2183.2X + 34.931 + 5653.125X + 10.774)}{10,401.75}$

$1,39,773.52 = 975.16X + 2,183.2\,X + 5,653.125X + 45.705$

$1,39,727.815 = 8,811.485X$

X = Rate of Interest on Bank term Loan		= **15.86%**
Rate of Interest on Debentures	= 15.86 x 1.5	= **23.79%**
(B) Rate of Preference Dividend	= 15.86 x 2.25	= **35.68%**

Question 2 → Do this instead of Super 100 Q. 11 & Vault Q.54

w/ (a) Capital structure of B Ltd. for the year ended 31st March, 2025 are as follows:

Particulars	Amount (₹)
Equity share capital @ ₹10 each	14,00,000
10% Preference share capital @ ₹1,000 each	10,00,000
Debenture @ ₹100 each	9,60,000
Bank Loan	6,40,000

- Risk-free rate of return is 14%, Market rate of return is 19% and beta of company is 1.20.
- 10% Preference shares are redeemable at ₹ 1,065.40 after 3 years.
- Interest on bank loan is 1.30 times of interest on debentures. *(Rate)* *(Rate)*
- Debentures are redeemable at par after 5 years. Floatation cost is ₹ 4 per debenture.
- Tax rate is 30%.
- Cost of capital is 14%.

You are required to calculate the following:

(i) Cost of Equity.

(ii) Cost of preference share using YTM method.

✱ (iii) Post-tax cost of debenture using approximation method.

✱ (iv) Interest rate of bank loan.

PV factors @ 10% and 14%

Year	1	2	3	4
PVIF$_{0.10, t}$	0.909	0.826	0.751	0.683
PVIF$_{0.14, t}$	0.877	0.769	0.675	0.592

(1 + 2 + 3 + 2 = 8 Marks)

(i) K_e = R_f + $(R_m - R_f) \times \beta$ = 14% + (19% − 14%) × 1.2

= 20%.

(ii) K_p :

Year	CFs	PVF @ 10%	PV @ 10%	PVF @ 14%	PV @ 14%
0	1,000	1	1,000	1	1,000
1−3	(100)	2.486	(248.6)	2.321	(232.1)
3	(1,065.40)	0.751	(800.115)	0.675	(719.145)
			(48.715)		48.755

$$Kp = 10 + \frac{(48.715)}{(48.715) - 48.755} \times (14 - 10)$$

$$= 10 + \frac{(48.715)}{(98.47)} \times 4$$

$$= 11.999\% \quad or \quad 12\% \quad approx.$$

(iii)   Let int. rate on debentures be $x \rightarrow$ in decimal like 0.08 or 0.09

⇒) int.rate on bank loon $= 1.3x$

Now. Kd :   Int = $100x$

RV =   100 Rs

NP = $100 - 4$ FC = 96 Rs   (MP not given)

$n =$ 5 years.

$$Kd = \frac{100x \times (1 - 0.30) + \frac{(100 - 96)}{5}}{100 + \frac{96}{2}}$$

$$= \frac{70x + 0.8}{98}$$

Imp. Note: 1) If taking all costs in decimal in WACC Table
→ Take Kd as it is.

2) But if taking all costs in % in WACC Table
→ Multiply Kd by 100 first because $\frac{70x + 0.8}{98}$
represents a decimal number.
Thus Kd (%) = $\frac{(70x + 0.8)}{98} \times 100$

Also, $K_T = 1.3x \times (1-0.30) = 0.91x$

Imp. Note: 1) If taking all costs in decimal in WACC Table
$\rightarrow$ Take K_T as it is.

2) But if taking all costs in % in WACC Table
$\rightarrow$ Multiply K_T by 100 first because $0.91x$
represents a decimal number.
Thus $K_T(\%) = 0.91x \times 100 = 91x$

Now WACC:

Source	Amount	Weight	Alt 1 - Decimal		Alt 2 - %	
			Cost	WACC	Cost	WACC
E.S.C.	14,00,000	0.35	0.20	0.07	20	7
Pref.S.C.	10,00,000	0.25	0.12	0.03	12	3
Debentures	9,60,000	0.24	$\dfrac{70x+0.8}{98}$	$\dfrac{16.8x+0.192}{98}$	$\dfrac{(70x+0.8)\times 100}{98}$	$\dfrac{1680x+19.2}{98}$
Loan	$\dfrac{6,40,000}{40,00,000}$	$\dfrac{0.16}{1}$	$0.91x$	$\dfrac{0.1456x}{0.14}$	$91x$	$\dfrac{14.56x}{14}$

Decimal Approach

$0.07 + 0.03 + \dfrac{16.8x+0.192}{98} + 0.1456x = 0.14$

$\Rightarrow \dfrac{16.8x+0.192}{98} + 0.1456x = 0.04$

$\Rightarrow 16.8x + 0.192 + 14.2688x = 3.92$

$\Rightarrow x = 0.11999$ ie 11.999 %

or 12% approx

% approach.

$7 + 3 + \dfrac{1680x+19.2}{98} + 14.56x = 14$

$\Rightarrow \dfrac{1680x+19.2}{98} + 14.56x = 4$

$\Rightarrow 1680x + 19.2 + 1426.88x = 392$

$\Rightarrow x = 0.11999$ ie 11.999%

or 12% approx

$$\Rightarrow K_d = \frac{(70 \times 12\%) + 0.8}{98}$$

$$= 0.0939 \text{ ie } 9.39\% \text{ approx,}$$

(iv) Int. rate on Bank Loan

$$= 1.3 \times 12 = 15.6\%$$

(+) Do Q.52 from Vault in writing.

Chapter 3 – Investment Decisions

➢ Internal Rate of Return (IRR)

Question 1 (Vault Q. 25)   [May 16 – 8 Marks]

Given below are the data on a capital project 'C':

Cost of the project	₹ 2,28,400
Useful life	4 years
Profitability index	1.0417
Internal rate of return	15%
Salvage value	0

You are required to calculate:

(i)   Annual cash flow

(ii)   Cost of capital

(iii)   Net present value (NPV)

(iv)   Discounted payback period

Given the following table of discount factors:

Discount Factor	15%	14%	13%	12%
1 years	0.869	0.877	0.885	0.893
2 years	0.756	0.769	0.783	0.797
3 years	0.658	0.675	0.693	0.712
4 years	0.572	0.592	0.613	0.636

Solution

(i)   Annual Cash Flow:

At 15% IRR, the sum of PV total cash inflows = cost of the project i.e. initial cash outlay

Cost of the Project = ₹ 2,28,400 and Useful life = 4 years

Considering the discount factor table @ 15%, cumulative present value of cash inflows for 4 years is 2.855 (0.869 + 0.756 + 0.658 + 0.572)

So, Annual cash flow × 2.855 = ₹ 2,28,400

Hence, Annual Cash flow = $\dfrac{₹\,2,28,400}{2.855}$ = ₹ 80,000

(ii)   Cost of Capital:

Profitability index = $\dfrac{\text{Sum of Discounted Cash inflows}}{\text{Cost of the Project}}$

1.0417 = $\dfrac{\text{Sum of Discounted Cash inflows}}{₹\,2,28,400}$

Sum of Discounted Cash inflows = ₹ 2,28,400 × 1.0417 = ₹ 2,37,924.28

Since, Annual Cash Inflows = ₹ 80,000

Hence, cumulative discount factor for 4 years = $\dfrac{₹2,37,924.28}{80,000} = 2.974$

From the discount factor table, at discount rate of 13%, the cumulative discount factor for 4 years is 2.974 (0.885 + 0.783 + 0.693 + 0.613)

Hence, Cost of Capital = 13%

(iii) **Net Present Value (NPV):**

NPV   = Sum of Present Values of Cash inflows – Cost of the Project

= ₹ 2,37,924.28 – ₹ 2,28,400 = ₹ 9,524.28

Net Present Value = ₹ 9,524.28

Alternative

NPV = Cost of Project × (Profitability Index – 1)   = 2,28,400 × (1.0417 – 1) or 2,28,400 × 0.0417 = 9,524.28

(iv) **Discounted Payback Period:**

Year	Annual CFAT	PVF @ 13%	PV	Cumulative PV
1	80,000	0.885	70,800	70,800
2	80,000	0.783	62,640	1,33,440
3	80,000	0.693	55,440	1,88,880
4	80,000	0.613	49,040	2,37,920

Discounted Payback Period   = $3 + \dfrac{39,520}{49,040}$ = 3.8059 years

Or   = 3 years, 9 Months and 21 days

➤ **Modified Internal Rate of Return**

Question 2 (Vault Q. 30)   **(ICAI SM)**

An investment of ₹ 1,36,000 yields the following cash inflows (profits before depreciation but after tax).

Determine MIRR considering 8% as cost of capital.

Year	1	2	3	4	5	Total
₹	30,000	40,000	60,000	30,000	20,000	1,80,000

Solution

Calculation of Future Values of Cash Flows at the reinvestment rate (= cost of capital) of 8%:

Year	Cash flow (₹)	FVF @ 8%	Future Value (₹)
1	30,000	1.3605*	40,815
2	40,000	1.2597	50,388
3	60,000	1.1664	69,984
4	30,000	1.0800	32,400
5	20,000	1.0000	20,000

	2,13,587

* Year 1 CF will be reinvested for 4 years from Year 1 end till Year 5 end and thus its FV shall be at the factor of $(1.08)^4 = 1.3605$. CFs from Year 5 end will not be reinvested or reinvested for 0 year.

Now, $2,13,587 = 1,36,000 \times (1 + r)^5$

So, MIRR = r $= \sqrt[5]{\dfrac{2,13,587}{1,36,000}} - 1$

$= \sqrt[5]{1.5705} - 1 = 0.09 = \textbf{9\%}$

Alternatively, $2,13,587 \times$ PVF (r, 5th year) = 1,36,000 or PVF $= \dfrac{1,36,000}{2,13,587} = 0.6367$.

When we look at Year 5 factors in PVF table, this value lies at discount rate of 9%, thus MIRR is 9%

➤ Accounting Rate of Return

Question 3 (Vault Q. 34)   **(May 08 – 8 Marks)**

C Ltd. is considering investing in a project. The expected original investment in the project will be ₹ 2,00,000, the life of project will be 5 year with no salvage value. The expected profit after depreciation but before tax during the life of the project will be as following:

Year	1	2	3	4	5
₹	85,000	1,00,000	80,000	80,000	40,000

The project will be depreciated at the rate of 20% on original cost. The company is subjected to 30% tax rate.

Required:

(i)   Calculate payback period and average rate of return (ARR)

(ii)   Calculate net present value and net present value index, if cost of capital is 10%.

(iii)   Calculate internal rate of return.

Note: The P.V. factors are:

Year	P.V. at 10%	P.V. at 37%	P.V. at 38%	P.V. at 40%
1	.909	.730	.725	.714
2	.826	.533	.525	.510
3	.751	.389	.381	.364
4	.683	.284	.276	.260
5	.621	.207	.200	.186

Solution

Project Outflow = ₹ 2,00,000

Year	1	2	3	4	5	Average
	₹	₹	₹	₹	₹	
EBT	85,000	1,00,000	80,000	80,000	40,000	
Less: Tax (30 %)	25,500	30,000	24,000	24,000	12,000	

PAT	59,500	70,000	56,000	56,000	28,000	₹ 53,900
Add: Dep.	40,000	40,000	40,000	40,000	40,000	
CFAT	99,500	1,10,000	96,000	96,000	68,000	₹ 93,900

Year	1	2	3	4	5
Initial investment	2,00,000	1,60,000	1,20,000	80,000	40,000
Less: Depreciation	40,000	40,000	40,000	40,000	40,000
Closing investment	1,60,000	1,20,000	80,000	40,000	0

(i) **Calculation of payback period**

$$= 1 + \frac{1,00,500}{1,10,000} = 1.914 \text{ years}$$

(ii) **Calculation of ARR**

Method 1: ARR = Average of PAT / Initial Investment $= \dfrac{53,900}{2,00,000} = 26.95\%$

Method 2: ARR = Average of PAT / Average investment $= \dfrac{53,900}{1,00,000} = 53.90\%$

Average Investment = (2,00,000 + 0) / 2 = 1,00,000

Method 3: ARR = Average of Annual ARRs

Year	1	2	3	4	5	Average
PAT	59,500	70,000	56,000	56,000	28,000	
÷ Initial Investment	2,00,000	1,60,000	1,20,000	80,000	40,000	
ARR	29.75%	43.75%	46.67%	70%	70%	52.034%

Study Note: All 3 methods of ARR has been given only for preparation purpose, in exam you have to solve by any one of these methods.

(iii) **Calculation of Net Present Value @ 10%**

Year	1	2	3	4	5	Total
CFAT	99,500	1,10,000	96,000	96,000	68,000	
× PVF	0.909	0.826	0.751	0.683	0.621	
Present value	90,446	90,860	72,096	65,568	42,228	3,61,198

Net present value = ₹ 3,61,197.50 – ₹ 2,00,000 = ₹ 1,61,197.50

Net present value index $= \dfrac{\text{NPV}}{\text{PV of Cash Outflows}}$ = Rs. 1,61,197.50 / Rs. 2,00,000 = 0.81

(iv) **Calculation of IRR**

Present value factor-Initial investment / Average annual cash inflow 2,00,000 / 93,900 = 2.13

It lies in between 38 % and 40%

Years	CFAT (₹)	PVF 38%	PV (₹)	PVF 40%	PV (₹)
0	(2,00,000)	1	(2,00,000)	1	(2,00,000)
1	99,500	0.725	72,138	0.714	71,043
2	1,10,000	0.525	57,750	0.51	56,100
3	96,000	0.381	36,576	0.364	34,944
4	96,000	0.276	26,496	0.26	24,960
5	68,000	0.2	13,600	0.186	12,648
	NPV		+6,560	0.51	−305

$$\text{IRR} = 38 + \frac{6{,}560}{6{,}560 - (-305)} \times (40 - 38)$$

$$= 38 + \frac{6{,}560}{6{,}865} \times 2 = 39.91\%$$

➢ Detailed Cash Flow Calculations with various techniques

Question 4 (Vault Q. 41)   **[Nov 22 – 10 Marks]**

A hospital is considering to purchase a diagnostic machine costing ₹ 80,000. The projected life of the machine is 8 years and has an expected salvage value of ₹ 6,000 at the end of 8 years. The annual operating cost of the machine is ₹ 7,500. It is expected to generate revenues of ₹ 40,000 per year for 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.

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

Solution

Calculation of Incremental CFAT

Determination of Cash inflows	Situation I Commission Income before taxes	Situation II Commission Income after taxes
Sales Revenue	40,000	40,000
Less: Operating Cost	(7,500)	(7,500)
Less: Loss of Commission Income	(12,000)	-
	20,500	32,500
Less: Depreciation (80,000 − 6,000) ÷ 8	(9,250)	(9,250)

Earnings before tax	11,250	23,250
Tax @ 30%	(3,375)	(6,975)
EAT	7,875	16,275
Add: Depreciation	9,250	9,250
Earnings after tax	17,125	25,525
Less: Loss of Commission Income	-	(12,000)
Incremental CFAT	17,125	13,525

Study Note: The loss of Commission Income in Situation I can also be deducted after tax but for that you need to make the after tax as 12,000 × (1 – 0.3) = 8,400. EAT would remain 25,525 and Inc. CFAT would remain the same as 25,525 – 8,400 = 17,125

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

		Situation I [Commission Income before taxes]		Situation II [Commission Income after taxes]	
Year	**PVF @ 10%**	**CFs (₹)**	**PV (₹)**	**CFs (₹)**	**PV (₹)**
1 – 8	5.334	17,125	91,345	13,525	72,142
8	0.467	6,000	2,802	6,000	2,802
Total PV (A)			94,147		74,944
Less: Investment (B)			80,000		80,000
NPV (A – B)			14,147		–5,056
PI (A ÷ B)			1.18		0.94

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

Question 5 (Vault Q. 43)   **(ICAI SM)**

A large profit making company is considering the installation of a machine to process the waste produced by one of its existing manufacturing process to be converted into a marketable product. At present, the waste is removed by a contractor for disposal on payment by the company of ₹ 150 lakh per annum for the next four years. The contract can be terminated upon installation of the aforesaid machine on payment of a compensation of ₹ 90 lakh before the processing operation starts. This compensation is not allowed as deduction for tax purposes.

The machine required for carrying out the processing will cost ₹ 600 lakh. At the end of the 4th year, the machine can be sold for ₹ 60 lakh and the cost of dismantling and removal will be ₹ 45 lakh.

Sales and direct costs of the product emerging from waste processing for 4 years are estimated as under:

(₹ In lakh)

Year	1	2	3	4
Sales	966	966	1,254	1,254
Material consumption	90	120	255	255
Wages	225	225	255	300

Other expenses	120	135	162	210
Factory overheads	165	180	330	435
Depreciation (as per income tax rules)	150	114	84	63

Initial stock of materials required before commencement of the processing operations is ₹ 60 lakh at the start of year 1. The stock levels of materials to be maintained at the end of year 1, 2 and 3 will be ₹ 165 lakh and the stocks at the end of year 4 will be nil. The storage of materials will utilise space which would otherwise have been rented out for ₹ 30 lakh per annum. Labour costs include wages of 40 workers, whose transfer to this process will reduce idle time payments of ₹ 45 lakh in the year- 1 and ₹ 30 lakh in the year- 2. Factory overheads include apportionment of general factory overheads except to the extent of insurance charges of ₹ 90 lakh per annum payable on this venture. The company's tax rate is 30%.

Consider cost of capital @ 14%, the present value factors of which is given below for four years:

Year	1	2	3	4
PV 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.

Solution

Initial Cash Outflow

= Cost of Machine + WC Investment + Compensation

= 600 Lakhs + 60 Lakhs + 90 Lakhs = 750 Lakhs

Statement of Incremental CFAT   **(₹ in lakh)**

Year	1	2	3	4
Sales	966	966	1,254	1,254
Add: Savings in Contract Payment	150	150	150	150
Less: Material consumption	(90)	(120)	(255)	(255)
Less: Wages	(180)	(195)	(255)	(300)
Less: Other expenses	(120)	(135)	(162)	(210)
Less: Factory overheads (insurance only)	(90)	(90)	(90)	(90)
Less: Loss of rent on storage space	(30)	(30)	(30)	(30)
Less: Depreciation (as per income tax rules)	(150)	(114)	(84)	(63)
Incremental PBT	456	432	528	456
Less: Tax (30%)	136.8	129.6	158.4	136.8
Profit after Tax (PAT)	319.2	302.4	369.6	319.2
Add: Depreciation added back	150	114	84	63
Incremental CFAT	469.2	416.4	453.6	382.2
Investment in WC (165 – 160)	105	-	-	-
Net Incremental CFAT	364.2	416.4	453.6	382.2

Calculation of NPV   (₹ in lakh)

Year	Description	Cash flows	PVF @ 14%	Present Value
0	Initial Cash Outflow	(750)	1.000	750
1	Net Incremental CFAT	364.2	0.877	319.40
2	Net Incremental CFAT	416.4	0.769	320.21
3	Net Incremental CFAT	453.6	0.674	305.73
4	Net Incremental CFAT	382.2	0.592	226.26
4	Terminal Cash Flow	180	0.592	106.56
NPV				528.16

Terminal Cash Flow

= Salvage Value – Dismantling Cost + WC Release = 60 Lakhs – 45 Lakhs + 165 Lakhs = 180 Lakhs

Advice: Since the net present value of cash flows is ₹ 528.16 lakhs which is positive the management should install the machine for processing the waste.

Notes:

1.   Material stock increases are taken in cash flows.

2.   Idle time wages have been excluded as they would anyways be paid.

3.   Apportioned factory overheads are not relevant only insurance charges of this project are relevant.

4.   Tax on Capital gains is ignored.

5.   Saving in contract payment and income tax thereon is considered in the cash flows.

Question 6 (Vault Q. 45)   **[Nov 22 – 10 Marks]**

A firm is in need of a small vehicle to make deliveries. It is intending to choose between two options. One option is to buy a new three wheeler that would cost ₹ 1,50,000 and will remain in service for 10 years.

The other alternative is to buy a second hand vehicle for ₹ 80,000 that could remain in service for 5 years. Thereafter the firm, can buy another second hand vehicle for ₹ 60,000 that will last for another 5 years.

The scrap value of the discarded vehicle will be equal to its written down value (WDV). The firm pays 30% tax and is allowed to claim depreciation on vehicles @ 25% on WDV basis.

The cost of capital of the firm is 12%.

You are required to advise the best option.

t	1	2	3	4	5	6	7	8	9	10
PVIF (t,12%)	0.892	0.797	0.711	0.635	0.567	0.506	0.452	0.403	0.360	0.322

Solution

Tax shield on Purchase of New vehicle			
Year	WDV	Dep. @ 25%	Tax shield @ 30%
1	1,50,000	37,500	11,250
2	1,12,500	28,125	8,437
3	84,375	21,094	6,328
4	63,281	15,820	4,746

5	47,461	11,865	3,560
6	35,596	8,899	2,670
7	26,697	6,674	2,002
8	20,023	5,006	1,502
9	15,017	3,754	1,126
10	11,263	2,816	845
	8,447	Scrap value	

Tax shield on Purchase of Second hand vehicles

Year	WDV	Dep. @ 25%	Tax shield @ 30%	
1	80,000	20,000	6,000	
2	60,000	15,000	4,500	
3	45,000	11,250	3,375	
4	33,750	8,437	2,531	
5	25,313	6,328	1,898	Scrap value = ₹ 18,985
6	60,000	15,000	4,500	
7	45,000	11,250	3,375	
8	33,750	8,437	2,531	
9	25,313	6,328	1,898	
10	18,985	4,746	1,424	Scrap value = ₹ 14,239

Calculation of Net Outflow of New Vehicle (NPV)

Year	Cash Flow	PV Factor	PV of Cash Flow
0	(1,50,000)	1	(1,50,000)
1	11,250	0.892	10,035
2	8,437	0.797	6,724
3	6,328	0.711	4,499
4	4,746	0.635	3,014
5	3,560	0.567	2,018
6	2,670	0.506	1,351
7	2,002	0.452	905
8	1,502	0.403	605
9	1,126	0.360	405
10	845 + 8447	0.322	2,992
		NPV	**1,17,452**

Calculation of Net Outflow of Second hand Vehicles (NPV)

Year	Cash Flow	PV Factor	PV of Cash Flow
0	(80,000)	1	(80,000)
1	6,000	0.892	5,352
2	4,500	0.797	3,587

3	3,375	0.711	2,400
4	2,531	0.635	1,607
5	(39,117)*	0.567	(22,179)
6	4,500	0.506	2,277
7	3,375	0.452	1,525
8	2,531	0.403	1,020
9	1,898	0.360	683
10	15,663**	0.322	5,043
		NPV	**78,686**

* 60000 – 18985 – 1898 = 39,117;   ** 1424 + 14239 = 15,663

Advise: The PV of net outflow is low in case of buying the second hand vehicles. Therefore, it is advisable to buy second hand vehicles.

➢ Capital Gain / Loss and Set off & Carry Forward

Question 7 (Vault Q. 53)   **(ICAI SM)**

XYZ Ltd. is planning to introduce a new product with a project life of 8 years. Initial equipment cost will be ₹ 3.5 crores. Additional equipment costing ₹ 25,00,000 will be purchased at the end of the third year from the cash inflow of this year. At the end of 8 years, the original equipment will have no resale value, but additional equipment can be sold for ₹ 2,50,000. A working capital of ₹ 40,00,000 will be needed and it will be released at the end of eighth year. The project will be financed with sufficient amount of equity capital.

The sales volumes over eight years have been estimated as follows:

Year	1	2	3	4 - 5	6 - 8
Units per year	72,000	1,08,000	2,60,000	2,70,000	1,80,000

A sales price of ₹ 240 per unit is expected and variable expenses will amount to 60% of sales revenue. Fixed cash operating costs will amount ₹ 36,00,000 per year. The loss of any year will be set off from the profits of subsequent two years. The company is subject to 30 per cent tax rate and considers 12 per cent to be an appropriate after-tax cost of capital for this project. The company follows straight line method of depreciation.

CALCULATE the net present value of the project and advise the management to take appropriate decision.

The PV factors at 12% are

Year	1	2	3	4	5	6	7	8
PV Factor	0.893	0.797	0.712	0.636	0.567	0.507	0.452	0.404

Solution

Workings:

(a)   Calculation of annual cash flows

Particulars	Year 1	Year 2	Year 3	Year 4 – 5	Year 6 – 8
Units	72,000	1,08,000	2,60,000	2,70,000	1,80,000
Contribution p.u.	96	96	96	96	96

(240 x 40%)	(₹ in lakh)	(₹ in lakh)	(₹ in lakh)	(₹ in lakh)	(₹ in lakh)
Total Contribution	69.12	103.68	249.6	259.2	172.8
Less: Fixed Costs	36	36	36	36	36
Less: Dep [(b) below]	43.75	43.75	43.75	48.25	48.25
PBT	(10.63)	23.93	169.85	174.95	88.55
Less: Tax	–	3.99*	50.955	52.485	26.565
PAT	–	19.94	118.895	122.465	61.985
Add: Depreciation	43.75	43.75	43.75	48.25	48.25
CFAT	33.12	63.69	162.645	170.715	110.235

(b)   Calculation of Depreciation:

- On Initial equipment $= \dfrac{₹\,350\ \text{lakh}}{8\ \text{years}}$ = 43.75 lakh

- On additional equipment $= \dfrac{(₹\,25 - ₹\,2.5)\text{lakh}}{5\ \text{years}}$ = 4.5 lakh

(c)   *Calculation of tax in 2nd Year:

	₹ in lakh
Profit for the year	23.93
Less: Set off of unabsorbed depreciation in 1st year	(10.63)
Taxable profit	13.30
Tax @30%	3.99

(d)   Calculation of Initial cash outflow

	₹ in lakh
Cost of New Equipment	350
Add: Working Capital	40
Outflow	390

Calculation of NPV   **(₹ in lakh)**

Year	Description	Cash flows	PVF @12%	Present Value
0	Initial equipment cost	(390)	1.000	(390.00)
1	CFAT	33.12	0.893	29.57
2	CFAT	63.69	0.797	50.76
3	CFAT	162.645	0.712	115.80
3	Additional equipment cost	(25.00)	0.712	(17.80)
4 - 5	CFAT	170.715	1.203	205.37
6 - 8	CFAT	110.235	1.363	150.25
8	Release of working capital	40.00	0.404	16.16
8	Additional equipment salvage value	2.50	0.404	1.01
NPV				161.12

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

Question 8 (Vault Q. 54)   **[MTP 2 May 24 – 5 Marks]**

An existing profitable company, RMC World Ltd. is considering a new project for manufacture of home automation gadget involving a capital expenditure of ₹ 1000 Lakhs and working capital of ₹ 150 Lakhs. The capacity of the plants for an annual production of 3 lakh units and capacity utilization during 5 year life of the project is expected to be as indicated below:

Year	1	2	3	4	5
Capacity Utilization (%)	50	65	80	100	100

The average price per unit of product is expected to be ₹ 600 netting a contribution of 60 percent. The annual fixed costs, excluding depreciation, are estimated to be ₹ 500 Lakhs per annum from the third year onwards. For the first and second year, it would be ₹ 200 lakhs and ₹ 350 lakhs respectively.

Scrap value of the capital asset at the end of 5th year is ₹ 200 Lakhs. Depreciation on capital asset is provided on written down value basis @ 40% p.a. for income tax purpose. The rate of income tax may be taken at 30%. The cost of capital is 12%. At end of the third year an additional investment of ₹ 200 lakhs would be required for working capital. There is no capital gain tax applicable.

COMPUTE the NPV of the project. RMC World Ltd. is about to make a presentation to Secure Venture Capital Firm. Secure Venture Capital Firms will invest in any project if the net addition to shareholder wealth from the project is above ₹ 100 lakhs. Present Value Factors to be taken upto 4 decimal places.

Solution

Calculation of Cash Flow after Tax

Particulars	Year 1	Year 2	Year 3	Year 4	Year 5
Capacity	50%	65%	80%	100%	100%
Units	1,50,000	1,95,000	2,40,000	3,00,000	3,00,000
Contribution p.u. (600 x 60%)	360	360	360	360	360
Total Contribution	5,40,00,000	7,02,00,000	8,64,00,000	10,80,00,000	10,80,00,000
Less: Fixed Costs	2,00,00,000	3,50,00,000	5,00,00,000	5,00,00,000	5,00,00,000
Less: Depreciation (W.N.)	4,00,00,000	2,40,00,000	1,44,00,000	86,40,000	51,84,000
PBT	(60,00,000)	1,12,00,000	2,20,00,000	4,93,60,000	5,28,16,000
Less: Tax	(18,00,000)	33,60,000	66,00,000	1,48,08,000	1,58,44,800
PAT	(42,00,000)	78,40,000	1,54,00,000	3,45,52,000	3,69,71,200
Add: Depreciation	4,00,00,000	2,40,00,000	1,44,00,000	86,40,000	51,84,000
CFAT	3,58,00,000	3,18,40,000	2,98,00,000	4,31,92,000	4,21,55,200

Calculation of NPV

Year	Description	Cash Flow	PVF @12%	PV
0	Initial Investment	(10,00,00,000)	1	(10,00,00,000)
0	WC introduced	(1,50,00,000)	1	(1,50,00,000)

3	WC introduced	(2,00,00,000)	0.7118	(1,42,36,000)
1	CFAT	3,58,00,000	0.8929	3,19,65,820
2	CFAT	3,18,40,000	0.7972	2,53,82,848
3	CFAT	2,98,00,000	0.7118	2,12,11,640
4	CFAT	4,31,92,000	0.6355	2,74,48,516
5	CFAT	4,21,55,200	0.5674	2,39,18,860
5	WC released	3,50,00,000	0.5674	1,98,59,000
5	Scrap Sale	2,00,00,000	0.5674	1,13,48,000
Net Present Value				**3,18,98,684**

Working Notes (W.N.)

Calculation of Depreciation

Year	Opening WDV	Depreciation	Closing WDV
1	10,00,00,000	4,00,00,000	6,00,00,000
2	6,00,00,000	2,40,00,000	3,60,00,000
3	3,60,00,000	1,44,00,000	2,16,00,000
4	2,16,00,000	86,40,000	1,29,60,000
5	1,29,60,000	51,84,000	77,76,000

Question 9 (Vault Q. 56)   **[MTP 1 Sep 24 – 8 Marks]**

Parmarth Limited is a manufacturer of computers. Owing to recent developments in Artificial Intelligence (AI), it is planning to introduce AI in its computer process. This would result into an estimated annual savings as follows:

(i)   Savings of ₹ 3,50,000 in production delays caused by inventory problem.

(ii)   Savings in Salaries of 5 employees with an annual pay of ₹ 4,20,000 per annum

(iii)   Reduction in Lost sales of ₹ 1,75,000

(iv)   Gain due to timely billing is ₹ 3,25,000

The project would result in annual maintenance and operating costs as follows, which are to be paid in advance (at the beginning)

Year	1	2	3	4	5
Cost	1,80,000	2,00,000	1,20,000	1,10,000	1,30,000

Furthermore, the new system would need 2 AI specialists professional drawing salaries of ₹ 6,50,000 per annum per person. The purchase price of the new system for installing AI into computers would involve an outlay of ₹ 21,50,000 and installation cost of ₹ 1,50,000.

75% of the total value for depreciation would be paid in the year of purchase and the balance would be paid at the end of the 1st year. The new system will be sold for ₹ 1,90,000. This is the only asset in the block for Income tax purpose.

The life of the system would be 5 years with the hurdle rate of 12%. Depreciation will be charged at 40% on WDV basis, corporate tax rate is 25% and capital gains tax rate is at 20%.

CALCULATE NPV and advise the management on the acceptability of the proposal. Also calculate ARR & PI.

Use Present Value Factors upto 4 decimal places.

Solution

Computation of Present Value of Cash Inflows (PV CI)

Particulars	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Savings in cost due to Production Delays		3,50,000	3,50,000	3,50,000	3,50,000	3,50,000
Savings in Salaries		21,00,000	21,00,000	21,00,000	21,00,000	21,00,000
Reduction in lost sales		1,75,000	1,75,000	1,75,000	1,75,000	1,75,000
Gain due to timely billing		3,25,000	3,25,000	3,25,000	3,25,000	3,25,000
Salary of AI specialists		13,00,000	13,00,000	13,00,000	13,00,000	13,00,000
Annual Maint. & Op. Cost		1,80,000	2,00,000	1,20,000	1,10,000	1,30,000
Less: Depreciation		9,20,000	5,52,000	3,31,200	1,98,720	1,19,232
Profit Before Tax		5,50,000	8,98,000	11,98,800	13,41,280	14,00,768
Less: Tax @ 25%		1,37,500	2,24,500	2,99,700	3,35,320	3,50,192
Profit After Tax		4,12,500	6,73,500	8,99,100	10,05,960	10,50,576
Add: Depreciation		9,20,000	5,52,000	3,31,200	1,98,720	1,19,232
Add: Maintenance and Operating Cost (payable in advance)		1,80,000	2,00,000	1,20,000	1,10,000	1,30,000
Less: Maintenance and Operating Cost (payable in advance)	1,80,000	2,00,000	1,20,000	1,10,000	1,30,000	-
(+) Sale Value (WN 1)	-	-	-	-	-	1,87,770
Total Cash Inflows	-1,80,000	13,12,500	13,05,500	12,40,300	11,84,680	14,87,578
PV Factor @ 12%	1	0.8929	0.7972	0.7118	0.6355	0.5674
PV of Cash Inflows	-1,80,000	11,71,931	10,40,745	8,82,846	7,52,864	8,44,052
Total PV CI						45,12,438

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

Calculation of Present value of cash outflows (PV CO)

As mentioned in the question, 75% of the depreciable value will be paid at the beginning. Depreciable value

means purchase price plus the installation cost.

	Year 0	Year 1
Purchase Price & Installation Cost	17,25,000	5,75,000
PV Factor @ 12%	1	0.8929
PV CO	17,25,000	5,13,418

Total PVCO   = 22,38,418

Calculation of:

(i)   NPV   = Total PV CI – PV CO

                  = 45,12,438 – 22,38,418

                  = 22,74,020

(ii)   PI   = PV CI / PV CO = 45,12,438/ 22,38,418 = 2.016

(iii)   ARR   = Average NPAT / Initial Investment

                  = 8,08,327 / 23,00,000 × 100 = 35.145%

Note – ARR is calculated based on Initial Investment, similarly it can be calculated based on Average Investment

Working Notes:

1. **Net Sale Value:**

    Capital Gains   = Sale Price – Closing WDV at 5th year

                      = 1,90,000 – 1,78,848

                      = 11,152

    Tax @ 20% on above = 2,230

    Net Sale Value = 1,90,000 – 2,230 = 1,87,770

2. **Average PAT** = (4,12,500 + 6,73,500 + 8,99,100 + 10,05,960 + 10,50,576) / 5

                  = 8,08,327

➤ Replacement Decision

Question 10 (Vault Q. 60)   **[Nov 05 – 12 Marks]**

MNP Limited is thinking of replacing its existing machine by a new machine which would cost ₹ 60 lakhs. The company's current production is 80,000 units, and is expected to increase to 1,00,000 units, if the new machine is bought. The selling price of the product would remain unchanged at ₹ 200 per unit. The following is the cost of producing one unit of product using both the existing and new machine:

	Existing Machine (80,000 units)	New Machine (1,00,000 units)	Unit cost (₹) 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)

	0.25	5.0	4.75
Depreciation			
Allocated Corporate Overheads	10.0	12.50	2.50
	183.25	165.50	(17.75)

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

Required:

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

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

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

Year (t)	1	2	3	4	5
PVIF $_{0.15, t}$	0.8696	0.7561	0.6575	0.5718	0.4972
PVIF $_{0.20, t}$	0.8333	0.6944	0.5787	0.4823	0.4019
PVIF $_{0.25, t}$	0.80	0.64	0.512	0.4096	0.3277
PVIF $_{0.30, t}$	0.7692	0.5917	0.4552	0.3501	0.2693
PVIF $_{0.35, t}$	0.7407	0.5487	0.4064	0.3011	0.2230

Solution

(i)   Net Present Value:

Initial Investment:

	Amount (₹)
Cost of new machine	60,00,000
Less: Sale Price of existing machine	(1,50,000)
Net of Tax (₹ 2,50,000 × 0.60)	
	58,50,000

Terminal Cash Flows:

(a)   New Machine

	Amount (₹)
Salvage value of Machine Less:	2,50,000
Less: Depreciated WDV	2,50,000
STCG	Nil
Tax	Nil
Net Salvage Value (cash flows)	2,50,000

(b)   Old Machine

Cash realised on disposal of existing machine = ₹ 35,000

Incremental terminal CF = ₹ 2,15,000 (2,50,000 – 35,000)

Calculation of Incremental CFAT

Particulars	Existing Machine	New Machine	Incremental
Production	80,000 Units	1,00,000 Units	20,000 Units
	(₹)	(₹)	(₹)
Selling Price	200	200	
Less: Variable Cost *	(173)	(148)	
EBITDA per Unit	27	52	
Total EBITDA	21,60,000	52,00,000	30,40,000
Less: Depreciation (60,00,000 – 2,50,000) / 5			(11,50,000)
Incremental EBT			18,90,000
Less: Tax @40%			(7,56,000)
Incremntal EAT			11,34,000
Add: Depreciation			11,50,000
Incremental CFAT			22,84,000

* All costs excluding Depreciation and Allocated Corporated Overheads

Note: Allocated Corporated Overheads will be ignored as it is irrelevant cost.

Alternatively

Calculation of Incremental CFAT

Particulars	Amount (₹)	Amount (₹)
Sales	1,60,00,000	2,00,00,000
Material	60,00,000	63,75,000
Wages & Salaries	41,00,000	37,50,000
Supervision	16,00,000	25,00,000
Repair & Maintenance	9,00,000	7,50,000
Power & fuel	12,40,000	14,25,000
Depreciation	--	11,50,000
Total cost	1,38,40,000	1,59,50,000
Profit(Sales – Total cost)	21,60,000	40,50,000
Less: Tax@40%	(8,64,000)	(16,20,000)
	12,96,000	24,30,000
Add: Depreciation	**	11,50,000*
CFAT	12,96,000	35,80,000
Incremental CFAT		22,84,000

*   Calculation of Depreciation $\dfrac{60,00,000 - 2,50,000}{5} = 11,50,0005$

**   As mention in the question WDV of Machine is zero for tax purpose hence no depreciation shall be provided in existing machine.

Computation of NPV @ 15%

Year	Particulars	CF (₹)	PVF @15%	PV (₹)
0	Initial Investment	(58,50,000)	1	(58,50,000)
1-5	Incremental CFAT	22,84,000	3.3522	76,56,425
5	Terminal Inc. CF	2,15,000	0.4972	1,06,898
Net Present Value				(19,13,323)

(ii)   Calculation of IRR

Year	CFAT (₹)	PVF @ 25%	PV @ 25% (₹)	PVF @ 30%	PV @ 30% (₹)
0	(58,50,000)	1.000	(58,50,000)	1.000	(58,50,000)
1 – 5	22,84,000	2.6893	61,42,361	2.4355	55,62,682
5	2,15,000	0.3277	70,456	0.2693	57,900
NPV			3,62,817		-2,29,418

$$IRR = 25 + \frac{3,62,817}{3,62,817 - (-2,29,418)} \times (30 - 25)$$

$$= 25 + \frac{3,62,817}{5,92,235} \times 5 = 28.06\%$$

(iii)   Decision: Since the NPV is positive and IRR is greater than K_o, company should accept the project.

Question 11 (Vault Q. 62)   **[ICAI SM]**

HMR Ltd. is considering replacing a manually operated old machine with a fully automatic new machine. The old machine had been fully depreciated for tax purpose but has a book value of ₹ 2,40,000 on 31st March. The machine has begun causing problems with breakdowns and it cannot fetch more than ₹ 30,000 if sold in the market at present. It will have no realizable value after 10 years. The company has been offered ₹ 1,00,000 for the old machine as a trade in on the new machine which has a price (before allowance for trade in) of ₹4,50,000. The expected life of new machine is 10 years with salvage value of ₹ 35,000.

Further, the company follows straight line depreciation method but for tax purpose, written down value method depreciation @ 7.5% is used considering that this is the only machine in the block of assets.

Given below are the expected sales and costs from both old and new machine:

Particulars	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

Solution

Workings:

1.   **Calculation of Base for depreciation or Cost of New Machine**

Particulars	(₹)
Purchase price of new machine	4,50,000
Less: Sale price of old machine	1,00,000
	3,50,000

2.   **Calculation of Profit before tax as per books**

Particulars	Old machine (₹)	New machine (₹)	Difference (₹)
PBT as per books	3,24,750	3,87,250	62,500
Add: Depreciation as per books	24,000	41,500	17,500
Profit before tax and depreciation (PBTD)	3,48,750	4,28,750	80,000

Calculation of Incremental NPV

Year	PVF @ 10%	PBTD (₹)	Dep. @ 7.5% (₹)	PBT (₹)	Tax @ 30% (₹)	CFAT (₹)	PV (₹)
	(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
Total PV of Annual CFATs							3,81,102.44
Add: PV of Salvage value of new machine (₹ 35,000 × 0.386)							13,510.00

Total PV of incremental cash inflows	3,94,612.44
Less: Cost of new machine	3,50,000.00
Incremental Net Present Value	44,612.44

Analysis: Since the Incremental NPV is positive, the old machine should be replaced.

Question 12 (Vault Q. 65)   **[May 21 – 10 Marks]**

An existing company has a machine which has been in operation for two years, its estimated remaining useful life is 4 years with no residual value in the end. Its current market value is ₹ 3 lakhs. The management is considering a proposal to purchase an improved model of a machine which gives increased output. The details are as under:

Particulars	Existing Machine	New Machine
Purchase Price	₹ 6,00,000	₹ 10,00,000
Estimated Life	6 years	4 years
Residual Value	0	0
Annual Operating days	300	300
Operating hours per day	6	6
Selling price per unit	₹ 10	₹ 10
Material cost per unit	₹ 2	₹ 2
Output per hour in units	20	40
Labour cost per hour	₹ 20	₹ 30
Fixed overhead per annum excluding depreciation	₹ 1,00,000	₹ 60,000
Working Capital	₹ 1,00,000	₹ 2,00,000
Income-tax rate	30%	30%

Assuming that - cost of capital is 10% and the company uses written down value of depreciation @ 20% and it has several machines in 20% block.

Advice the management on the Replacement of Machine as per the NPV method.

The discounting factors table given below:

Discounting Factors	Year 1	Year 2	Year 3	Year 4
10%	0.909	0.826	0.751	0.683

Solution

(i)   Calculation of Net Initial Cash Outflows:

Particulars	₹
Purchase Price of new machine	10,00,000
Add: Net Working Capital	1,00,000
Less: Sale proceeds of existing machine	3,00,000
Net initial cash outflows	8,00,000

(ii)   Calculation of Base for depreciation

Particulars		₹
Cost 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		
Cost 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**

(iii)   Calculation of Annual Incremental Profit Before Tax and depreciation

Particulars	Existing machine	New Machine
Annual output	36,000 units	72,000 units
	₹	₹
Sales revenue @ ₹ 10 per unit	3,60,000	7,20,000
Less: Cost of Operation		
Material @ ₹ 2 per unit	72,000	1,44,000
Labour		
Old = 300 × 6 × ₹ 20	36,000	-
New = 300 × 6 × ₹ 30	-	54,000
Fixed OH excluding Dep	1,00,000	60,000
Profit Before Tax & depreciation (PBTD)	1,52,000	4,62,000

Incremental PBTD = 3,10,000

(iv)   Calculation of Incremental Net Present Value:

Year	PBTD	Dep. @ 20%	PBT	Tax @ 30%	PAT	Inc. CFAT	PVF @ 10%	PV
(1)	(2)	(3)	(4 = 2-3)	(5)	(6 = 4-5)	(7 = 6+3)	(8)	(9 = 8 x 7)
1	3,10,000	1,40,000	1,70,000	51,000	1,19,000	2,59,000	0.909	2,35,431
2	3,10,000	1,12,000	1,98,000	59,400	1,38,600	2,50,600	0.826	2,06,996
3	3,10,000	89,600	2,20,400	66,120	1,54,280	2,43,880	0.751	1,83,154
4	3,10,000	71,680	2,38,320	71,496	1,66,824	2,38,504	0.683	1,62,898
Total PV of Incremental CFAT								**7,88,479**
Add: Net Working Cap. Release (₹ 1,00,000 x 0.683)								68,300
Less: Initial Cash Outflow								8,00,000
NPV								**56,779**

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

Working Notes:

Calculation of Annual Output

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

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

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

Note: The above solution have been done based on incremental approach)

Alternatively, solution can be done based on Total Approach as well.

Question 13 (Vault Q. 66)   **[May 24 – 7 Marks]**

HCP Ltd. is a leading manufacturer of railway parts for passenger coaches and freight wagons. Due to high wastage of material and quality issues in production, the General Manager of the company is considering the replacement of machine A with a new CNC machine B. Machine A has a book value of ₹ 4,80,000 and remaining economic life is 6 years. It could be sold now at ₹ 1,80,000 and zero salvage value at the end of sixth year. The purchase price of Machine B is ₹ 24,00,000 with economic life of 6 years. It will require ₹ 1,40,000 for installation and ₹ 60,000 for testing. Subsidy of 15% on the purchase price of the machine B will be received from Government at the end of 1st year. Salvage value at the end of sixth year will be ₹ 3,20,000.

The General manager estimates that the annual savings due to installation of machine B include a reduction of three skilled workers with annual salaries of ₹ 1,68,000 each, ₹ 4,80,000 from reduced wastage of materials and defectives and ₹ 3,50,000 from loss in sales due to delay in execution of purchase orders. Operation of Machine B will require the services of a trained technician with annual salary of 3,90,000 and annual operation and maintenance cost will increase by ₹ 1,54,000. The company's tax rate is 30% and it's required rate of return is 14%. The company follows straight line method of depreciation. Ignore tax savings on loss due to sale of existing machine.

The present value factors at 14% are:

Years	0	1	2	3	4	5	6
PV Factor	1	0.877	0.769	0.675	0.592	0.519	0.456

Required:

(i)   Calculate the Net Present Value and Profitability Index and advise the company for replacement decision.

(ii)   Also calculate the discounted pay-back period.

Solution

Calculation of Initial Investment:

Particulars	₹
Cost of new machine	24,00,000
Less: Sale proceeds of existing machine	(1,80,000)
Add: Installation	1,40,000
Add: Testing	60,000
Less: Subsidy from government (15% of 24,00,000) × 0.877	(3,15,720)
PV of Initial Investment	21,04,280

Calculation of Incremental Depreciation

Particulars	₹
Depreciation on existing machine (4,80,000/6) (i)	80,000
Depreciation base of New Machine	
Cost of new machine	24,00,000
Add: Installation	1,40,000
Add: Testing	60,000
Less: Subsidy from government	(3,60,000)
Less: Salvage value at the end of 6th year	(3,20,000)
Depreciation base of New Machine	19,20,000
Depreciation on New Machine (19,20,000/6) (ii)	3,20,000
Incremental depreciation [(ii) – (i)]	2,40,000

Computation of Annual Operating Cash flow after tax (CFAT)

Particulars	Amount (₹)	Amount (₹)
Savings in cost:		
Cost of 3 skilled workers (₹1,68,000 x 3)	5,04,000	
Reduced wastage of material	4,80,000	
Saving in loss of sales	3,50,000	
Total		13,34,000
Less: Increase in cost		
Salary to trained technician	3,90,000	
Increase in annual operation and maintenance cost	1,54,000	
Total		(5,44,000)
Incremental Saving before tax and depreciation		7,90,000
Less: Incremental Depreciation		(2,40,000)
Incremental PBT		5,50,000
Less: Tax @30%		(1,65,000)
PAT		3,85,000
Add: Depreciation		2,40,000
Incremental CFAT		6,25,000

Calculation of NPV

Year	Particulars	CF (₹)	PVF @ 14%	PV (₹)
1 to 6	Incremental CFAT	6,25,000	3.888	24,30,000
6	Salvage Value of New Machine	3,20,000	0.456	1,45,920
	PV of Inflows			25,75,920
	PV of Initial Investment			(21,04,280)
	Net Present Value			**4,71,640**

Profitability Index = $\dfrac{\text{Sum of discounted cash inflows}}{\text{Initial cash outlay or Total discounted cash outflow (as the case may)}}$

= 25,75,920/21,04,280= **1.224**

Advise: Since the NPV is positive and PI is greater than 1, the company should replace the machine.

Computation of Discounted Payback Period

Year	Cashflow	PVF @ 14%	PV of CFs (₹)	Cumulative PV (₹)
1	6,25,000	0.877	5,48,125	5,48,125
2	6,25,000	0.769	4,80,625	10,28,750
3	6,25,000	0.675	4,21,875	14,50,625
4	6,25,000	0.592	3,70,000	18,20,625
5	6,25,000	0.519	3,24,375	21,45,000
6	9,45,000	0.456	4,30,920	25,75,920

Discounted Payback Period

$= 4 + \dfrac{21,04,280 - 18,20,625}{3,24,375}$ = **4.87 years**

➤ Capital Rationing

Question 14 (Vault Q. 68)   **[ICAI SM]**

Try marking combinations in (ii)

Shiva Limited is planning its capital investment programme for next year. It has five projects all of which give a positive NPV at the company cut-off rate of 15 percent, the investment outflows and present values being as follows:

Project	A	B	C	D	E
Investment (₹)	(50,000)	(40,000)	(25,000)	(30,000)	(35,000)
NPV @ 15% (₹)	15,400	18,700	10,100	11,200	19,300

The company is limited to a capital spending of ₹ 1,20,000.

You are required to ILLUSTRATE the returns from a package of projects within the capital spending limit.

Case 1: The projects are independent of each other and are divisible (i.e, part- project is possible).

Case 2: The projects are independent of each other but not divisible.

Solution

Computation of NPV and NPI (NPV per Re 1) and ranking of the projects:

Project	Investment (₹)	NPV @ 15% (₹)	NPV per Re 1 invested	Ranking
A	(50,000)	15,400	0.31	5
B	(40,000)	18,700	0.47	2
C	(25,000)	10,100	0.40	3
D	(30,000)	11,200	0.37	4
E	(35,000)	19,300	0.55	1

Case 1: When projects are divisible:

Project	Investment (₹)	NPV @ 15% (₹)
E	(35,000)	19,300
B	(40,000)	18,700
C	(25,000)	10,100
D	(20,000)*	7,500
Total	(120,000)	55,600

*Project A is rejected and only 2/3rd of Project D is accepted

Case 2: When projects are not divisible:

Combinations	Investment (₹)	NPV @ 15% (₹)
E + B + C	(1,00,000)	48,100
E + B + D	(1,05,000)	49,200
E + B + A	Not Possible	-
E + C + D	(90,000)	40,600
E + C + A	(1,10,000)	44,100
E + D + A	(1,15,000)	45,900

In this case, combination of Projects E, B and D should be accepted.

➢ Equivalent Annualized Criterion (EAC)

Question 15 (Vault Q. 72)   **[Nov 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.

Deteremine which machine is more beneficial, using Annualized Equivalent Approach? Ignore tax.

Year	1	2	3	4	5	6
PVIF $_{0.12, t}$	0.893	0.797	0.712	0.636	0.567	0.507

| PVIFA $_{0.12, t}$ | 0.893 | 1.690 | 2.402 | 3.038 | 3.605 | 4.112 |

Solution

(i)   Calculation of Net Cash flows

Machine 1

Other fixed operating costs (excluding depreciation) = 7,20,000–[(12,00,000–1,20,000)/3] = ₹ 3,60,000

Year	0	1 – 2	3
	₹	₹	₹
Initial Investment	(12,00,000)	-	-
Contribution	-	11,60,000	11,60,000
Fixed maintenance costs (in advance)	(40,000)	(40,000)	-
Other fixed operating costs (excluding dep)	-	(3,60,000)	(3,60,000)
Salvage Value	-	-	1,20,000
Net Cash Flow	(12,40,000)	7,60,000	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	1 – 4	5
	₹	₹	₹
Initial Investment	(16,00,000)	-	-
Contribution	-	12,00,000	12,00,000
Fixed maintenance costs (in advance)	(80,000)	(80,000)	-
Other fixed operating costs (excluding dep)	-	(3,10,000)	(3,10,000)
Salvage Value	-	-	1,00,000
Net Cash Flow	(16,80,000)	8,10,000	9,90,000

Calculation of Net Present Value

Year	PVF @ 12%	Machine 1		Machine 2	
		CF (₹)	PV (₹)	CF (₹)	PV (₹)
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			2,91,190.67		3,72,291.26

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

Question 16 (Vault Q. 73)   **[May 19 RTP]**

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%.

Year	PVF	Year	PVF
1	0.893	9	0.361
2	0.797	10	0.322
3	0.712	11	0.287
4	0.636	12	0.257
5	0.567	13	0.229
6	0.507	14	0.205
7	0.452	15	0.183
8	0.404	16	0.163

Solution

Since the life span of each machine is different and time span exceeds the useful lives of each model, we shall use Equivalent Annual Cost method to decide which brand should be chosen.

(i)   If machine is used for 20 years

    (a)   Residual value of machine of brand XYZ

        = (₹ 6,00,000 × 2/3) – (₹ 6,00,000 × 0.04 × 14) = ₹ 64,000

    (b)   Residual value of machine of brand ABC

        = (₹ 4,50,000 × 2/3) – (₹ 4,50,000 × 0.06 × 9)   = ₹ 57,000

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
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 = 6.812

Equivalent Annual Cost = $\dfrac{₹7,62,927}{6.812}$ = ₹ 1,11,998

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 = 5.651

Equivalent Annual Cost = $\dfrac{₹6,51,786}{5.651}$ = ₹ 1,15,340

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 = 5.651

Equivalent Annual Cost = $\dfrac{₹6,65,188}{5.651}$ = ₹ 1,17,712

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.

Chapter 4 – Dividend Decisions

➤ Walter's Model

Question 1 (Vault Q. 6)   **[Jan 25 – 5 Marks]**

Following information have been provided by LP Ltd.:

Profit before Tax	₹ 40 Lakh
Tax Rate	30%
Equity Share Capital (₹ 10)	₹ 40 Lakh
Return on Investment	18%
Cost of Equity	15%
Dividend Payout Ratio	50%

You are required:

(i)   to determine the price of Equity Share of the company as per Walter's Model;

(ii)   to determine the Dividend Pay-out Ratio by applying Walter's Model assuming the price of equity share of the company is ₹ 48.

Solution

(i)   **Price per share as per Walter's Model**

	₹ in lakhs
Profit before tax	40
Less: tax @ 30%	12
Earning for equity shareholders	28
Earning per share	28/4 = ₹ 7

$$P = \frac{D + \dfrac{r}{K_e}(E - D)}{K_e} = \frac{3.5 + \dfrac{0.18}{0.15}(7 - 3.5)}{0.15} = \frac{3.5 + 4.2}{0.15} = ₹\,51.33$$

(ii)   **Let, the dividend per share be D to get share price of ₹ 48**

P	$=$	$\dfrac{D + \dfrac{r}{K_e}(E - D)}{K_e}$
₹ 48	$=$	$\dfrac{D + \dfrac{0.18}{0.15}(7 - D)}{0.15}$
7.2	$=$	$\dfrac{0.15D + 1.26 - 0.18D}{0.15}$
0.03D	$= 1.26 - 1.08$	
D	$= ₹\,6$	
D/P ratio	$= \dfrac{DPS}{EPS} \times 100 = \dfrac{6}{7} \times 100 = 85.714\%$	

Question 2 (Vault Q. 10)   **[RTP Jan 25]**

The following information is supplied to you:

Particulars	Amount (₹)
Total Earnings	4,50,000
No of Equity Shares (of ₹ 100 each)	25,000 shares
Retention ratio	40%
MPS	198

Applying Walter's model:

(i)   Analyse whether the company is following an optimal dividend policy.

(ii)   Compute P/E ratio at which the dividend policy will have no effect on the value of the share. Also calculate the MPS at such P/E ratio

(iii)   Will your decision change if the P/E atio is 4.5? Analyse

Solution

(i)   As per Walter,

If ROI > K_e, firm should retain everything and distribute nothing to maximize the share price. On the contrary, if ROI < K_e, firm should distribute everything and retain nothing to maximize the wealth of the equity owners.

ROI   = Total Earnings / Equity Share capital = 4,50,000 / 25,00,000 **= 18%**

K_e = $\dfrac{1}{PE}$

P.E Ratio   = MPS / EPS = 198 /18 = 11

Therefore K_e = 1/11 = **9.091%**

Since ROI > K_e, optimal dividend policy of the firm should be to retain everything and distribute nothing. However, the firm has retained 40% and distributed 60%, hence it is not having an optimal dividend policy as per Walter's model.

(ii)   When ROI = K_e, dividend policy of the company will have no effect on the value of the share as per Walter's model.

Therefore, in that case, K_e should be equal to 18%

P/E Ratio   = $\dfrac{1}{Ke}$ = $\dfrac{1}{0.18}$ **= 5.56 times**

MPS at the above P.E Ratio = 18 × 5.56 = **₹ 100.08**

(iii)   If P.E Ratio is 4.5,

Ke   = $\dfrac{1}{4.5}$ = **22.22%**

Since, ROI < K_e, optimal dividend policy of the firm should be to distribute everything and retain nothing, as the value of share would be maximum at that point thereby maximizing the wealth of the shareholder.

➢ Gordon's Model

Question 3 (Vault Q. 16)   **[Nov 23 – 5 Marks]**

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.

Solution

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

$$P \quad = \frac{D_0(1 + g)}{K_e - g} \ = \ \frac{50(1 + 0.14)}{0.18 - 0.14} \ = ₹ \, 1425$$

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

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

(c)   If internal rate of return, r = 25% and K_e = 18%

When IRR is greater than cost of capital, the price per share increases and dividend pay- out decreases.

As per Gordon's model, when r > K_e, optimum dividend payout ratio is 'Zero'.

Question 4 (Vault Q. 17)   **[RTP Nov 23]**

HM Ltd. is listed on Bombay Stock Exchange which is currently been evaluated by Mr. A on certain parameters.

Mr. A collated following information:

(a)   The company generally gives a quarterly interim dividend. ₹ 2.5 per share is the last dividend declared.

(b)   The company's sales are growing by 20% on a 5-year Compounded Annual Growth Rate (CAGR) basis, however the company expects following retention amounts against probabilities mentioned as contention is dependent upon cash requirements for the company. Rate of return is 10% generated by the company.

Situation	Prob.	Retention Ratio
A	30%	50%
B	40%	60%
C	30%	50%

(c)   The current risk-free rate is 3.75% and with a beta of 1.2 company is having a risk premium of 4.25%.

You are required to help Mr. A in calculating the current market price using Gordon's formula.

Solution

Market price using Gordon's formula

$$P_0 \quad = \frac{D_0(1+g)}{K_e - g}$$

D_0 = 2.5 × 4 = 10 per share (annual)

g   = br or retention ratio × rate of return

Calculation of expected retention ratio

Situation	Prob.	Retention Ratio	Expected Retention Ratio
A	30%	50%	0.15
B	40%	60%	0.24
C	30%	50%	0.15
Total			**0.54**

g   = 0.54 x 0.10 = 0.054 or 5.4%

$$P_0 \quad = \frac{D_0(1+g)}{K_e - g} = \frac{10(1+0.054)}{0.0885 - 0.054} = \frac{10.54}{0.0345} = 305.51$$

K_e = Risk free rate + (β × Risk Premium) = 3.75% + (1.2 × 4.25%) = 8.85%

Question 5 (Vault Q. 20)   **[Nov 21 – 5 Marks]**

X Ltd. is a multinational company. Current market price per share is ₹ 2,185. During the F.Y. 2020-21, the company paid ₹ 140 as dividend per share. The company is expected to grow @ 12% p.a. for next four years, then 5% p.a. for an indefinite period. Expected rate of return of shareholders is 18% p.a.

(i)   Find out intrinsic value per share.

(ii)   State whether shares are overpriced or underpriced.

Year	1	2	3	4	5
Discounting Factor @ 18%	0.847	0.718	0.608	0.515	0.436

Solution

As per Dividend discount model, the price of share is calculated as follows:

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

$$P = \frac{₹140 \times 1.12}{(1 + 0.18)^1} + \frac{₹156.80 \times 1.12}{(1 + 0.18)^2} + \frac{₹175.62 \times 1.12}{(1 + 0.18)^3} + \frac{₹196.69 \times 1.12}{(1 + 0.18)^4} + \frac{₹220.29(1 + 0.05)}{(0.18 - 0.05)} \times \frac{1}{(1 + 0.18)^4}$$

P = 132.81 + 126.10 + 119.59 + 113.45 + 916.34 = **₹ 1,408.29**

Market price of share is over-priced by ₹ 776.71 (Current Market Price ₹ 2,185 – ₹ 1,408.29)

Question 6 (Vault Q. 21)   **[Corrected - ICAI SM]**

In the month of May of the current Financial Year, shares of RT Ltd. was sold for ₹ 1,460 per share. A long term earnings growth rate of 7.5% is anticipated. RT Ltd. is expected to pay dividend of ₹ 20 per share.

(i)   Calculate rate of return an investor can expect to earn assuming that dividends are expected to grow along with earnings at 7.5% per year in perpetuity?

(ii)   It is expected that RT Ltd. will earn about 10% on retained earnings and shall retain 60% of earnings. In this case, STATE whether, there would be any change in growth rate and cost of Equity?

Solution

(i)   According to Dividend Discount Model approach, the firm's expected or required return on equity is computed as follows:

$$K_e = \frac{D_1}{P_0} + g = \frac{20}{1,460} + 7.5\% = 0.0137 + 0.075 = 0.0887 \text{ or } \mathbf{8.87\%}$$

(ii)   With rate of return on retained earnings (r) is 10% and retention ratio (b) is 60%, new growth rate will be as follows:

g = br = 0.10 × 0.60 = 0.06 = 6%

Accordingly, dividend will also get changed and to calculate this, first we shall calculate previous year retention ratio (b_1) and then previous EPS assuming that rate of return on retained earnings (r) is same.

With, previous Growth Rate = 7.5%, and r =10%, the retention ratio comes out to be:

0.075   = b_1 × 0.10

b_1 = 0.75 and payout ratio = 0.25

With 0.25 payout ratio the previous EPS will be:

$$\frac{₹\ 20}{0.25} = ₹\ 80$$

With new 0.40 (1 – 0.60) payout ratio, the new dividend will be

D_1 = ₹ 80 × 0.40 = ₹ 32

Accordingly, new K_e will be:

$$K_e = \frac{32}{1,460} + 0.06 = 0.0819 = \mathbf{8.19\%}$$

➢ Combination of Gordon and Walter's Model

Question 7 (Vault Q. 24)   **[RTP Sep 24]**

The following information is taken from Gamma Ltd.

Net Profit for the year	₹ 30,00,000
12% Preference share capital	₹ 1,00,00,000
Equity share capital (Share of Rs 10 each)	₹ 60,00,000
Internal rate of return on investment	22%
Cost of Equity Capital	18%

Retention Ratio	75%

Calculate the market price of the share using:

(1)   Gordon's Model

(2)   Walter's Model

Solution

(1)   Market price per share by Gordon's Model

g   = Growth rate (br)   = 0.75 × 0.22 = 0.165

Present market price per share $(P_o)^* = \dfrac{D_0(1+g)}{K_e - g}$ Or $\dfrac{D_1}{K_e - g}$

$P_o \quad = \dfrac{0.75(1+0.165)}{0.18-0.165} \quad = \dfrac{0.874}{0.015}$ = **₹ 58.27 approx**

(ii)   Walter's Model

$P \quad = \dfrac{D + \dfrac{r}{K_e}(E - D)}{K_e} \quad = \dfrac{0.75 + \dfrac{0.22}{0.18}(3-0.75)}{0.18}$ = **₹ 19.44**

Workings:

1.   Calculation of Earnings per share

Particulars	Amount (₹)
Net Profit for the year	30,00,000
Less: Preference dividend (12% of ₹ 1,00,00,000)	(12,00,000)
Earnings for equity shareholders	18,00,000
÷ No. of equity shares (₹ 60,00,000/₹ 10)	6,00,000
Therefore, Earnings per share	**₹ 3.00**

2.   Calculation of Dividend per share (D₀)

Particulars	
Earnings per share	₹ 3
Retention Ratio (b)	75%
Dividend pay-out ratio (1-b)	25%
Dividend per share	₹ 3 x 0.25 = **₹ 0.75**

Question 8 (Vault Q. 25)   **[May 23 – 5 Marks]**

Following information are given for a company:

Earnings per share	₹ 10
P/E ratio	12.5
Rate of return on investment	12%
Market price per share as per Walter's Model	₹ 130

You are required to calculate:

(i) Dividend payout ratio

(ii) Market price of share at optimum dividend payout ratio

(iii) P/E ratio, at which the dividend policy will have no effect on the price of share

(iv) Market price of share at this P/E ratio

(v) Market price of share using Dividend growth model

Solution

(i) The EPS of the firm is ₹ 10, r =12%. The P/E Ratio is given at 12.5 and the cost of capital (Ke) may be taken as the inverse of P/E ratio. Therefore, Ke is 8% (i.e., 1/12.5). The value of the share is ₹ 130 which may be equated with Walter Model as follows:

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

Or, [D + 1.5 (10 - D)] / 0.08 = 130

Or, D + 15 – 1.5D = 10.4

Or, – 0.5D = – 4.6

So, D = ₹ 9.2

The firm has a dividend pay-out of 92% (i.e., 9.2/10).

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

$$P = \frac{0 + \frac{12\%}{8\%}(10 - 0)}{8\%} = ₹ 187.5$$

So, theoretically the market price of the share can be increased by adopting a zero pay-out.

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

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

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

(v) **Dividend Growth Model taking Dividend as D_0**

K_e = 8%, r = 12%, D_0 = 9.2, b = 0.08

g = b.r = 0.08 × 0.12 = 0.96%

D_1 = D_0 (1+g) = 9.2 (1 + 0.0096) = ₹ 9.2883

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

Alternatively, taking Dividend as D₁

$$P = \frac{E(1-b)}{K_e - br} = \frac{10(1-0.08)}{0.08 - (0.08 \times 0.12)} = \frac{9.2}{0.08 - 0.0096} = 130.68$$

➢ MM Hypothesis

Question 9 (Vault Q. 31)   **[MTP 2 May 23 – 10 Marks]**

Rex Ltd has 20 lakh equity shares outstanding at the start of the accounting year 2023. The existing market price per share is ₹ 300. Expected dividend is ₹ 20 per share. The rate of capitalization appropriate to the risk class to which the company belongs is 20%.

CALCULATE the market price per share when expected dividends are: (a) declared, and (b) not declared, based on the Miller – Modigliani approach.

CALCULATE number of shares to be issued by the company at the end of the accounting year on the assumption that the net income for the year is ₹ 5 crore; investment budget is ₹ 8 crores, when (a) Dividends are declared, and (b) Dividends are not declared.

PROVE that the market value of the shares at the end of the accounting year will remain unchanged irrespective of whether (a) Dividends are declared, or (b) Dividends are not declared.

WHAT is the implied growth rate in dividends as per Gordon's model, if expected dividend payment is considered imminent?

Solution

(a)   (i)   Calculation of market price per share

According to Miller – Modigliani (MM) Approach:

$$P_o = \frac{P_1 + D_1}{1 + K_e}$$

a. If expected dividends are declared, then

$$300 = \frac{P_1 + 20}{1 + 0.2}$$

$$300 \times 1.2 = P_1 + 20$$

$$P_1 = 340$$

b. If expected dividends are not declared, then

$$300 = \frac{P_1 + 0}{1 + 0.2}$$

$$300 \times 1.2 = P_1$$

$$P_1 = 360$$

(ii)   Calculation of number of shares to be issued

	(a) Dividends are declared (₹ lakhs)	(b) Dividends are not declared (₹ lakhs)
Net income	500	500
Less: Total dividends	(400)	-
A. Retained earnings	100	500

B. Investment budget	800	800
Amount to be raised by new issue (B – A)	700	300
÷ Relevant market price (₹ per share)	340	360
No. of new shares to be issued (in lakhs)	2.0588	0.8333

(iii)   Calculation of market value of the shares

	(a) Dividends are declared	(b) Dividends are not declared
Existing shares (in lakhs)	20.00	20.00
Add: New shares (in lakhs)	2.0588	0.8333
Total shares (in lakhs)	22.0588	20.8333
× Market price per share (₹)	340	360
Total market value of shares at the end of the year (₹ in lakh)	22.0588 × 340 = **7,500 (approx.)**	20.8333 × 360 = **7,500 (approx.)**

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

(iv) $P_0 = \dfrac{D_1}{K_e - g}$

$300 = \dfrac{20}{0.20 - g}$

$0.2 - g = 20/300 = 0.0667$

$g = 0.133333 = \textbf{13.3333\%}$

Question 10 (Vault Q. 32) **[RTP Nov 22]**

Ordinary shares of a listed company are currently trading at ₹ 10 per share with two lakh shares outstanding. The company anticipates that its earnings for next year will be ₹ 5,00,000. Existing cost of capital for equity shares is 15%. The company has certain investment proposals under discussion which will cause an additional 26,089 ordinary shares to be issued if no dividend is paid or an additional 47,619 ordinary shares to be issued if dividend is paid.

Applying the MM hypothesis on dividend decisions, calculate the amount of investment and dividend that is under consideration by the company.

Solution

P_0 = ₹ 10;   n = ₹ 2,00,000;   E = ₹ 5,00,000,

K_e = 15%; Δ n = 26,089;   I = ?

$P_0 = \dfrac{D_1 + P_1}{1 + K_e}$

$10 = \dfrac{0 + P_1}{1.15}$

$\therefore P_1 = 11.5$

$$\Delta n \quad = \frac{I - E + nD_1}{P_1}$$

$$26{,}089 \quad = \frac{I - 5{,}00{,}000}{11.5}$$

I   = 8,00,024

Now,

P₀ = ₹10,   n = ₹ 2,00,000,   E = ₹ 5,00,000,   I = 8,00,024,

K_e = 15%, Δn = 47,619, D_1 = ?

$$P_0 \quad = \frac{P_1 + D_1}{1 + K_e}$$

$$10 \quad = \frac{P_1 + D_1}{1.15}$$

$P_1 + D_1$ = 11.5

∴ P_1 = 11.5 – D_1 .... Eq. 1

$$\therefore \Delta n \quad = \frac{I - E + nD_1}{P_1}$$

$$47{,}619 \quad = \frac{8{,}00{,}024 - 5{,}00{,}000 + 2{,}00{,}000 D_1}{P_1}$$

47,619 P_1 = 2,00,000 D_1 + 3,00,024

From Eq. 1,

47,619 (11.5 – D_1)   = 2,00,000 D_1 + 3,00,024

5,47,618.5 – 47,619D_1 = 2,00,000 D_1 + 3,00,024

∴ 2,47,594.5   = 2,00,000 D_1 + 47,619D_1

∴ 2,47,594.5   = 2,47,619D_1

$$\therefore D_1 \quad = \frac{2{,}47{,}594.5}{2{,}47{,}619} = 0.99 \approx ₹ 1$$

∴ P_1 = 11.5 – D_1

P_1 = 10.5

$$\therefore n.P_0 \quad = \frac{(n + \Delta n) P_1 - I + E}{1 + K_e} \quad = \frac{(2{,}00{,}000 + 47{,}619) \times 10.5 - 8{,}00{,}024 + 5{,}00{,}000}{1.15}$$

∴ $n.P_0$ = ₹ 19,99,979 ≈ ₹ 20,00,000

Using direct calculation,

$n.P_0$ = 2,00,000 × 10 = ₹ 20,00,000

➢ **Bonus, Buyback and Others**

Question 11 (Vault Q. 36)   **[MTP 2 Sep 24 – 5 Marks]**

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.

Solution

(i)	No. of Equity share (before buyback)	= Total Earnings (before buyback)/EPS
		= 18,00,000/(270/18)
		= 1,20,000 Shares
(ii)	Buyback price	= 270 + 10% premium = 297
(iii)	No. of Equity share (after buyback)	= 1,20,000 (−) 20,000 = 1,00,000 Shares
(iv)	Total Book Value of Equity (after buyback)	= 1,00,000 × 193.20 = 1,93,20,000
	Now,	
	Total Book Value of Equity (after buyback)	= Total Book Value of Equity (before buyback) (−) Amount of buyback
	1,93,20,000	= x (−) (20,000 × 297)
	Therefore X	= 2,52,60,000 (Total Book Value before buyback)
	Book Value per share (before buyback)	= $\frac{2,52,60,000}{1,20,000}$ = **210.50 per share**

Question 12 (Vault Q. 37)   [MTP 2 Sep 24 – 5 Marks]

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.

Solution

Computation of PV of Future Cash Flows

Year	Nature	Cash Flow	DF @ 12%	DCF
0	Initial Investment (₹ 500 + 5%)	(525)	1	(525)
1 – 4	Dividends (₹ 100 × 20%)	20	3.038	60.76
5 – 7	Dividends (₹ 100 × 1.2 × 20%)	24	1.526	36.62
7	Net sale Proceeds (₹ 900 x 1.2 − 5%)	1026	0.452	463.75
	Net Present Value			**36.13**

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

➢ EBIT – EPS – MPS Analysis

Question 1 (Vault Q. 9)   **[May 23 – 10 Marks]**

The following information pertains to CIZA Ltd.:

	₹
Capital Structure:	
Equity share capital (₹ 10 each)	8,00,000
Retained earnings	20,00,000
9% Preference share capital (₹ 100 each)	12,00,000
12% Long-term loan	10,00,000
Interest coverage ratio	8
Income tax rate	30%
Price – earnings ratio	25

The company is proposed to take up an expansion plan, which requires an additional investment of ₹34,50,000. Due to this proposed expansion, earnings before interest and taxes of the company will increase by ₹ 6,15,000 per annum. The additional fund can be raised in following manner:

● By issue of equity shares at present market price, or

● By borrowing 16% Long-term loans from bank.

You are informed that Debt-equity ratio (Debt/ Shareholders' fund) in the range of 50% to 80% will bring down the price-earnings ratio to 22 whereas; Debt-equity ratio over 80% will bring down the price-earnings ratio to 18.

Required:

Advise which option is most suitable to raise additional capital so that the Market Price per Share (MPS) is maximized.

Solution

Working notes:

(i)   Interest Coverage ratio = 8

$$\frac{\text{EBIT}}{\text{Interst}} = 8$$

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

So, EBIT = ₹ 9,60,000

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

Option 1: Equity option

Debt = ₹ 10,00,000

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

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

P/E ratio in this case will be 25 times

Option 2: Debt option

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

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

Debt Equity ratio (Debt/Shareholders fund) = $\dfrac{44,50,000}{40,00,000}$ = 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.

Question 2 (Vault Q. 11)   **[May 22 – 10 Marks]**

The particulars relating to Raj Ltd. for the year ended 31st March, 2022 are given as follows:

Output (units at normal capacity)	1,00,000
Selling price per unit	₹ 40
Variable cost per unit	₹ 20
Fixed cost	₹ 10,00,000

The capital structure of the company as on 31st March, 2022 is as follows:

Particulars	Amount in ₹
Equity share capital (1,00,000 shares of ₹ 10 each)	10,00,000
Reserves and surplus	5,00,000
Current liabilities	5,00,000
Total	**20,00,000**

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

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

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

Current market price per share is ₹ 200.

Slab wise interest rate for fund borrowed is as follows:

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

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

Solution

Alternative 1   =   Raising Debt of ₹ 5 lakh + Equity of ₹ 15 lakh

Alternative 2   =   Raising Debt of ₹ 10 lakh + Equity of ₹ 10 lakh

Alternative 3   =   Raising Debt of ₹ 14 lakh + Equity of ₹ 6 lakh

Calculation of Earnings per share (EPS)

Particulars	FINANCIAL ALTERNATIVES		
	Alternative 1 (₹)	Alternative 2 (₹)	Alternative 3 (₹)
Expected EBIT [W. N. (a)]	19,50,000	19,50,000	19,50,000
Less: Interest [W. N. (b)]	(50,000)	(1,25,000)	(2,05,000)
Earnings before taxes (EBT)	**19,00,000**	**18,25,000**	**17,45,000**
Less: Taxes @ 40%	7,60,000	7,30,000	6,98,000
Earnings after taxes (EAT)	**11,40,000**	**10,95,000**	**10,47,000**
Number of shares [W. N. (d)]	1,07,500	1,05,000	1,03,000
Earnings per share (EPS)	**10.60**	**10.43**	**10.17**

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

Working Notes (W.N.):

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

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

(b)   Calculation of interest on Debt

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

(c)   Number of equity shares to be issued

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

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

Alternative 3 $= \dfrac{₹(20,00,000 - 14,00,000)}{₹\,200 \text{ (Market price of share)}} = \dfrac{₹\,6,00,000}{₹\,200} = 3.000 \text{ shares}$

(d)   **Calculation of total equity shares after expansion program**

	Alternative 1	Alternative 2	Alternative 3
Existing no. of shares	1,00,000	1,00,000	1,00,000
Add: issued under expansion program	7,500	5,000	3,000
Total no. of equity shares	**1,07,500**	**1,05,000**	**1,03,000**

Question 3 (Vault Q. 12)   [May 25 RTP]

Namra Limited provides you with the following information –

Particulars	Amount (₹)
Operating Profit	6,20,000
Less: Interest on Debentures @ 10%	(80,000)
EBT	5,40,000
Less: Tax @ 20%	(1,08,000)
PAT	4,32,000
Less: 14% Preference Dividend	(1,12,000)
Earnings for Equity Share Holders	3,20,000
No of Equity Shares (₹ 10 Each)	16,000
EPS	20

The Reserves & Surplus of the company is at ₹ 9,00,000 and Namra Limited requires additional funds of ₹15,00,000 for modernization and expansion. The current capitalization rate for the equity is 20% and company has a policy to retain 40% of its earnings. The debentures and preference shares are trading at premium of 10% & 25% to its current book value respectively. The fair value of equity shares is calculated by dividing the number of equity shares to the Overall Value of the firm.

New equity shares for expansion will be issued 15% discount to the current fair value price.

Return on Capital Employed (ROCE) which is based on the total value of the firm, will increase by 10% to its current rate after expansion and modernization. If the capital gearing ratio goes above 2.50 then interest rate on additional debt will increase by 200 basis points and dividend on preference shares would increase by half a percentage.

You are required to ADVISE on the below two financial plan to be selected based on earnings.

(i)   Two-third amount is raised through debenture and remaining by preference share.

(ii)   Issue of equity shares only.

Solution

Particulars	Additional Funds : Debt = 15,00,000 × 2/3 Pref = 15,00,000 × 1/3	Additional Funds: 100% Equity
Operating Profit **Wn – 1**	9,55,776	9,55,776
Less: Interest Exp		
Current	(80,000)	(80,000)
Additional (10,00,000 × 12%) **Wn – 2**	(1,20,000)	-

EBT	7,55,776	8,75,776
Less: Tax @ 20%	(1,51,155)	(1,75,155)
EAT	6,04,621	7,00,621
Less: Preference Dividend		
Current	(1,12,000)	(1,12,000)
Additional (5,00,000 × 14.5%) **Wn – 2**	(72,500)	-
Earnings for Equity Shareholders	4,20,121	5,88,621
No of Equity Shares:		
Current	16,000	16,000
Additional **Wn – 3**	-	7,550
EPS	**26.26**	**25.00**

WN 1 – Calculation of EBIT after expansion

As given in the question, ROCE is based on the total value of firm, so first step would be to calculate the total value of the firm

Value of Firm   = Value of Debt + Value of Pref shares + Value of Equity + Value of R/S

Value of Debt (Vd)   = $\dfrac{\text{Interest}(₹)}{\text{Interest \%}}$ + 10% premium

                         = $\dfrac{80,000}{0.10}$ + 10% premium

                         = ₹ 8,80,000

Value of Preference (Vp)   = $\dfrac{\text{Pref Div}(₹)}{\text{Pref Div \%}}$ + 25% premium

                         = $\dfrac{1,12,000}{0.14}$ + 25% premium

                         = ₹ 10,00,000

Value of Equity share capital (Ve)   = $\dfrac{\text{Dividend}}{\text{Ke}}$

                                = $\dfrac{3,20,000 \times 0.6}{0.20}$

                                = 9,60,000

Value of R/S = 9,00,000

Therefore, Value of Firm (Vf)   = 8,80,000 + 10,00,000 + 9,60,000 + 9,00,000

                                = 37,40,000

ROCE (Before expansion)   = $\dfrac{\text{EBIT}}{\text{Total value of the firm}}$

                                = $\dfrac{6,20,000}{37,40,000}$

                                = 16.58%

ROCE (After expansion)   = 16.58 + 1.658 (i.e 16.58 + 10%)

                                = 18.24%

EBIT (After expansion)   = (37,40,000 + 15,00,000) × 18.24% **= ₹ 9,55,776**

WN 2 – Calculation of Interest on additional debt and Preference dividend on additional Preference share capital

Condition – If the capital gearing ratio goes above 2.50, then additional debt raised would be at higher rate of interest and additional Preference shares would also be raised at higher preference dividend rate

Capital gearing ratio when Additional funds are raised through additional debt and preference share capital.

Capital gearing ratio $\quad = \dfrac{8,00,000 + 8,00,000 + 15,00,000}{1,60,000 + 9,00,000}$

Capital gearing ratio $\quad = 2.92$

Since it is greater than 2.50, Interest on Debt = 10% + 2% (200 basis points)

$$= 12\%$$

Preference Dividend $\quad = 14\% + 0.5\% = 14.5\%$

WN 3 – Calculation of Additional No of Equity shares when funds are raised through equity

Fair value of equity shares before issuing new equity share

$$= \frac{\text{Total Value of the firm}}{\text{No of existing equity shares}}$$

$$= \frac{37,40,000}{16,000}$$

$$= ₹ 233.75$$

Issue Price $\quad = 233.75 – 15\%$ Discount $= ₹ 198.69$

Therefore, No of New Equity shares to be issued

$$= \frac{\text{Additional Funds to be raised}}{\text{Fair value}}$$

$$= \frac{15,00,000}{198.69}$$

$$= 7549.45 \text{ shares approx. } \textbf{7550 shares}$$

Comment – It is advisable for Namra Limited to raise the additional funds through a mix of debentures and preference as EPS is maximum.

➢ Indifference Point

Question 4 (Vault Q. 17)   **[ICAI SM]**

Xylo Ltd. is considering two alternative financing plans as follows:

Particulars	Plan – A (₹)	Plan – B (₹)
Equity shares of ₹ 10 each	8,00,000	8,00,000
Preference Shares of ₹ 100 each	-	4,00,000
12% Debentures	4,00,000	-
	12,00,000	12,00,000

The indifference point between the plans is ₹ 4,80,000. Corporate tax rate is 30%. CALCULATE the rate of dividend on preference shares.

Solution

Computation of Rate of Preference Dividend

$$\frac{(\text{EBIT} - \text{Interest})(1 - t)}{\text{No. of Equity Shares}(N_1)} = \frac{\text{EBIT}(1 - t) - \text{Preference Dividend}}{\text{No. of Equity Shares }(N_2)}$$

$$\frac{(₹\,4,80,000 - ₹\,48,000) \times (1 - 0.30)}{80,00,000 \text{ shares}} = \frac{₹\,4,80,000(1 - 0.30) - \text{Preference Dividend}}{80,00,000 \text{ shares}}$$

$$\frac{₹\,3,02,400}{80,00,000 \text{ shares}} = \frac{₹\,3,36,000 - \text{Preference Dividend}}{80,00,000 \text{ shares}}$$

$$₹\,3,02,400 = ₹\,3,36,000 - \text{Preference Dividend}$$

$$\text{Preference Dividend} = ₹\,3,36,000 - ₹\,3,02,400 = ₹\,33,600$$

$$\text{Rate of Dividend} = \frac{\text{Preference Dividend}}{\text{Preference share capital}} \times 100$$

$$= \frac{33,600}{4,00,000} \times 100 = 8.4\%$$

Question 5 (Vault Q. 18)   [ICAI SM]

Ganapati Limited is considering three financing plans. The key information is as follows:

(a)   Total investment to be raised is ₹ 2,00,000.

(b)   Plans of Financing Proportion:

Plans	Equity	Debt	Preference Shares
A	100%	-	-
B	50%	50%	-
C	50%	-	50%

(c)   Cost of debt   8%

         Cost of preference shares   8%

(d)   Tax rate   50%

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

(f)   Expected EBIT is ₹ 80,000.

You are required to DETERMINE for each plan:

(i)   Earnings per share (EPS)

(ii)   The financial break-even point

(iii)   Indicate if any of the plans dominate and compute the EBIT range among the plans for indifference.

Solution

(i)   Computation of Earnings per share (EPS)

Plans	A (₹)	B (₹)	C (₹)
Earnings before interest and tax (EBIT)	80,000	80,000	80,000
Less: Interest charges	---	(8,000) (8% × ₹1 lakh)	---
Earnings before tax (EBT)	80,000	72,000	80,000

Less: Tax (@ 50%)	(40,000)	(36,000)	(40,000)
Earnings after tax (EAT)	40,000	36,000	40,000
Less: Preference dividend	---	---	(8,000) (8% × ₹1 lakh)
EATESH (A)	40,000	36,000	32,000
No. of Equity shares (B)	10,000 (₹ 2 lakh ÷ ₹ 20)	5,000 (₹ 1 lakh ÷ ₹ 20)	5,000 (₹ 1 lakh ÷ ₹ 20)
EPS [(A) ÷ (B)]	4	7.20	6.40

(ii) **Calculation of Financial Break-even point**

Financial break-even point = Interest + Preference Dividend/(1 – t)

Plan A: Under this plan there is no interest or preference dividend payment hence, the Financial Break-even point will be zero.

Plan B: Under this plan there is an interest payment of ₹ 8,000 and no preference dividend, hence, the Financial Break-even point will be ₹ 8,000 (Interest charges).

Plan C: Under this plan there is no interest payment but an after tax preference dividend of ₹ 8,000 is paid. Hence, the Financial Break- even point will be before tax earnings of ₹ 16,000 (i.e. ₹8,000 ÷ (1 – 0.5) = ₹ 16,000)

(iii) **Computation of indifference point between the plans**

The indifference between two alternative methods of financing is calculated by applying the following formula:

$$\frac{(EBIT - I_1)(1 - T)}{E_1} = \frac{(EBIT - I_2)(1 - T)}{E_2}$$

I. **Indifference point where EBIT of Plan A and Plan B is equal.**

$$\frac{(EBIT - 0)(1 - 0.5)}{10,000} = \frac{(EBIT - 8,000)(1 - 0.5)}{5,000}$$

0.5 EBIT (5,000)	=	(0.5 EBIT – 4,000) (10,000)
0.5 EBIT	=	EBIT – 8,000
0.5 EBIT	=	8,000
EBIT	=	₹ 16,000

II. **Indifference point where EBIT of Plan A and Plan C is equal.**

$$\frac{(EBIT - 0)(1 - 0.5)}{10,000} = \frac{(EBIT - 0)(1 - 0.5) - 8,000}{5,000}$$

$$\frac{0.5\ EBIT}{10,000} = \frac{0.5\ EBIT - 8,000}{5,000}$$

0.25 EBIT	=	0.5 EBIT – 8,000
0.25 EBIT	=	8,000
EBIT	=	₹ 32,000

III. **Indifference point where EBIT of Plan B and Plan C are equal.**

$$\frac{(EBIT - ₹8,000)(1 - 0.5)}{5,000} = \frac{(EBIT - 0)(1 - 0.5) - ₹8,000}{5,000}$$

0.5 EBIT – 4,000   =   0.5 EBIT – ₹ 8,000

There is no indifference point between the financial plan B and C.

It can be seen that Financial Plan B dominates Plan C. Since, the financial break-even point of the former is only ₹ 8,000 but in case of latter it is ₹ 16,000. Further EPS of plan B is the highest.

Question 6 (Vault Q. 20)   **[Nov 05 – 10 Marks]**

A Company needs ₹ 31,25,000 for the construction of a new plant. The following three plans are feasible:

I   The Company may issue 3,12,500 equity shares at ₹ 10 per share.

II   The Company may issue 1,56,250 equity shares at ₹ 10 per share and 15,625 debentures of ₹ 100 denomination bearing a 8% rate of interest.

III   The Company may issue 1,56,250 equity shares at ₹ 10 per share and 15,625 cumulative preference shares at ₹ 100 per share bearing a 8% rate of dividend.

(i)   if the Company's earnings before interest and taxes are ₹ 62,500, ₹ 1,25,000, ₹ 2,50,000, ₹3,75,000 and ₹ 6,25,000, what are the earnings per share under each of three financial plans ? Assume a Corporate Income tax rate of 40%.

(ii)   Which alternative would you recommend and why?

(iii)   Determine the EBIT-EPS indifference points by formulae between Financing Plan I and Plan II and Plan I and Plan III.

Solution

(i)   Computation of EPS under three-financial plans.

Plan I: Equity Financing

	(₹)	(₹)	(₹)	(₹)	(₹)
EBIT	62,500	1,25,000	2,50,000	3,75,000	6,25,000
Interest	0	0	0	0	0
EBT	62,500	1,25,000	2,50,000	3,75,000	6,25,000
Less: Tax @ 40%	25,000	50,000	1,00,000	1,50,000	2,50,000
PAT	37,500	75,000	1,50,000	2,25,000	3,75,000
No. of equity shares	3,12,500	3,12,500	3,12,500	3,12,500	3,12,500
EPS	0.12	0.24	0.48	0.72	1.20

Plan II: Debt – Equity Mix

	(₹)	(₹)	(₹)	(₹)	(₹)
EBIT	62,500	1,25,000	2,50,000	3,75,000	6,25,000
Less: Interest	1,25,000	1,25,000	1,25,000	1,25,000	1,25,000
EBT	(62,500)	0	1,25,000	2,50,000	5,00,000
Less: Tax @ 40%	25,000*	0	50,000	1,00,000	2,00,000
PAT	(37,500)	0	75,000	1,50,000	3,00,000
No. of equity shares	1,56,250	1,56,250	1,56,250	1,56,250	1,56,250
EPS	(₹ 0.24)	0	0.48	0.96	1.92

* The Company can set off losses against the overall business profit or may carry forward it to next financial years.

Plan III: Preference Shares – Equity Mix

	(₹)	(₹)	(₹)	(₹)	(₹)
EBIT	62,500	1,25,000	2,50,000	3,75,000	6,25,000
Less: Interest	0	0	0	0	0
EBT	62,500	1,25,000	2,50,000	3,75,000	6,25,000
Less: Tax @ 40%	25,000	50,000	1,00,000	1,50,000	2,50,000
PAT	37,500	75,000	1,50,000	2,25,000	3,75,000
Less: Pref. dividend	1,25,000*	1,25,000*	1,25,000	1,25,000	1,25,000
PAT after Pref. dividend	(87,500)	(50,000)	25,000	1,00,000	2,50,000
No. of Equity shares	1,56,250	1,56,250	1,56,250	1,56,250	1,56,250
EPS	(0.56)	(0.32)	0.16	0.64	1.60

* In case of cumulative preference shares, the company has to pay cumulative dividend to preference shareholders, when company earns sufficient profits.

(ii)   From the above EPS computations tables under the three financial plans we can see that when EBIT is ₹ 2,50,000 or more, Plan II: Debt-Equity mix is preferable over the Plan I and Plan III, as rate of EPS is more under this plan. On the other hand an EBIT of less than ₹ 2,50,000, Plan I: Equity Financing has higher EPS than Plan II and Plan III. Plan III Preference share-Equity mix is not acceptable at any level of EBIT, as EPS under this plan is lower.

The choice of the financing plan will depend on the performance of the company and other macro economic conditions. If the company is expected to have higher operating profit Plan II: Debt – Equity Mix is preferable. Moreover, debt financing gives more benefit due to availability of tax shield.

(iii)   **EBIT – EPS Indifference point : Plan I and Plan II**

$$\frac{EBIT_1 \times (1-t)}{\text{No. of equity shares } (N_1)} = \frac{(EBIT_2 - \text{Interest}) \times (1-t)}{\text{No. of equity shares } (N_2)}$$

$$\frac{EBIT(1-0.40)}{3,12,500 \text{ shares}} = \frac{(EBIT - ₹1,25,000) \times (1-0.40)}{1,56,250 \text{ shares}}$$

$$0.6 \, EBIT = 1.2 \, EBIT - ₹1,50,000$$

$$EBIT = \frac{₹1,50,000}{0.6} = ₹2,50,000$$

Indifference points between Plan I and Plan II is ₹ 2,50,000

EBIT – EPS Indifference Point: Plan I and Plan III

$$\frac{EBIT_1 \times (1-t)}{\text{No. of equity shares } (N_1)} = \frac{EBIT_3 \times (1-t) - \text{Pref. dividend}}{\text{No. of equity shares } (N_3)}$$

$$\frac{EBIT_1(1-0.40)}{3,12,500 \text{ shares}} = \frac{EBIT_3(1-0.40) - ₹1,25,000}{1,56,250 \text{ shares}}$$

$$0.6 \, EBIT = 1.2 \, EBIT - ₹2,50,000$$

$$EBIT = \frac{₹2,50,000}{0.6} = ₹4,16,667$$

Indifference points between Plan I and Plan III is ₹ 4,16,667.

Question 7 (Vault Q. 21)   **[May 23 RTP]**

Current Capital Structure of XYZ Ltd is as follows:

Equity Share Capital of 7 lakh shares of face value ₹ 20 each

Reserves of ₹ 10,00,000

9% bonds of ₹ 3,00,00,000

11% preference capital: 3,00,000 shares of face value ₹ 50 each

Additional Funds required for XYZ Ltd are ₹ 5,00,00,000.

XYZ Ltd is evaluating the following alternatives:

I.   Proposed alternative I: Raise the funds via 25% equity capital and 75% debt at 10%. PE ratio in such scenario would be 12.

II.   Proposed alternative II: Raise the funds via 50% equity capital and rest from 12% Preference capital. PE ratio in such scenario would be 11.

Any new equity capital would be issued at a face value of ₹ 20 each. Any new preferential capital would be issued at a face value of ₹ 20 each. Tax rate is 34%

DETERMINE the indifference point under both the alternatives.

Solution

Current Capital Structure		
Equity Share Capital	₹ 20 × 7 lakhs	₹ 1,40,00,000
Reserves		₹ 10,00,000
9% Bonds		₹ 3,00,00,000
11% Preference Share Capital	₹ 50 × 3 lakhs	₹ 1,50,00,000
Total Capital Employed		**₹ 6,00,00,000**

Proposed Capital Structure

Capital	Working	Proposal I	Proposal II
Capital to be raised		₹5,00,00,000	₹5,00,00,000
Equity	5,00,00,000 × 25%	₹ 1,25,00,000	-
	5,00,00,000 × 50%	-	₹ 2,50,00,000
Debt @ 10%	5,00,00,000 × 75%	₹ 3,75,00,000	-
Preference Shares @ 12%	5,00,00,000 × 50%	-	₹ 2,50,00,000
Combined Capital		**Amount (Proposal 1)**	**Amount (Proposal 2)**
Equity		₹ 2,65,00,000	₹ 3,90,00,000
Reserves		₹ 10,00,000	₹ 10,00,000
9% Bond		₹ 3,00,00,000	₹ 3,00,00,000
10% Debt		₹ 3,75,00,000	-
11% Preference Shares		₹ 1,50,00,000	₹ 1,50,00,000
12% Preference Shares		-	₹ 2,50,00,000
		₹ 11,00,00,000	**₹ 11,00,00,000**

Interest for Proposal I   = ₹ 3,00,00,000 × 9% + ₹ 3,75,00,000 × 10%

$$= ₹\,27,00,000 + ₹\,37,50,000$$

$$= ₹\,64,50,000$$

Preference Dividend for Proposal I	$= ₹\,1,50,00,000 × 11\% = ₹\,16,50,000$
Interest for Proposal II	$= ₹\,3,00,00,000 × 9\% = ₹\,27,00,000$
Preference Dividend for Proposal II	$= ₹\,1,50,00,000 × 11\% + ₹\,2,50,00,000 × 12\%$
	$= ₹\,16,50,000 + ₹\,30,00,000 = ₹\,46,50,000$

Let the indifference point be ₹ X

For Proposal I,

$$\text{EPS} = \frac{(X - ₹\,64,50,000) × 0.66 - ₹\,16,50,000}{₹\,13,25,000} \qquad (1)$$

For Proposal II,

$$\text{EPS} = \frac{(X - ₹\,27,00,000) × 0.66 - ₹\,46,50,000}{₹\,13,25,000} \qquad (2)$$

Equating (1) and (2),

$$\text{EPS} = \frac{(X - ₹\,64,50,000) × 0.66 - ₹\,16,50,000}{₹\,13,25,000} = \frac{(X - ₹\,27,00,000) × 0.66 - ₹\,46,50,000}{₹\,19,50,000}$$

$$\frac{0.66X\ ₹\,42,57,000 - ₹\,16,50,000}{₹\,1,325} = \frac{0.66X - ₹\,17,82,000 - ₹\,46,50,000}{₹\,1,950}$$

$$\frac{0.66X - ₹\,59,07,000}{₹\,53} \text{.......} = \frac{0.66X - ₹\,64,32,000}{₹\,78}$$

₹ 51.48X – ₹ 46,07,46,000 = ₹ 37.98X – ₹ 34,08,96,000

₹ 16.5X = ₹ 11,98,50,000

Indifference Point = X = ₹ 72,63,636.36

➢ Net Income Approach

○ **Question 8 (Vault Q. 22)**   **[ICAI SM]**

Indra Ltd. has an EBIT of ₹ 1,00,000. The company makes use of both the debt and equity capital. The firm has 10% debentures of ₹ 5,00,000 and the firm's equity capitalization rate is 15%.

You are required to COMPUTE:

(i)   Total value of the firm

(ii)   Overall cost of capital.

Solution

(i)   Calculation of total value of the firm

	₹
EBIT	1,00,000
Less: Interest (@10% on ₹ 5,00,000)	50,000
Earnings available for equity holders	50,000
Equity capitalization rate i.e. K_e	15%

$$\text{Value of equity(s)} = \frac{\text{Earnings available for equity holders}}{K_e}$$

$$= \frac{₹50,000}{0.15} = ₹3,33,333$$

Value of Debt (D) (given)   ₹ 5,00,000

Total value of the firm (V) = D + S (5,00,000 + 3,33,333)   ₹ 8,33,333

(ii)   Overall cost of capital$(K_o) = K_e\left(\dfrac{S}{V}\right) + K_d\left(\dfrac{D}{V}\right)$

$$= 0.15\left(\frac{₹3,33,333}{₹8,33,333}\right) + 0.10\left(\frac{₹5,00,000}{₹8,33,333}\right)$$

$$= \frac{1}{₹8,33,333}[₹50,000 + ₹50,000] = 12.00\%$$

Or, $K_0 = \dfrac{\text{EBIT}}{V} = \dfrac{₹1,00,000}{₹8,33,333} = 12.00\%$

➢ Net Operating Income Approach

Question 9 (Vault Q. 25)   **[ICAI SM]**

Alpha Ltd. and Beta Ltd. are identical except for capital structure. Alpha Ltd. has 50 per cent debt and 50 per cent equity, whereas Beta Ltd. has 20 per cent debt and 80 per cent equity (All percentages are in market-value terms). The borrowing rate for both the companies is 8 per cent in a no-tax world, and capital markets are assumed to be perfect.

(a)   (i)   If you own 2 per cent of the shares of Alpha Ltd., DETERMINE your return if the company has net operating income of ₹ 3,60,000 and the overall capitalisation rate of the company (K_0) is 18 per cent.

        (ii)   CALCULATE the implied required rate of return on equity of Alpha Ltd.

(b)   Beta Ltd. has the same net operating income as Alpha Ltd.

        (i)   CALCULATE the implied required rate of return on equity of Beta Ltd.

        (ii)   ANALYSE why does it differ from that of Alpha Ltd.

Solution

(a)   Value of the Alpha Ltd. $= \dfrac{\text{NOI}}{K_0} = \dfrac{₹3,60,000}{18\%} = ₹20,00,000$

        (i)   Return on Equity shares of Alpha Ltd.

	₹
Value of the company	20,00,000
Market value of debt (50% × ₹ 20,00,000)	10,00,000
Market value of equity (50% × ₹ 20,00,000)	10,00,000
	₹
Net operating income	3,60,000

Less: Interest on debt (8% × ₹ 10,00,000)	80,000
Earnings available to equity shareholders	2,80,000
Return on 2% equity shares (2% × ₹ 2,80,000)	5,600

(ii)   Implied required rate of return on equity of Alpha Ltd.

$$= \frac{\text{Earnings available for equity shareholders}}{\text{Market value of Equity}} = \frac{₹\,2,80,000}{₹\,10,00,000} = 28\%$$

(b)   (i)   Calculation of Implied rate of return on equity of Beta Ltd.

	₹
Total value of company	20,00,000
Market value of debt (20% × ₹ 20,00,000)	4,00,000
Market value of equity (80% × ₹ 20,00,000)	16,00,000

	₹
Net operating income	3,60,000
Less: Interest on debt (8% × ₹4,00,000)	32,000
Earnings available to shareholders	3,28,000

Implied required rate of return on equity

$$= \frac{\text{Earnings available for equity shareholders}}{\text{Market value of Equity}} = \frac{₹\,3,28,000}{₹\,16,00,000} = 20.5\%$$

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

Question 10 (Vault Q. 26)   **[May 18 RTP]**

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.

Solution

(i)   Valuation under Net Income Approach

Particulars	P Amount (₹)	Q Amount (₹)
Earnings before Interest & Tax (EBIT) (20% of ₹ 30,00,000)	6,00,000	6,00,000
Less: Interest (10% of ₹ 18,00,000)	1,80,000	
Earnings before Tax (EBT)	4,20,000	6,00,000

Less: Tax @ 50%	2,10,000	3,00,000
Earnings after Tax (EAT) (available to equity holders)	2,10,000	3,00,000
Value of equity (capitalized @ 15%)	14,00,000 (2,10,000 × 100/15)	20,00,000 (3,00,000 × 100/15)
Add: Total Value of debt	18,00,000	Nil
Total Value of Company	32,00,000	20,00,000

(ii)   Valuation of Companies under Net Operating Income Approach

Particulars	P Amount (₹)	Q Amount (₹)
Capitalisation of earnings at 15% $\left(\dfrac{₹\,6,00,000(1-0.5)}{0.15}\right)$	20,00,000	20,00,000
Less: Value of debt {18,00,000 (1 – 0.5)}	9,00,000	Nil
Value of equity	11,00,000	20,00,000
Add: Total Value of debt	18,00,000	Nil
Total Value of Company	29,00,000	20,00,000

➢ MM Hypothesis – Arbitrage

Question 11 (Vault Q. 28)   **[May 24 – 4 Marks]**

Following data is available in respect of Levered and Unlevered companies having same business risk:

Capital employed = ₹ 2,00,000, EBIT = ₹ 25,000 and K_e = 12.5%

Sources	Levered Company (₹)	Unlevered Company (₹)
Debt (@ 8%)	75,000	Nil
Equity	1,25,000	2,00,000

An investor is holding 12% shares in levered company. Calculate the increase in annual earnings of investor if he switches over his holding from Levered to Unlevered company.

Solution

1.   Valuation of firms

Particulars	Levered Firm (₹)	Unlevered Firm (₹)
EBIT	25,000	25,000
Less: Interest on debt (8% × ₹ 75,000)	6,000	Nil
Earnings available to Equity shareholders	19,000	25,000
K_e	12.5%	12.5%
Value of Equity (S) (Earnings available to Equity shareholders/ K_e)	1,52,000	2,00,000

Debt (D)	75,000	Nil
Value of Firm (V) = S + D	2,27,000	2,00,000

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.

2.	**Investment & Borrowings**	₹
	Sell shares in Levered company (₹ 1,52,000 × 12%)	18,240
	Borrow money (₹ 75,000 × 12%)	9,000
	Buy shares in Unlevered company	27,240
3.	**Change in Return**	₹
	Income from shares in Unlevered company (₹ 27,240 × 12.5%)	3,405
	Less: Interest on loan (₹ 9,000 × 8%)	720
	Net Income from unlevered firm	2,685
	Less: Income from Levered firm (₹ 18,240 × 12.5%)	2,280
	Incremental Income due to arbitrage	405

Solution can also be done in the following way:

Valuation of firms

Particulars	Levered Firm (₹)	Unlevered Firm (₹)
EBIT	25,000	25,000
Less: Interest on debt (8% × ₹ 75,000)	6,000	Nil
Earnings available to Equity shareholders	19,000	25,000
K_e	12.5%	12.5%
Value of Equity (S) (Earnings available to Equity shareholders/ K_e)	1,52,000	2,00,000
Debt (D)	75,000	Nil
Value of Firm (V) = S + D	2,27,000	2,00,000

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.

Arbitrage Process:

If investor have 12% shares of levered company, value of investment in equity shares is 12% of ₹1,52,000 i.e. ₹ 18,240 and return will be 12% of ₹19,000 = ₹ 2,280.

Alternate Strategy will be:

Sell 12% shares of levered firm for ₹ 18,240 and borrow 12% of levered firm's debt i.e. ₹ 9,000 (12% of ₹ 75,000) and invest the money i.e. 12% in unlevered firm's stock:

Total resources or Money investor have = ₹ 18,240 + ₹ 9,000 = ₹ 27,240 and investor invest 12% of ₹2,00,000 = ₹ 24,000

Surplus cash available with investor is = ₹ 27,240 – ₹ 24,000 = ₹ 3,240

Investor return = 12% EBIT of unlevered firm – Interest to be paid on borrowed funds

i.e. = 12% of ₹ 25,000 – 8% of ₹ 9,000 = ₹ 3,000 – ₹ 720 = ₹ 2,280

Now, return remains the same i.e. ₹ 2,280 which investor is getting from levered company before investing in unlevered company but still have ₹ 3,240 excess money available with investor. Hence, investor is better off by doing arbitrage.

Question 12 (Vault Q. 30)   **[ICAI SM]**

Following data is available in respect of two companies having same business risk:

Capital employed = ₹ 2,00,000, EBIT = ₹ 30,000

Sources	Levered Company (₹)	Unlevered Company (₹)
Debt (@10%)	1,00,000	Nil
Equity	1,00,000	2,00,000
K_e	20%	12.5%

An investor is holding 15% shares in Unlevered company. CALCULATE the increase in annual earnings of investor if he switches his holding from Unlevered to Levered Company.

Solution

1.   **Valuation of firms**

Particulars	Levered Firm (₹)	Unlevered Firm (₹)
EBIT	30,000	30,000
Less: Interest on debt (10% × ₹ 1,00,000)	10,000	Nil
Earnings available to Equity shareholders	20,000	30,000
K_e	20%	12.5%
Value of Equity (S) (Earnings available to Equity shareholders/K_e)	1,00,000	2,40,000
Debt (D)	1,00,000	Nil
Value of Firm (V) = S + D	2,00,000	2,40,000

Value of Unlevered company is more than that of Levered company therefore investor will sell his shares in Unlevered company and buy shares in Levered company. Market value of Debt and Equity of Levered company are in the ratio of ₹ 1,00,000 : ₹ 1,00,000 i.e. 1:1. To maintain the level of risk he will lend proportionate amount (50%) and invest balance amount (50%) in shares of Levered company.

2.   **Investment & Borrowings**   ₹

Sell shares in Unlevered company (₹ 2,40,000 × 15%)   36,000

Lend money (₹ 36,000 × 50%)   18,000

Buy shares in Levered company (₹ 36,000 × 50%)   18,000

Total   36,000

3.   **Change in Return**   ₹

Income from shares in Levered company (₹ 18,000 × 20%)   3,600

Interest on money lent (₹ 18,000 × 10%)   1,800

Total Income after switch over   5,400

Less: Income from Unlevered firm (₹ 36,000 × 12.5%)   4,500

Incremental Income due to arbitrage   900

Question 13 (Vault Q. 40)   **[MTP 1 May 20 – 5 Marks]**

A&R Ltd. is an all equity financed company with a market value of Rs.25,000 lakh and cost of equity (K_e) 18%. The company wants to buyback equity shares worth Rs.5,000 lakh by issuing and raising 10% debentures redeemable at 10% premium after 5 years. Rate of tax may be taken as 35%. Applying Modigliani-Miller (MM) (with taxes), you are required to CALCULATE after restructuring:

(i)   Market value of A&R Ltd.

(ii)   Cost of Equity (K_e)

(iii)   Weighted average cost of capital (using market weights).

Solution

Value of a company (V) = Value of equity (S) + Value of debt (D)

A&R Ltd. is all equity financed company, its value would equal to value of equity.

$$\text{Market value of equity} = \frac{\text{Net Income (NI)}}{K_e}$$

In the question, market value of equity is Rs. 25,000 lakh and cost of equity (K_e) is 18%. The Net Income (NI) is calculated as follows:

$$\frac{\text{Net Income (NI) for Equity} - \text{holders}}{K_e} = \text{Market value of equity}$$

$$\frac{\text{Net Income (NI) for Equity holders}}{0.18} = 25000 \text{ lakh}$$

Net income for equity holders = 4,500 lakh

Net Income (NI) is after tax income, the before tax income would be

$$\text{EBT} = \frac{4,500 \text{ lakh}}{(1 - 0.35)} = 6,923.07 \text{ lakh.}$$

Since, A&R Ltd. is an all equity financed and there is no interest expense, so here EBT is equal to EBIT.

After issuing 10% debentures, the A&R Ltd would become a levered company.

(i)   **The value of A&R Ltd. after issuing debentures would be calculated as follows:**

Value of a levered company (V_g)

= Value of an unlevered company (V_u) + Tax benefit (T_B)

= Rs.25,000 lakh + (Rs.5,000 lakh × 35%)

= Rs.25,000 + Rs.1,750 = Rs.26,750

(ii)   **Cost of Equity (K_e)**

Total Value   = Rs.26,750 lakh

Less: Value of Debt   = Rs. 5,000 lakh

Value of Equity   = Rs. 21,750

$$K_e = \frac{4,175 \text{ lakh}}{21,750 \text{ lakh}} = 0.1919 = 19.19\%$$

(iii)   **WACC (on market value weights)**

Sources	Amount (₹ in lakhs)	Cost (%)	Weight	WACC (%)
Equity	21,750	19.19	0.81	15.54
Debt	5,000	8.10	0.19	1.54

	26,750			17.08

Workings Note:

1.   **(Rs. in lakh)**

	All Equity	Debt and Equity
EBIT (as calculated above)	6,923.07	6,923.07
Interest to debt-holders	-	500.00
EBT	6,923.07	6,423.07
Taxes (35%)	2,423.07	2,248.07
Income available to equity shareholders	4,500.00	4,175.00
Income to debt holders plus income available to shareholders	4,500.00	4,675.00

2. $$\text{Cost of Debenture}\,(K_d) = \frac{\text{Rs. } 500(1 - 0.35) + \dfrac{(5,500 - 5,000)}{5}}{\dfrac{(5,500 + 5,000)}{2}}$$

$$= \frac{\text{Rs.} 325 + 100}{5,250} = 0.081 \text{ or } \mathbf{8.1\%}$$

Question 14 (Vault Q. 41)   **[ICAI SM]**

The following data relates to two companies belonging to the same risk class:

Particulars	A Ltd.	B Ltd.
Expected Net Operating Income	₹ 18,00,000	₹ 18,00,000
12% Debt	₹ 54,00,000	-
Equity Capitalization Rate	-	18

REQUIRED:

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

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

Solution

(a)   Assuming no tax as per MM Approach.

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

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

Total Value of Unlevered Firm (V_u) = [NOI/K_e] = 18,00,000/0.18 = ₹ 1,00,00,000

K_e of Unlevered Firm (given) = 0.18

K_o of Unlevered Firm (Same as above = K_e as there is no debt) = 0.18

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

Total Value of Levered Firm (V_L) = V_u + (Debt × Nil)

= ₹ 1,00,00,000 + (54,00,000 × nil)

= ₹ 1,00,00,000

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

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

*Computation of WACC of A Ltd.

Source	Amount	Weight	Cost	WACC
Equity	₹ 46,00,000	0.46	0.2504	0.1152
Debt	₹ 54,00,000	0.54	0.12*	0.0648
Total	₹ 1,00,00,000			0.18

*K_d = 12% (since there is no tax)

WACC = 18%

(b) Assuming 40% taxes as per MM Approach

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

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

Total Value of unlevered Firm (V_u) = [NOI (1 - t)/K_e] = 18,00,000 (1 – 0.40)] / 0.18

= ₹ 60,00,000

K_e of unlevered Firm (given) = 0.18

K_o of unlevered Firm (Same as above = K_e as there is no debt) = 0.18

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

Total Value of Levered Firm (V_L) = V_u + (Debt × Tax)

= ₹ 60,00,000 + (₹ 54,00,000 × 0.4)

= ₹ 81,60,000

Computation of Weighted Average Cost of Capital (WACC) of 'B Ltd.'

= 18% (i.e. $K_e = K_o$)

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

Particulars	A Ltd. (₹)
Net Operating Income (NOI)	18,00,000
Less: Interest on Debt (I)	6,48,000
Earnings Before Tax (EBT)	11,52,000
Less: Tax @ 40%	4,60,800
Earnings for equity shareholders (NI)	6,91,200

Total Value of Firm (V) as calculated above	81,60,000
Less: Market Value of Debt	54,00,000
Market Value of Equity (S)	27,60,000
Equity Capitalization Rate [k_e = NI/S]	0.2504
Weighted Average Cost of Capital (k_o) *K_o = (K_e × S/V) + (K_d × D/V)	13.23%

*Computation of WACC of A Ltd.

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

*K_d = 12% (1 – 0.4) = 12% × 0.6 = 7.2%

WACC = 13.23%

Question 15 (Vault Q. 42)   [Nov 22 – 4 Marks]

The following are the costs and values for the firms A and B according to the traditional approach.

	Firm A	Firm B
Total value of firm, V (in ₹)	50,000	60,000
Market value of debt, D (in ₹)	0	30,000
Market value of equity, E (in ₹)	50,000	30,000
Expected net operating income (in ₹)	5,000	5,000
Cost of debt (in ₹)	0	1,800
Net Income (in ₹)	5,000	3,200
Cost of equity, Ke = NI/V	10.00%	10.70%

(i)   Compute the Equilibrium value for Firm A and B in accordance with the M-M approach. Assume that (a) taxes do not exist and (b) the equilibrium value of Ke is 9.09%.

(ii)   Compute Value of Equity and Cost of Equity for both the firms.

Solution

(i)   Computation of Equilibrium value of Firms A & B under MM Approach:

As per MM approach K_0 is equal to K_{eu}

∴ K_0 = K_{eu} (1 – t) = 9.09 (1 – 0) = 9.09

Particulars	A	B
EBIT (NOI) (₹)	5000	5000
K_0 (%)	9.09	9.09
Equilibrium value (₹) (NOI/Ko) × 100	55005.5	55005.5
	$\frac{5,000}{9.09} \times 100$	$\frac{5,000}{9.09} \times 100$

(ii)   Computation of value of equity and cost of equity of Firms A & B

Particulars	A	B
Equilibrium value (₹)	55,005.5	55,005.5
Less: Value of Debt	-	30,000
Value of Equity	55,005.5	25,005.5

Cost of Equity of Firm A (unlevered)   = 9.09

Cost of Debt of Firm B (K_d) (levered)   = $(1,800/30,000) \times 100 = 6\%$

Cost of Equity of Firm B (Levered) $= K_0 + (K_0 - K_d) \times (\text{Debt} / \text{Equity})$

$= 9.09 + (9.09 - 6) \times (30000/25005.5)$

$= 9.09 + 3.09 \times 1.2 = 9.09 + 3.71 =$ **12.80%**

OR

Cost of Equity of Firm B (Levered) $= \left(\dfrac{NI}{\text{Value of Equity}} \right) \times 100$

$= \left(\dfrac{3200}{25005.5} \right) \times 100 = 12.8\%$

➢ **Traditional Approach**

Question 16 (Vault Q. 44)   **[May 21 RTP]**

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.

Solution

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

Calculation of Equity, W_d and W_e

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

Statement of Weighted Average Cost of Capital (WACC)

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

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

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

$$\text{Value of a firm} = \frac{\text{Net Operating Income (NOI)}}{K_0}$$

$$₹\,50,00,000 = \frac{5,00,000}{K_0} \qquad s$$

$$K_0 = \frac{₹\,5,00,000}{₹\,50,00,000} = 10\%$$

Statement of Equity Capitalization rate (k_e) under MM approach

Debt (₹)	Equity (₹)	Debt/Equity	Ko	Kd	K_o - Kd	$K_e = K_o + (K_o - K_d) \dfrac{\text{Debt}}{\text{Equity}}$
(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 |

Chapter 6 – Ratio Analysis

➤ Profitability Ratios

Question 1 (Vault Q. 2)   **[Nov 22 – 5 Marks]**

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

Total assets	₹ 10,00,000
Debt to total assets	50%
Interest cost	10% per year
Direct Cost	10 times of the interest cost
Operating Exp.	₹ 1,00,000

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

You are required to calculate

(i)   Net profit margin

(ii)   Net operating profit margin

(iii)   Return on assets

(iv)   Return on owner's equity

Solution

(i)   Computation of Net Profit Margin

Debt = (10,00,000 x 50%)   = ₹ 5,00,000

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

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

Sales = 5,00,000 x 150%   = ₹ 7,50,000

                                                                (₹)

Gross profit = 7,50,000 – 5,00,000   = 2,50,000

Less: Operating expenses   = 1,00,000

∴ EBIT   = 1,50,000

Less: Interest   =   50,000

∴ EBT   = 1,00,000

Less: Tax @ 30%   =   30,000

∴ PAT   =   70,000

Net profit margin   = $\left(\dfrac{70,000}{7,50,000}\right) \times 100 = 9.33\%$

(ii)   Net Operating Profit margin

Net operating profit margin   = $\left(\dfrac{EBIT}{Sales}\right) \times 100 = \left(\dfrac{1,50,000}{7,50,000}\right) \times 100 = 20\%$

(iii)   Return on Assets

| Return on Assets | $= \left[\dfrac{1,50,000\,(1-0.3)}{10,00,000} \right] \times 100 = 10.5\%$ |

(iv)   Return on owner's equity

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

➢ Turnover / Efficiency / Acitvity Ratios

Question 2 (Vault Q. 8)   **[May 14 – 4 Marks]**

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

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

You are required to prepare:

Trading and Profit & Loss Account for the year ending 31st March, 2014.

Solution

Working Notes:

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

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

Net Profit   = 6,25,000

(ii) $\dfrac{\text{Net Profit}}{\text{Sale}}$ = 20%

Sale $= \dfrac{6,25,000}{0.20} = 31,25,000$

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

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

Gross Profit $= \dfrac{31,25,000 \times 25}{100} = 7,81,250$

(iv)   Stock Turnover $= \dfrac{\text{COGS}}{\text{Average Stock}}$

$$5 \quad = \left(\frac{31,25,000 - 7,81,250}{\text{Average Stock}} \right)$$

$$\text{Average Stock} \quad = \frac{23,43,750}{5} = 4,68,750$$

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

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

Opening Stock $= 9,37,500 - 6,00,000 = 3,37,500$

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

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

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

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

➤ Various Ratios Combined

Question 3 (Vault Q. 34)   **[Nov 16 – 8 Marks]**

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

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

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

Solution

Working Notes:

(i)   Cost of Goods Sold   = Sales – Gross Profit (28% of Sales)

                                        = ₹ 50,00,000 – ₹ 14,00,000 = ₹ 36,00,000

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

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

                                        = ₹ 36,00,000/1.5 = ₹ 24,00,000

(iv)   Current Assets : Current Ratio = 1.5 and Liquid Ratio = 1

         Stock   = 1.5 – 1 = 0.5

         Current Assets   = Amount of Stock × 1.5/0.5 = ₹ 6,00,000 × 1.5/ 0.5 = ₹ 18,00,000

(v)   Liquid Assets (Debtors and Cash & Cash equivalents) = Current Assets – Stock

                                        = ₹ 18,00,000 – ₹ 6,00,000 = ₹12,00,000

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

                                        = $50,00,000 \times \dfrac{45}{360}$ = ₹ 6,25,000

(vii)   Cash & Cash equivalents = Liquid Assets – Debtors

                                        = ₹12,00,000 – ₹ 6,25,000 = ₹ 5,75,000

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

(ix)   Reserves and Surplus

         Reserves & Surplus and Share Capital = 0.6 + 1 = 1.6

         Reserves and Surplus   = ₹ 20,00,000 × 0.6/1.6 = ₹ 7,50,000

(x)   Share Capital   = Net worth – Reserves and Surplus = ₹ 20,00,000 – ₹ 7,50,000

                                        = ₹12,50,000

(xi)   Current Liabilities   = Current Assets / Current Ratio = ₹18,00,000/1.5 = ₹12,00,000

(xii)   Long- term Debts

         Capital Gearing Ratio   = Long-term Debts / Equity Shareholders' Fund (Net worth)

         Or, Long-term Debts   = ₹ 20,00,000 × 0.5 = ₹10,00,000

Balance Sheet as at 31st March, 2016

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

Question 4 (Vault Q. 38)   **[May 24 – 5 Marks]**

Theme Ltd provides you the following information:

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

You are required to calculate:

(i)   Interest Coverage Ratio

(ii)   Gross Profit Ratio

(iii)   Current Assets

Solution

Working Notes:

Debt   = ₹ 45,00,000

Interest   = ₹ 45,00,000 x 12.5%= 5,62,500

Debt to Equity   = 1.5:1 = $\dfrac{\text{Total Debt}}{\text{Shareholders'Equity}}$

Equity   = ₹ 30,00,000

Return of Shareholder's funds   = 54%   = $\dfrac{\text{Net Profit after taxes}}{\text{Equity shareholders' fund}} \times 100$

Profit after tax (PAT)   = 54% x Equity = ₹ 16,20,000

Profit before tax (PBT)(1 – 25%)   = Profit after tax

                                                      = ₹ 16,20,000/75% = ₹ 21,60,000

Earning before interest and tax (EBIT)   = PBT + Interest

                                                      = ₹ 21,60,000 + ₹ 5,62,500 = ₹ 27,22,500

(i)   Interest Coverage Ratio   = EBIT/Interest = ₹ 27,22,500/₹ 5,62,500 = 4.84 Times

(ii)   Operating Profit Ratio   = 1 - Operating Ratio = 1 – 0.85 = 0.15 or 15%

                             0.15   = $\dfrac{\text{Operating Profit}}{\text{Sales}} \times 100$

          Sales   = EBIT or Operating Profit /0.15

                                          = ₹ 27,22,500 / 0.15 = ₹ 1,81,50,000

          Operating ratio   = $\dfrac{\text{Operating expenses}}{\text{Cost of goods sold COGS}}$ = 2 : 6 = 1 : 3

          Operating expenses   = 1/3 COGS

          Operating cost   = Sales – Operating profit

                                          = ₹ 1,81,50,000 - ₹ 27,22,500 = ₹ 1,54,27,500

          ₹ 1,54,27,500   = COGS + Operating expenses = COGS + 1/3 COGS

          COGS   = ₹ 1,15,70,625

          Gross profit   = Sales – COGS = 1,81,50,000 – 1,15,70,625 = ₹ 65,79,375

Gross Profit ratio $= \dfrac{\text{Gross Profit}}{\text{Sales}} \times 100 = 65,79,375/1,81,50,000$

= 0.3625 or 36.25%

Gross profit and sales can be calculated in alternative way also. However, there will be no change in GP ratio i.e 36.25%

(iii)   Current Ratio $= \dfrac{\text{Current Assets}}{\text{Current Liabilities}} = 1.8$

Current Assets	= 1.8 Current Liabilities
Total of Balance sheet liability	= Equity + Debt + Current Liabilities
	= 30,00,000 + 45,00,000 + CL ………….(2)
Total Balance sheet asset	= Fixed Assets + Current Assets
	= 39 lakhs + CA = 39 + 1.8CL………….(3)
Equating 2 and 3,	
75,00,000 + CL	= 39,00,000 + 1.8CL
0.8CL	= 36,00,000
CL	= ₹ 45,00,000
Current Assets	= 1.8 CL = 1.8 × 45 lakhs = ₹ **81,00,000**

Question 5 (Vault Q. 40)   **[ICAI SM]**

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

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

Solution

1.   Current Ratio   = 3:1

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

CA	= 3CL
WC	= 10,00,000
CA – CL	= 10,00,000

	3CL – CL	= 10,00,000	
	2CL	= 10,00,000	
	CL	$= \dfrac{10,00,000}{2}$ = ₹5,00,000	
	CA	= 3 × 5,00,000 = ₹15,00,000	

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

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

15,00,000 – stock   = 5,00,000

Stock   = ₹10,00,000

3.   Stock Turnover ratio (on sales) = 5

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

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

Sales = ₹50,00,000

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

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

5.   PBIT/PBT   = 2.2

PBIT   = 2.2 × 5,00,000

PBIT   = 11,00,000

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

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

6.   Average collection period   = 30 days

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

7.   Fixed Assets Turnover Ratio   = 0.8

50,00,000/ Fixed Assets   = 0.8

Fixed Assets   = ₹ 62,50,000

Income Statement

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

Balance sheet

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

Question 6 (Vault Q. 43)   **[May 21 – 10 Marks]**

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

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

You are required to:

(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	

Solution

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

Particulars		(₹)
Net Profit [@ 6.5% of Sales]		4,87,500

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

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

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

Working Notes:

(i)   Calculation of Share Capital and Reserves

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

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

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

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

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

(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

$\therefore$ Current Assets = 2.5 × Current Liabilities = 2.5 × 4,00,000 = ₹ 10,00,000

(iv)   Calculation of Fixed Assets

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

(v)   Calculation of Composition of Current Assets

Inventory Turnover = 12

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

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

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

Question 7 (Vault Q. 44)   [May 23 – 10 Marks]

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

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

Assume 360 days in a year.

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

Balance Sheet as on 31st March, 2023:

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

Solution

(i)   Current Ratio   = 4

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

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

∴ Current Assets   = ₹ 12,40,000

(ii)   Acid Test Ratio   = 2.5

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

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

∴ 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

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

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

Total Assets   = ₹ 29,06,250

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

Fixed Assets   = ₹ 16,66,250

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

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

$\therefore$ Cash $= ₹\ 1,33,300$

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

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

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

(ix)   Equity Dividend Coverage Ratio $= 1.6$

or $\dfrac{\text{EPS}}{\text{DPS}}$ $= \dfrac{3.5}{\text{DPS}}$

$\therefore$ DPS $= ₹\ 2.1875$

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

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

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

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

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

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

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

Balance Sheet as on 31st March 2023

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

Question 8 (Vault Q. 45)   [May 25 RTP]

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

Particulars	Details
Stock turnover Ratio	15 times
Cash and Bank balance	10% of Current Assets (net off prepaid exp)
GP Ratio	20%
Creditors turnover (cost of goods sold)	10 times

Debtors turnover ratio	12 times
Net Fixed Assets	25% of Total Liabilities
Depreciation	15% on Opening WDV
Current Ratio	1.6 : 1
Capital Gearing Ratio	0.6 : 1

All Purchases and Sales are assumed to be on credit basis.

Balance Sheet of Nevy Private Limited as of 31.03.2025

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

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

Solution

Balance Sheet of Nevy Private Limited as of 31.03.2025

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

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

WN 1 – Calculation of Current Assets using Current Ratio

Current Ratio	$= \dfrac{CA}{CL}$
CL	= 45,00,000 + 7,50,000 = 52,50,000
1.6	= CA / 52,50,000
Therefore CA	= 84,00,000

CA = Inventory + Trade Receivables + Cash Bank Balance + Prepaid Exp

84,00,000 = Inventory + Trade Receivables + Cash Bank Balance + 7,50,000

Therefore, total of Inventory + Trade Receivables + Cash Bank Balance = 76,50,000

WN 2 – Calculation of Fixed Assets & Total Assets

Fixed Assets	= 25% of Total liabilities or 25% of Total Assets which means
Current Assets	= 75% of Total liabilities or 75% of Total Assets
Fixed Assets + Current Assets	**= Total Assets/Total Liabilities**
25 + 75	**= 100**
Fixed Assets	= 84,00,000 × 25/75 = 28,00,000
Total Assets	= 1,12,00,000

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

Opening WDV - Depreciation	**= Closing WDV**
100 - 15	**= 85**
Therefore, Depreciation	= 28,00,000 × 15/85 = 4,94,118
Opening WDV	= 32,94,118

WN 4 – Calculation of Cash & Bank Balance

Cash & Bank Balance	= 10% of (CA – Prepaid Exp)
Cash & Bank balance	= 10% of (84,00,000 – 7,50,000)

Therefore, cash and bank balance = 7,65,000

WN 5 – Calculation of Inventory & Trade receivables

Total CA	= Inventory + Trade Receivables + Cash Bank Balance + Prepaid Exp
84,00,000	= Inventory + Trade Receivables + 7,65,000 + 7,50,000
Inventory + Trade Receivables	= 68,85,000

Now, Let Sales be X

GP Ratio	= 20%	= 0.2X
COGS	= 80%	= 0.8X

Debtors T/O Ratio	$= \dfrac{\text{Net Credit Sales}}{\text{Debtors}}$
12	$= \dfrac{X}{\text{Debtors}}$
Debtors	**= X / 12**
Inventory T/O Ratio	= COGS / Inventory
15 Inventory	= 0.8X / Inventory
Inventory	**= 0.8X / 15**
Inventory + Trade Receivables	= 68,85,000
0.8X / 15 + X / 12	= 68,85,000
Therefore X	= Sales = 5,03,78,050
COGS	= 4,03,02,440
Trade Receivables	= 41,98,170
Inventory	= 26,86,829

WN 6 – Calculation of Trade Payables using Creditors Turnover Ratio

Creditors T/O Ratio	$= \dfrac{\text{COGS}}{\text{Trade Payables}}$
10	$= \dfrac{4,03,02,440}{\text{Trade Payables}}$
Trade Payables	= 40,30,244

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

Total Capital Employed	= Share Cap + R&S + Bonds
Capital Gearing Ratio	= Capital bearing Fixed % / Capital not bearing fixed %
0.6	= Bonds/Share Capital + R&S
Therefore, Bonds	= 21,60,000 + 0.6 R&S

Substituting the value of bonds in the above equation,

Total Capital Employed	= Share Cap + R&S + (21,60,000 + 0.6 R&S)
59,50,000	= 36,00,000 + 1.6 R&S + 21,60,000
Therefore R&S	= 1,18,750

Question 9 (Vault Q. 46)   **[Jan 25 RTP]**

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

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

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

Tax rate applicable to the company is 25%

You are required to CALCULATE:

(i)   Quick Ratio

(ii)   Fixed Assets Turnover Ratio

(iii)   Debt Service Coverage

(iv)   Earnings per Share

(v)   Price Earnings Ratio

Solution

WN 1: Calculation of Current Assets & Current Liabilities

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

WN 2: Calculation of Average Stock Value & Closing Stock

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

WN 3: Calculation of Cash Profit before Interest & Tax

Return on Total Assets (pre-tax)	= (EBIT / Total Assets)
0.15	= EBIT / 22.50 lakhs

Therefore, EBIT	**= 3,37,500**
Cash Profit before Int & Tax	= EBIT + Depreciation = 3,37,500 + 50,000
Cash Profit before Int & Tax	**= 3,87,500**

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

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

As per the Accounting equation,

Equity + Debt + Current Liab.	**= Fixed Assets + Current Assets**
3 Debt + Debt + 2,50,000	= 15,00,000 + 7,50,000
4 Debt	= 20,00,000
Therefor Debt (Loan Funds)	**= 5,00,000**
Equity (Owned Funds)	**= 15,00,000**

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

Particulars	Amount (₹)
EBIT	3,37,500
(-) Int (5 lakhs x 9%)	(45,000)
EBT	2,92,500
(-) Tax @ 0.25	(73,125)
EAT	2,19,375
(-) Pref Div. (2,50,000 x 12%)	(30,000)
Earnings For Eq. Sh Holders	1,89,375

1.   Quick Ratio   = {CA - Cl Stock}/CL = 7,50,000 – 1,93,250 / 2,50,000

        Quick Ratio   **= 2.23 : 1**

2.   Fixed Assets Turnover Ratio   = Sales / Total Fixed Assets = 56,25,000 / 15,00,000

        Fixed Assets Turnover Ratio   **= 3.75 times**

3.   Debt Service Coverage Ratio   = Cash profit before Int & Tax / (Int + Instalments)

                                    = 3,87,500 / (45,000+2,00,000)

        Debt Service Coverage Ratio   **= 1.58 times.**

4.   EPS = Earnings for Eq. Shareholders / No of Eq. Shareholders = 1,89,375/75,000

        EPS = ₹ 2.53

5.   Price to Earnings Ratio   = MPS / EPS = 20 / 2.53

        Price to Earnings Ratio   **= 7.91 times**

Question 10 (Vault Q. 49)   **[ICAI SM]**

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.

Solution

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

Calculation of Assets

Total liabilities	=	Total Assets
₹ 2,00,000	=	Total Assets
Fixed Assets	=	60% of total fixed assets and current assets
	=	₹ 2,00,000 × 60/100 = ₹ 1,20,000
Current Assets	=	Total Assets – Fixed Assets = ₹ 2,00,000 – ₹ 1,20,000 = ₹ 80,000

Calculation of additions to Plant & Machinery:

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

Calculation of stock

Quick ratio:	=	$\dfrac{\text{Current assets } - \text{stock}}{\text{Current liabilities}} = 1$
	=	$\dfrac{₹\,80,000 - \text{Stock}}{₹\,50,000} = 1$
₹ 50,000	=	₹ 80,000 – Stock
Stock	=	₹ 80,000 - ₹ 50,000 = ₹ 30,000
Receivables	=	4/5th of quick assets = (₹ 80,000 – ₹ 30,000) × 4/5 = ₹ 40,000
Receivables turnover	=	$\dfrac{\text{Receivables}}{\text{Credit Sales}} \times 12\,\text{Months} = 12\,\text{Months}$
	=	$\dfrac{40,000 \times 12}{\text{Credit Sales}} = 2\,\text{Months}$
2×credit sales	=	4,80,000
Credit sales	=	4,80,000/2
	=	₹ 2,40,000 = Total Sales (As there were no cash sales)
Gross profit	=	15% of sales = ₹ 2,40,000 × 15/100 = ₹ 36,000

Return on net worth (net profit)

Net worth	=	₹ 1,00,000 + ₹ 30,000	= ₹ 1,30,000
Net profit	=	₹ 1,30,000 × 10/100	= ₹ 13,000
Debenture interest	=	₹ 20,000 × 5/100	= ₹ 1,000

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

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

Projected Balance Sheet as at 31ˢᵗ March, 2023

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

Question 11 (Vault Q. 50)   **[ICAI SM]**

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

I	Accounting Information:	
	Gross Profit	15% of Sales
	Net profit	8% of sales
	Raw materials consumed	20% of works cost
	Direct wages	10% of works cost
	Stock of raw materials	3 months' usage
	Stock of finished goods	6% of works cost
	Debt collection period	60 days
	(All sales are on credit)	
II	**Financial Ratios:**	
	Fixed assets to sales	1 : 3
	Fixed assets to Current assets	13 : 11
	Current ratio	2 : 1
	Long-term loans to Current liabilities	2 : 1
	Share Capital to Reserves and Surplus	1 : 4

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

Solution

(a)   Working Notes:

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

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

(ii)   Calculation of Current Assets

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

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

(iii)   Calculation of Raw Material Consumption and Direct Wages

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

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

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

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

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

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

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

(vi)   Calculation of Current Liabilities

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

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

(vii)   Calculation of Receivables

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

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

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

(viii)   Calculation of Long term Loan

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

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

(ix)   Calculation of Cash Balance

		₹
Current assets		22,00,000
Less: Receivables	12,82,192	

Raw materials stock	3,31,500	
Finished goods stock	3,97,800	20,11,492
Cash balance		1,88,508

(x)   Calculation of Net worth

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

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

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

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

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

Profit and Loss Account of PQR Ltd. for the year ended 31st March, 2023

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

Balance Sheet of PQR Ltd. as at 31st March, 2023

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

Question 12 (Vault Q. 53)   **[MTP 1 Jan 25 – 6 Marks]**

From the following information pertaining to M/s Anya Co. Ltd., PREPARE its trading, Profit & Loss Account for the year ended on 31 March, 2024 and a summarized Balance Sheet as at that date:

	Amt in ₹
Current Ratio	2.5
Quick Ratio	1.3
Proprietary Ratio (Fixed Assets/ Proprietary Fund)	0.6
Gross Profit to Sale Ratio	10%
Debtors Velocity	40 days
Sales	7,30,000
Working Capital	1,20,000
Bank Overdraft	15,000
Share Capital	2,50,000

Closing Stock is 10% more than opening Stock.

Net Profit is 10% of Proprietary Funds.

Solution

Working Note:

1. **Current Liabilities and Current Assets:**

    Let Current Liabilities be x

    Given Current ratio   = 2.5

    Current Assets   = 2.5x

    Working Capital   = 2.5x – x   = 1.5x

    or x   = 1,20,000/1.5   = 80,000

    So Current Liabilities   = 80,000

    And Current Assets   = 80,000 × 2.5   = 2,00,000

2. **Closing Stock:**

    Given, Quick Ratio   = 1.3

    $$\frac{\text{Current Assets} - \text{Closing Stock}}{\text{Current Liabilities} - \text{Bank Overdraft}} = 1.3$$

    $$\frac{2,00,000 - \text{Closing Stock}}{80,000 - 15,000} = 1.3$$

    or Closing Stock   = 2,00,000 – 84,500 = 1,15,500

    Opening Stock   = 1,15,500 × 100/110 = 1,05,000

3. **Debtors:**

    Given Debtors Velocity   = 40 days

    $$\frac{\text{Debtors}}{\text{Sales}} \times 365 = 40$$

    Debtors $$= \frac{7,30,000 \times 40}{365} = 80,000$$

4. **Gross Profit**	= 7,30,000 × 10/100 = 73,000
5. **Proprietary Fund:**	
Proprietary Ratio	= 0.6

$$\frac{\text{Fixed Assets}}{\text{Proprietary Fund}} = 0.6$$

$$\frac{\text{Working Capital}}{\text{Proprietary Fund}} = 0.4$$

Proprietary Fund $= \dfrac{1,20,000}{0.4} = 3,00,000$

Fixed Assets   = 3,00,000 x 0.6 = 1,80,000

Net Profit   = 10% of Proprietary Fund = 30,000

Trading and Profit and loss Account for the year ended 31 March 2024

Particulars	Amount in (₹)	Particulars	Amount in (₹)
To Opening Stock	1,05,000	By Sales	7,30,000
To Purchase (Balancing Fig.)	6,67,500	By Closing Stock	1,15,500
To Gross Profit	73,000		
	8,45,500		**8,45,500**
To Operating Expenses (Balancing Figure)	43,000	By Gross Profit	73,000
To Net Profit	30,000		
	73,000		**73,000**

Balance Sheet as on 31 March 2024

Liabilities	Amount in (₹)	Assets	Amount in (₹)
Share Capital	2,50,000	Fixed Assets	1,80,000
Reserves & Surplus (Opening bal. + Current profit)	50,000		
Current Liabilities		**Current Assets**	
Bank Overdraft	15,000	Stock	1,15,500
Other Current Liabilities	65,000	Debtors	80,000
		Other Current Assets	4,500
	3,80,000		**3,80,000**

Question 13   (Vault Q. 54)   **[ICAI SM]**

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

Debt Equity Ratio	1:1
Current Ratio	3:1
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%.

Solution

Balance Sheet of Rudra Ltd.

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

Working Notes:

Let sales be ₹ x

Balance Sheet of Rudra Ltd.

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

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

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

2.   Stock Turnover $= 6 = \dfrac{x}{Stock}$

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

3.   Sales to net worth $= 4 = \dfrac{x}{net\ worth}$

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

4.   Debt: Equity $= 1 : 1$

        $\dfrac{Long\ Term\ Loan}{Net\ Worth}$ $= \dfrac{1}{1}$

        Long Term Loan $= Net\ worth = \dfrac{x}{4}$

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

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

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

        GP $= 0.2\ x - 0.2\ GP$

        1.2 GP $= 0.2\ x$

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

        G P $= x/6$

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

6.   COGS to creditors $= 10:1$

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

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

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

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

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

8.   Current Ratio $= 3 : 1$

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

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

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

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

9. $CA = 3CL = 3\left(\dfrac{x}{9} + \dfrac{₹\,5,00,000}{3}\right)$

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

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

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

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

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

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

$$x = ₹\,1,20,00,000$$

11. Now, from above calculations, we get,

Fixed Asset	$= \dfrac{x}{4} = \dfrac{₹\,1,20,00,000}{4} = ₹\,30,00,000$
Stock	$= \dfrac{x}{6} = \dfrac{₹\,1,20,00,000}{6} = ₹\,20,00,000$
Debtor	$= \dfrac{x}{6} = \dfrac{₹\,1,20,00,000}{6} = ₹\,20,00,000$

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 = $\dfrac{x}{4}$ = ₹ 30,00,000

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

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

Current Liabilities = Creditors + Other STCL + Outstanding Interest

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

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

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

Other STCL = ₹ 2,00,000

Chapter 7 – Working Capital Management

Unit 1: Estimation of Working Capital

➢ Operating Cycle Method

Question 1 (Vault Q. 6 Modified)   **(Modified Nov 11 – 8 Marks)**

The Trading and Profit and Loss Account of Beta Ltd. for the year ended 31st March, 20X1 is given below:

Particulars	Amount (₹)	Amount (₹)	Particulars	Amount (₹)	Amount (₹)
To Opening Stock:			By Sales (Credit)		20,00,000
-Raw Materials	1,80,000		By Closing Stock:		
-Work- in- progress	60,000		- Raw Materials	2,00,000	
-Finished Goods	2,60,000	5,00,000	-Work-in-progress	1,00,000	
To Purchases (credit)		11,00,000	-Finished Goods	3,00,000	6,00,000
To Wages		3,00,000			
To Production Expenses		2,00,000			
(inlc. Dep. Rs 50,000)					
To Gross Profit c/d		5,00,000			
		26,00,000			26,00,000
To Administration Expenses		1,75,000	By Gross Profit b/d		5,00,000
To Selling Expenses		75,000			
To Net Profit		2,50,000			
		5,00,000			5,00,000

Depreciation is considered as part of factory cost for valuation of relevant stocks. The opening and closing balances of receivables were ₹ 1,50,000 and ₹ 2,00,000 respectively whereas opening and closing payables for raw materials were ₹ 2,00,000 and ₹ 2,40,000 respectively.

You are required to ascertain the working capital requirement by operating cycle method on a cash cost basis.

Solution

Computation of Operating Cycle

(1)   Raw Material Storage Period (R)

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

$$= \frac{(1,80,000 + 200000)/2}{10,80,000/360} = 63.33\,\text{Days}$$

Raw Material Consumed = Opening Stock + Purchases – Closing Stock

= ₹ 1,80,000 + ₹ 11,00,000 – ₹ 2,00,000 = ₹ 10,80,000

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

$$\text{Conversion/Processing Period} = \frac{\text{Average Stock of WIP}}{\text{Daily Average Production cost}}$$

$$= \frac{(60,000 + 1,00,000) / 2}{15,40,000 / 360} = 18.7 \text{ days}$$

Production Cost (including Dep):		₹
Opening Stock of WIP	=	60,000
Add: Raw Material Consumed	=	10,80,000
Add: Wages	=	3,00,000
Add: Production Expenses	=	2,00,000
		16,40,000
Less: Closing Stock of WIP	=	1,00,000
Production Cost		15,40,000

(3)   Finished Goods Storage Period (F)

$$\text{Finished Goods Storage Period} = \frac{\text{Average Stock of Finished Goods}}{\text{Daily Average Cost of Good Sold}}$$

$$= \frac{(2,60,000 + 3,00,000) / 2}{15,00,000 / 360} = 67.2 \text{ Days}$$

Cost of Goods Sold	₹
Opening Stock of Finished Goods	2,60,000
Add: Production Cost (including Dep.)	15,40,000
	18,00,000
Less: Closing Stock of Finished Goods	(3,00,000)
	15,00,000

(4)   Receivables Collection Period (D)

$$\text{Receivables Collection Period} = \frac{\text{Average Receivables}}{\text{Daily average credit sales}} = \frac{(1,50,000 + 2,00,000) / 2}{20,00,000 / 360} = 31.5 \text{ Days}$$

(5)   Payables Payment Period (C)

$$\text{Payables Payment Period} = \frac{\text{Average Payables}}{\text{Daily average credit purchase}} = \frac{(2,00,000 + 2,40,000) / 2}{11,00,000 / 360} = 72 \text{ Days}$$

(6)   Duration of Operating Cycle (O)

O = R + W + F + D – C = 63.33 + 18.7 + 67.2 + 31.5 – 72 = 108.73 days

Computation of Working Capital

(i)   Number of Operating Cycles per Year = 360/Duration Operating Cycle = 360/108.73 = 3.311

(ii)   Total Operating Expenses   ₹

Total Cost of Goods sold	15,00,000
Add: Administration Expenses	1,75,000
Add: Selling Expenses	75,000
Less: Depreciation	(50,000)
	17,00,000

(iii)   Working Capital Required

Working Capital Required = $\dfrac{\text{Total Operating Expenses}}{\text{Number of Operating Cycles per year}}$ = $\dfrac{17,00,000}{3.311}$ = ₹ 5,13,440

[Note: The solution can also be solved by taking 365 days a year.]

➢ Component Wise – Estimation Method

Question 2 (Vault Q. 16)   **(Nov 20 – 10 Marks)**

PK Ltd., a manufacturing company, provides the following information:

	(₹)
Sales	1,08,00,000
Raw Material Consumed	27,00,000
Labour Paid	21,60,000
Manufacturing Overhead (Including Depreciation for the year ₹ 3,60,000)	32,40,000
Administrative & Selling Overhead	10,80,000

Additional Information:

(a)   Receivables are allowed 3 months' credit.

(b)   Raw Material Supplier extends 3 months' credit.

(c)   Lag in payment of Labour is 1 month.

(d)   Manufacturing Overhead are paid one month in arrear.

(e)   Administrative & Selling Overhead is paid 1 month advance.

(f)   Inventory holding period of Raw Material & Finished Goods are of 3 months.

(g)   Work-in-Progress is Nil.

(h)   PK Ltd. sells goods at Cost plus 33⅓%.

(i)   Cash Balance ₹ 3,00,000.

(j)   Safety Margin 10%.

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

Solution

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

Particulars	(₹)	(₹)
A. Current Assets:		
Inventory:		
Stock of Raw material (₹ 27,00,000 × 3/12)	6,75,000	
Stock of Finished goods (₹ 77,40,000 × 3/12)	19,35,000	
Receivables (₹ 88,20,000 × 3/12)	22,05,000	
Administrative and Selling Overhead (₹ 10,80,000 × 1/12)	90,000	

Cash in Hand	3,00,000	
Gross Working Capital	52,05,000	**52,05,000**
B. Current Liabilities:		
Payables for Raw materials* (₹ 27,00,000 × 3/12)	6,75,000	
Outstanding Expenses:		
Wages Expenses (₹ 21,60,000 × 1/12)	1,80,000	
Manufacturing Overhead (₹ 28,80,000 × 1/12)	2,40,000	
Total Current Liabilities	10,95,000	10,95,000
Net Working Capital (A – B)		**41,10,000**
Add: Safety margin @ 10%		4,11,000
Total Working Capital requirements		**45,21,000**

Working Notes:

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

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

Question 3 (Vault Q. 20)   **(RTP May 25)**

The management of Parshvam Limited is planning to expand its business at international level and consults you for preparing and estimation of working capital needs so that they can avail the finance from the bank. The estimated data of Parshvam Limited reveal the following information –

Particulars	Amount (₹)
Materials Used	
Domestic on 2 months credit	9,00,000
Imports on 3 months credit **	6,00,000
Lag in Payment of wages - 1 month	6,00,000
Lag in Payment of Manufacturing Overheads – ½ Month	26,40,000

Sales	
Domestic on 1.5 months credit	30,00,000
Export on 3 months credit (sale price 10% below domestic price)	24,80,000
Administrative expenses payable in advance for 2 months	3,60,000
Lag in payment of Selling & Distribution expenses – 1 month	3,00,000

Advance Income tax for ₹ 25,000 for the quarter falling in the next financial year is paid by the company. Manufacturing overheads is inclusive of depreciation on the new machine purchased for tailor-made export products. The purchase price for the new machine is ₹ 24,00,000 with a depreciation rate of 10%. Cash Gross profit is at 20% on domestic sales.

However, to promote exports, Export Promotion Council (EPC Board) provides a revenue subsidy of 2.5% for the new machine purchased. Furthermore, Parshvam Limited submits the letter of credit (LOC) to its bank and avails the all-Export Sales value within 1 month. Financial institution charges a fee of 5% for the same.

The company keeps one month stock of raw materials and finished goods each. Goods remain in process for half a month with 90% raw materials introduced in the process. The company believes in keeping cash and bank balance of ₹ 1,50,000. The management is of the opinion that the safety margin is to be kept at 15%.

**Raw materials imported will attract a custom duty at 20% to be paid up front with a duty drawback of 5% credited upfront. You are required to –

(A)   PREPARE the estimated working capital statement for the next year.

(B)   ADVISE whether Parshvam Limited should continue with the export business or not.

(Requisite assumptions and notes should form part of the solution).

Solution

(A)   Statement for estimation of Working Capital using Cash Cost Basis

       Parshvam Limited

Particulars	Amount (₹)	Amount (₹)
(A) Current Assets		
1. Raw materials (15,90,000 × 1/12)	1,32,500	
2. WIP		
~ RM (15,90,000 × 0.5/12 × 90%)	59,625	
~ Wages (6,00,000 × 0.5/12 × 50%)	12,500	
~ Manufacturing OH (23,40,000 × 0.5/12 × 50%)	48,750	
~ Other OH (74,472 × 0.5/12 × 50%)	1,552	
3. FG (on COGS) (46,04,472 × 1/12)	3,83,706	
4. Debtors		
~ Domestic (27,61,314 × 1.5/12)	3,45,164	
~ Export (26,27,158 × 1/12) **WN - 5**	2,18,930	
5. Cash/bank balance (given)	1,50,000	
6. Prepaid admin. exp. (3,60,000 × 2/12)	60,000	
7. Income tax paid in advance (given)	25,000	

Gross working capital		14,37,727
(B) Current Liabilities		
1. Creditors		
~ Domestic (9,00,000 × 2/12)	1,50,000	
~ Import (6,00,000 × 3/12)	1,50,000	
2. Lag in wages payment (6,00,000 × 1/12)	50,000	
3. Lag in manufacturing OH (23,40,000 × 0.5/12)	97,500	
4. Lag in other OH (74,472 × 0.5/12)	3,103	
5. Lag in S&D exp (3,00,000 × 1/12)	25,000	
Excess of CA over CL		**9,62,124**
Add: 15% safety margin (9,87,124 × 15%)		1,44,319
Net working capital		**11,06,443**

Notes –

(a)   Working Capital is estimated on Cash Cost Basis

(b)   Other Overheads are assumed to be the part of production.

(c)   In absence of information on % completion for wages, manufacturing and other overheads, it is assumed to be 50% complete for the purpose of calculating WIP.

(d)   Other Overheads are also assumed to be outstanding for a period of ½ month. In absence of specific information, it can also be assumed that nothing is outstanding or prepaid.

(B)   If just the monetary aspects and factors are considered then, Parshvam limited should discontinue its operations at international level as the Cash Cost of sales for export at ₹ 26,27,158 is higher than the Export sales value which is just ₹ 24,80,000. In reality, non-monetary factors are also considered in decision making; exports will add a new customer base for the company. Furthermore, existence at international level brings on a high credibility and image to the company, etc.

WN 1 - Calculation of gross profit on Export Sales:

Let the domestic selling price be ₹ 100.

Therefore, Gross profit = ₹ 20, and cost per unit = ₹ 80

Now as given, Export price is 10% less than the domestic price = 100 – 10% = ₹ 90. However, the cost per unit to produce exported goods will remain at ₹ 80 only.

So gross profit on exports will be ₹ 90 – ₹ 80 = ₹ 10.

Therefore, Gross profit in % for Export Sales = 10 / 90 = 11.11%

	Domestic	Export	Total
Sales	30,00,000	24,80,000	54,80,000
Less: Gross Profit (20% for Domestic; 11.11% for Export)	(6,00,000)	(2,75,528)	(8,75,528)
COGS	24,00,000	22,04,472	46,04,472
Add: Admin Exp (To be Apportioned in the ratio of Sales)	1,97,080	1,62,920	3,60,000

Add: S&D Expense (To be Apportioned in the ratio of Sales)	1,64,234	1,35,766	3,00,000
Add: Bank Fees and charges for providing LOC services	-	1,24,000	1,24,000
Cash Cost of Sales	**27,61,314**	**26,27,158**	**53,88,472**

WN 2 - Preparation of Cost/Income Statement

Particulars	Amount (₹)
Raw Materials :	
Domestic	9,00,000
Import **WN - 3**	6,90,000
Wages	6,00,000
Manufacturing Overheads (Cash) **WN - 4**	23,40,000
Other Overheads (Bal. Fig)	74,472
Cost of Production/Cost of Goods Sold	**46,04,472**
Add: Admin Exp	3,60,000
Add: S&D Exp	3,00,000
Add: Bank charges & Fees for L.O.C services	1,24,000
Cost of Sales	**53,88,472**

WN 3 – Calculation of Raw Materials Purchased - Imports

Purchase Price	= ₹ 6,00,000
+ Custom Duty @ 20%	= ₹ 1,20,000
(-) Upfront Duty Drawback @ 5%	= ₹ (30,000)
Total Value of Raw materials	**= ₹ 6,90,000**

WN 4 – Calculation of Cash Manufacturing Overheads

Manufacturing Overheads	= ₹ 26,40,000
Less: Depreciation on Machinery (24,00,000 × 10%)	= ₹ (2,40,000)
Less: Revenue Subsidy from EPC Board *** (24,00,000 × 2.5%)	= ₹ (60,000)
Cash Manufacturing Overheads	**= ₹ 23,40,000**

***Revenue subsidy shall not be capitalized but instead it will result in bringing down your manufacturing expenses which is revenue in nature. Had it been the capital subsidy, then it would have reduced the purchase price of the machine and thereby changing the amount of depreciation.

WN 5 - Credit Period for Export customers

Since the company is availing benefit of Letter of Credit (L.O.C), the funds blocked in export customers would only be for 1 month and not 3 months; as the company would receive the entire Export Sales value in 1 month's time from the financial institution after paying the bank charges and fees.

**WIP
+ RM Stock
+ Creditors**
↳
W

Question 4 (Vault Q. 22)   **(RTP May 21)**

While applying for financing of working capital requirements to a commercial bank, TN Industries Ltd. projected the following information for the next year:

Cost Element	Per unit (₹)	Per unit (₹)
Raw materials		
X	30	
Y	7	
Z	6	43
Direct Labour		25
Manuf. and Admin Overheads (excl. Dep.)		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.)

Solution

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

	Amount in (₹)	Amount in (₹)
A. Current Assets		
(i) Inventories:		
Raw material		
X $(1,50,000 \text{ units} \times ₹ 30 \times 2/12)$	7,50,000	
Y $(1,50,000 \text{ units} \times ₹ 7 \times 1/12)$	87,500	

Z $(1,50,000 \text{ units} \times ₹6 \times 1/12)$	75,000	
WIP $(1,50,000 \text{ units} \times ₹64 \times 0.5/12)$	4,00,000	
Finished goods $(1,50,000 \text{ units} \times ₹88 \times 1/12)$	11,00,000	24,12,500
(ii) Receivables (Debtors) $(1,50,000 \text{ units} \times ₹103 \times 2/12) \times 0.75$		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 $(1,50,000 \text{ units} \times ₹30 \times 2/12)$	7,50,000	
Y $(1,50,000 \text{ units} \times ₹7 \times 1/12)$	87,500	
Z $(1,50,000 \text{ units} \times ₹6 \times 0.5/12)$	37,500	8,75,000
(ii) Outstanding Direct Labour $(1,50,000 \text{ units} \times ₹25 \times 0.5/12)$		1,56,250
(iii) Outstanding Manufacturing and administration overheads $(1,50,000 \text{ units} \times ₹20 \times 1/12)$		2,50,000
(iv) Outstanding Selling overheads $(1,50,000 \text{ units} \times ₹15 \times 1/12)$		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 × 50%)	3
Cost during the year:	
Z {(₹ 6 × 50%) × 50%}	1.5
Direct Labour (₹ 25 × 50%)	12.5
Manufacturing and administration overheads (₹ 20 × 50%)	10
	64

Question 5 (Vault Q. 23)   **(MTP 2 May 22 – 10 Marks)**

The following annual figures relate to manufacturing entity:

A.   Sales at one month credit   84,00,000

B.   Material consumption   60% of sales value

C.   Wages (paid in a lag of 15 days)   12,00,000

D.   Cash Manufacturing Expenses   3,00,000

E.   Administrative Expenses   2,40,000

F.   Creditors extend 3 months credit for payment.

G.   Cash manufacturing and administrative expenses are paid 1 months in arrear.

The company maintains stock of raw material equal to economic order quantity. The company incurs ₹ 100 as per ordering cost per order and opportunity cost of capital is 15% p.a. The optimum cash balance is determined using Baumol's model. The bank charges ₹ 10 for each cash withdrawal. Finished goods are held in stock for 1 month. The company maintains a bank balance of ₹ 12,00,000 on an average. Creditors are paid through net banking and all other expenses are incurred in cash which is withdrawn from bank.

Assuming a 20% safety margin, you are required to ESTIMATE the amount of working capital that needs to be invested by the Company.

Solution

Statement of working capital Requirement

Particular	(₹)	(₹)
A. Current Assets		
Stock of Raw Material (W.N. 2)	81,975	
Stock of finished Goods (65,40,000 × 1/12)	5,45,000	
Average Receivables (at Cost) (67,80,000 × 1/12)	5,65,000	
Bank Balance	12,00,000	
Cash Balance (W.N. 3)	15,232	
Gross Working Capital		24,07,207
B. Current Liabilities		
Average Creditor for materials (50,40,000 × 3/12)	12,60,000	

Outstanding Wages (12,00,000 × 0.5/12)	50,000	
Outstanding Cash Manufacturing Expenses (3,00,000 × 1/12)	25,000	
Outstanding administrative Expenses (2,40,000 × 1/12)	20,000	
		13,55,000
Net Working Capital (A – B)		10,52,207
Add: Safety Margin @ 20%		2,10,441
Total Working Capital Requirement		**12,62,648**

Working Notes:

1.   **Computation of annual cash Cost of Production & Sales**

Material Consumed (84,00,000 × 60%)	50,40,000
Wages	12,00,000
Manufacturing expenses	3,00,000
Cash Cost of production	**65,40,000**
(+) Administrative Expenses	2,40,000
Cash Cost of Sales	**67,80,000**

2.   **Computation of stock of Raw Material**

A = 50,40,000

B = 100

C = 0.15

$\therefore$ EOQ = $\sqrt{\dfrac{2AB}{C}}$ = $\sqrt{\dfrac{2 \times 50,40,000 \times 100}{0.15}}$ = ₹ 81,975

3.   **Calculation of Cash Balance**

A = 12,00,000 + 3,00,000 + 2,40,000 = 17,40,000

B = 10

C = 0.15

Optimal Cash Balance = $\sqrt{\dfrac{2AB}{C}}$ = $\sqrt{\dfrac{2 \times 17,40,000 \times 10}{0.15}}$ = ₹ 15,232

➢ **WC Estimation for New Projects**

Question 6 (Vault Q. 28)   **(Corrected MTP 2 Jan 25 – 6 Marks)**

ABC 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.

Raw Material Cost	Rs 40 per unit
Direct Wages Cost	Rs 25 per Unit
Overhead	Rs 40 per Unit (Incl. Rs 10 of Depreciation)

Selling Price	Rs 150 per unit
Net Profit Ratio	25% (On Cash cost)
Raw Material in Stock	Avg of 30 days consumption
Work in Progress Stock at 30% of FG Produced Units	**Valued at Prime Cost Material – 90% into process Relevant Conversion Cost – 60% completed
Finished Goods Stock	2,500 units
Credit Allowed by the supplier	30 Days
Credit Allowed to Purchasers	45 Days
Direct Wages [Lag in payment]	15 Days
Expected Cash Balance	1,25,000

Safety margin is to be kept at 15% of the net working capital required inclusive of the margin amount. 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.

Solution

A bank will not finance depreciation cost (being non-cash cost) and it will also not finance profit. Hence, question to be solved using cash cost basis.

Calculation of Net Working Capital requirement:

	(₹)	(₹)
A. Current Assets:		
Inventories:		
- Raw material stock (Refer to Working note 3)	1,32,080	
- Work in progress stock (Refer to Working note 2)	4,77,360	
- Finished goods stock	2,37,500	
Receivables (Debtors) (Refer to Working note 4)	4,30,500	
Cash	1,25,000	
Gross Working Capital	14,02,440	14,02,440
B. Current Liabilities:		
Creditors for raw materials (Refer to Working note 5)	1,43,087	
Creditors for wages (Refer to Working note 6)	38,350	
	1,81,437	1,81,437
Excess of CA over CL (A - B)		12,21,003
Safety Margin (12,21,003 × 15/85)		2,15,471
Net Working Capital		14,36,474

Working Notes:

1.   **Annual cost of production**

	(₹)
Raw material requirements {(31,200 × 40) + 3,36,960}	15,84,960
Direct wages {(31,200 × 25) + 1,40,400}	9,20,400
Overheads (exclusive of depreciation) (31,200 × 30)	9,36,000
Gross Factory Cost	34,41,360
Less: Closing W.I.P	4,77,360
Cash Cost of Goods Produced	29,64,000
Less: Closing Stock of Finished Goods (29,64,000 × 2,500/31,200)	(2,37,500)
Total Cash Cost of Goods Sold	27,26,500
Selling and Distribution Exp (b/f)	7,17,500
Cash Cost of Sales	34,44,000
Profit (43,05,000 × 25/125)	8,61,000
Sales	43,05,000

2.   **Work in progress stock**

WIP Inventory = 31,200 Units × 30% = 9,360 units

	(₹)
Raw material requirements (9,360 units × ₹ 40 × 90%)	3,36,960
Direct wages (9,360 units × ₹ 25 × 60%)	1,40,400
	4,77,360

3.   **Raw material stock** = 15,84,960 × 30/360 = 1,32,080

4.   **Debtors for sale:** 34,44,000 × 45/360 = ₹ 4,30,500

5.   **Creditors for raw material:**

   Material Consumed   ₹ 15,84,960

   Add: Closing stock of raw material   ₹   1,32,080

   Purchases of Raw Material   ₹ 17,17,040

Credit allowed by suppliers   = 17,17,040 × 30/360   = ₹ 1,43,087

6.   **Creditors for wages**

Outstanding wage payment   = 9,20,400 × 15/360   = ₹ 38,350

Study Note: ICAI's answer had terrible blunders, so the above solution has been modified.

Question 7 (Vault Q. 29)   **(ICAI SM)**

M.A. Limited is commencing a new project for manufacture of a plastic component. The following cost information has been ascertained for annual production of 12,000 units which is the full capacity:

	Costs per unit (₹)
Materials	40.00
Direct labour and variable expenses	20.00

Fixed manufacturing expenses	6.00
Depreciation	10.00
Fixed administration expenses	4.00
	80.00

The selling price per unit is expected to be ₹ 96 and the selling expenses ₹ 5 per unit, 80% of which is variable.

In the first two years of operations, production and sales are expected to be as follows:

Year	Production (No. of units)	Sales (No. of units)
1	6,000	5,000
2	9,000	8,500

To assess the working capital requirements, the following additional information is available:

(a)	Stock of materials	2.25 months' average consumption
(b)	Work-in-process	Nil
(c)	Debtors	1 month's average sales.
(d)	Cash balance	₹ 10,000
(e)	Creditors for supply of materials	1 month's average purchase during the year.
(f)	Creditors for expenses	1 month's average of all expenses during the year.

PREPARE, for the two years:

(i) A projected statement of Profit/Loss (Ignoring taxation); and

(ii) A projected statement of working capital requirements.

Solution

(i)   M.A. Limited

Projected Statement of Profit / Loss (Ignoring Taxation)

	Year 1	Year 2
Production (Units)	6,000	9,000
Sales (Units)	5,000	8,500
	(₹)	**(₹)**
Sales revenue (A) (Sales unit × ₹ 96)	4,80,000	8,16,000
Cost of production:		
Materials cost (Units produced × ₹ 40)	2,40,000	3,60,000
Direct labour and variable expenses (Units produced × ₹ 20)	1,20,000	1,80,000
Fixed manufacturing expenses (Production Capacity: 12,000 units × ₹ 6)	72,000	72,000
Depreciation (Production Capacity : 12,000 units × ₹ 10)	1,20,000	1,20,000
Fixed administration expenses (Production Capacity : 12,000 units × ₹ 4)	48,000	48,000

Total Costs of Production	6,00,000	7,80,000
Add: Opening stock of finished goods (Year 1 : Nil; Year 2 : 1,000 units)	---	1,00,000
Cost of Goods available for sale (Year 1: 6,000 units; Year 2: 10,000 units)	6,00,000	8,80,000
Less: Closing stock of finished goods at average cost (Year 1: 1000 units, Year 2 : 1500 units) (Cost of Production × Closing stock/ units produced)	(1,00,000)	(1,32,000)
Cost of Goods Sold	5,00,000	7,48,000
Add: Selling expenses – Variable (Sales unit × ₹ 4)	20,000	34,000
Add: Selling expenses – Fixed (12,000 units × ₹ 1)	12,000	12,000
Cost of Sales : (B)	5,32,000	7,94,000
Profit (+) / Loss (-): (A - B)	(-) 52,000	(+) 22,000

Note: Value of closing stock valued at average cost of goods available for sale.

Working Notes:

1.   Calculation of creditors for supply of materials:

	Year 1 (₹)	Year 2 (₹)
Materials consumed during the year	2,40,000	3,60,000
Add: Closing stock (2.25 month's average consumption)	45,000	67,500
	2,85,000	4,27,500
Less: Opening Stock	---	45,000
Purchases during the year	2,85,000	3,82,500
Average purchases per month (Creditors)	23,750	31,875

2.   Creditors for expenses:

	Year 1 (₹)	Year 2 (₹)
Direct labour and variable expenses	1,20,000	1,80,000
Fixed manufacturing expenses	72,000	72,000
Fixed administration expenses	48,000	48,000
Selling expenses (variable + fixed)	32,000	46,000
Total	2,72,000	3,46,000
Average per month	22,667	28,833

(ii)   Projected Statement of Working Capital requirements

	Year 1 (₹)	Year 2 (₹)
Current Assets:		
Inventories:		
- Stock of materials (2.25 month's average consumption)	45,000	67,500
- Finished goods	1,00,000	1,32,000
Debtors (1 month's average sales) (including profit)	40,000	68,000

Cash	10,000	10,000
Total Current Assets/ Gross working capital (A)	1,95,000	2,77,500
Current Liabilities:		
Creditors for supply of materials (Refer to working note 1)	23,750	31,875
Creditors for expenses (Refer to working note 2)	22,667	28,833
Total Current Liabilities: (B)	46,417	60,708
Estimated Working Capital Requirements: (A-B)	1,48,583	2,16,792

Projected Statement of Working Capital Requirement

(Cash Cost Basis)

	Year 1 (₹)	Year 2 (₹)
(A) Current Assets		
Inventories:		
- Stock of Raw Material (6,000 units × ₹ 40 × 2.25/12); (9,000 units × ₹ 40 × 2.25 /12)	45,000	67,500
- Finished Goods (Refer working note 3)	80,000	1,11,000
Receivables (Debtors) (Refer working note 4)	36,000	56,250
Minimum Cash balance	10,000	10,000
Total Current Assets/ Gross working capital (A)	1,71,000	2,44,750
(B) Current Liabilities		
Creditors for raw material (Refer working note 1)	23,750	31,875
Creditors for Expenses (Refer working note 2)	22,667	28,833
Total Current Liabilities	46,417	60,708
Net Working Capital (A – B)	1,24,583	1,84,042

Working Note:

3. Cash Cost of Production:

	Year 1 (₹)	Year 2 (₹)
Cost of Production as per projected Statement of P&L	6,00,000	7,80,000
Less: Depreciation	1,20,000	1,20,000
Cash Cost of Production	4,80,000	6,60,000
Add: Opening Stock at Average Cost:	--	80,000
Cash Cost of Goods Available for sale	4,80,000	7,40,000
Less : Closing Stock at Avg. Cost ₹ 4,80,000 × 1,000 / 6,000; ₹7,40,000 × 1,500/10,000	(80,000)	(1,11,000)
Cash Cost of Goods Sold	4,00,000	6,29,000

4. Receivables (Debtors)

	Year 1 (₹)	Year 2 (₹)
Cash Cost of Goods Sold	4,00,000	6,29,000
Add : Variable Expenses @ ₹ 4	20,000	34,000

Add : Total Fixed Selling expenses (12,000 units × ₹ 1)	12,000	12,000
Cash Cost of Debtors	4,32,000	6,75,000
Average Debtors	36,000	56,250

➢ WC Estimation for Double Shift

Question 8 (Vault Q. 31)   **(ICAI SM)**

Samreen Enterprises has been operating its manufacturing facilities till 31.3.2022 on a single shift working with the following cost structure:

	Per unit (₹)
Cost of Materials	6.00
Wages (out of which 40% fixed)	5.00
Overheads (out of which 80% fixed)	5.00
Profit	2.00
Selling Price	18.00
Sales during 2020-21 – ₹ 4,32,000	

As at 31.3.2022 the company held:

	(₹)
Stock of raw materials (at cost)	36,000
Work-in-progress (valued at prime cost)	22,000
Finished goods (valued at total cost)	72,000
Sundry debtors	1,08,000

In view of increased market demand, it is proposed to double production by working an extra shift. It is expected that a 10% discount will be available from suppliers of raw materials in view of increased volume of business. Selling price will remain the same. The credit period allowed to customers will remain unaltered. Credit availed of from suppliers will continue to remain at the present level i.e., 2 months. Lag in payment of wages and expenses will continue to remain half a month.

You are required to PREPARE the additional working capital requirements, if the policy to increase output is implemented.

Solution

Comparative Statement of Working Capital Requirement

	Single Shift (24,000)			Double Shift (48,000)		
	Unit	Rate (₹)	Amount (₹)	Unit	Rate (₹)	Amount (₹)
Current Assets						
Inventories:						
Raw Materials	6,000	6.00	36,000	12,000	5.40	64,800
Work-in-Progress	2,000	11.00	22,000	2,000	9.40	18,800
Finished Goods	4,500	16.00	72,000	9,000	12.40	1,11,600

Sundry Debtors	6,000	16.00	96,000	12,000	12.40	1,48,800
Total Current Assets: (A)			2,26,000			3,44,000
Current Liabilities						
Creditors for Materials	4,000	6.00	24,000	8,000	5.40	43,200
Creditors for Wages	1,000	5.00	5,000	2,000	4.00	8,000
Creditors for Expenses	1,000	5.00	5,000	2,000	3.00	6,000
Total Current Liabilities: (B)			34,000			57,200
Working Capital: (A) – (B)			1,92,000			2,86,800

Additional Working Capital requirement = ₹ 2,86,800 – ₹ 1,92,000 = ₹ 94,800

Workings:

(1) Statement of cost at single shift and double shift working

	24,000 units		48,000 Units	
	Per unit (₹)	Total (₹)	Per unit (₹)	Total (₹)
Raw materials	6.00	1,44,000	5.40	2,59,200
Wages - Variable	3.00	72,000	3.00	1,44,000
Fixed	2.00	48,000	1.00	48,000
Overheads - Variable	1.00	24,000	1.00	48,000
Fixed	4.00	96,000	2.00	96,000
Total cost	16.00	3,84,000	12.40	5,95,200
Profit	2.00	48,000	5.60	2,68,800
	18.00	4,32,000	18.00	8,64,000

(2) Sales in units 2020-21 = $\dfrac{\text{Sales}}{\text{Unit selling price}}$ = $\dfrac{₹\,4,32,000}{₹\,18}$ = 24,000 units

(3) Stock of Raw Materials in units on 31.3.2021 = $\dfrac{\text{Value of Stock}}{\text{Cost per unit}}$ = $\dfrac{₹\,36,000}{6}$ = 6,000 units

(4) Stock of work-in-progress in units on 31.3.2021 = $\dfrac{\text{Value of work}-\text{in}-\text{progress}}{\text{Prime Cost per unit}}$

$\qquad\qquad\qquad\qquad\qquad\qquad = \dfrac{₹\,22,000}{(₹\,6 + ₹\,5)}$ = 2,000 units

(5) Stock of finished goods in units 2020-21 = $\dfrac{\text{Value of Stock}}{\text{Total Cost per unit}}$ = $\dfrac{₹\,72,000}{₹\,16}$ = 4,500 units

Notes:

(i) The quantity of material in process will not change due to double shift working since work started in the first shift will be completed in the second shift.

(ii) It is given in the question that the WIP is valued at prime cost hence, it is assumed that the WIP is 100% complete in respect of material and labour.

(iii) In absence of any information on proportion of credit sales to total sales, debtors quantity has been doubled for double shift. Hence, the units have been taken as 12,000 only.

(iv) It is assumed that all purchases are on credit.

(v)   The valuation of work-in-progress based on prime cost (i.e. material & labor) as per the policy of the company is as under.

	Single shift (₹)	Double shift (₹)
Materials	6.00	5.40
Wages – Variable	3.00	3.00
– Fixed	2.00	1.00
	11.00	9.40

Unit 2: Management of Receivables

➢ Evaluation of Credit Policies

C
(Policy C)

Question 1 (Vault Q. 2)   **(ICAI SM)**

A trader whose current sales are in the region of ₹ 6 lakhs per annum and an average collection period of 30 days wants to pursue a more liberal policy to improve sales. A study made by a management consultant reveals the following information:-

Credit Policy	Increase in collection period	Increase in sales	Present default anticipated
A	10 days	30,000	1.5%
B	20 days	48,000	2%
C	30 days	75,000	3%
D	45 days	90,000	4%

The selling price per unit is ₹ 3. Average cost per unit is ₹ 2.25 and variable costs per unit are ₹ 2. The current bad debt loss is 1%. Required return on additional investment is 20%. Assume a 360 days year.

ANALYSE which of the above policies would you recommend for adoption?

Solution

A. Statement showing the Evaluation of Debtors Policies (Total Approach)

Particulars		Present Policy 30 days	Proposed Policy A 40 days	Proposed Policy B 50 days	Proposed Policy C 60 days	Proposed Policy D 75 days
		₹	₹	₹	₹	₹
A.	Expected Profit:					
	(a) Credit Sales	6,00,000	6,30,000	6,48,000	6,75,000	6,90,000
	(b) Total Cost other than Bad Debts					
	(i) Variable Costs [Sales × 2/ 3]	4,00,000	4,20,000	4,32,000	4,50,000	4,60,000
	(ii) Fixed Costs	50,000	50,000	50,000	50,000	50,000
		4,50,000	4,70,000	4,82,000	5,00,000	5,10,000
	(c) Bad Debts	6,000	9,450	12,960	20,250	27,600
	(d) Expected Profit [(a) – (b) – (c)]	1,44,000	1,50,550	1,53,040	1,54,750	1,52,400
B.	Opportunity Cost of Investments in Receivables	7,500	10,444	13,389	16,667	21,250
C.	Net Benefits (A – B)	1,36,500	1,40,106	1,39,651	1,38,083	1,31,150

Recommendation: The Proposed Policy A (i.e. increase in collection period by 10 days or total 40 days) should be adopted since the net benefits under this policy are higher as compared to other policies.

Working Notes:

(i)   Calculation of Fixed Cost = [Average Cost per unit – Variable Cost per unit] × No. of Units sold

= [₹ 2.25 - ₹ 2.00] × (₹ 6,00,000/3) = ₹ 0.25 × 2,00,000 = ₹ 50,000

(ii)   Calculation of Opportunity Cost of Average Investments

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

Present Policy $= 4,50,000 \times \dfrac{30}{360} \times \dfrac{20}{100} = 7,500$

Policy A $= 4,70,000 \times \dfrac{40}{360} \times \dfrac{20}{100} = 10,444$

Policy B $= 4,82,000 \times \dfrac{50}{360} \times \dfrac{20}{100} = 13,389$

Policy C $= 5,00,000 \times \dfrac{60}{360} \times \dfrac{20}{100} = 16,667$

Policy D $= 5,10,000 \times \dfrac{75}{360} \times \dfrac{20}{100} = 21,250$

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

Particulars		Present Policy 30 days	Proposed Policy A 40 days	Proposed Policy B 50 days	Proposed Policy C 60 days	Proposed Policy D 75 days
		₹	₹	₹	₹	₹
A.	**Incremental Expected Profit:**					
	(a) Incremental Credit Sales	---	30,000	48,000	75,000	90,000
	(b) Incremental Costs					
	(i) Variable Costs	---	20,000	32,000	50,000	60,000
	(ii) Fixed Costs	---	-	-	-	-
	(c) Incremental Bad Debt Losses	---	3,450	6,960	14,250	21,600
	(d) Incremental Expected Profit (a – b –c)]		**6,550**	**9,040**	**10,750**	**8,400**
B.	**Required Return on Incremental**					
	Investments:					
	(a) Cost of Credit Sales	4,50,000	4,70,000	4,82,000	5,00,000	5,10,000
	(b) Collection period	30	40	50	60	75
	(c) Investment in Receivable (a × b/360)	37,500	52,222	66,944	83,333	1,06,250
	(d) Incremental Investment in Receivables	---	14,722	29,444	45,833	68,750
	(e) Required Rate of Return (in %)		20	20	20	20

	(f) Required Return on Incremental Investments (d× e)	---	2,944	5,889	9,167	13,750
C.	**Net Benefits (A – B)**	---	3,606	3,151	1,583	- 5,350

Recommendation: The Proposed Policy A should be adopted since the net benefits under this policy are higher than those under other policies.

C.   Another method of solving the problem is by computing the **Expected Rate of Return.**

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

$$\text{For Policy A} = \frac{₹6,550}{₹14,722} \times 100 = 44.49\%$$

$$\text{For Policy B} = \frac{₹9,040}{₹29,444} \times 100 = 30.70\%$$

$$\text{For Policy C} = \frac{₹10,750}{₹45,833} \times 100 = 23.45\%$$

$$\text{For Policy D} = \frac{₹8,400}{₹68,750} \times 100 = 12.22\%$$

Recommendation: The Proposed Policy A should be adopted since the Expected Rate of Return (44.49%) is more than the Required Rate of Return (20%) and is highest among the given policies compared.

Question 2 (Vault Q. 13)   (ICAI SM)

As a part of the strategy to increase sales and profits, the sales manager of a company proposes to sell goods to a group of new customers with 10% risk of non-payment. This group would require one and a half months credit and is likely to increase sales by ₹ 1,00,000 p.a. Production and Selling expenses amount to 80% of sales and the income-tax rate is 50%. The company's minimum required rate of return (after tax) is 25%.

Should the sales manager's proposal be accepted? ANALYSE

Also COMPUTE the degree of risk of non-payment that the company should be willing to assume if the required rate of return (after tax) were (i) 30%, (ii) 40% and (iii) 60%.

Solution

Statement showing the Evaluation of Proposal

Particulars	₹
A. Expected Profit:	
Net Sales	1,00,000
Less: Production and Selling Expenses @ 80%	(80,000)
Profit before providing for Bad Debts	20,000
Less: Bad Debts @10%	(10,000)
Profit before Tax	10,000
Less: Tax @ 50%	(5,000)
Profit after Tax	5,000
B. Opportunity Cost of Investment in Receivables	(2,500)

C. Net Benefits (A – B)	2,500

Advise: The sales manager's proposal should be accepted.

Working Note: Calculation of Opportunity Cost of Funds

Opportunity Cost = Total Cost of Credit Sales × $\dfrac{\text{Collection period}}{12}$ × $\dfrac{\text{Required Rate of Return}}{100}$

= ₹ 80,000 × $\dfrac{1.5}{12}$ × $\dfrac{25}{100}$ = ₹ 2,500

Statement showing the Acceptable Degree of Risk of Non-payment

Particulars	Required Rate of Return		
	30%	**40%**	**60%**
Sales	1,00,000	1,00,000	1,00,000
Less: Production and Sales Expenses	80,000	80,000	80,000
Profit before providing for Bad Debts	20,000	20,000	20,000
Less: Bad Debts (assume X)	X	X	X
Profit before tax	20,000 – X	20,000 – X	20,000 – X
Less: Tax @ 50%	(20,000 – X) 0.5	(20,000 – X) 0.5	(20,000 – X) 0.5
Profit after Tax	10,000 – 0.5X	10,000 – 0.5X	10,000 – 0.5X
Required Return (given)	30% of 10,000* = ₹ 3,000	40% of 10,000* = ₹ 4,000	60% of 10,000* = ₹ 6,000

*Average Debtors = Total Cost of Credit Sales × $\dfrac{\text{Collection period}}{12}$ = ₹ 80,000 × $\dfrac{1.5}{12}$ = ₹ 10,000

Computation of the value and percentage of X in each case is as follows:

Case I:
10,000 – 0.5x	= 3,000
0.5x	= 7,000
X	= 7,000/0.5 = ₹ 14,000
Bad Debts as % of sales	= ₹ 14,000/ ₹ 1,00,000 × 100 = 14%

Case II:
10,000 – 0.5x	= 4,000
0.5x	= 6,000
X	= 6,000/0.5 = ₹ 12,000
Bad Debts as % of sales	= ₹ 12,000/ ₹ 1,00,000 × 100 = 12%

Case III:
10,000 – 0.5x	= 6,000
0.5x	= 4,000
X	= 4,000/0.5 = ₹ 8,000
Bad Debts as % of sales	= ₹ 8,000/₹ 1,00,000 × 100 = 8%

Thus, it is found that the Acceptable Degree of risk of non-payment is 14%, 12% and 8% if required rate of return (after tax) is 30%, 40% and 60% respectively.

Question 3 (Vault Q. 14)   **(ICAI SM)**

Slow Payers are regular customers of Goods Dealers Ltd. and have approached the sellers for extension of credit facility for enabling them to purchase goods. On an analysis of past performance and on the basis of

information supplied, the following pattern of payment schedule emerges in regard to Slow Payers:

Pattern of Payment Schedule	
At the end of 30 days	15% of the bill
At the end of 60 days	34% of the bill
At the end of 90 days	30% of the bill
At the end of 100 days	20% of the bill
Non-recovery	1% of the bill

Slow Payers want to enter into a firm commitment for purchase of goods of ₹ 15 lakhs in 2021-22, deliveries to be made in equal quantities on the first day of each quarter in the calendar year. The price per unit of commodity is ₹ 150 on which a profit of ₹ 5 per unit is expected to be made. It is anticipated by Goods Dealers Ltd., that taking up of this contract would mean an extra recurring expenditure of ₹ 5,000 per annum. If the opportunity cost of funds in the hands of Goods Dealers is 24% per annum, would you as the finance manager of the seller recommend the grant of credit to Slow Payers? ANALYSE. Workings should form part of your answer. Assume year of 365 days.

Solution

Statement showing the Evaluation of Debtors Policies

Particulars	Proposed Policy ₹
A. Expected Profit:	
(a) Credit Sales	15,00,000
(b) Total Cost	
(i) Variable Costs	14,50,000
(ii) Recurring Costs	5,000
	14,55,000
(c) Bad Debts	15,000
(d) Expected Profit [(a) – (b) – (c)]	30,000
B. Opportunity Cost of Investments in Receivables	68,787
C. Net Benefits (A – B)	(38,787)

Recommendation: The Proposed Policy should not be adopted since the net benefits under this policy are negative

Working Note: Calculation of Opportunity Cost of Average Investments

$$\text{Opportunity Cost} = \text{Total Cost} \times \frac{\text{Collection period}}{365} \times \frac{\text{Rate of Return}}{100}$$

Particulars	15%	34%	30%	20%	Total
A. Total Cost	2,18,250	4,94,700	4,36,500	2,91,000	14,40,450
B. Collection period	30/365	60/365	90/365	100/365	
C. Required Rate of Return	24%	24%	24%	24%	
D. Opportunity Cost (A × B × C)	4,305	19,517	25,831	19,134	68,787

Question 4 (Vault Q. 15)   **(MTP 1 Sep 24 – 6 Marks)**

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?

Solution

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.

➢ Evaluation of Factoring Services

Question 5 (Vault Q. 17)   **(PM)**

A firm has a total sales of ₹ 200 lakhs of which 80% is on credit. It is offering credit terms of 2/40, net 120. Of the total, 50% of customers avail of discount and the balance pay in 120 days. Past experience indicates that bad debt losses are around 1% of credit sales. The firm spends about ₹ 2,40,000 per annum to administer its credit sales. These are avoidable as a factor is prepared to buy the firm's receivables. He will charge 2% commission. He will pay advance against receivables to the firm at an interest rate of 18% after withholding 10% as reserve.

(i)   What is the effective cost of factoring? Consider year as 360 days.

(ii)   If bank finance for working capital is available at 14% interest, should the firm avail of factoring service

Solution   *(ICAI not included Cash Discount in Savings!!)*

Particulars	(₹)
Total Sales	₹ 200 lakhs
Credit Sales (80%)	₹ 160 lakhs
Receivables for 40 days	₹ 80 lakhs
Receivables for 120 days	₹ 80 lakhs
Average collection period [(40 × 0.5) + (120 × 0.5)]	80 days
Average level of Receivables (₹ 1,60,00,000 × 80/360)	₹ 35,55,556
Factoring Commission (₹ 35,55,556 × 2/100)	₹ 71,111
Factoring Reserve (₹ 35,55,556 × 10/100)	₹ 3,55,556
Amount available for advance {₹ 35,55,556 – (3,55,556 + 71,111)}	₹ 31,28,889
Factor will deduct his interest @ 18% : Interest = ₹ 31,28,889 × 18 × 80/(100 × 360)	₹ 1,25,156
Advance to be paid (₹ 31,28,889 – ₹ 1,25,156)	₹ 30,03,733

(i)   Statement Showing Evaluation of Factoring Proposal

		₹
A.	**Annual Cost of Factoring to the Firm:**	
	Factoring commission (₹ 71,111 × 360/80)	3,20,000
	Interest charges (₹ 1,25,156 × 360/80)	5,63,200
	Total	8,83,200
B.	**Firm's Savings on taking Factoring Service:**	
	Cost of credit administration saved	2,40,000
	Bad Debts (₹ 1,60,00,000 × 1/100) avoided	1,60,000
	Total	4,00,000
C.	Net Cost to the firm (A – B) (₹ 8,83,200 – ₹ 4,00,000)	4,83,200

$$\text{Effective cost of factoring} \quad = \frac{₹\,4,83,200}{₹\,30,03,733} \times 100 = 16.09^* \%$$

* If cost of factoring is calculated on the basis of total amount available for advance, then, it will be

$$= \frac{₹\,4,83,200}{₹\,31,28,889} \times 100 = 15.44\%$$

(ii)   If Bank finance for working capital is available at 14%, firm will not avail factoring service as 14 % is less than 16.09% (or 15.44%)

Question 6 (Vault Q. 18)   **(Nov 21 – 5 Marks)**

A factoring firm has offered a company to buy its accounts receivables.

The relevant information is given below:

(i)   The current average collection period for the company's debt is 80 days and ½% of debtors default. The factor has agreed to pay over money due to the company after 60 days and it will suffer all the losses of bad debts also.

(ii)   Factor will charge commission @2%.

(iii)   The company spends ₹ 1,00,000 p.a. on administration of debtor. These are avoidable cost.

(iv)   Annual credit sales are ₹ 90 lakhs. Total variable costs is 80% of sales. The company's cost of borrowing is 15% per annum. Assume 365 days in a year.

Should the company enter into agreement with factoring firm?

Solution

	Particulars	(₹)
A.	**Annual Savings (Benefit) on taking Factoring Service**	
	Cost of credit administration saved	1,00,000
	Bad debts avoided (₹ 90 lakh × ½%)	45,000
	Interest saved due to reduction in average collection period [₹ 90 lakh × 0.80 × 0.15 × (80 days – 60 days)/365 days]	59,178
	Total	**2,04,178**
B.	**Annual Cost of Factoring to the Firm:**	

	Factoring Commission [₹ 90 lakh × 2%]	1,80,000
	Total	**1,80,000**
C.	**Net Annual Benefit of Factoring to the Firm (A – B)**	**24,178**

Advice: Since savings to the firm exceeds the cost to the firm on account of factoring, therefore, the company should enter into agreement with the factoring firm.

Question 7 (Vault Q. 19)   (May 24 – 5 Marks)

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)

Solution

Evaluation of Factoring Proposal

	Particulars	₹	₹
A.	**Savings due to factoring**		
	Bad Debts saved	0.75% × 7.5 crores × 90%	₹ 5,06,250
	Administration cost saved	18.6 lakhs × 2/5	₹ 7,44,000
	Interest saved due to reduction in average collection period	7.5 crores × 90% × (70 – 45)/ 360 × 12.5%	₹ 5,85,937.5
	Total		**₹ 18,36,187.5**
B.	**Costs of factoring:**		
	Service charge	7.5 crores × 90% × 2%	₹ 13,50,000
	Interest cost	1,15,171.875 × 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 × 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 × 90%	₹ 6,75,00,000
Average level of receivables = ₹ 6.75 crores × 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 × 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 × 90%	₹ 6,75,00,000
Average level of receivables = ₹ 6.75 crores × 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 × 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.

Question 8 (Vault Q. 20)   **(MTP 2 Sep 24 – 7 Marks)**

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.

Solution

Evaluation of Factoring Proposal –

Particulars		Calculation (₹)	(₹)
(A)	**Savings (Benefit) to the firm**		
	Administration Cost	45,000	45,000
	Bad Debts Cost (On Recourse basis) In House – 75 lakhs × 1% Factoring – 75 lakhs × 0.5% **Net Savings in bad debts cost**	(75 lakhs × 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 × 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 × Avg Collection Period / 360 × Interest (%) p.a

= 75,00,000 × 60/360 × 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 × 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 × 80%   = 4,42,500

Int. cost on Advance from Factor = 4,42,500 × 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 × 10% = 18,250**

Net Savings in Interest Cost of Carrying Debtors = 1,25,000 – 18,250 = 1,06,750

Sales

(–) G.P.
_____

COGS
(–) wages
_____

Stock Consumed

(+) Cl. Stock

(–) Op. Stock
_____

Stock Purchased.

(+) Op. Creditors

(–) Cl. Creditors
_____

Payment to Creditors.

Unit 3: Treasury & Cash Management

➢ **Preparation of Cash Budget**

Question 1 (Vault Q. 2)   (ICAI SM)

From the following information relating to a departmental store, you are required to PREPARE for the three months ending 31st March, 2022:

(a)   Month-wise cash budget on receipts and payments basis; and

(b)   Statement of Sources and uses of funds for the three months period.

It is anticipated that the working capital & other account balances at 1st January, 2022 will be as follows:

	(₹) in '000
Cash in hand and at bank	545
Short term investments	300
Debtors	2,570
Stock	1,300
Trade creditors	2,110
Other creditors	200
Dividends payable	485
Tax due	320
Plant	800

Budgeted Profit Statement:		(₹) in '000	
	January	February	March
Sales	2,100	1,800	1,700
Cost of goods sold	1,635	1,405	1,330
Gross Profit	465	395	370
Administrative, Selling and Distribution Expenses	315	270	255
Net Profit before tax	150	125	115

Budgeted balances at the end of each months		(₹) in '000	
	31st Jan.	28th Feb.	31st March
Short term investments	700	---	200
Debtors	2,600	2,500	2,350
Stock	1,200	1,100	1,000
Trade creditors	2,000	1,950	1,900
Other creditors	200	200	200
Dividends payable	485	--	--
Tax due	320	320	320

Plant (depreciation ignored)	800	1,600	1,550

Depreciation amount to ₹ 60,000 is included in the budgeted expenditure for each month.

Solution

WORKING

			(₹) in '000		
			Jan.	Feb.	March
(1)	**Payments to creditors:**				
	Cost of goods sold		1,635	1,405	1,330
	Add: Closing Stocks		1,200	1,100	1,000
			2,835	2,505	2,330
	Less: Opening Stocks		1,300	1,200	1,100
	Purchases		1,535	1,305	1,230
	Add: Trade Creditors, Opening balance		2,110	2,000	1,950
			3,645	3,305	3,180
	Less: Trade Creditors, closing balance		2,000	1,950	1,900
	Payment		1,645	1,355	1,280
(2)	**Receipts from debtors:**				
	Debtors, Opening balances		2,570	2,600	2,500
	Add: Sales		2,100	1,800	1,700
			4,670	4,400	4,200
	Less: Debtors, closing balance		2,600	2,500	2,350
	Receipt		2,070	1,900	1,850

CASH BUDGET

(a)   3 months ending 31st March, 2022

	(₹) in '000		
	Jan, 2022	Feb, 2022	Mar, 2022
Opening cash balances	545	315	65
Add: Receipts:			
From Debtors	2,070	1,900	1,850
Sale of Investments	---	700	----
Sale of Plant	---	---	50
Total (A)	2,615	2,915	1,965
Deduct: Payments			
Creditors	1,645	1,355	1,280
Expenses	255	210	195
Capital Expenditure	---	800	---
Payment of dividend	---	485	---
Purchase of investments	400	---	200

Total payments (B)	2,300	2,850	1,675
Closing cash balance (A-B)	315	65	290

(b) **Statement of Sources and uses of Funds for the three month period ending 31st March, 2022**

	(₹) '000	(₹) '000
Sources:		
Funds from operation:		
Net profit (150+125+115)	390	
Add: Depreciation (60×3)	180	570
Sale of plant		50
		620
Decrease in Working Capital		
(Refer Statement of changes in working capital)		665
Total		1,285
Uses:		
Purchase of plant		800
Payment by dividends		485
Total		1,285

Statement of Changes in Working Capital

	Jan, 22	Mar, 22	Increase	Decrease
	(₹) '000	(₹) '000	(₹) '000	(₹) '000
Current Assets				
Cash in hand and at Bank	545	290		255
Bank Short term Investments	300	200		100
Debtors	2,570	2,350		220
Stock	1,300	1,000		300
	4,715	3,840		
Current Liabilities				
Trade Creditors	2,110	1,900	210	---
Other Creditors	200	200	---	---
Tax Due	320	320	---	---
	2,630	2,420		
Working Capital	2,085	1,420		
Decrease	-	665	665	
	2,085	2,085	875	875

⭕ **Question 2 (Vault Q. 4)**   **(ICAI SM)**

Prachi Ltd is a manufacturing company producing and selling a range of cleaning products to wholesale customers. It has three suppliers and two customers. Prachi Ltd relies on its cleared funds forecast to manage its cash.

You are an accounting technician for the company and have been asked to prepare a cleared funds forecast for the period Saturday 9 August to Wednesday 13 August 20X2 inclusive. You have been provided with the following information:

(1)   Receipts from customers

	Credit terms	Payment method	9 Aug 20X2 sales	9 Jul 20X2 sales
W Ltd	1 calendar month	BACS	₹ 150,000	₹ 130,000
X Ltde	None	Cheque	₹ 180,000	₹ 160,000

(a)   Receipt of money by BACS (Bankers' Automated Clearing Services) is instantaneous.

(b)   X Ltd's cheque will be paid into Prachi Ltd's bank account on the same day as the sale is made and will clear on the third day following this (excluding day of payment).

(2)   Payments to suppliers

Supplier name	Credit terms	Payment method	9 Aug 20X2 purchases	9 Jul 20X2 purchases	9 Jun 20X2 purchases
A Ltd	1 calendar month	Standing order	₹ 65,000	₹ 55,000	₹ 45,000
B Ltd	2 calendar months	Cheque	₹ 85,000	₹ 80,000	₹ 75,000
C Ltd	None	Cheque	₹ 95,000	₹ 90,000	₹ 85,000

(a)   Prachi Ltd has set up a standing order for ₹ 45,000 a month to pay for supplies from A Ltd. This will leave Prachi's bank account on 9 August. Every few months, an adjustment is made to reflect the actual cost of supplies purchased (you do NOT need to make this adjustment).

(b)   Prachi Ltd will send out, by post, cheques to B Ltd and C Ltd on 9 August. The amounts will leave its bank account on the second day following this (excluding the day of posting).

(3)   Wages and salaries

	July 20X2	August 20X2
Weekly wages	₹12,000	₹ 13,000
Monthly salaries	₹ 56,000	₹ 59,000

(a)   Factory workers are paid cash wages (weekly). They will be paid one week's wages, on 13 August, for the last week's work done in July (i.e. they work a week in hand).

(b)   All the office workers are paid salaries (monthly) by BACS. Salaries for July will be paid on 9 August.

(4)   Other miscellaneous payments

(a)   Every Saturday morning, the petty cashier withdraws ₹ 200 from the company bank account for the petty cash. The money leaves Prachi's bank account straight away.

(b)   The room cleaner is paid ₹ 30 from petty cash every Monday morning.

(c)   Office stationery will be ordered by telephone on Sunday 10 August to the value of ₹ 300. This is paid for by company debit card. Such payments are generally seen to leave the company account on the next working day.

(d)   Five new softwares will be ordered over the Internet on 12 August at a total cost of ₹ 6,500. A cheque will be sent out on the same day. The amount will leave Prachi Ltd's bank account on the second day following this (excluding the day of posting).

(5)   Other information

The balance on Prachi's bank account will be ₹ 200,000 on 9 August 20X2. This represents both the book balance and the cleared funds.

PREPARE a cleared funds forecast for the period Saturday 7th August to Wednesday 13th August 20X2 inclusive using the information provided. Show clearly the uncleared funds float each day.

Solution

Cleared Funds Forecast

	9 Aug	10 Aug	11 Aug	12 Aug	13Aug
	(Saturday)	(Sunday)	(Monday)	(Tuesday)	(Wednesday)
	₹	₹	₹	₹	₹
Receipts					
W Ltd	1,30,000	0	0	0	0
X Ltd	0	0	0	1,80,000	0
(a)	**1,30,000**	**0**	**0**	**1,80,000**	**0**
Payments					
A Ltd	45,000	0	0	0	0
B Ltd	0	0	75,000	0	0
C Ltd	0	0	95,000	0	0
Wages	0	0	0	0	12,000
Salaries	56,000	0	0	0	0
Petty Cash	200	0	0	0	0
Stationery	0	0	300	0	0
(b)	**1,01,200**	**0**	**1,70,300**	**0**	**12,000**
Cleared excess Receipts over payments (a) – (b)	28,800	0	(1,70,300)	1,80,000	(12,000)
Cleared balance b/f	2,00,000	2,28,800	2,28,800	58,500	2,38,500
Cleared balance c/f (c)	**2,28,800**	**2,28,800**	**58,500**	**2,38,500**	**2,26,500**
Uncleared funds float					
Receipts	1,80,000	1,80,000	1,80,000	0	0
Payments	(1,70,000)	(1,70,300)	0	(6,500)	(6,500)
(d)	**10,000**	**9,700**	**180,000**	**(6,500)**	**(6,500)**
Total book balance c/f **(c+d)**	**2,38,800**	**2,38,500**	**2,38,500**	**2,32,000**	**2,20,000**

Question 3 (Vault Q. 5)   **(ICAI SM)**

The following information relates to Zeta Limited, a publishing company:

The selling price of a book is ₹ 15, and sales are made on credit through a book club and invoiced on the last day of the month.

Variable costs of production per book are materials (₹ 5), labour (₹ 4), and overhead (₹ 2)

The sales manager has forecasted the following volumes:

Month	No. of Books
November	1,000
December	1,000
January	1,000
February	1,250
March	1,500
April	2,000
May	1,900
June	2,200
July	2,200
August	2,300

Customers are expected to pay as follows:

One month after the sale	40%
Two months after the sale	60%

The company produces the books two months before they are sold and the creditors for materials are paid two months after production.

Variable overheads are paid in the month following production and are expected to increase by 25% in April; 75% of wages are paid in the month of production and 25% in the following month. A wage increase of 12.5% will take place on 1st March.

The company is going through a restructuring and will sell one of its freehold properties in May for ₹ 25,000, but it is also planning to buy a new printing press in May for ₹ 10,000. Depreciation is currently ₹ 1,000 per month, and will rise to ₹ 1,500 after the purchase of the new machine.

The company's corporation tax (of ₹ 10,000) is due for payment in March.

The company presently has a cash balance at bank on 31 December 2021, of ₹ 1,500.

You are required to PREPARE a cash budget for the six months from January to June, 2022.

Solution

Workings:

1.   **Sale receipts**

Month	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Forecast sales (S)	1,000	1,000	1,000	1,250	1,500	2,000	1,900	2,200
	₹	₹	₹	₹	₹	₹	₹	₹
S×15	15,000	15,000	15,000	18,750	22,500	30,000	28,500	33,000
Debtors pay:								
1month 40%		6,000	6,000	6,000	7,500	9,000	12,000	11,400
2month 60% -		-	9,000	9,000	9,000	11,250	13,500	18,000
	-	-	15,000	15,000	16,500	20,250	25,500	29,400

2.   **Payment for materials – books produced two months before sale**

Month	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Qty produced (Q)	1,000	1,250	1,500	2,000	1,900	2,200	2,200	2,300
	₹	₹	₹	₹	₹	₹	₹	₹
Materials (Q×5)	5,000	6,250	7,500	10,000	9,500	11,000	11,000	11,500
Paid (2 months after)	-	-	5,000	6,250	7,500	10,000	9,500	11,000

3.   **Variable overheads**

Month	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Qty produced (Q)	1,000	1,250	1,500	2,000	1,900	2,200	2,200	2,300
	₹	₹	₹	₹	₹	₹	₹	₹
Var. overhead (Q×2)	2,000	2,500	3,000	4,000	3,800			
Var. overhead (Q×2.50)						5,500	5,500	5,750
Paid one month later		2,000	2,500	3,000	4,000	3,800	5,500	5,500

4.   **Wages payments**

Month	Dec	Jan	Feb	Mar	Apr	May	Jun
Qty produced (Q)	1,250	1,500	2,000	1,900	2,200	2,200	2,300
	₹	₹	₹	₹	₹	₹	₹
Wages (Q × 4)	5,000	6,000	8,000				
Wages (Q × 4.50)				8,550	9,900	9,900	10,350
75% this month	3,750	4,500	6,000	6,412	7,425	7,425	7,762
25% this month		1,250	1,500	2,000	2,138	2,475	2,475
		5,750	7,500	8,412	9,563	9,900	10,237

Cash budget – six months ended June

	Jan	Feb	Mar	Apr	May	Jun
	₹	₹	₹	₹	₹	₹
Receipts:						
Sales receipts	15,000	15,000	16,500	20,250	25,500	29,400
Freehold property	-	-	-	-	25,000	-
	15,000	**15,000**	**16,500**	**20,250**	**50,500**	**29,400**
Payments:						
Materials	5,000	6,250	7,500	10,000	9,500	11,000
Var. overheads	2,500	3,000	4,000	3,800	5,500	5,500
Wages	5,750	7,500	8,412	9,563	9,900	10,237
Printing press	-	-	-	-	10,000	-
Corporation tax	-	-	10,000	-	-	-
	13,250	**16,750**	**29,912**	**23,363**	**34,900**	**26,737**

Net cash flow	1,750	(1,750)	(13,412)	(3,113)	15,600	2,663
Balance b/f	1,500	3,250	1,500	(11,912)	(15,025)	575
Cumulative cash flow	3,250	1,500	(11,912)	(15,025)	575	3,238

➢ Others

Question 4 (Vault Q. 16)   **(ICAI SM)**

The following information is available in respect of Sai trading company:

(i)   On an average, debtors are collected after 45 days; inventories have an average holding period of 75 days and creditor's payment period on an average is 30 days.

(ii)   The firm spends a total of ₹ 120 lakhs annually at a constant rate.

(iii)   It can earn 10 per cent on investments.

From the above information, you are required to CALCULATE:

(a)   The cash cycle and cash turnover,

(b)   Minimum amounts of cash to be maintained to meet payments as they become due,

(c)   Savings by reducing the average inventory holding period by 30 days.

Solution

(a)   Cash cycle = 45 days + 75 days – 30 days = 90 days (3 months)

         Cash turnover = 12 months (360 days)/3 months (90 days) = 4.

(b)   Minimum operating cash = Total operating annual outlay/cash turnover, that is,

         ₹ 120 lakhs/4 = ₹ 30 lakhs.

(c)   Cash cycle = 45 days + 45 days – 30 days = 60 days (2 months).

         Cash turnover = 12 months (360 days)/2 months (60 days) = 6.

         Minimum operating cash = ₹ 120 lakhs/6 = ₹ 20 lakhs.

         Reduction in investments = ₹ 30 lakhs – ₹ 20 lakhs = ₹ 10 lakhs.

         Savings = 0.10 × ₹ 10 lakhs = ₹ 1 lakh.

Treasury & Cash Mgmt.

O

Fq: Make Cash Budget for the month March – June from below info:

(i) Projected Sales for Year 2025 are:

Month	Jan	Feb	March	April	May	June	July
Sales	35,000	40,000	40,000	50,000	70,000	35,000	45,000

(ii) GP Margin is 40% on Sales.

(iii) Following are balances of closing Stock:

Month	Jan	Feb	March	April	May	June	July
Amount	5,000	8,000	7,000	5,000	3,000	2,000	5,000

The opening stock as on 1 Jan/20 – was Rs 1,000.

(iv) Cash Sales are 25% of Credit Sales in each month.

$$\frac{3}{3+1} = 75\% \quad \Longleftarrow \quad \Longrightarrow \quad \frac{1}{3+1} \quad 25\%$$

(v) Credit to Cash Purchases are in the ratio of 3:1 in each month.

(vi) 30% of credit Sales are collected in the month following Sales.
68% of Credit Sales are collected in the second month following Sales.

(vii) Of the cash purchases, 40% are paid in the month preceding the purchases.

$$\vdash \underset{40\% \qquad 60\%}{\xrightarrow{\hspace{3cm}}} \dashv$$

Of the credit purchases, 60% are paid in the month following Purchases while remaining are paid in the month thereafter.

1 – 30th = 3.000   1 – 15 = 1.500
                    16 – 30 = 1.500

(viii)   Other expenses for each month are as follows:

Month	Jan	Feb	March	April	May	June	July
Wages & salaries	3000	3000	3.000	4.000	4.000	3.000	3.000
Admin Exp.	2.000	2.000	2.000	2,000	2000	2.000	2.000

wages have a lag in payment of ½ month while admin exp. are paid in the same month.

(ix)   A dividend of Rs 5.000 will be received in May month.

(x)   The company to make a provision of Rs 27.000 for P & M Purchase in April

(xi)   The company had opening cash balance for March of Rs 2.000 but it wants to maintain a desired closing balance at each monthend of Rs 10.000. Any surplus or deficit will be invested or borrowed respectively in the multiplier of thousand ruppees.

(xii)   Any unrecovered Sales will be written off.

Sol. ①   Statement of Collection from Sales

Month	Jan	Feb	March	April	May	June	July
Sales	35.000	40.000	40.000	50,000	30.000	35,000	45,000
A. Cash Sales (20%)	7,000	8.000	8.000	10.000	6.000	7.000	9.000
Credit Sales (80%)	28.000	32.000	32.000	40.000	24.000	28.000	36.000
B. Collections in next month (30%)	–	8.400	9.600	9.600	12.000	7.200	8.400
C. Collection in second month (68%)	–		19.040	21.760	21.760	27.200	16.320
Total collections (A+B+C)	7,000	16.400	36.640	41.360	39.760	41.400	33,720

Note: Cash Sales = 25% of Credit Sales

=) Total Sales = Cash Sales + Credit Sales = 25% of Credit + Credit Sales

=) Total Sales = 125% of Credit Sales

=) Credit Sales = $\dfrac{\text{Total Sales}}{125\%}$ = 0.8 Total Sales.

=) Credit Sales = 80% of Total Sales &

Cash Sales = 20% of Total Sales.

② Purchases for each month & their payments.

Month	Jan	Feb	March	April	May	June	July
Sales	35.000	40.000	40.000	50.000	30.000	35.000	45.000
COGS (60%)	21,000	24.000	24,000	30.000	18.000	21.000	27.000
Wages & Salaries	(3000)	(3000)	(3.000)	(4.000)	(4.000)	(3.000)	(3.000)
Stock Consumed	18.000	21.000	21,000	26.000	14.000	18.000	24.000
(+) Closing Stock	5.000	8.000	3.000	5.000	3.000	2.000	5.000
(-) Opening Stock	(1.000)	(5.000)	(8.000)	(3.000)	(5.000)	(3.000)	(2.000)
Purchases	22.000	24.000	16.000	28.000	12.000	17.000	27.000
Cash Purchases (25%)	5.500	6.000	4.000	7.000	3.000	4.250	6.750
A. Advance (40%)	2.400	1.600	2.800	1.200	1.700	2.700	—
B. Same Month (60%)		3.600	2.400	4.200	1.800	2.550	4.050
Credit Purchases (75%)	16.500	18.000	12.000	21.000	9.000	12.750	20.250
C. 60% in next month	—	9.900	10.800	7.200	12.600	5.400	7.650
D. 40% in second month	—	—	6.600	7.200	4.800	8.400	7.600
Total Payment (A+B+C+D)	7.400	15.100	22.600	19.800	20.900	19.050	15.300

Note: COGS = Stock Consumed + Wages + Direct Exp.

$$21,000 = \text{Stock Consumed} + 3,000 + 0.$$

⇒ Stock Consumed = 21,000 − 3,000 = ₹8,000

Now Stock Consumed = Op. + Purchase − Closing = 18,000

⇒ Purchases = Stock Consumed + Closing − Opening.

$$= 18,000 + 5,000 − 1,000$$

$$= 22,000$$

③ Cash Budget for March − June:

Particulars	March	April	May	June
Opening Balance	2,000	10,040	10,100	10,960
Receipts:				
Collection from Sales	36,640	41,360	39,760	41,400
Dividend	—	—	5,000	—
Total Cash Available (A)	38,640	51,400	54,860	52,360
Payments:				
Purchases	22,600	19,800	20,900	19,050
Wages & Salaries	3,000 (1500 + 1500)	3,500 (1500 + 2,000)	4,000 (2,000 + 2,000)	3,500 (2,000 + 1,500)
Admin Exp.	2,000	2,000	2,000	2,000
P&M Purchase	—	27,000	—	—
Total Payments (B)	27,600	52,300	26,900	24,550
Surplus / Deficit (A − B)	11,040	(900)	27,960	27,810
(+) Funds borrowed		11,000		
(−) Funds Invested.	(1,000)		(17,000)	(17,000)
Desired Closing Balance	10,040	10,100	10,960	10,810

Note: wages have lag of 1/2 month ie. 15 days lag

March wages = 3,000

1 – 15 March = 1,500 → Payment between 16th March – 30th March.

16 – 30 March = 1,500 → Payment between 1st April – 15 April.

Unit 5: Management of Payables

Question 1 (Vault Unit 5 - Q. 2)   (RTP May 18)

A Ltd. is in the manufacturing business and it acquires raw material from X Ltd. on a regular basis. As per the terms of agreement the payment must be made within 40 days of purchase. However, A Ltd. has a choice of paying ₹ 98.50 per ₹ 100 it owes to X Ltd. on or before 10th day of purchase.

Required:

EXAMINE whether A Ltd. should accept the offer of discount assuming average billing of A Ltd. with X Ltd. Is ₹ 10,00,000 and an alternative investment yield a return of 15% and company pays the invoice.

Solution

Annual Benefit of accepting the Discount

$$\frac{₹\,1.5}{₹\,100 - ₹\,1.50} \times \frac{365\,\text{days}}{40 - 10\,\text{days}} = 18.53\%$$

Annual Cost = Opportunity Cost of foregoing interest on investment = 15%

If average invoice amount is ₹ 10,00,000

	If discount is	
	Accepted (₹)	Not Accepted (₹)
Payment to Supplier (₹)	9,85,000	10,00,000
Return on investment of ₹ 9,85,000 for 30 days {₹ 9,85,000 × (30/365) × 15%}		(12,144)
	9,85,000	9,87,856

Thus, from above table it can be seen that it is cheaper to accept the discount.

Question 2 (Vault Unit 6 - Q. 2)   (MTP 2 May 23 – 5 Marks)

Sundaram limited a plastic manufacturing company had invested enormous amount of money in a new expansion project. Due to such a great amount of capital investment, Company needs an additional ₹2,00,00,000 in working capital immediately. The CFO has determined the following three feasible sources of working capital funds:

Bank Loan: The company's bank will lend ₹ 2,30,00,000 at 12% per annum. However, the bank will require 15% of the loan granted to be kept in a current account as the minimum average balance which otherwise would have been just ₹ 50,000.

Trade Credit: A major supplier with 2/20 net 80 credit terms has approached for supply of raw material worth ₹ 1,90,00,000 p.m.

Factoring: factoring firm will buy the companies receivables of ₹ 2,50,00,000 per month, which have a collection period of 60 days. factor will advance up to 75% of the face value of the receivables at 14 percent per annum. Factor Commission will amount to 2% on all receivables purchased. Factoring will save credit department expense and bad debts of ₹ 1,75,000 p.m. and ₹ 2,25,000 p.m.

Based on annual percentage cost, ADVISE which alternative should the company select. Assume 360 days a year.

Solution

(i) **Bank Loan:** As the minimum average balance more than ₹ 50,000 need not be kept if loan is not undertaken, the incremental money made available by bank through bank loan is ₹ 2,30,00,000 – (15% × ₹ 2,30,00,000 – ₹ 50,000) = ₹ 1,96,00,000. Real annual cost of bank loan = (₹ 2.3 crores × 12%)/ ₹ 1.96 crores = 14.08%.

(ii) **Trade Credit:** The real annual cost of trade credit will be 2/98 × 360/60 × 100 = 12.24%

(iii) **Factoring:**

Commission charges per year	= 2% × 2.5 crores × 12	= ₹ 60,00,000
Savings per year	= (1,75,000 + 2,25,000) × 12	= ₹ 48,00,000
Net Factoring cost per year	= ₹ 60,00,000 – ₹ 48,00,000	= ₹ 12,00,000

Annual cost of borrowing ₹ 2.5 crores × 75% i.e. ₹ 1,87,50,000 will be

$$\frac{1,87,50,000 \times 14\% + 12,00,000}{1,87,50,000} = 20.4\%$$

Conclusion: The company should select trade credit as a preferred mode of financing the working capital requirement as it results in lowest cost on an annual basis.