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Solved Question Bank

Welcome to this **'One of a Kind'** Solved Question Bank on Financial Management.

This book is your single source of FM preparation as it is meticulously compiled to include all questions & Case Study Based MCQs with solutions from ICAI Study Material, Past Exam Papers (PEPs), Revision Test Papers (RTPs), and Mock Test Papers (MTPs)—ensuring you have everything you need in one place.

For the first time ever, similar questions are grouped together with unique numbering & a distinct colour background to make your revision structured and effortless. The best part is that I have personally improvised the presentation of solutions wherever required to enhance your learning experience, making them easy to follow and apply in your exams. This innovative approach will help you collate problem solving faster and practice efficiently.

Study smarter, stay ahead, and ace your exams with confidence.
Remember, a perfect 50/50 in FM is soon a reality for you.

With Best Wishes,
CA Ganesh Bharadwaj

FOREWORD

In 1999-2000 my son and his group of ten friends who were pursuing the Chartered Accountancy course wanted me to coach them in Cost Accounting and Financial Management to which I agreed.

When they passed the Intermediate level of the course, they wanted me to teach Advanced Management Accounting and Strategic Financial Management for the Final level of the course. That was when my journey in coaching CA Intermediate and Final started.

Since then, I took more than 30 batches for Intermediate and Final students in small groups. To my satisfaction, I have a success rate of more than 90%.

I am satisfied that my students have been well placed in the industry. But to my surprise, I found that none of my students were interested in teaching. With this background, I got a call from Ganesh for an appointment. Ganesh was my student in CA Intermediate and Final level for the subjects Costing and Financial Management. He told me his desire to enter the teaching profession and wanted my views. Immediately I gave him the consent and gave some tips from my experience to start coaching students.

In Ganesh, I found an enterprising character and an urge to excel in whatever he does. As a student, he learned some finer points and asked pertinent questions. To his advantage, he has a command over technology and is tech-savvy. He keeps himself abreast of the latest technology and uses tech to his advantage.

Ganesh prepared this study material and wanted my views. A casual glance of this study material suggested the hard work and intelligence put in by him in preparing the study material. He has taken micro care in ensuring that this study material covers all the syllabus of the CA curriculum. The chapters are arranged in logical order and questions are arranged well from basic fundamental level to high professional level. Also, he has grouped all the similar questions together which will help students to revise similar questions in a short time span. This idea is definitely one of a kind!

With the well-prepared study material and well-motivated Ganesh, I am absolutely certain that the students will benefit from his coaching sessions. If followed sincerely there is no doubt that students can face the CA exams with courage and determination.

I pray to my Guru to shower his blessings to Ganesh and reward him and his students for the hard work.

Love you all.
V N Prabakar CA, CMA, CS

PREFACE

It gives me immense pleasure to present this Solved Question Bank on Financial Management designed specifically for students pursuing the **Intermediate level** of **Chartered Accountancy (CA)** course as per the New Syllabus.

As per the learning objectives prescribed on the subject by The Institute of Chartered Accountants of India, a student at the Intermediate level is expected to develop an in-depth understanding of various aspects of Financial Management and acquire the ability to apply such knowledge in decision making, understand various finance functions like **Financing Decision, Investment Decision, Dividend Decision** and to develop an understanding of **Working Capital Management** and its components.

This book is a classroom supplement and contains a **rich collection** of solved problems ranging from Easy to Difficult, that covers **100%** of the Illustrations, Exercise Problems & Case Study Based MCQs prescribed in **ICAI Study Material, Past Exam Papers (PEPs), Revision Test Papers (RTPs) & Mock Test Papers (MTPs).** An extensive and in-depth discussion on the concepts dealt with by these problems along with the tips on the presentation of answers in exams will be covered during the lectures.

I am forever grateful to my parents **(Shri Seetharaman & Smt Usha Seetharaman)** and my brother **Hari,** for their constant motivation and support in all walks of my life. Many thanks to my friends **Mohit** and **Srinivas** who have stood by me through thick and thin in various phases of my life no matter what. I sincerely thank & appreciate the efforts of my **student Bharathi**, who helped me in editing the contents of this book. Special thanks to **Habib and team** for their complete DTP support.

I dedicate this book to my Costing & FM guru **Shri CA V.N. Prabakar Sir** who not only inculcated me with interest in the subject but was also kind enough to write a foreword to this book.

Finally, none of this would have been a reality without the blessings of **Shri Kanchi Maha Periyava** and I bow down to the great lineage of gurus originating from **Shri Adi Shankaracharya.**

I wish the students the very best in all their future endeavors. As the famous verse from the Bhagavad Gita goes - **"Your right is for action alone, never for the results. Do not become the agent of the results of action. May you not have any inclination for inaction."**

So, give your best and leave the rest. Success will automatically follow.

With Best Wishes,
CA Ganesh Bharadwaj

"Work Hard in Silence. Let your success make all the noise."

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CHAPTER 01: TIME VALUE OF MONEY

VALUATION OF EQUITY- (DEFINITE PERIOD AND CONSTANT DIVIDEND)

PROBLEM – 1

Mr Sachin wants to buy shares of MRF Ltd. He intends to hold those shares for 6 years, during which he expects to receive an annual dividend of ₹ 5 per share. According to his estimation, he can sell these shares after 6 years for ₹ 85 per share. His required rate of return is 12% p.a.

Calculate the Current Market Price of MRF Ltd.

SOLUTION:

Current market price (or) P_0 (or) PV

= ₹5 x PVIFA (12%, 6 years) (+) ₹85 (PVIF 12%, 6 years)

= ₹ 5 x 4.111 (+) ₹85 x 0.507

= ₹20.555 (+) ₹43.095

= ₹63.65

VALUATION OF EQUITY- (DEFINITE PERIOD AND VARIABLE DIVIDEND)

PROBLEM – 2

Mr Dhoni wants to buy shares of India Cements Ltd. He intends to hold those shares for 6 years, during which he expects to receive dividends of ₹ 5, ₹ 3, ₹ 4, ₹ 2, ₹ 9, and ₹ 8 per share at the end of each year. According to his estimation, he can sell these shares after 6 years for ₹ 85 per share. His required rate of return is 12%p.a. **Calculate** the Current Market Price of India Cements Ltd.

SOLUTION:

Year	CF (₹)	PVIF 12%	PVCF
1	5	0.893	4.465
2	3	0.797	2.391
3	4	0.712	2.848
4	2	0.636	1.272
5	9	0.567	5.103
6	8 + 85	0.507	47.151
		Market Price	**63.228**

VALUATION OF EQUITY- (INDEFINITE PERIOD AND CONSTANT DIVIDEND)

PROBLEM – 3

Mr Hariharan wants to buy shares of ITC Ltd. He intends to hold those shares forever. He expects to receive a dividend of ₹ 5 per share every year. His required rate of return is 12% p.a.

Calculate the Current Market Price of ITC Ltd.

SOLUTION:

$$\text{Current market price} = \frac{\text{Annual dividend}}{\text{Discount Rate}} = \frac{₹\ 5}{12\%} = ₹41.67$$

VALUATION OF EQUITY- (INDEFINITE PERIOD AND GROWING DIVIDEND)

PROBLEM – 4

Mr Ram wants to buy shares of A Ltd. He intends to hold those shares forever. He expects to receive a dividend of ₹ 5 per share in the next year, which will grow@ 4% p.a. forever. His required rate of return is 12% p.a. **Calculate** the Current Market Price.

SOLUTION:

$$\text{Current Market Price} = \frac{\text{Cashflow at the end of year}(D_1)}{\text{Discount rate-Growth rate (r-g)}} = \frac{₹\ 5}{12\text{-}4} = \frac{₹\ 5}{8\%} = ₹\ 62.5$$

VALUATION OF REDEEMABLE PREFERENCE SHARES – (EVEN DIVIDEND AND DEFINITE PERIOD)

PROBLEM – 5

Mr X is considering purchasing a 12-year, 10% ₹ 100 par value preference share. The redemption value of the preference share on maturity is ₹ 120. Mr X's required rate of return is 10.5%. **Calculate** the Current Market Price.

SOLUTION:

₹ 10 x PVIFA (10.5%, 12 years) + ₹ 120 x PVIF (10.5%, 12 years)

(₹ 10 X 6.65) + (0.302 X ₹ 120) = ₹ 102.74

VALUATION OF PERPETUAL/IRREDEEMABLE PREFERENCE SHARES – (INDEFINITE PERIOD AND CONSTANT DIVIDEND)

PROBLEM – 6

A preference share pays ₹ 10 as dividend annually up to perpetuity. What is the value of the Preference Share, if the cost of the preference Share is 10%?

SOLUTION:

$$\frac{\text{Annual dividend}}{\text{Discount rate}} = \frac{₹\ 10}{10\%} = ₹\ 100$$

VALUATION OF STRAIGHT COUPON BOND – (DEFINITE PERIOD)

PROBLEM – 7

A ₹ 1,000 par value bond bearing a coupon rate of 14% matures after 5 years, the required rate of return on this bond is 13%. **Calculate** the value of the bond. The redemption value at year-end 5 is ₹1000.

SOLUTION:

Interest rate = Coupon rate

Value of Bond (B_o) = (₹ 1000 x 14%) x PVIAF (13%, 5 years) + ₹ 1000 x PVIF (13% 5 years)

= ₹ 140 x 3.517 (+) ₹ 1000 x 0.543

= ₹ 492.38 (+) ₹ 543

= ₹ 1035.38

VALUATION OF PERPETUAL /IRREDEEMABLE BOND – (CONSTANT INTEREST)

PROBLEM – 8

A bond pays ₹ 90 interest annually up to perpetuity. What is its value? Discount Rate is 10%?

SOLUTION:

$$\text{Value of Bond} = \frac{\text{Annual Interest}}{\text{Discount rate}} = \frac{₹\ 90}{10\%} = ₹\ 900$$

VALUATION OF SELF-AMORTIZATION BOND – (PRINCIPAL REPAYMENT P.A)

PROBLEM – 9

A PSU is proposing to sell 8 years bond of ₹ 1000 at a 10% coupon rate p.a. Bond amount will be amortized equally over its life. If an investor has a minimum required rate of return of 8%, what is the bond's present value?

SOLUTION:

Principal Repayment Every Year = ₹ 1000 ÷ 8 year = ₹ 125

Year	Op Bal (1)	Repayment (2)	Cl Bal (3) = (1) – (2)	Interest @ 10% (4) = (1) × 10%	Cash Flow (5) = (2) + (4)	PVIF 8% (6)	PVCF (7) = (5) × (6)
1	1000	125	875	100	225	0.926	208.35
2	875	125	750	87.5	212.5	0.857	182.11
3	750	125	625	75	200	0.794	158.8
4	625	125	500	62.5	187.5	0.735	137.81
5	500	125	375	50	175	0.681	119.17
6	375	125	250	37.5	162.5	0.63	102.37
7	250	125	125	25	150	0.583	87.45
8	125	125	0	12.5	137.5	0.54	74.25
			Total				1070.32

Value of Bond = ₹ 1070.32-/

CHAPTER 02: COST OF CAPITAL

PROBLEM 1:

A Ltd. issued 30,000, 15% Debenture of ₹ 100 each. The cost of the issue was 30,000. Determine the cost of Debenture Capital if they were issued at

i. Par

ii. Premium of 10%

iii. Discount of 10%

SOLUTION:

$$K_d = \frac{\text{Int}(1 - \text{Tax Rate})}{\text{Net Proceeds}}$$

Interest = 30000 × ₹ 100 × 15% = ₹ 4,50,000

i. **Par:**

NP = (30,000 x ₹ 100) - ₹ 30,000 = ₹ 29,70,000

$$K_d = \frac{₹\,4,50,000\ (1 - 0)}{₹\,29,70,000} = 15.15\%$$

ii. **Premium @ 10%**

NP = (30,000 x ₹ 110) - ₹ 30,000 = ₹ 32,70,000

$$K_d = \frac{₹\,4,50,000(1 - 0)}{₹\,32,70,000} = 13.76\%$$

iii. **Discount @ 10%**

NP = (30,000 x ₹ 90) - ₹ 30,000 = ₹ 26,70,000

$$K_d = \frac{₹\,4,50,000}{₹\,26,70,000} = 16.85\%$$

PROBLEM 1A:

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

SOLUTION:

Cost of irredeemable debenture:

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

$$k_d = \frac{₹\,12}{₹\,94}(1 - 0.35) = 0.08297 \text{ or } 8.30\%$$

PROBLEM 2:

A Company issues ₹ 10,00,000 12% debentures of ₹ 100 each. The debentures are redeemable after the expiry of a fixed period of 7 years. The Company is in 35% tax bracket.

Required:

I. Calculate the cost of debt after tax, if debentures are issued at:

a. Par

b. 10% Discount

c. 10% Premium

II. If a brokerage is paid at 2%, what will be the cost of debentures, if the issue is at par?

SOLUTION:

$$K_d = \frac{\text{Int}(1 - \text{Tax Rate}) + \left(\frac{RV - NP}{n}\right)}{\left(\frac{RV + NP}{2}\right)}$$

Part – I

a. Par

RV = ₹ 100

NP = ₹ 100

Tax Rate = 35%

Interest Rate = 12%

$$K_d = \frac{₹\,12(1 - 35\%) + \left(\frac{₹\,100 - ₹\,100}{7\ \text{yrs}}\right)}{\left(\frac{₹\,100 + ₹\,100}{2}\right)}$$

$$K_d = \frac{₹\,7.8}{₹\,100} = \mathbf{7.8\%}$$

b. Discount 10%

RV = ₹ 100

NP = ₹ 100 - (₹ 100 x 10%) = ₹ 100 – ₹ 10 = ₹ 90

$$K_d = \frac{₹\,12(1 - 35\%) + \left(\frac{₹\,100 - ₹\,90}{7\ \text{yrs}}\right)}{\left(\frac{₹\,100 + ₹\,90}{2}\right)}$$

$$= \frac{₹\,7.8 + ₹\,1.429}{₹\,95} = \mathbf{9.715\%}$$

c. Premium 10%

RV = ₹ 100

NP = ₹ 100 + (₹ 100 x 10%) = ₹ 100 + ₹ 10 = ₹ 110

$$= \frac{₹12(1-35\%) + \left(\frac{₹100 - ₹110}{7\ yrs}\right)}{\left(\frac{₹100 + ₹110}{2}\right)}$$

$$= \frac{₹7.8 - ₹1.429}{₹105} = \mathbf{6.067\%}$$

Part – II

Brokerage = 2%

NP = Issue Price – Brokerage Cost = 100 - (100 x 2%) =₹ 100 – ₹ 2 = ₹ 98

$$K_d = \frac{₹12(0.65)\,(+)\left(\frac{₹100 - ₹98}{7\ years}\right)}{\left(\frac{₹100 + ₹98}{2}\right)}$$

$$= \frac{₹7.8\,(+)\,₹0.286}{₹99} = \mathbf{8.168\%}$$

PROBLEM 3:

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

SOLUTION:

Irredeemable Preference Share

Net Proceeds (P_0) = Issue Price - Floatation Cost.

Po = ₹ 100 – (3% x ₹ 100) = ₹ 97

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

$$= \frac{₹12}{₹97} = \mathbf{12.37\%}$$

PROBLEM 4:

Preferential Ltd issued 30,000, 15% Preference Shares of ₹ 100 each, redeemable at a 10% premium after 20 years. The Issue Management Expenses were 30,000. Find out the cost of Preference Capital if they were issued at

I. Par

II. Premium of 10%

III. Discount of 10%

SOLUTION:

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

Case 1: At Par

PD = ₹ 15 x 30,000 shares = ₹ 4,50,000

RV = ₹ 110 x 30,000 Shares = ₹ 33,00,000

NP = (₹ 100 x 30,000 Shares) - ₹ 30,000 = ₹ 29,70,000

$$K_P = \frac{4,50,000 (+) \left(\frac{33,00,000 - 29,70,000}{20yrs}\right)}{\left(\frac{33,00,000 + 29,70,000}{2}\right)}$$

$$K_p = \frac{4,50,000 (+) 16,500}{31,35,000} = \mathbf{14.88\%}$$

Case 2: Premium @10%

PD = ₹ 15 x 30,000 Shares = ₹ 4,50,000

RV = ₹ 110 x 30,000 Shares = ₹ 33,00,000

NP = (₹ 110 x 30,000) - ₹ 30,000 = ₹ 32,70,000

$$K_p = \frac{4,50,000 (+) \left(\frac{33,00,000 - 32,70,000}{20\,yrs}\right)}{\left(\frac{33,00,000 + 32,70,000}{2}\right)}$$

$$K_p = \frac{4,50,000 + 1,500}{32,85,000} = \mathbf{13.744\%}$$

Case 3: Discount @ 10%

PD = ₹ 15 x 30,000 shares = ₹ 4,50,000

RV = ₹ 110 x 30,000 Shares = ₹ 33,00,000

NP = (₹ 90 x 30,000) - 30,000 = ₹ 26,70,000

$$K_p = \frac{4,50,000 (+) \left(\frac{33,00,000 - 26,70,000}{20\,yrs}\right)}{\left(\frac{33,00,000 + 26,70,000}{2}\right)}$$

$$K_p = \frac{4,50,000 (+) 31,500}{29,85,000} = 16.131\%$$

PROBLEM 5:

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

SOLUTION:

$D_1 = D_0 (1 + g)$

$$K_e = \frac{D_1}{P_0} + g = \frac{₹\,1 (1 + 0.1)}{₹\,55} + 0.10 = \mathbf{12\%}$$

PROBLEM 6:

Mr Mehra had purchased a share of Alpha Limited for ₹ 1,000. He received dividends for a period of five years at the rate of 10 per cent. At the end of the fifth year, he sold the share of Alpha Limited for ₹ 1,128. You are required to COMPUTE the cost of equity as per realised yield approach.

SOLUTION:

As per the realised yield approach, **cost of equity is equal to the realised rate of return.** Therefore, it is important to compute the internal rate ofreturn by **trial and error** method. This realised rate of return is the discount rate which equates the present value of the dividends received in the past five yearsplus the present value of sale price of ₹ 1,128 to the purchase price of ₹ 1,000.

Year	Dividend (₹)	Sale Proceeds (₹)	Discount Factor @ 12%	Present Value (₹)
1	100	-	0.893	89.3
2	100	-	0.797	79.7
3	100	-	0.712	71.2
4	100	-	0.636	63.6
5	100	-	0.567	56.7
5	End	1,128	0.567	639.576
				1,000.076

We find that the purchase price of Alpha Limited's share was ₹ 1,000 and thepresent value of the past five years of dividends plus the present value of the sale price at the discount rate of 12 per cent is ₹ 1,000.076. Therefore, the realised rateof return may be taken as 12%. This **12% is the cost of equity**.

PROBLEM 7:

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

SOLUTION:

$Ke = R_f + ß\ (Rm - R_f)$

$Ke = 0.10 + 1.75\ (0.15 - 0.10)$

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

PROBLEM 8:

Face value of equity shares of a company is ₹ 10, while current market price is ₹ 200 per share. Company is going to start a new project, and is planning to finance it partially by new issue and partially by retained earnings. You are Required to CALCULATE cost of equity shares as well as cost of retained earnings if issue price will be ₹ 190 per share

and floatation cost will be ₹ 5 per share. Dividend at the end of first year is expected to be ₹ 10 and growth rate will be 5%.

SOLUTION:

$$k_r = \frac{D_1}{P_0} + g = \frac{₹\,10}{₹\,200} + 0.05 = \mathbf{10\%}$$

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

PROBLEM 9:

Calculate Kr when Ke is 20%, rate of floatation cost is 5% and rate of personal income tax is 30%.

SOLUTION:

$K_r = Ke\,(1- t_p)\,(1-f)$

Where t_p= Personal Income Tax of investor

f = Flotation cost

= 20%(1 - 0.3)(1 - 0.05)

= 20%(0.7)(0.95)

= **13.30%**

PROBLEM 10:

ABC Company provides the following details:

Rf = 7% ß = 1.20 Rm - Rf = 6%

CALCULATE the cost of retained earnings based on CAPM method.

SOLUTION:

$k_r = R_f + ß\,(Rm - Rf)$

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

K_r = 14.20%

PROBLEM 11:

CALCULATE the WACC using the following data by using:

(a) Book value weights

(b) Market value weights

The capital structure of the company is as under:

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

The market prices of these securities are:
Debentures ₹ 105 per debenture
Preference shares ₹ 110 per preference share
Equity shares ₹ 24 per equity share
Additional information:
i. ₹ 100 per debenture redeemable at par, 10% coupon rate, 4% floatation costs, 10-year maturity.
ii. ₹ 100 per preference share redeemable at par, 5% coupon rate, 2% floatation cost and 10-year maturity.
iii. Equity shares have ₹ 4 floatation cost and a market price of ₹ 24 per share.
The next year expected dividend is ₹ 1 with annual growth of 5%. The firm has practice of paying all earnings in the form of dividend. Corporate tax rate is 30%.
Use YTM method to calculate cost of debentures & preference shares.

SOLUTION:

WN – 1: Cost of Equity (Ke) Dividend Growth Model

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

WN – 2: Cost of Debt (K_d) YTM Method

P_0 – floatation cost = I(1-t) × PVAF (r,10) + RV × PVIF (r,10)

₹ 105 – 4% of ₹ 105 = ₹ 10 (1 - 0.3) × PVAF (r,10) + ₹ 100 × PVIF (r,10)

Note: It is assumed that Flotation cost is a % on issue price.

Calculation of NPV at discount rate of 5% and 7%

Year	Cash flows (₹)	Discount factor @ 5%	Present Value (₹)	Discount factor @ 7%	Present Value (₹)
0	(100.8)	1.000	(100.8)	1.000	(100.8)
1 to 10	7	7.722	54.05	7.024	49.17
10	100	0.614	61.40	0.508	50.80
NPV			**+14.65**		**-0.83**

Calculation of IRR

$$IRR = 5\% + \frac{14.65}{14.65 - (-0.83)}(7\% - 5\%) = 5\% + \frac{14.65}{15.48}(7\% - 5\%) = 6.89\%$$

Cost of Debt **(Kd) = 6.89%**

WN – 3: Cost of Preference shares (Kp) YTM Method

P_0 – floatation cost = PD × PVAF (r,10) + RV × PVIF (r,10)

₹ 110 – 2% of ₹ 110 = ₹ 5 × PVAF (r,10) + ₹ 100 × PVIF (r,10)

Note: It is assumed that Flotation cost is a % on issue price.

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

Year	Cash flows (₹)	Discount factor @ 3%	Present Value (₹)	Discount factor @ 5%	Present Value (₹)
0	(107.8)	1.000	(107.8)	1.000	(107.8)
1 to 10	5	8.530	42.65	7.722	38.61
10	100	0.744	74.40	0.614	61.40
NPV			+9.25		-7.79

Calculation of IRR

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

Cost of Preference Shares **(K_p) = 4.08%**

(a) Calculation of WACC using book value weights

Source of capital	Book Value	Weights	After tax cost of capital	WACC (K_o)
	(₹)	(a)	(b)	(c) = (a)×(b)
10% Debentures	5,00,000	0.25	0.0689	0.01723
5% Preference shares	5,00,000	0.25	0.0408	0.0102
Equity shares	10,00,000	0.50	0.10	0.05000
	20,00,000	1.00		0.07743

WACC (K_o) = 0.07743 or **7.74%**

(b) Calculation of WACC using market value weights

Source of capital	Market Value	Weights	After tax cost of capital	WACC (Ko)
	(₹)	(a)	(b)	(c) = (a)×(b)
10% Debentures (₹ 105 × 5,000)	5,25,000	0.151	0.0689	0.0104
5% Preference shares (₹ 110 × 5,000)	5,50,000	0.158	0.0408	0.0064
Equity shares (₹ 24 × 1,00,000)	24,00,000	0.691	0.10	0.0691
	34,75,000	1.000		0.0859

WACC (K_o) = 0.0859 or **8.59%**

PROBLEM 11A:

The following details are provided by the GPS Limited:

	(₹)
Equity Share Capital	65,00,000
12% Preference Share Capital	12,00,000
15% Redeemable Debentures	20,00,000

10% Convertible Debentures	8,00,000

The cost of equity capital for the company is 16.30% and income tax rate for the company is 30%.

You are required to CALCULATE the Weighted Average Cost of Capital (WACC) of the company.

SOLUTION:

Calculation of Weighted Average Cost of Capital (WACC)

Source	(₹)	Weight	Cost (%)	WACC
Equity Capital	65,00,000	0.619	0.163	0.1009
12% Preference Capital	12,00,000	0.114	0.120	0.0137
15% RedeemableDebentures	20,00,000	0.190	0.105*	0.020
10% ConvertibleDebentures	8,00,000	0.076	0.070**	0.0053
Total	**1,05,00,000**	**1.0000**		**0.1399**

Weighted Average Cost of Capital (WACC) = 0.1399 = 13.99%

*** Cost of 15% Redeemable Debentures (after tax)**

= Interest Rate (1 - Tax Rate)

= 15 (1 – 0.30)

= 10.5% or 0.105

**** Cost of 10% Convertible Debentures (after tax)**

= Interest Rate (1 - Tax Rate)

= 10 (1 – 0.30) = 7% or 0.070

(Note: In the above solution, the Cost of Debentures has been computed without considering the impact of special features i.e. redeemability and convertibility in absence of requisite information.)

PROBLEM 11B: **(PEP Sep '24)**

Capital structure of T Limited as on 1st April,2024 is as under:

	₹
Equity Share Capital (₹ 10 per share)	50,00,000
10% Debentures (₹ 100 per Debenture)	40,00,000
12% Preference Share Capital (10,000 shares of ₹ 100 each)	10,00,000

Additional Information:

(1) The risk-free rate of return is 10%. The Beta of T Ltd. is 1.75 and the return on market portfolio is 12%. The Equity shares have a current market price of ₹ 70 per share.

(2) The debentures are trading at a market price of ₹ 80 per debenture. The Debentures are to be redeemed after 5 years at par.

(3) Preference shares are redeemable after 5 years at a premium of 5%, presently selling at ₹ 104 per share.

(4) The Company pays tax at a rate of 30%.

(5) The Cost of Debentures are to be calculated on Yield to Maturity approach.

(6) The present value factors at 10% and 14% are:

Year	1	2	3	4	5
$PVIF_{0.10, t}$	0.909	0.826	0.751	0.683	0.621
$PVIF_{0.14, t}$	0.877	0.769	0.675	0.592	0.519

You are required to calculate Weighted Average Cost of Capital (after tax) of T Limited using Market value weights.

SOLUTION:

(a) Cost of Equity Share Capital using Capital Asset Pricing Model (CAPM) Approach

Ke = Rf + ß (Rm – Rf)

Ke = 0.10 + 1.75 (0.12 – 0.10)

= 0.10 + 1.75 (0.02) = 0.135 or 13.5%

(b) Cost of Redeemable Debentures using Yield to Maturity (YTM) Approach

Step-1: Identification of relevant cash flows

Year	Cash flows
0	Current market price (P0) = ₹ 80
1 to 5	Interest net of tax [I (1 - t)] = 10% of ₹ 100 (1 - 0.30) = ₹ 7
5	Redemption value (RV) = Face value i.e. ₹ 100

Step- 2: Calculation of NPVs at two discount rates

Year	Cash flows (₹)	Discount factor @ 10% (L)	Present Value (₹)	Discount factor @ 14% (H)	Present Value (₹)
0	80	1.000	(80,000)	1.000	(80,000)
1 to 5	7	3.790	26,530	3.432	24,024
5	100	0.621	62,100	0.519	51,900
NPV			**+8,630**		**-4,076**

Step- 3: Calculation of Cost of Debentures (Kd)

$$K_d = L + \frac{NPV_L}{NPV_L - NPV_H} \times (H - L) = 10\% + \frac{₹\,8,630}{₹\,8,630 - (-₹\,4,076)} \times (14\% - 10\%) = 12.72\%$$

(c) Cost of Redeemable Preference Share Capital using approximation method

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

$$K_p = \frac{12 + \frac{(105-104)}{5}}{\frac{(105 + 104)}{2}}$$

= 11.67%

(d) Calculation of WACC using market value weights

Source of Capital	Market Value	Weights	After tax cost of capital	WACC (Ko)
	(₹)	(a)	(b)	(c) = (a)×(b)
Equity Share Capital (₹ 70 x 5,00,000 equity shares)	3,50,00,000	0.8919	0.1350	0.1204
10% Debentures (₹ 80 × 40,000)	32,00,000	0.0816	0.1272	0.0104
12% Preference Share Capital (₹ 104 × 10,000 shares)	10,40,000	0.0265	0.1167	0.0031
	3,92,40,000	**1.000**		**0.1339**

WACC (Ko) = 0.1339 or 13.39%

PROBLEM 11C: **(MTP2 SEPT '24)**

Calculate the WACC using the following data by using Market Value weights:

Particulars	₹
Equity Shares (₹ 10 per equity share)	15,00,000
Reserves & Surplus	5,00,000
Preference Shares (₹ 100 per preference share)	7,50,000
Debentures (₹ 100 per debenture)	5,50,000

The market prices of these securities are:

Debentures - ₹ 105 per debenture,

Preference shares - ₹ 115 per preference share

Equity shares - ₹ 27 per equity share

Additional information:

(1) ₹ 100 FV per debenture redeemable at premium of 10%, 10% coupon rate, 4% floatation costs, 10-year maturity.

(2) ₹ 100 FV per preference share redeemable at par, 12% coupon rate, 2% floatation cost and 10-year maturity.

(3) Equity shares have ₹ 4.5 floatation cost and market price of 27 per share.

The last dividend paid by the company was ₹ 2 which is expected to grow at an annual growth rate of 9%. The firm has the practice of paying all earnings as a dividend.

The corporate tax rate is 25%. To calculate the overall cost of debt & preference shares, take the average of their respective costs using YTM & approximation method.

SOLUTION:

WN-1: Calculation of Cost of Debt (Kd)

a. Approximation Method

$$= \frac{\text{Int}\,(1-t) + \frac{RV - NP}{N}}{\frac{(RV + NP)}{2}}$$

RV = 100 + 10% = 110,

NP = 105 - 4% = 100.8

$$= \frac{10\,(1 - 0.25) + (110 - 100.8) \div 10}{(110 + 100.8) \div 2}$$

= 7.99%

b. YTM Method:

CMP (Po) (-) Floatation Cost = {Int (1 - t) × PVAF (r%, 10years)} + {RV × PVIF (r%,10th Year)}

105 - 4% = {10 (1 – 0.25) × PVAF (r%, 10 years)} + {110 × PVIF (r%, 10th year)}

Using trial and error method, NPV at 5% & 10%

Year	Cash flows	Disc Factor @ 5%	PV (₹)	Disc Factor @ 10%	PV (₹)
0	-100.8	1	-100.8	1	-100.8
1 to 10	7.5	7.7217	57.91275	6.1446	46.0845
10	110	0.6139	67.529	0.3855	42.405
			24.64175		**-12.3105**

$$IRR = 5 + \frac{24.64175}{24.64175 - (-12.3105)} X\ (10 - 5) = \mathbf{8.33\%}$$

Therefore, overall cost of debt (K_d) = (7.99 + 8.33) / 2 = 8.16%

WN-2: Calculation of Cost of Preference (Kp)

a. Approximation Method

$$= \frac{\text{Pref Div} + (RV - NP) / N}{(RV + NP) / 2}$$

RV = 100 NP = (115 - 2%) = 112.7

$$= \frac{12 + (100 - 112.7) / 10}{(100 + 112.7) / 2} = \mathbf{10.09\%}$$

b. YTM Method:

CMP (Po) (-) Floatation Cost = {Pref Div × PVAF (r%, 10years)} + {RV × PVIF (r%,10th Year)}

115 - 2% = {12 × PVAF (r%, 10 years)} + {100 × PVIF (r%, 10th year)}

Using trial and error method, NPV at 5% & 10%

Year	Cash flows	Disc Factor @ 5%	PV (₹)	Disc Factor @ 10%	PV (₹)
0	-112.7	1	-112.7	1	-112.7
1 to 10	12	7.7217	92.6604	6.1446	73.7352
10	100	0.6139	61.39	0.3855	38.55
			41.3504		**-0.4148**

$$IRR = 5 + \frac{41.3504}{41.3504 - (-0.4148)} \times (10 - 5) = \mathbf{9.95\%}$$

Therefore, overall cost of debt (Kp) = (10.09 + 9.95) / 2 = 10.02%

WN-3z: Calculation of Cost of equity (Ke)

Ke = {D_1 / (P_o - Floatation)} + G

= {2 + 9% / 27 – 4.5} + 0.09

= 18.69%

Calculation of WACC using Market Value weights

Source of Capital	Working	Market Value	Weights	Cost (K)	WACC (Ko)
		(₹)	(A)	(B)	(A x B)
Equity	27 x 150000	40,50,000	0.7377	18.69	13.7877
Reserves	Included in equity	-	-	-	-
Preference	115 x 7500	8,62,500	0.1571	10.02	1.5741
Debentures	105 x 5500	5,77,500	0.1052	8.16	0.8584
		54,90,000	**1**		**16.22%**

WACC (Ko) = 16.22%

PROBLEM 11D: **(MTP1 JAN '25)**

P Ltd. has the following capital structure at book-value as on 31st March, 2024:

Particulars	(₹)
Equity share capital (1,00,000 shares)	10,00,000
12% Preference shares	15,00,000
10% Debentures	15,00,000
	40,00,000

Additional Information:

1. **The equity shares of P Ltd. are currently traded at ₹ 100 per share.**
2. **The company expects to pay a dividend of ₹ 5 per equity share next year, with dividends projected to grow perpetually at a rate of 5% p.a.**
3. **The corporate tax rate is 35%.**

Requirements:

1. **CALCULATE the Weighted Average Cost of Capital (WACC) based on the current capital structure.**
2. **RECALCULATE the WACC if the company raises an additional ₹ 5 lakhs of debt by issuing 12% debentures. This change will result in:**
   - **An increase in the expected equity dividend to ₹ 7 per share while the growth rate remains constant at 5%.**
   - **A decrease in the market price of equity shares to ₹ 90 per share**

SOLUTION:

(i) Computation of Weighted Average Cost of Capital based on existing capital structure

Source of Capital	Existing Capital structure (₹)	Weights (a)	After tax cost of capital (%) (b)	WACC (%) (a) × (b)
Equity share capital (W.N.1)	10,00,000	0.250	10.000	2.500
12% Preference share capital	15,00,000	0.375	12.000	4.500

10% Debentures (W.N.2)	15,00,000	0.375	6.500	2.438
Total	**40,00,000**	**1.000**		**9.438**

Working Notes:

1. Cost of Equity Capital:

$$K_e = \frac{\text{Expected Dividend } (D_1)}{\text{Current Market Price } (P_0)} + \text{Growth } (g)$$

$$= \frac{₹\,5}{₹\,100} + 0.05 = 10\%$$

2. Cost of 10% Debentures

$$K_d = \frac{\text{Interest } (1 - t)}{\text{Net Proceeds}}$$

$$= \frac{₹\,1,50,000\ (1 - 0.35)}{₹\,15,00,000}$$

$$= 0.065 \text{ or } 6.5\%$$

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

Source of Capital	New Capital structure (₹)	Weights (a)	After tax cost of capital (%) (b)	WACC (%) (a) x (b)
Equity share capital (W.N.3)	10,00,000	0.222	12.777	2.836
12% Preference share capital	15,00,000	0.334	12.000	4.000
10% Debentures (W.N.2)	15,00,000	0.333	6.500	2.165
12% Debentures (W.N.4)	5,00,000	0.111	7.800	0.866
Total	**45,00,000**	**1.000**		**9.867**

Working Notes:

3. Cost of Equity Capital:

$$K_e = \frac{₹\,7}{₹\,90} + 0.05$$

$$= 12.777\%$$

4. Cost of 12% Debentures

$$K_d = \frac{₹\,60,000\ (1 - 0.35)}{₹\,5,00,000}$$

$$= 0.078 \text{ or } 7.8\%$$

PROBLEM 11E: **(RTP JAN '25)**

The Capital Structure of Samyaktva Limited is as follows:

	Amount (in ₹)
12% Debentures	**3,50,000**
14% Preference 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

$$K_d = \frac{I(1-t) + \left(\frac{RV - NP}{n}\right)}{\frac{(RV + NP)}{n}}$$

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 no Face Value)

= 109.25

$$K_d = \frac{12(1-0.25) + \left(\frac{106 - 109.25}{5}\right)}{\frac{(106 + 109.25)}{2}}$$

Therefore **Kd = 7.76%**

WN 2: Calculation of Cost of Preference Shares

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

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

$$K_p = \frac{14 + \left(\frac{110 - 100.55}{10}\right)}{\frac{(110 + 100.55)}{2}}$$

Therefore **Kp = 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,

$$K_e = \frac{D_1}{P_0} + g$$

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

Po = Current Market Price (–) Floatation cost

G = growth rate in dividends

$$K_e = \frac{(4 + 9\%) \times 4}{30 - 5} + 0.09$$

K_e = 26.44%

Calculation of WACC using Market Value Weights

Sources	Amount of Capital (₹)	Weights (W)	Cost (K)	W x K
Debentures	4,02,500 (3,500 x 115)	0.1171	7.76 (WN 1)	0.9087
Preference shares	4,86,000 (4,500 x 108)	0.1413	14.19 (WN 2)	2.00
Equity shares	25,50,000 (85,000 x 30)	0.7416	26.44 (WN 3)	19.6079
		34,38,500		**Ko = 22.52%**

PROBLEM 12: **(RTP SEP '24)**

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 $(K_e) = \frac{D_1}{P_0 - F} + g = \frac{₹\,15}{₹\,125 - ₹\,5} + 0.06^*$

$K_e = 0.125 + 0.06 = 0.185$

***Calculation of g:**

$₹\,10.6\,(1+g)^5 = ₹\,14.19$

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

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

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

(iii).Cost of Preference Shares $(Kp) = \frac{PD}{P_0} = \frac{₹\,15}{₹\,105} = 0.1429$

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

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

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

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

Market price of debentures (approximation method)

= ₹ 15 ÷ 0.16 = ₹ 93.75

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

Market value (P0) of debentures can also be found out using the present value method:

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

$P_0 = ₹\,15 \times 5.029 + ₹\,100 \times 0.195$

$P_0 = ₹\,75.435 + ₹\,19.5 = ₹\,94.935$

Net Proceeds = ₹ 94.935 – 2% of ₹ 100 = ₹ 92.935

Accordingly, the cost of debt can be calculated

TOTAL COST OF CAPITAL [BV WEIGHTS AND MV WEIGHTS]

(Amount in (₹) lakh)

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

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

Weighted Average Cost of Capital (WACC):

Using Book Value = $\frac{₹\,33.73}{₹\,195}$ = 0.1729 or 17.29%

Using Market Value = $\frac{₹\,42.76}{₹\,244.15}$ = 0.1751 or 17.51%

PROBLEM 13: .

Gamma Ltd. has in issue 5,00,000 ₹ 1 ordinary shares whose current ex-dividend market price is ₹ 1.50 per share. The company has just paid a dividend of 27 paise per share, and dividends are expected to continue at this level for some time. If the company has no debt capital, what is the weighted average cost of capital?

SOLUTION:

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

Market value of debt, D = 0

Since there is no debt in capital structure it is an unlevered entity. WACC (Ko) = Ke

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

WACC = K_e = 18 per cent

PROBLEM 14:

From the following information, determine the appropriate weighted average cost of capital, relevant for evaluating long-term investment projects of the company.

Cost of equity = 0.18

After-tax cost of long-term debt = 0.08

After-tax cost of short-term debt = 0.09

Cost of Reserve = 0.15

Sources of capital	Book Value (BV)	Market Value (MV)
Equity Capital	3,00,000	7,50,000
Reserve	2,00,000	
Long-term Debt	4,00,000	3,75,000
Short-term Debt	1,00,000	1,00,000
	10,00,000	12,25,000

SOLUTION:

Computation of WACC:

A Using Book value weights:

Source	Amount Book value	Weights	Cost (K)	(K_o) WACC
Equity	3,00,000	0.33	0.18	0.0594
Reserve	2,00,000	0.22	0.15	0.033
Long term Debt	4,00,000	0.45	0.08	0.036
	9,00,000	**1**		**12.84%**

Note: Short term debt should **not** be considered for the purpose of WACC computation

B Using Market value weights

Source	Amount Book value	Weights	Cost (K)	(K_o) WACC
Equity	4,50,000	0.4	0.18	0.072
Reserve	3,00,000	0.27	0.15	0.0405
Long term Debt	3,75,000	0.33	0.08	0.0264
	11,25,000	**1**		**13.89%**

Note: The market value of equity has been apportioned between ESC and Reserves in BV proportion.

PROBLEM 15: **(RTP MAY '24)**

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

14% Debentures	₹ 30,000
11% Preference shares	₹ 10,000
Equity (10,000 shares)	₹ 1,60,000
	₹ 2,00,000

The company share has a market price of ₹ 23.60. Next year's dividend per share is 50% of year 2022 EPS. The following is the growth trend of EPS for the preceding 10 years which is expected to continue in future.

Year	EPS (₹)	Year	EPS (₹)
2013	1.00	2018	1.61

2014	1.10	2019	1.77
2015	1.21	2020	1.95
2016	1.33	2021	2.15
2017	1.46	2022	2.36

The company issued new debentures carrying a 16% rate of interest and the current market price of the debenture is ₹ 96. Preference shares ₹ 9.20 (with an annual dividend of ₹ 1.1 per share) were also issued. The company is in the 50% tax bracket.

A. Calculate:

i. Cost of new debt

ii. Cost of new preference shares

iii. Cost of new equity share (assuming new equity from retained earnings)

B. Calculate marginal cost of capital when no new shares are issued.

C. Determine the amount that can be spent for capital investment before new ordinary shares must be sold. Assuming that retained earnings for next years' investment is 50 percent of 2022.

D. Compute marginal cost of capital when the funds exceed the amount calculated in (C), assuming new equity is issued at ₹ 20 per share?

SOLUTION:

(A)

i. Cost Of New Debt

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

$$= \frac{₹\,16\,(1-0.5)}{₹\,96} = 0.0833$$

ii. Cost Of New Preference Shares-Irredeemable

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

iii. Cost Of New Equity Shares (Dividend Growth Model)

$$K_e = \frac{D_1}{P_0} + g$$

$$= \frac{₹\,1.18}{₹\,23.60} + 0.10 = 0.05 + 0.10 = 0.15$$

WN-1: Calculation of g when there is a uniform trend (on the basis of EPS)

$$= \frac{EPS(2014) - EPS(2013)}{EPS(2013)}$$

$$= \frac{₹\,1.10 - ₹\,1.00}{₹\,1.00} = 0.10 \text{ or } 10\%$$

WN-2: Calculation of D1

D_1 = 50% of 2022 EPS

= 50% of 2.36 = ₹ 1.18

(B) Calculation Of Marginal Cost Of Capital

Type of Capital	Proportion	Specific Cost	Product
(1)	(2)	(3)	(2) × (3) = (4)
Debenture	0.15	0.0833	0.0125
Preference Share	0.05	0.1200	0.0060
Equity Share	0.80	0.1500	0.1200
Marginal cost of capital			**0.1385**

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

Retained Earnings = 50% of EPS of 2022 × outstanding equity shares

= 0.50 × ₹ 2.36 × 10,000 shares = ₹ 11,800

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

So, ₹ 11,800 = 80% of Total **Additional** Capital

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

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

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

The marginal cost of capital will be:

Type of Capital	Proportion	Specific Cost	Product
(1)	(2)	(3)	(2) × (3) = (4)
Debentures	0.15	0.0833	0.0125
Preference Shares	0.05	0.1200	0.0060
Equity Shares (New)	0.80	0.1590	0.1272
			0.1457

PROBLEM 16:

Masco Limited wishes to raise additional finance of ₹ 10 lakhs for meeting its investment plans. It has ₹ 2,10,000 in the form of retained earnings available for investment purposes. Further details are as following:

1.	Debt / Equity mix	3:7
2.	Cost of debt:	
	- Upto ₹ 1,80,000	10% (before tax)
	- Beyond ₹ 1,80,000	16% (before tax)
3.	Earnings per share	₹ 4
4.	Dividend pay out	50% of earnings

5.	Expected growth rate of dividend	10%
6.	Current market price per share	₹ 44
7.	Tax rate	50%

You are required to:

a. DETERMINE the pattern for raising the additional finance.

b. DETERMINE the post-tax average cost of additional debt.

c. DETERMINE the cost of retained earnings and cost of equity.

d. COMPUTE the overall weighted average after tax cost of additional finance.

SOLUTION:

(a) Pattern for raising the additional finance:

Equity	70% of ₹ 10,00,000	₹ 7,00,000
Debt	30% of ₹ 10,00,000	₹ 3,00,000

The capital structure after raising additional finance:

		(₹)
Equity Capital	(₹ 7,00,000 – ₹ 2,10,000)	4,90,000
Retained earnings		2,10,000
Debt (Interest at 10% p.a.)		1,80,000
Debt (Interest at 16% p.a.)	(₹ 3,00,000 – ₹ 1,80,000)	1,20,000
Total Funds		**10,00,000**

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

$K_d = I (1 - t)$

Where,

I = Interest Rate

t = Corporate tax-rate

On ₹ 1,80,000 = 10% (1 – 0.5) = 5% or 0.05

On ₹ 1,20,000 = 16% (1 – 0.5) = 8% or 0.08

Average Cost of Debt

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

(c) Determination Of Cost Of Retained Earnings And Cost Of Equity (by applying Dividend growth model):

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

Where,

D_0 = Dividend paid = 50% of EPS = 50% × ₹ 4 = ₹ 2

g = Growth rate =10%

P_0 = Current market price per share = ₹ 44

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

Note: It is assumed that dividend given in the Question as Do

(d) Computation Of Overall Weighted Average After Tax Cost Of Additional Finance:

Particulars	Amount (₹)	Weights	Cost of funds	Weighted Cost (%)
Equity (incl. Ret. Earnings)	7,00,000	0.70	15%	10.5
Debt	3,00,000	0.30	6.2%	1.86
WACC	**10,00,000**			**12.36**

PROBLEM 17: (MTP 1 SEPT '24)

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:

Calculation of slab wise Overall Cost of Capital

(i)

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

	Equity	0.7	16	11.2
			Ko	**15.4**

Cost of Raising funds for Project I

Total Capital	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 (%) = (358650 / 2600000) * 100 = **13.79%**

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

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

Maximum Value of the Project that can be taken at 13% is approx.

(Using IRR technique Interpolation)

At 15 Lakhs Ko = 12.95%

At 26 Lakhs Ko = 13.79%

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

15 Lakhs + {(0.05 x 11) / 0.84}

= **15.6548 lakhs**

PROBLEM 18:

A company issued 10,000, 15% Convertible debentures of ₹ 100 each with a maturity period of 5 years. At maturity, the debenture holders will have the option to convert the debentures into equity shares of the company in the ratio of 1:10 (10 shares for each debenture). The current market price of the equity shares is ₹ 12 each and historically the growth rate of the shares is 5% per annum. Compute the cost of debentures assuming a 35% tax rate.

SOLUTION:

Determination of Redemption value:

Higher of

(i) The cash value of debentures = ₹ 100

(ii) Value of equity shares = 10 shares × ₹ 12 $(1 + 0.05)^5$

= 10 shares × 15.312 = ₹ 153.12

₹ 153.12 will be taken as redemption value as it is higher than the cash option and is more attractive to the investor.

Calculation of Cost of Convertible debenture (using approximation method):

$$K_d = \frac{I(1-t) + \frac{(RV - NP)}{n}}{\frac{(RV + NP)}{2}} = \frac{15(1 - 0.35) + \frac{(153.12 - 100)}{5}}{\frac{(153.12 + 100)}{2}} = \frac{9.75 + 10.62}{126.53} = \mathbf{16.09\%}$$

Alternatively:

Calculation of Cost of Convertible Debenture (Using Present Value Method):

* Post Tax Interest per annum = (100 x 15%) x 0.65 = 9.75

Year	Cash flows (₹)	Discount factor @ 15% (L)	Present Value (₹)	Discount factor @ 20% (H)	Present Value (₹)
0	100	1.000	(100.00)	1.000	(100.00)
1 to 5	9.75*	3.352	32.68	2.991	29.16
5	153.12	0.497	76.10	0.402	61.55
NPV			**+8.78**		**-9.29**

$$IRR = L + \frac{NPV_L}{NPV_H}(H - L) = 15\% + \frac{₹\,8.78}{₹\,8.78 - (₹\,-9.29)}(20\% - 15\%) = 0.17429 \text{ or } \mathbf{17.43\%}$$

PROBLEM 19:

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%.

1. **CALCULATE the cost of convertible debentures using the approximation method.**
2. **Use YTM method to CALCULATE cost of preference shares.**

Year	1	2	3	4	5	6	7	8	9	10
PVIF 0.03, t	0.971	0.943	0.915	0.888	0.863	0.837	0.813	0.789	0.766	0.744

PVIF 0.05, t	0.952	0.907	0.864	0.823	0.784	0.746	0.711	0.677	0.645	0.614
PVIFA 0.03, t	0.971	1.913	2.829	3.717	4.580	5.417	6.230	7.020	7.786	8.530
PVIFA 0.05, t	0.952	1.859	2.723	3.546	4.329	5.076	5.786	6.463	7.108	7.722

Interest rate	1%	2%	3%	4%	5%	6%	7%	8%	9%
FVIF i, 5	1.051	1.104	1.159	1.217	1.276	1.338	1.403	1.469	1.539
FVIF i, 6	1.062	1.126	1.194	1.265	1.340	1.419	1.501	1.587	1.677
FVIF i, 7	1.072	1.149	1.230	1.316	1.407	1.504	1.606	1.714	1.828

SOLUTION:

Calculation of Cost of Convertible Debentures:

Given that,

R_f = 10%

$R_m - R_f$ = 18%

β = 1.25

D_0 = 10

D5 = 12.76

Using CAPM,

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

= 10% + 1.25 (18%)

= **32.50%**

Calculation of growth rate in dividend

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

$1.276 = (1 + g)^5$

$(1 + 5\%)^5 = 1.276$

g = 5%..... from FV Table

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

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

P_6 = 65.28

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

Flotation Cost = 5%

NP = ₹ 95 (₹ 100 - ₹ 5)

n = 6 years

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

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

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

K_d = **13.24%**

(ii) Calculation of Cost of Preference Shares (YTM Method):

Net Proceeds = 100 x (1.10) - 6% of 100 x (1.10)
= 110 - 6.60
= 103.40

Redemption Value = 100

Year	Cash Flows (₹)	PVF @ 3%	PV (₹)	PVF @ 5%	PV (₹)
0	103.40	1	103.40	1	103.40
1-10	-5	8.530	-42.65	7.722	-38.61
10	-100	0.744	-74.40	0.614	-61.40
			-13.65		**3.39**

$$K_p = L + \frac{NPV_L}{NPV_H}(H - L) = 3\% + \frac{-₹\ 13.65}{-₹\ 13.65 - (₹\ 3.39)}(5\% - 3\%) = \textbf{4.6021\%}$$

PROBLEM 19A: **(PEP MAY 24 6M)**

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

Particulars	Amount (₹)
Equity share capital off 10 each	45,00,000
15% Preference share capital of f 100 each	36,00,000
Retained earnings	32,00,000
13% Convertible Debenture off 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 yeaAt 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 Ke = Rf + ß (Rm – Rf)

Rf = 6%

B = 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

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

$$K_p = \frac{15 + \frac{(100 - 150)}{8}}{\frac{(100 + 150)}{2}}$$

K_p = 7%

(iii) Cost of convertible debenture

Cash Redemption Value (RV) = 100

Share Redemption Value (RV):

Value of share after 5 years = $25 \times (1.06)^5 = 33.46$

Share Redemption Value (RV) = 33.46 X 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%

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

$$= \frac{13(1 - 0.25) + \frac{(133.82 - 100)}{5}}{\frac{(133.82 + 100)}{2}}$$

$K_d = 14.13\%$

(iv) Cost of Retained Earnings

Kr = Ke (1-tp) = 18.32 % x (1 - 0.20) = 14.66%

We can also take cost of equity as cost of retained earnings, Accordingly, Kr = Ke = 18.32%

(v) Cost of Term Loan

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

PROBLEM 20:

Annova Ltd is considering raising of funds of about ₹ 250 lakhs by any of two alternative methods, viz., 14% institutional term loan and 13% non-convertible debentures. The term loan option would attract no major incidental cost and can be ignored. The debentures would have to be issued at a discount of 2.5% and would involve a cost of issue of 2% on face value. ADVISE the company as to the better option based on the effective cost of capital in each case. Assume a tax rate of 50%.

SOLUTION:

Step 1: Calculation of effective cost of capital in case of 14% institutional Term loan

K_t = Int Rate (1 – T)

= 14% (1 – 50%)

= 7%

Step 2: Calculation of effective cost of capital in case of 13% non-convertible debentures

$$K_d = \frac{Int(1 - tax)}{NP}$$

$$= \frac{13\%(1 - 50\%)}{243.75\% - 5} = \frac{16.25}{238.75} = 6.806\%$$

Note: Since the period of debt is missing the debt is assumed to be perpetual

Conclusion: It is better to raise the funds of ₹ 250L by issuing 13% NCD, since its effective cost is less than the term loan option

PROBLEM 21:

Suppose we are considering investing in a zero-coupon bond that matures in 5 years and has a face value of ₹ 1000. If these bonds are priced to yield 10%, what is the present value of the bonds?

SOLUTION:

B_0 = Maturity Value ÷ $(1 + kd)^n$

= ₹ 1000 ÷ 1.61051 = **₹ 620.92**

PROBLEM 22:

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

SOLUTION:

Here,

Redemption Value (RV) = ₹ 1,00,000; Net Proceeds (NP) = ₹ 2,500; Interest = 0

Life of bond = 25 years

There is huge difference between RV and NP, therefore, in place of approximationmethod, we should use trial & error method.

FV = PV x $(1 + r)^n$

₹ 1,00,000 = ₹ 2,500 x $(1 + r)^{25}$

₹ 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

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

$$= 15\% + \frac{₹\ -7.081}{₹\ 7.081 - (₹\ 0.874)} \times (16\% - 15\%) = \mathbf{15.89\%}$$

PROBLEM 23:

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	11.5	11.00	10.60

SOLUTION:

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

Yield for last 4 years:

Year HPR = (P1 – Po) +D ÷ Po

$$1 = \frac{(₹\ 9.75 - ₹\ 9) + 1}{₹\ 9} = 0.1944$$

$$1 = \frac{(₹\ 11.5 - ₹\ 9.75) + 1}{₹\ 9.75} = 0.282$$

$$1 = \frac{(₹\ 11 - ₹\ 11.5) + 1.2}{₹\ 11.5} = 0.0608$$

$$1 = \frac{(₹\ 10.6 - ₹\ 11) + 1.25}{₹\ 11} = 0.0772$$

Geometric mean:

$$K_e = [(1+HPR_1) \times (1+HPR_2) \times (1+HPR_3) \times (1+HPR_4)]^{\frac{1}{4}} - 1$$

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

PROBLEM 24:
ABC Company's equity share is quoted in the market at ₹ 25 per share currently. The company pays a dividend of ₹ 2 per share and the investor's market expects a growth rate of 6% per year.
You are required to:
1. CALCULATE the company's cost of equity capital.
2. If the company issues 10% debentures of face value of ₹ 100 each and realises ₹ 96 per debenture while the debentures are redeemable after 12 years at a premium of 12%, CALCULATE cost of debenture using YTM?
Assume Tax Rate to be 50%.

SOLUTION:

(i) Cost of Equity Capital (Ke):

$$Ke = \frac{D_1}{P_0} + g = \frac{₹\ 2 \times 1.06}{₹\ 25} + 0.06 = 0.1448 \text{ or } 14.48\%$$

(ii) Cost of Debenture (Kd):

Using Present Value method (YTM)

Identification of relevant cash flows

Year	Cash flows
0	Current market price (P0) = ₹ 96
1 to 12	Interest net of tax [I(1-t)] = 10% of ₹ 100 (1 – 0.5) = ₹ 5
12	Redemption value (RV) = ₹ 100 (1.12) = ₹ 112

Calculation of Net Present Values (NPV) at two discount rates

Year	Cash flows (₹)	Discount factor @ 5% (L)	Present Value (₹)	Discount factor @ 10% (H)	Present Value (₹)
0	(96)	1.000	(96.00)	1.000	(96.00)
1 to 12	5	8.863	44.32	6.814	34.07
12	112	0.557	62.38	0.319	35.73
NPV			**+10.7**		**-26.2**

Calculation of IRR

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

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

Therefore, Kd = 6.45%

PROBLEM 25:

Today, being 1st January 2019, Ram is considering to purchase an outstanding Corporate Bond having a face value of ₹ 1,000 that was issued on 1st January 2007 which has a 9.5% Annual Coupon and 20 years of original maturity (i.e., maturing on 31st December 2027). Since the bond was issued, the interest rates have been on the downside and it is now selling at a premium of ₹ 125.75 per bond. Determine the prevailing interest on the similar type of Bonds if it is held till the maturity which shall be at Par.

PV Factors:

	1	2	3	4	5	6	7	8	9
6%	**0.943**	**0.89**	**0.84**	**0.792**	**0.747**	**0.705**	**0.665**	**0.627**	**0.592**
8%	**0.926**	**0.857**	**0.794**	**0.735**	**0.681**	**0.63**	**0.583**	**0.54**	**0.5**

SOLUTION:

To determine the interest rate, we compute YTM of this bond using IRR method:

1125.75 = 95 x PVIFA (x % for 9 years) + 1000 (PVIF x % for 9 years)

0 = 95 x PVIFA + 1000 - 1125.75

Calculation of NPV at discount ratios:

Year	CF	PVF @ 6%	PVCF @ 6%	PVF @ 8%	PVCF @ 8%
0	(1125.75)	1	(1125.75)	1	(1125.75)
1 - 9	95	6.801	646.095	6.246	593.37
9	1000	0.592	592	0.5	500
			112.345		-32.38

$$= 6\% + \frac{₹\ 112.345}{₹\ 112.345. - (₹\ -32.38)}(8\% - 6\%) = 7.958\% \text{ or } 8\%$$

PROBLEM 25A:

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

SOLUTION:

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

I	= Interest on debenture = 10% of ₹ 100	= ₹ 10
NP	= Current market price	= ₹ 80
RV	= Redemption value	= ₹ 100
n	= Period of debenture	= 5 years
t	= Tax rate	= 35% or 0.35

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

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

PROBLEM 26: **(MTP 1 MAY '24)**

Ram Ltd evaluates all its capital projects using discounting rate of 16%. Its capital structure consists of equity share capital, retained earnings, bank term loan and debentures redeemable at par. Rate of interest on bank term loan is 1.4 times that of debenture. Remaining tenure of debenture and bank loan is 4 years and 6 years respectively. Book value of equity share capital, retained earnings and bank loan is ₹ 20,00,000, ₹ 30,00,000 and ₹ 20,00,000 respectively. Debentures which are having book value of ₹ 30,00,000 are currently trading at ₹ 98 per debenture.

The ongoing PE multiple for the shares of the company stands at 4.

You are required to:

(i) CALCULATE the rate of interest on bank loan and

(ii) CALCULATE the rate of interest on debentures

Tax rate applicable is 30%.

SOLUTION:

Working Note:

Let the rate of Interest on debenture be x

∴ Rate of Interest on loan = 1.4x

$\therefore$ k_d on debentures $= \dfrac{Int(1-t)+\dfrac{RV-NP}{n}}{\dfrac{RV+NP}{n}} = \dfrac{100 \times (1-0.30)+\dfrac{100-98}{4}}{\dfrac{100+98}{2}}$

$= 70x + 0.5 / 99$

$\therefore$ K_d on bank loan $= 1.4 \times (1 - 0.30) = 0.98x$

$K_e = \dfrac{EPS}{MPS} = \dfrac{1}{\dfrac{MPS}{EPS}} = \dfrac{1}{PE} = \dfrac{1}{4} = 0.25$

$K_e = 0.25$

Computation of WACC

Capital	Amount	Weights	Cost	Product
Equity	20,00,000	0.2	0.25	0.05
Reserves	30,00,000	0.3	0.25	0.075
Debentures	30,00,000	0.3	(70x+0.5)/99	(21x + 0.15)/99
Bank Loan	20,00,000	0.2	0.98x	0.196x
	1,00,00,000	**1**		**0.125 + 0.196x + (21x + 0.15)/99**

WACC = 16%

$\therefore$ $0.125 + 0.196x + \dfrac{(21x + 0.15)}{99} = 0.16$

$\therefore$ $12.375 + 19.404x + 21x + 0.15 = (0.16 \times 99)$

$\therefore$ $40.404x = 15.84 - 12.525$

$\therefore$ $40.404x = 3.315$

$\therefore$ $x = 3.315 / 40.404$

$\therefore$ $x = 8.20\%$

(i) Rate of interest on debenture = x = 8.20%

(ii) Rate of interest on Bank loan = 1.4x = (1.4 x 8.20%) = 11.48%.

Multiple Choice Questions

1. **Which of the following is not an assumption of the capital asset pricing model (CAPM)?**
   a. The capital market is efficient.
   b. Investors lend or borrow at a risk-free rate of return.
   c. Investors do not have the same expectations about the risk and return.
   d. Investor's decisions are based on a single-time period.

2. **Given: risk-free rate of return = 5%; market return 10%; cost of equity = 15%; value of beta (β) is:**
   a. 1.9
   b. 1.8
   c. 2.0
   d. 2.2

3. **May be defined as the cost of raising an additional rupee of capital:**
   a. Marginal cost of capital
   b. Weighted Average cost of capital
   c. Simple Average cost of capital
   d. Liquid cost of capital

4. **Which of the following cost of capital requires to adjust taxes?**
   a. Cost of Equity Share
   b. Cost of Preference Shares,
   c. Cost of Debentures
   d. Cost of Retained Earnings

5. **Marginal Cost of capital is the cost of:**
   a. Additional Revenue
   b. Additional Funds
   c. Additional Interests
   d. None of the above

6. **In order to calculate Weighted Average Cost of Capital, weights may be based on:**
   a. Market Values
   b. Target Values

c. Book Values

d. Anyone of the above

7. **Firm's Cost of Capital is the average cost of:**

a. All sources of finance

b. All Borrowings

c. All share capital

d. All Bonds & Debentures

8. **A company has a financial structure where equity is 70% of its total debt plus equity. Its cost of equity is 10% and gross loan interest is 5%. Corporation tax is paid at 30%. What is the company's weighted average cost of capital (WACC)?**

a. 7.55%

b. 7.80%

c. 8.70%

d. 8.05%

9. **The cost of equity capital is all of the following except:**

a. The minimum rate that a firm should earn on the equity-financed part ofan investment.

b. A return on the equity-financed portion of an investment that, at worst,leaves the market price of the stock unchanged.

c. By far, the most difficult component cost to estimate.

d. Generally, lower than the before-tax cost of debt.

10. **What is the overall (weighted average) cost of capital when the firm has Rs.20 crores in long-term debt, Rs.4 crores in preferred stock, and Rs.16 crores in equity shares? The before-tax cost for debt, preferred stock, and equity capital are 8%, 9%, and 15%, respectively. Assume a 50% tax rate.**

a. 7.60%

b. 6.90%

c. 7.30%

d. 8.90%

Answers to the MCQs

1.	(c)	2.	(c)	3.	(a)	4.	(c)	5.	(b)	6.	(d)
7.	(a)	8.	(d)	9.	(d)	10.	(d)				

Case Scenarios

MNP Ltd. is a multinational company having its operations spread mostly in India and neighbouring countries of India. The promotors of the company believed that capital structure of a company must be kept flexible and balanced, where proper mix should always be maintained between debt and equity. Such mix of debt and equity should be reviewed from time to time keeping in mind the changing situation of India and the global scenario.

The capital structure of MNP Ltd. is as under:

9% Debentures	₹ 2,75,000
11% Preference shares	₹ 2,25,000
Equity shares (face value: ₹ 10 per share)	₹ 5,00,000
Total capital of the company	₹ 10,00,000

The following are some of the additional information provided by MNP Ltd. relating to the above-mentioned capital structure.

i. ₹ 100 per debenture redeemable at par has 2% floatation cost and 10 years of maturity. The market price per debenture is ₹ 105.

ii. ₹ 100 per preference share redeemable at par has 3% floatation cost and 10 years of maturity. The market price per preference share is ₹ 106.

iii. Equity share has ₹ 4 floatation cost and market price per share of ₹ 24. The next year expected dividend is ₹ 2 per share with an annual growth of 5%.
The firm has a practice of paying all earnings in the form of dividends.

iv. Corporate Income-tax rate is 35%.

Since the company is a multinational company market value weights are preferred over book value weights when calculating the Weighted Average Cost of Capital (WACC) for several reasons. The company believes that market values reflect the current market perception of a company's financial health and future prospects. This is more relevant for calculating the cost of capital today, as investors base their decisions on current market conditions. Book values, based on historical accounting principles, may not accurately represent the true economic value of the company's capital components. Market values capture the actual cost that a company would incur if it were to raise new capital in the current market. Book values might not reflect the true cost of debt due to factors like changes in interest rates or creditworthiness. Similarly, book value of equity might not reflect the current investor expectations for future dividends and growth. Market values are readily available through stock prices and market interest rates. Obtaining accurate book values, especially for intangible assets, can be a complex and time-consuming process.

Being a Finance manager of the company, you are required to provide the answer to the following questions to the top management:

1. Calculate the cost of equity and choose the correct answer from the following?
   a. 14%
   b. 15%
   c. 16%
   d. 17%

2. Calculate the cost of debt and choose the correct answer from the following?
   a. 6.11%
   b. 5.11%
   c. 5.48%
   d. 10.55%

3. Calculate the cost of preference shares and choose the correct answer from the following?
   a. 10.57 %
   b. 5.11%
   c. 9%
   d. 10.55%

4. Calculate the WACC using market value weights and choose the correct answer from the following?
   a. 12.80 %
   b. 5.11%
   c. 9%
   d. 10.55%

5. What will be the current market price of MNP Ltd.'s equity shares if Ke = 10%, expected dividend is ₹ 2 per share and annual growth rate is 5% from the following options:
   a. ₹ 40 per share
   b. ₹ 20 per share
   c. ₹ 30 per share

d. ₹ 45 per share

Answers to the Case Scenarios

1.	(b)	2.	(c)	3.	(a)	4.	(a)	5.	(a)

Working Notes:

$$Ke = \frac{D_1}{P_0} + g$$

= 2/20 + 0.05 = 15%

$$K_p = \frac{PD + \frac{(RV - NP)}{n}}{\frac{(RV + NP)}{2}} = \frac{11 + \frac{(100 - 102.82)}{10}}{\frac{(100 + 102.82)}{2}} = 10.57\%$$

$$K_d = \frac{I(1 - t) + \frac{(RV - NP)}{n}}{\frac{(RV + NP)}{2}} = \frac{9(1-0.35) + \frac{(100 - 102.90)}{10}}{\frac{(100 + 102.90)}{2}} = 5.48\%$$

Calculation of WACC using market value weights

Source of capital	Market Value	Weights	After tax cost of capital	WACC (Ko)
	(₹)	(a)	(b)	(c) = (a)×(b)
Debentures (₹ 105 per debenture)	2,88,750	0.1672	0.0548	0.0092
Preference shares (₹ 106 per preference share)	2,38,500	0.1381	0.1057	0.0146
Equity shares (₹ 24)	12,00,000	0.6947	0.1500	0.1042
	17,27,250	1.00		0.128

WACC (Ko) = 12.8%

$$\text{Current Market Price} = \frac{D_1}{K_e - g} = \frac{2}{0.10 - 0.05} = ₹ 40 \text{ per share}$$

CHAPTER 03: LEVERAGES

PROBLEM 1:

A firm's details are as under:

Sales (@100 per unit): ₹ 24,00,000; Variable Cost: 50%; Fixed Cost: ₹ 10,00,000. It has borrowed ₹ 10,00,000 @ 10% p.a. and its equity share capital is ₹ 10,00,000 (₹ 100 each). Tax Rate: 50%

Calculate:

a. **Operating Leverage**
b. **Financial Leverage**
c. **Combined Leverage**
d. **Return on (Equity) Investment**
e. **If the sales increase by ₹ 6,00,000; what will be the new EBIT?**

SOLUTION:

Particulars	Amount	Workings
Sales	₹ 24,00,000	Given
Less: Variable Cost	₹ 12,00,000	Sales x 50%
Contribution	**₹ 12,00,000**	**Sales - Variable Cost**
Less: Fixed Cost	₹ 10,00,000	Given
EBIT	**₹ 2,00,000**	**Contribution - Fixed Cost**
Less: Interest @ 10%	₹ 1,00,000	Debt x 10%
EBT	**₹ 1,00,000**	**EBIT - Interest**
Less: Tax @ 50%	₹ 50,000	EBT x Tax Rate
EAT	**₹ 50,000**	**EBT -Tax Rate**
Less: PD	-	
EFE	**₹ 50,000**	**EAT - PD**
No of Equity Shares	10000	Given
EPS	**₹ 5**	**EFE ÷ No of Equity Shares.**

(a) Operating Leverage = Contribution ÷ EBIT

$$= \frac{₹\,12,00,000}{₹\,2,00,000} = 6 \text{ times}$$

(b) Financial Leverage = EBIT ÷ (EBIT – Interest)

$$\frac{₹\,2,00,000}{₹\,1,00,000} = 2 \text{ Times}$$

(c) Combined Leverage = OL × FL = 6 × 2 = 12 Times.

(d) ROI = $\frac{₹\,50,000}{₹\,10,00,000} \times 100 = 5\%$

Here ROI is calculated as ROE i.e. $\frac{\text{EAT- Preference Dividend}}{\text{Equity Shareholders Fund}}$

(e) Operating Leverage = 6 Times

% change in EBIT ÷ % change in sales

$$6 = \frac{\Delta EBIT}{0.25}$$

$\Delta EBIT = 6 \times 0.25 = 1.5$

Increase in EBIT = ₹ 2,00,000 × 1.5
= ₹ 3,00,000

New EBIT = ₹ 5,00,000 (₹ 2,00,000 + ₹ 3,00,000)

PROBLEM 1A:

You are given the following information of 5 firms of the same industry:

Name of the Firm	Change in Revenue	Change in Operating Income	Change in Earning per share
M	28%	26%	32%
N	27%	34%	26%
P	25%	38%	23%
Q	23%	43%	27%
R	25%	40%	28%

You are required to CALCULATE for all firms:

i. **Degree of operating leverage and**

ii. **Degree of combined leverage.**

SOLUTION:

Calculation of Degree of Operating leverage and Degree of Combined leverage

Firm	Degree of Operating Leverage (DOL) = % change in Operating Income / % change in Revenue	Degree of Combined Leverage (DCL) = % change in EPS / % change in Revenue
M	$\frac{26\%}{28\%}$ =0.929Times	$\frac{32\%}{28\%}$=1.143 Times
N	$\frac{34\%}{27\%}$=1.259 Times	$\frac{26\%}{27\%}$=0.963 Times
P	$\frac{38\%}{25\%}$=1.520 Times	$\frac{23\%}{25\%}$=0.920 Times
Q	$\frac{43\%}{23\%}$=1.870 Times	$\frac{27\%}{23\%}$=1.174 Times
R	$\frac{40\%}{25\%}$=1.60 Times	$\frac{28\%}{25\%}$=1.120 Times

PROBLEM 2:

From the following information extracted from the books of accounts of Imax Ltd., CALCULATE percentage change in earnings per share, if sales increase by 10% and Fixed Operating cost is ₹ 1,57,500.

Particulars	(₹)
EBIT (Earnings before Interest and Tax)	31,50,000
Earnings before Tax (EBT)	14,00,000

SOLUTION:

Operating Leverage (OL)

$$= \frac{\text{Contribution}}{\text{EBIT}} = \frac{\text{EBIT + Fixed Cost}}{\text{EBIT}} = \frac{₹\ 31,50,000 + ₹\ 1,57,500}{₹\ 31,50,000} = 1.05 \text{ Times}$$

Financial Leverage (FL)

$$= \frac{\text{EBIT}}{\text{EBT}} = \frac{₹\ 31,50,000}{₹\ 14,00,000} = 2.25 \text{Times}$$

Combined Leverage (CL)

= 1.05 x 2.25 = 2.3625 Times

Percentage Change in Earnings per share

$$\text{DCL} = \frac{\%\text{ Change in EPS}}{\%\text{ Change in Sales}} = 2.3625 = \frac{\%\text{ Change in EPS}}{10\%}$$

∴% change in EPS = 23.625% (2.3625% x 10%)

Hence, if sales increase by 10%, EPS will be increased by 23.625%.

PROBLEM 2A: **(MTP 1 JAN 25)**

ABC Industries is a mid-sized company manufacturing consumer goods. Last quarter, the company reported sales of ₹ 2,00,000. The production process involves significant variable costs, which account for 50% of the sales value. Additionally, the company incurs ₹ 40,000 as fixed operating costs for rent, utilities, and management expenses. ABC Industries has also borrowed funds, leading to ₹ 10,000 as annual interest on long-term debt.

The company is currently planning to launch a new marketing campaign aimed at boosting sales by 10%. As a financial analyst at ABC Industries, you are required to:

1. CALCULATE the combined leverage.

2. ILLUSTRATE the impact of the 10% sales increase using the combined leverage.

SOLUTION:

Statement showing Computation of Combined leverage

	₹
Sales (Given)	2,00,000
Less: Variable costs (50% on Sales)	1,00,000
Contribution (Sales – Variable Cost)	**1,00,000**
Less: Fixed operating costs (Given)	40,000
EBIT (Contribution – Fixed operating cost)	**60,000**

Less: Interest (Given)	10,000
Taxable Income [PBT] (EBIT – Interest)	**50,000**

Combined leverage = Contribution ÷ PBT = ₹ 1,00,000 ÷ ₹ 50,000 = 2 Times

The combined leverage of '2' indicates that with every increase of ₹ 1 in sales, the taxable income will increase by ₹ 2 (i.e. 1 × 2).

This can be verified by the following computations when the sales increase by 10%

	₹
Sales (₹ 200000 + 10%)	2,20,000
Less: Variable costs (50% on sales)	1,10,000
Contribution (Sales – Variable Cost)	**1,10,000**
Less: Fixed operating costs (Given)	40,000
EBIT (Contribution – Fixed operating cost)	**70,000**
Less: Interest (Given)	10,000
Taxable Income [PBT] (EBIT – Interest)	**60,000**

It is clear from the above computation that on account of increase in sales by 10%, the profit before tax has increased by 20%.

PROBLEM 3: **(MTP 2 MAY '24, MTP 1 SEP '24)**

Following are the selected financial information of A Ltd. and B Ltd. for the current Financial Year:

	A Ltd.	B Ltd.
Variable Cost Ratio	60%	50%
Interest	₹ 20,000	₹ 1,00,000
Operating Leverage	5	2
Financial Leverage	3	2
Tax Rate	30%	30%

You are required to FIND out:

i. **EBIT**

ii. **Sales**

iii. **Fixed Cost**

iv. **Identify the company which is better placed with reasons based on leverages.**

SOLUTION:

Company A

Working Note: 1

(i) Financial Leverage $= \frac{\text{EBIT}}{\text{EBT} = \text{EBIT} - \text{Interest}}$

So, $3 = \frac{\text{EBIT}}{\text{EBT} - ₹\,20{,}0000} \Rightarrow 3\,(\text{EBIT} - ₹\,20{,}000) = \text{EBIT}$

$\Rightarrow$ 2 EBIT = ₹ 60,000

$\Rightarrow$ EBIT = ₹ 30,000

(ii) Operating Leverage = $\frac{\text{Contribution}}{\text{EBIT}} \Rightarrow 5 = \frac{\text{Contribution}}{₹\ 30,000}$

$\Rightarrow$ Contribution = ₹ 1,50,000

$\text{Sales} = \frac{\text{Contribution}}{\text{P/V Ratio}} = \frac{₹\ 1,50,000}{40\%} = ₹\ 3,75,000$

Note: P/V Ratio = 1 – V/C Ratio

(iii) Fixed Cost = Contribution – EBIT

Fixed cost = ₹ 1,50,000 – ₹ 30,000

Fixed cost = ₹ 1,20,000

Company B

Working Note: 2

(i) Financial Leverage = $\frac{\text{EBIT}}{\text{EBIT - Interest}} \Rightarrow 2 = \frac{\text{EBIT}}{\text{EBIT - ₹ 1,00,000}}$

$\Rightarrow$ 2 (EBIT – ₹ 1,00,000) = EBIT

$\Rightarrow$ 2 EBIT – ₹ 2,00,000 = EBIT

$\Rightarrow$ EBIT = ₹ 2,00,000

(ii) Operating Leverage = $\frac{\text{Contribution}}{\text{EBIT}}$

$\Rightarrow 2 = \frac{\text{Contribution}}{₹\ 2,00,000}$

$\Rightarrow$ Contribution = ₹ 4,00,000

$\text{Sales} = \frac{\text{Contribution}}{\text{P/V Ratio}} = \frac{₹\ 4,00,000}{50\%} = ₹\ 8,00,000$

Note: P/V Ratio = 1 – V/C Ratio

(iii) Fixed Cost = Contribution – EBIT

= ₹ 4,00,000 – ₹ 2,00,000

Or, Fixed cost = ₹ 2,00,000

Income Statements of Company A and Company B

Particulars	Company A	Workings	Company B	Workings
Sales	3,75,000.00	WN - 1	8,00,000.00	WN - 2
Less: Variable Cost	2,25,000.00	Sales - Contribution	4,00,000.00	Sales - Contribution
Contribution	**1,50,000.00**	WN - 1	**4,00,000.00**	WN - 2
Less: Fixed Cost	1,20,000.00	WN - 1	2,00,000.00	WN - 2
EBIT	**30,000.00**	WN - 1	**2,00,000.00**	WN - 2
Less: Interest	20,000.00	Given	1,00,000.00	Given

EBT	**10,000.00**	**EBIT - Interest**	**1,00,000.00**	**EBIT - Interest**
Tax (30%)	3,000.00	EBT X 30%	30,000.00	EBT X 30%
EAT	**7,000.00**	**EBT - Tax Amount**	**70,000.00**	**EBT - Tax Amount**

Comment based on Leverage

Comment based on leverage – Company B is better than company A of the following reasons:

- Capacity of Company B to meet interest liability is better than that of companies A (from EBIT/Interest ratio)

  $[A=\frac{₹\,30,000}{₹\,20,000}=1.5;\ B=\frac{₹\,2,00,000}{₹\,1,00,000}=2]$

- Company B has the least financial risk as the total risk (business and financial) of company B is lower (combined leverage of Company A – 15 and Company B- 4)

PROBLEM 4:

The Capital structure of RST Ltd. is as follows:

Equity Share of 10 each	**₹ 8,00,000**
10% Preference Share of 100 each	**₹ 5,00,000**
12% Debentures of 100 each	**₹ 7,00,000**
	₹ 20,00,000

Additional Information:

Profit after tax (Tax Rate 30%) is ₹ 2,80,000;

Operating Expenses (including Depreciation of ₹ 96,800) are 1.5 times of EBIT;

Equity Dividend paid is 15%;

Market price of Equity Share is ₹ 23

Calculate:

i. Operating and Financial Leverage

ii. Cover for preference and equity dividend

iii. The Earning Yield Ratio and Price Earnings Ratio

iv. The Net Fund Flow

Note: All operating expenses (excluding depreciation) are variable

SOLUTION:

Income statement

Particulars	Amount (₹)	Workings (₹)
Sales	12,10,000	
Less: Variable Cost	6,29,200	(₹ 1.5 x ₹ 484000) - ₹ 96800
Contribution	**5,80,800**	**₹ 484000 + ₹ 96800**
Less: Fixed Cost	96,800	Given
EBIT	**4,84,000**	**₹ 400000 + ₹ 84000**
Less: Interest	84,000	₹ 700000 x 12%
EBT	**4,00,000**	**₹ 280000 ÷ 70 x 100**
Less: Tax Rate @ 30%	1,20,000	(₹ 280000 ÷ 70%) x 30

EAT	**2,80,000**	**Given**
Less: Preference Dividend	50,000	₹ 500000 x 10%
Earnings for Equity	**2,30,000**	**EAT – Preference Dividend**
Less: Equity Dividend	1,20,000	₹ 800000 x 15%
Retained Earnings	**1,10,000**	**EFE – Equity Dividend**

i. Operating leverage = Contribution ÷ EBIT

$$= \frac{₹\ 5,80,800}{₹\ 4,84,000} = 1.2 \text{ times}$$

ii Financial leverage = $\frac{EBIT}{EBT} = \frac{₹\ 484000}{₹\ 4,00,000}$ = **1.21 Times**

or

$$\text{Financial leverage} = \frac{EBIT}{EBIT - Int - \frac{PD}{(1-tax)}} = \frac{₹\ 484000}{₹\ 4,00,000 - \frac{₹\ 50,000}{0.7}} = \frac{₹\ 484000}{₹\ 328571} = \textbf{1.473 Times}$$

Note: Any one of the 2 formulas can be used in exam

ii PD coverage ratio = $\frac{EAT}{PD} = \frac{₹\ 280000}{₹\ 50000}$ = 5.6 Times

Equity coverage ratio = $\frac{EFE}{ED} = \frac{₹\ 230000}{₹\ 120000}$ = 1.917 Times

iii Earnings yield ratio: = $\frac{EPS}{MPS} = \frac{₹\ 230000 \div ₹\ 80000}{₹\ 23} = \frac{₹\ 2.875}{₹\ 23}$ = 0.125 = 12.5%

Price yield ratio = $\frac{MPS}{EPS} = \frac{₹\ 23}{₹\ 2.875}$ = 8 Times

iv. Net fund flow = EAT (+) Depreciation (-) Preference Dividend (-) Equity Dividend

= ₹ 280000 + ₹ 96800 – ₹ 50000 – ₹ 120000

= ₹ 206800

PROBLEM 5: **(RTP SEP '24)**

Calculate the operating leverage, financial leverage and combined leverage from the following data under Situation I and II and Financial Plan A and B:

Installed Capacity	**4,000 units**
Actual Production and Sales	**75% of the Capacity**
Selling Price	**₹ 30 Per Unit**
Variable Cost	**₹ 15 Per Unit**

Fixed Cost:

Under Situation I	**₹ 15,000**
Under Situation-II	**₹ 20,000**

Capital Structure:

Financial Plan	**A**	**B**
Equity	**10,000**	**15,000**

Debt (Rate of Interest at 20%)	**10,000**	**5,000**
	20,000	**20,000**

SOLUTION:

(i) Operating Leverage (OL)

	Situation-I	**Situation-II**
	(₹)	**(₹)**
Sales (3000 units @ ₹ 30 per unit)	90,000	90,000
Less: Variable Cost (@ ₹ 15 per unit)	45,000	45,000
Contribution (Sales – Variable Cost)	**45,000**	**45,000**
Less: Fixed Cost (Given)	15,000	20,000
EBIT (Contribution – Fixed Cost)	**30,000**	**25,000**
Operating Leverage (OL) = $\frac{\text{Contribution}}{\text{EBIT}}$	$= \frac{₹\ 45,000}{₹\ 30,000}$	$= \frac{₹\ 45,000}{₹\ 25,000}$
	= 1.5 Times	**= 1.8 Times**

(ii) Financial Leverage (FL)

	A (₹)	**B (₹)**
Situation I		
EBIT **(Contribution – Fixed Cost)**	30,000	30,000
Less: Interest on debt (Debt Amount x 20%)	2,000	1,000
EBT (EBIT- Interest)	**28,000**	**29,000**
Financial Leverage (FL) = $\frac{\text{EBIT}}{\text{EBT}}$	$= \frac{₹\ 30,000}{₹\ 28,000}$	$= \frac{₹\ 30,000}{₹\ 29,000}$
	= 1.07 Times	**= 1.034 Times**

	A (₹)	**B (₹)**
Situation-II		
EBIT **(Contribution – Fixed Cost)**	25,000	25,000
Less: Interest on debt (Debt Amount x 20%)	2,000	1,000
EBT (EBIT – Interest)	**23,000**	**24,000**
Financial Leverage (FL) = $\frac{\text{EBIT}}{\text{EBT}}$	$= \frac{₹\ 25,000}{₹\ 23,000}$	$= \frac{₹\ 25,000}{₹\ 23,000}$
	= 1.09 Times	**= 1.04 Times**

(iii)Combined Leverage (CL)

	A	**B**
Situation-I		
CL = FL x OL	1.5 × 1.07 = **1.61 Times**	1.5 × 1.034 = **1.55 Times**
Situation-II		
CL = FL x OL	1.8 × 1.09 = **1.96 Times**	1.8 × 1.04 = **1.872 Times**

PROBLEM 6:

Betatronics Ltd. has the following balance sheet and income statement information:

Balance Sheet

Liabilities	(₹)	Assets	(₹)
Equity capital (₹ 10 per share)	8,00,000	Net fixed assets	10,00,000
10% Debt	6,00,000	Current assets	9,00,000
Retained earnings	3,50,000		
Current liabilities	1,50,000		
	19,00,000		19,00,000

Income Statement for the year

Particulars	(₹)
Sales	3,40,000
Operating expenses (including ₹ 60,000 depreciation)	1,20,000
EBIT	2,20,000
Less: Interest	60,000
Earnings before tax	1,60,000
Less: Taxes	56,000
Net Earnings (EAT)	1,04,000

a. **DETERMINE the degree of operating, financial and combined leverages at the current sales level, if all operating expenses, other than depreciation, are variable costs.**

b. **If total assets remain at the same level, but sales (i) increase by 20 percent and (ii) decrease by 20 percent, COMPUTE the earnings per share at the new sales level?**

SOLUTION:

(a) Calculation of Degree of Operating (DOL), Financial (DFL) and Combined leverages (DCL).

$$DOL = \frac{₹\,3,40,000 - ₹\,60,000}{₹\,2,20,000} = \textbf{1.27 Times}$$

$$DFL = \frac{₹\,2,20,000}{₹\,1,60,000} = \textbf{1.38 Times}$$

DCL = DOL x DFL = 1.27 x 1.38 = **1.75 Times**

(b) Earnings per share at the new sales level

	(i) Increase by 20%	(ii) Decrease by 20%
	(₹)	(₹)
Sales level (WN)	4,08,000	2,72,000
Less: Variable expenses (WN)	72,000	48,000
Less: Fixed cost (Depreciation – Given)	60,000	60,000
Earnings before interest and taxes (Sales – Variable Cost – Fixed Cost)	**2,76,000**	**1,64,000**

Less: Interest (Given)	60,000	60,000
Earnings Before Taxes (EBIT – Interest)	**2,16,000**	**1,04,000**
Less: Taxes @35% (WN)	75,600	36,400
Earnings After Taxes [EAT] (EBIT- Tax)	**1,40,400**	**67,600**
Number of equity shares (Given)	80,000	80,000
EPS (EAT ÷ No of Equity Shares)	**1.76**	**0.85**

Working Note:

a. **Sales increase by 20%** = ₹ 340000 + 20% = ₹ 408000

b. **Sales Decrease by 20%** = ₹ 340000 - 20% = ₹ 272000

c. **Variable Cost increase by 20%**
= ₹ 120000 - ₹ 60000 = ₹ 60000 + 20% = ₹ 72000

d. **Variable Cost decrease by 20%**
= ₹ 120000 - ₹ 60000 = ₹ 60000 - 20% = ₹ 48000

e. **Tax rate** = 56000 ÷ 160000 = 35%

PROBLEM 6A: **(PEP MAY 24 - 5M)**

Alpha Limited has provided following information:

Equity Share Capital	**25,000 Shares @ ₹ 100 per Share**
15% Debentures	**10,000 Debentures @ ₹ 750/- per Debenture**
Sales	**50 Lakhs units@ ₹ 20 per unit**
Variable Cost	**₹ 12.50 per unit**
Fixed Costs	**₹ 175.00 Lakhs**

Due to recent policy changes and entry of foreign competitors in the sector, Alpha Limited expects the sales may decline by 15-20%, However, selling price and other costs will remain the same. Corporate Taxes will continue @ 20%.

You are required to calculate the decrease in Earnings per share, Degree of Operating Leverage and Financial Leverage separately if sales are declined by (i) 15%; and (ii) 20%;

SOLUTION:

Income Statement with required calculations

Particulars	**(₹)**	**(₹)**	**(₹)**
	Existing	**Sales declined by 15%**	**Sales declined by 20%**
Sales in units (Given)	50,00,000	42,50,000	40,00,000
Sales price per unit (Given)	20	20	20
Variable Cost per unit (Given)	(12.50)	(12.50)	(12.50)
Contribution per unit (SP - VC)	7.5	7.5	7.5
Contribution (contribution per unit x sales in units)	**3,75,00,000**	**3,18,75,000**	**3,00,00,000**
Fixed Cost (Given)	(1,75,00,000)	(1,75,00,000)	(1,75,00,000)

EBIT (Contribution – FC)	**2,00,00,000**	**1,43,75,000**	**1,25,00,000**
Debenture Interest (10000 Deb x ₹ 750 x 15%)	(11,25,000)	(11,25,000)	(11,25,000)
EBT (EBIT – interest)	**1,88,75,000**	**1,32,50,000**	**1,13,75,000**
Tax @ 20% - (EBT x 20%)	(37,75,000)	(26,50,000)	(22,75,000)
Profit after tax (PAT) (PBT - Tax Amount)	**1,51,00,000**	**1,06,00,000**	**91,00,000**
No. of shares (Given)	25,000	25,000	25,000
Earnings per share (EPS) $= \frac{\text{PAT}}{\text{No.of shares}}$	$= \frac{₹\,1,51,00,000}{25,000}$ = ₹ 604	$= \frac{₹\,1,06,00,000}{25,000}$ = ₹ 424	$= \frac{₹\,91,00,000}{25,000}$ = ₹ 364
(i) Decrease in EPS		= ₹ 180 Or % Decrease in EPS $= \frac{180}{604} \times 100$ = 29.80%	= ₹ 240 Or % Decrease in EPS $= \frac{240}{604} \times 100$ = 39.73%
(ii) Operating leverage $= \frac{\text{Contribution}}{\text{EBIT}}$ Or $= \frac{\text{Percentage change in EBIT}}{\text{Percentage change in sales}}$		$= \frac{₹\,3,18,75,000}{₹\,1,43,75,000}$ = 2.22Times Or 28.125 ÷ 15 = 1.875 Times	$= \frac{₹\,3,00,00,000}{₹\,1,25,00,000}$ = 2.40 Times Or 37.50 ÷ 20 1.875 Times
(iii) Financial Leverage $= \frac{\text{EBIT}}{\text{EBT}}$ Or $= \frac{\text{Percentage change in EPS}}{\text{Percentage change in EBIT}}$		$= \frac{₹\,1,43,75,000}{₹\,1,32,50,000}$ = 1.08 Times Or 29.80 ÷ 28.125 = 1.06 Times	$= \frac{₹\,1,25,00,000}{₹\,1,13,75,000}$ = 1.10 Times Or 39.735 ÷ 37.50 = 1.06 Times

PROBLEM 6B: **(MTP 2 JAN '25)**

The following data relates to Beta Limited:

	₹
Sales	**2,00,000**
***Less:* Variable Expenses (30%)**	**60,000**
Contribution	**1,40,000**
Fixed operating expenses	**1,00,000**
EBIT	**40,000**
***Less:* Interest**	**5,000**
EBT	**35,000**

i. **CALCULATE by what percentage will EBT increase if sales increases by 6 percent.**

ii. **CALCULATE by what percentage will EBIT increase if there is 10 per cent increase in sales?**

iii. **CALCULATE by what percentage EBT increase if EBIT increases by 6 per cent?**

SOLUTION:

(i) Increase in taxable income if sales increase by 6%.

Combined Leverage= Contribution ÷ EBT = ₹ 1,40,000 ÷ ₹ 35,000 = 4 Times

If the sales increases by 6%, EBT will increase by 24%. (4 × 6%)

(ii) Increase in EBIT if sales increase by 10%.

Operating Leverage= Contribution ÷ Earnings before interest and tax

= ₹ 1,40,000 ÷ ₹ 40,000 = 3.5 Times

If sales increase by 10%, EBIT will increase by (3.5× 10) 35%.

(iii) Increase in taxable income if EBIT increase by 6%.

Financial Leverage = Earnings before interest and tax (EBIT) ÷ EBT = ₹ 40,000 ÷ ₹ 35,000 =1.14 Times

If EBIT increases by 6%, EBT will increase by 6.8%. (1.14 × 6%)

PROBLEM 7:

X corporation has estimated that for a new product, its break-even point is 2,000 units if the item is sold for ₹ 14 per unit; the cost accounting department has currently identified a variable cost of ₹ 9 per unit. Calculate the degree of operating leverage for sales volume of 2,500 units and 3,000 units. What do you infer from the Operating Leverage at the sales volumes of 2500 units and 3000 units and their difference if any?

SOLUTION:

Particulars	2500 units	Workings	3000 units	Workings
Sales @₹ 14	35,000	2500 x ₹ 14	42,000	3000 x ₹ 14
Less: VC @₹ 9	22,500	2500 x ₹ 9	27,000	3000 x ₹ 9
Contribution	**12,500**	**Sales - VC**	**15,000**	**Sales - VC**
Less: Fixed Cost	10,000	WN	10,000	WN
EBIT	**2,500**	**Contribution – FC**	**5,000**	**Contribution - FC**
Operating Leverage	**5 Times**	**Contribution ÷ EBIT**	**3 Times**	**Contribution ÷ EBIT**

Working Note

Fixed Cost = Breakeven point x Contribution Per unit

Fixed Cost = 2000 units x ₹ 5

Fixed Cost = ₹ 10,000

Comment:

1. At sales volume of 3000 units the operating leverage is 3 times. Any change in sales from this level will result in 3 times change in EBIT
2. At sales volume of 2500 units the operating leverage is 50. Any change in sales from this level the change in EBIT 5 times.

PROBLEM 8:

The capital structure of PS Ltd. at the end of the current Financial Year consisted as follows:

Particulars	(₹)
Equity shares capital (face value ₹ 100 each)	10,00,000
10% debentures (₹ 100 each)	10,00,000

During the year, sales decreased to 1,00,000 units as compared to 1,20,000 units in the previous year. However, the selling price stood at ₹ 12 per unit and variable cost at ₹ 8 per unit for both the years The fixed expenses were at ₹ 2,00,000 p.a. and the income tax rate is 30%. You are required to CALCULATE the following:

i. **The degree of financial leverage at 1,20,000 units and 1,00,000 units.**
ii. **The degree of operating leverage at 1,20,000 units and 1,00,000 units.**
iii. **The percentage change in EPS.**

SOLUTION:

Income Statement with required calculations

Particulars	(₹)	(₹)
Sales in units (Given)	1,20,000	1,00,000
Sales Value (sales units x ₹ 12)	14,40,000	12,00,000
Variable Cost (variable cost x ₹ 8)	(9,60,000)	(8,00,000)
Contribution (Sales – Variable Cost)	**4,80,000**	**4,00,000**
Less: Fixed expenses (Given)	(2,00,000)	(2,00,000)
EBIT (Contribution - Fixed Expenses)	**2,80,000**	**2,00,000**
Less: Debenture Interest (₹ 1000000 x 10%)	(1,00,000)	(1,00,000)
EBT (EBIT – Interest)	**1,80,000**	**1,00,000**
Less: Tax @ 30%	(54,000)	(30,000)
Profit after tax (PAT) **(EBT – Tax Amount)**	**1,26,000**	**70,000**
No. of shares (Given)	10,000	10,000
(i) Financial Leverage $= \frac{EBIT}{EBT}$	$= \frac{₹\ 2,80,000}{₹\ 1,80,000}$ **= 1.56 Times**	$= \frac{₹\ 2,00,000}{₹\ 1,00,000}$ **= 2 Times**
(ii) Operating leverage $= \frac{Contribution}{EBIT}$	$= \frac{₹\ 4,80,000}{₹\ 2,80,000}$ **= 1.71 Times**	$= \frac{₹\ 4,00,000}{₹\ 2,00,000}$ **= 2 Times**
(iii) Earnings per share (EPS) $= \frac{PAT}{No.of shares}$	$= \frac{₹\ 1,26,000}{₹\ 10,000}$ **= ₹ 12.6**	$= \frac{₹\ 70,000}{₹\ 10,000}$ **= ₹ 7**
Decrease in EPS	₹ 12.6 – ₹ 7 = ₹ 5.6	

	% Decrease in EPS = $\frac{5.6}{12.6} \times 100$ = 44.44%

PROBLEM 9:

Calculate the operating leverage for each of the four firms. A, B, C and D from the following price and cost data:

Firms	A (₹)	B (₹)	C (₹)	D (₹)
Sale price per unit	20	32	50	70
Variable cost per unit	6	16	20	50
Fixed operating cost	80,000	40,000	2,00,000	Nil

What calculations can you draw with respect to levels of fixed cost and the degree of operating leverage result? Explain. Assume number of units sold is 5,000.

SOLUTION:

Calculation DOL:

Particulars	A (₹)	B (₹)	C (₹)	D (₹)
Sales (Units sold x Sale Price per unit)	1,00,000	1,60,000	2,50,000	3,50,000
Less: Variable Cost (Units sold x variable Cost per unit)	30,000	80,000	1,00,000	2,50,000
Contribution (Sales – Variable Cost)	**70,000**	**80,000**	**1,50,000**	**1,00,000**
Less: Fixed Cost (Given)	80,000	40,000	2,00,000	-
EBIT	**10,000**	**40,000**	**-50,000**	**1,00,000**
Operating Leverage = Contribution ÷ EBIT	7 Times	2 Times	-3 Times	1 Times

Analysis:

i) OL exists only when there is fixed cost in case of firm D there is no magnifying effect on EBIT due to change in sales service there is no fixed cost.

ii) In case of the other firms, OL exists. It is maximum in form A followed by firm C and minimum in firm B.

iii) The interpretation of DOC of is that 1% change in sales result in 7% change in EBIT. (the "+", "(-)" symbols have no meaning at all in leverages)

PROBLEM 10:

From the following information, prepare the Income Statements of Company A & B:

Particulars	Company A	Company B
Margin of safety	0.20	0.25
Interest	₹ 3000	₹ 2000
Profit volume ratio	25%	33.33%
Financial Leverage	4	3

Tax rate	45%	45%

SOLUTION:

Income Statement

Particulars	Co. A	Workings	Co. B	Workings
Sales	80,000	**WN 3**	36,000	**WN 3**
Less: Variable Cost	60,000	Sales - Contribution	24,000	Sales - Contribution
Contribution	**20,000**	**WN 2**	**12,000**	**WN 2**
Less: Fixed Cost	16,000	Contribution - EBIT	9,000	Contribution - EBIT
EBIT	**4,000**	**WN 1**	**3,000**	**WN 1**
Less: Interest	3,000	Given	2,000	Given
EBT	**1,000**	**EBIT - Interest**	**1,000**	**EBIT - Interest**
TaxAmount (45%)	450	EBIT x 45%	450	EBIT x 45%
EAT	**550**	**EBT – Tax Amount**	**550**	**EBT - Tax Amount**

Workings:

i. **Company A**

Financial Leverage = EBIT ÷ (EBIT- Interest)

4 = EBIT ÷ (EBIT- ₹ 3,000)

4EBIT – (4 x ₹ 3000) = EBIT

3 EBIT = ₹ 12,000

EBIT = ₹ 4,000 (₹ 12000 ÷ 3)

Company B

Financial Leverage = EBIT ÷ (EBIT - Interest)

3 = EBIT ÷ (EBIT – ₹ 2,000)

3EBIT – ₹ 6000 (₹ 2000 x 3) = EBIT

2EBIT = ₹ 6,000

EBIT = ₹ 3,000 (₹ 6000 ÷ 2)

ii. **Company A**

Operating Leverage = 1 ÷ Margin of Safety

= 1 ÷ 0.20 = 5

Operating Leverage = Contribution ÷ EBIT

5 = Contribution ÷ ₹ 4,000

Contribution = ₹ 20,000 (₹ 4000 x 5)

Company B

Operating Leverage = 1 ÷ Margin of Safety

= 1/0.25 = 4

Operating Leverage = Contribution ÷ EBIT

4 = Contribution ÷ ₹ 3,000

Contribution = ₹ 12,000 (₹ 3000 x 4)

iii. Company A

Profit Volume Ratio = 25% (Given)

Profit Volume Ratio = Contribution ÷ Sales x 100

25% = ₹ 20,000 ÷ Sales

Sales = ₹ 20,000 ÷ 25%

Sales = ₹ 80,000

Company B

Profit Volume Ratio = 33.33%

Therefore, Sales = ₹ 12,000 ÷ 33.33%

Sales = ₹ 36,000

PROBLEM 10A: **(PEP SEP '24 - 5M)**

Financial information for the year 2023-24 of two companies, N Limited and C Limited are as under:

Details	N Limited	C Limited
Equity Share Capital (₹ 100 each)	₹ 10,00,000	₹ 8,00,000
Debt	₹ 5,00,000 @10%	₹ 7,00,000 @ 8%
Fixed Cost	3,00,000	3,36,000
Combined Leverage	8	4.5
Financial Leverage	2	1.5

You are required to calculate:

(i) Contribution for N Ltd. and C Ltd.

(ii) Margin of safety in % for N Ltd. and C. Ltd.

(iii)Sales of C Ltd.

Note: Assume that PV ratio is 40%

SOLUTION:

(i) Calculation of Contribution

N Limited	C Limited
Financial Leverage (FL) $= \frac{EBIT}{EBT}$ or $\frac{EBIT}{EBIT - Interest}$	Financial Leverage (FL) $= \frac{EBIT}{EBT}$ or $\frac{EBIT}{EBIT - Interest}$
$2 = \frac{EBIT}{EBIT - ₹\,50,000}$	$1.5 = \frac{EBIT}{EBIT - ₹\,56,000}$
2 EBIT – ₹ 1,00,000 = EBIT	1.5 EBIT – ₹ 84,000 = EBIT
EBIT = ₹ 1,00,000	**EBIT = ₹ 1,68,000**
EBT = ₹ 50,000	EBT = ₹ 1,12,000
Combined Leverage (CL) = Contribution ÷ EBT	Combined Leverage (CL) = Contribution ÷ EBT
8 = Contribution ÷ 50,000	4.5 = Contribution ÷ 1,12,000
Contribution = ₹ 4,00,000	**Contribution = ₹ 5,04,000**

(ii) Calculation of Margin of safety (MOS) in %

$$MOS = \frac{\text{Contribution - Fixed Cost}}{\text{Contribution}} = \frac{\text{EBIT}}{\text{Contribution}}$$

N Limited	C Limited
MOS = ₹ 1,00,000 ÷ ₹ 4,00,000 = **25%**	MOS = ₹ 1,68,000 ÷ ₹ 5,04,000 = **33.33%**

Part (ii) can also be presented in following way:

Calculation of Margin of safety (MOS) in %

MOS = 1 ÷ operating leverage (OL)

OL = CL ÷ FL

N Limited	C Limited
OL = 8 ÷ 2 = 4 Times	OL = 4.5 ÷ 1.5 = 3 Times
MOS = 1 ÷ 4 = 25%	MOS = 1÷ 3 = 33.33%

(iii)Sales of C Limited

$$PV\ Ratio = \frac{\text{Contribution}}{\text{Sales}}\ \text{Or}\ Sales = \frac{\text{Contribution}}{\text{PV Ratio}}$$

$$Sales = \frac{₹\ 5,04,000}{0.40} = ₹\ 12,60,000$$

PROBLEM 10B: **(RTP MAY '24, JAN '25)**

From the following financial data of Company X and Company Y:

i. **PREPARE their Income Statements.**

ii. **CALCULATE Margin of Safety for both the Companies**

iii. **CALCULATE Percentage change in EPS for both the companies, if percentage change in sales is 25%**

(in ₹)

	Company X	Company Y
Variable Cost	72,000	65% of Sales
Fixed Cost	35,000	-
Interest Expenses	12,000	6,000
Financial Leverage	4:1	-
Operating Leverage	-	5:1
Income Tax Rate	30%	30%
Sales	-	1,45,000

SOLUTION:

i. **Income Statement**

Particulars	X	Workings	Y	Workings
	(₹)		(₹)	
Sales	1,23,000	VC + Contribution	1,45,000	Given
Less: VC	72,000	Given	94,250	Sales x 65%

Contribution	**51,000**	**EBIT + FC**	**50,750**	**Sales - VC**
Less: FC	35,000	Given	40,600	Contribution - EBIT
EBIT	**16,000**	**WN - 1**	**10,150**	**WN - 3**
Less: Interest	12,000	Given	6,000	Given
EBT	**4,000**	**WN - 1**	**4,150**	**EBIT - Interest**
Tax (30%)	1,200	EBT x 30%	1,245	EBT x 30%
EAT	**2,800**	**EBT - Tax Amount**	**2,905**	**EBT - Tax Amount**

WN 1: Calculation of EBIT for Co. X using Financial Leverage

Financial Leverage (FL)

$$\frac{EBIT}{EBT} \text{ or } \frac{EBIT}{EBIT - Interest}$$

$$4 = \frac{EBIT}{EBIT - ₹\ 12000} \Rightarrow 4\ (EBIT - ₹\ 12000) = EBIT \Rightarrow 4\ EBIT - ₹\ 48000 = EBIT$$

EBIT = ₹ 16000

EBT = ₹ 16,000 – ₹ 12,000 = ₹ 4,000

WN 2: Calculation of Contribution and Sales using reverse mechanism

Contribution = EBIT + Fixed Cost

= ₹ 16,000 + ₹ 35,000

Contribution = ₹ 51,000

Sales = Contribution + Variable Cost

Sales = ₹ 1,23,000

WN 3: Calculation of EBIT for Co. Y using Operating leverage

OL = Contribution ÷ EBIT

5 = ₹ 50,750 ÷ EBIT

EBIT = ₹ 10,150

(ii) Margin of Safety (MOS) is inversely proportionate to the Operating Leverage as higher the safety margin lower would be the business risk

MOS = 1 ÷ Operating Leverage

Operating Leverage (Co. X) = ₹ 51,000 ÷ ₹ 16,000

Operating Leverage (Co. X) = 3.1875: 1

Therefore, MOS for Co. X = 1÷ 3.1875

MOS for Co. X = 31.37%

Operating Leverage (Co. Y) = 5 : 1

Therefore, MOS for Co. Y = 1 ÷5

MOS for Co. Y = 20%

(iii) Combined leverage measures the percentage change in EPS due to percentage change in sales

Combined Leverage = Contribution ÷ EBT

Combined Leverage (Co. X) = ₹ 51,000 ÷ ₹ 4,000 = 12.75

Combined Leverage = % change in EPS ÷ % change in sales

12.75 = % change in EPS ÷ 25%

% change in EPS (Co. X) = 318.75%

Combined Leverage (Co. Y) = ₹ 50,750 ÷ ₹ 4,150

= ₹ 12.23

₹ 12.23 = % change in EPS ÷ 25%

% change in EPS (Co. Y) = 305.75%

PROBLEM 11:

A company had the following Balance Sheet at the end of the current Financial Year:

Liabilities	(₹) in crores	Assets	(₹) in crores
Equity Share Capital (50 lakhs shares of ₹ 10 each)	5	Fixed Assets (Net)	12.5
Reserves and Surplus	1	Current Assets	7.5
15% Debentures	10		
Current Liabilities	4		
	20		20

The additional information given is as under:

Fixed cost per annum (excluding interest)	₹ 4 crores
Variable operating cost ratio	65%
Total assets turnover ratio	2.5
Income Tax rate	30%

Required:

CALCULATE the following and comment:

i. **Earnings Per Share**
ii. **Operating Leverage**
iii. **Financial Leverage**
iv. **Combined Leverage**

SOLUTION:

Working Note: 1

Total Assets = ₹ 20 crores

Total Asset Turnover Ratio = 2.5

Hence, Total Sales = 20 x 2.5 = ₹ 50 crores

Computation of Profit after Tax (PAT)

Particulars	Amount (₹) in crores	Workings
Sales	50	WN - 1
Less: Variable Cost	32.5	Sales x Variable Cost Ratio
Contribution	**17.5**	**Sales - Variable Cost**
Less: Fixed Cost	4	Given
EBIT	**13.5**	**Contribution - Fixed Cost**
Less: Interest @ 10%	1.5	Debtentures x 15%

EBT	**12**	**EBIT - Interest**
Less: Tax@ 30%	3.6	EBT X 30%
EAT	**8.4**	**EBT - Tax Amount**

(i) Earnings per Share

$$EPS = \frac{PAT}{\text{Number of Equity Shares}} = \frac{₹\,8.40 crores}{50,00,000} = ₹\,16.80$$

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

(ii) Operating Leverage

$$\text{Operating Leverage} = \frac{\text{Contribution}}{EBIT} = \frac{₹\,17.50 crores}{₹\,13.50 crores} = 1.296 \text{ times}$$

It indicates the choice of technology and fixed cost in cost structure. It is level specific. When firm operates beyond operating break-even level, then operating leverage is low. It indicates sensitivity of earnings before interest and tax (EBIT) to change in sales at a particular level.

(iii)Financial Leverage

$$\text{Financial Leverage} = \frac{EBIT}{PBT} = \frac{₹\,13.50 crores}{₹\,12.00 crores} = 1.125 \text{ Times}$$

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

(iv)Combined Leverage

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

$$= \text{Operating Leverage} \times \text{Financial Leverage}$$

$$= 1.296 \times 1.125 = 1.458 \text{ Times}$$

The combined leverage studies the choice of fixed cost in cost structure and choice of debt in capital structure. It studies how sensitive the change in EPS is vis-à-vis change in sales. The leverages, operating, financial and combined are used as measurement of risk.

PROBLEM 12:

The following details of a company for the year ended 31st March are given below:

Operating leverage	**2:1**
Combined leverage	**2.5:1**
Fixed Cost excluding interest	**₹ 3.4 lakhs**
Sales	**₹ 50 lakhs**
8% Debentures of ₹ 100 each	**₹ 30.25 lakhs**
Equity Share Capital of ₹ 10 each	**34 lakhs**

Income Tax Rate	30%

CALCULATE:

1. **Financial Leverage**
2. **P/V ratio and Earning per Share (EPS)**
3. **If the company belongs to an industry, whose assets turnover is 1.5, does it have a high or low assets turnover?**
4. **At what level of sales, the Earning before Tax (EBT) of the company will be equal to zero?**

SOLUTION:

i. Financial leverage

Combined Leverage = Operating Leverage (OL) x Financial Leverage (FL)

2.5 = 2 x FL

$\Rightarrow$ FL = 1.25

Financial Leverage = 1.25 Times

ii. P/V Ratio and Earning per share (EPS)

$$\text{Operating leverage} = \frac{\text{Contribution}(C)}{\text{Contribution - Fixed Cost (FC)}}$$

$$2 = \frac{C}{C - ₹\,3,40,000}$$

$$\Rightarrow C = 2\,(C - ₹\,3,40,000)$$

$$\Rightarrow C = 2C - ₹\,6,80,000$$

$$\Rightarrow \text{Contribution} = ₹\,6,80,000$$

$$\text{Now, P/V ratio} = \frac{\text{Contribution}(C)}{\text{Sales}(S)} \times 100$$

$$= \frac{₹\,6,80,000}{₹\,50,00,000} \times 100 = 13.6\%$$

Therefore, P/V Ratio = 13.6%

EBT = Sales – Variable Cost – Fixed Cost – Interest

= ₹ 50,00,000 – ₹ 50,00,000 (1 - 0.136) – ₹ 3,40,000 – (8% × ₹ 30,25,000)

= ₹ 50,00,000 – ₹ 43,20,000 – ₹ 3,40,000 – ₹ 2,42,000

= ₹ 98,000

PAT = EBT (1-Tax rate) = ₹ 98,000(1-0.3) = ₹ 68,600

$$\text{EPS} = \frac{\text{Profit after tax}}{\text{No. of equity shares}}$$

$$\text{EPS} = \frac{₹\,68,600}{3,40,000 \text{shares}} = ₹\,0.202$$

iii. Assets turnover

$$\text{Assets turnover} = \frac{\text{Sales}}{\text{TotalAssets*}}$$

$$= \frac{₹\ .50,00,000}{₹\ 34,00,000 + ₹\ 30,25,000} = 0.78$$

0.78 < 1.5 means lower than industry turnover.

*Total Asset = Equity share capital + 8% Debentures

iv. EBT zero means 100% reduction in EBT. Since combined leverage is 2.5, sales have to be dropped by 100 ÷ 2.5 = 40%. Hence new sales will be ₹ 50,00,000 x (100 – 40) %
= ₹ 30,00,000.
Therefore, at ₹ 30,00,000 level of sales, the Earnings before Tax (EBT) of the company will be zero.

Alternatively

$$\text{Required sales when EBT is zero} = \frac{\text{FixedCost} + \text{Interest} + \text{desired Profit}}{\text{P/V Ratio}}$$

$$= \frac{₹\ 3,40,000 + ₹\ 2,42,000 + 0}{13.60\%}$$

$$= \frac{₹\ 5,82,000}{13.60\%}$$

$$= ₹\ 42,79,412$$

[**Note:** The question can also be solved by first calculating EBIT with the help of Financial Leverage. Accordingly, answer to the requirement (ii) and (iv) will also vary]

PROBLEM 12A:

Consider the following information for Mega Ltd.:

Production level	**2,500 units**
Contribution per unit	**₹ 150**
Operating leverage	**6**
Combined leverage	**24**
Tax rate	**30%**

Required:

COMPUTE its earnings after tax.

SOLUTION:

Workings:

$$\text{Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}}$$

$$= \frac{₹\ 150 \times 2,500}{\text{EBIT}} = \frac{₹\ 3,75,000}{\text{EBIT}} = 6 \text{ times}$$

$$\therefore \text{EBIT} = \frac{₹\ 3,75,000}{6} = ₹\ 62,500$$

Operating Leverage (OL) x Financial Leverage (FL) = Combined Leverage (CL)

6 x Financial Leverage = 24

∴ Financial Leverage = 4

Also, Financial Leverage = $\frac{EBIT}{EBT}$ = 4 times

∴ EBT = $\frac{EBIT}{4}$ = $\frac{₹\,62,500}{4}$ = ₹ 15,625

Computation of Earnings after tax

Earnings after Tax (EAT) = EBT (1 – t)

= ₹ 15,625 (1 – 0.30) = ₹ 15,625 x 0.70

∴ Earnings after Tax (EAT) = ₹ 10,938

PROBLEM 12B:

The following data have been extracted from the books of LM Ltd:

Sales - ₹ 100 lakhs

Interest Payable per annum - ₹ 10 lakhs

Operating leverage - 1.2

Combined leverage - 2.16

You are required to calculate:

i. The financial leverage,

ii. Fixed cost and

iii. P/V ratio

SOLUTION:

i) Calculation of Financial Leverage:

Combined Leverage (CL) = Operating Leverage (OL) x Financial Leverage (FL)

2.16 = 1.2 x FL

FL = 1.8 Times

ii) Calculation of Fixed cost:

Financial Leverage = $\frac{EBIT}{EBIT - Interest}$

1.8 = $\frac{EBIT}{EBIT - ₹\,10,00,000}$

1.8 (EBIT – ₹ 10,00,000) = EBIT

1.8 EBIT - ₹ 18,00,000 = EBIT

EBIT = $\frac{₹\,18,00,000}{0.8}$

= ₹ 22,50,000

Further, Operating Leverage = $\frac{Contribution}{EBIT}$

1.2 = $\frac{Contribution}{₹\,22,50,000}$

Contribution = ₹ 27,00,000

Fixed Cost = Contribution – EBIT

= ₹ 27,00,000 – ₹ 22,50,000

Fixed cost = ₹ 4,50,000

(iii) Calculation of P/V ratio:

$$\text{P/V ratio} = \frac{\text{Contribution } (C)}{\text{Sales } (S)} \times 100 = \frac{₹\,27,00,000}{₹\,100,00,000} \times 100 = 27\%$$

PROBLEM 12C:

The following information is related to Yizi Company Ltd. for the current Financial Year:

Equity shares capital (of ₹ 10 each)	**₹ 50 lakhs**
12% Bonds of ₹ 1,000 each	**₹ 37 lakhs**
Sales	**₹ 84 lakhs**
Fixed cost (excluding interest)	**₹ 6.96 lakhs**
Financial leverage	**1.49**
Profit-volume Ratio	**27.55%**
Income Tax Applicable	**40%**

You are required to CALCULATE:

i. Operating Leverage;

ii. Combined leverage; and

iii. Earnings per share.

Show calculations up-to two decimal points.

SOLUTION:

Computation of Profits after Tax (PAT)

Particulars	Amount (₹)	Workings
Sales	84,00,000.00	Given
Less: Variable Cost	60,85,800.00	Sales - Contribution
Contribution	**23,14,200.00**	**Sales x PV Ratio**
Less: Fixed Cost	6,96,000.00	Given
EBIT	**16,18,200.00**	**Contribution - Fixed Cost**
Less: Interest	4,44,000.00	(12% x ₹ 37 lakhs)
Less: Other Interest	88,160.00	Balancing Figure *
EBT	**10,86,040.00**	**EBIT – Interest – Other Interest**
Tax (40%)	4,34,416.00	EBT x 40%
EAT	**6,51,624.00**	**EBT - Tax Amount**

Operating Leverage:

$$= \frac{\text{Contribution}}{\text{EBIT}} = \frac{₹\,23,14,000}{₹\,16,18,200} = 1.43 \text{ times}$$

Combined Leverage:

= Operating Leverage × Financial Leverage

= 1.43 x 1.49 = 2.13

Or,

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

$$\text{Combined Leverage} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{₹\,23,14,000}{₹\,10,86,040} = 2.13$$

$$*\text{Financial Leverage} = \frac{\text{EBIT}}{\text{EBT}} = \frac{₹\,16,18,200}{\text{EBT}} = 1.49$$

$$\text{So, EBT} = \frac{₹\,16,18,200}{1.49} = ₹\,10,86,040$$

Accordingly, other fixed interest = ₹ 16,18,200 - ₹ 10,86,040 - ₹ 4,44,000

= ₹ 88,160

Earnings per share (EPS):

$$= \frac{\text{PAT}}{\text{No. of shares outstanding}} = \frac{₹\,6,51,624}{5,00,000 \text{ equity shares}} = ₹\,1.30$$

PROBLEM 13:

The Sale revenue of TM excellence Ltd. @ ₹ 20 Per unit of output is ₹ 20 lakhs and Contribution is ₹ 10 lakhs. At the present level of output, the DOL of the company is 2.5. The company does not have any Preference Shares. The number of Equity Shares are 1 lakh. Applicable corporate Income Tax rate is 50% and the rate of interest on Debt Capital is 16% p.a. CALCULATE the EPS (at sales revenue of ₹ 20 lakhs) and amount of Debt Capital of the company if a 25% decline in Sales will wipe out EPS.

SOLUTION:

(i) Calculation of Fixed Cost

$$\text{DOL} = \frac{\text{Contribution}}{\text{Contribution - Fixed Cost}} \text{ or } 2.5 = \frac{₹\,10,00,000}{\text{EBIT}} \text{ or EBIT} = ₹\,4,00,000$$

EBIT = Contribution – Fixed Cost

₹ 4,00,000 = ₹ 10,00,000 – Fixed Cost

Fixed Cost = ₹ 10,00,000 - ₹ 4,00,000 = ₹ 6,00,000

(ii) Calculation of Degree of Combined Leverage (DCL)

Question says that 25% change in sales will wipe out EPS. Here, wipe out means it will reduce EPS by 100%.

$$\text{DCL} = \frac{\text{Percentage Change in EPS}}{\text{Percentage Change in Sales}} = \frac{100\%}{25\%} = 4 \text{ times}$$

(iii)Calculation of Degree of Financial Leverage (DFL)

DCL = DOL x DFL

4 = 2.5 x DFL

So, DFL = 1.6 Times

(iv) Calculation of Interest and amount of Debt

$$DFL = \frac{EBIT}{EBIT - Int} \text{ or } 1.6 = \frac{₹\,4,00,000}{₹\,4,00,000 - Int} \text{ or } Int = 1,50,000$$

Debt x Interest rate = Amount of Interest

Debt x 16% = ₹ 1,50,000

Debt = ₹ 9,37,500

(v) Calculation of Earnings per share (EPS)

$$EPS = \frac{(EBIT - Int)(1 - t)}{N} = \frac{(₹\,4,00,000 - ₹\,1,50,000) \times 0.5}{1,00,000} = ₹\,1.25$$

PROBLEM 14:

Find out of financial leverage from the following data:

Net Worth ₹ 25,00,000; Debt/Equity 3:1; Interest rate 12%; Operating Profit ₹ 20,00,000

SOLUTION:

Net worth = ₹ 25,00,000

Debt equity = 3: 1

$$\therefore \text{ Debt} = ₹\,25,00,000 \times \frac{3}{1} = ₹\,75,00,000$$

Interest = ₹ 75,00,000 x 12% = ₹ 9,00,000

EBIT = ₹ 20,00,000

Int = ₹ 9,00,000

EBT (EBIT – Interest) = ₹ 11,00,000

$$FL = \frac{20}{11} = 1.82 \text{ Times}$$

PROBLEM 15:

The following particulars relating to Navya Ltd. for the year ended 31 st March is given:

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

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

Particulars	**₹**
Equity shares capital (1,00,000 shares of ₹ 10 each)	**10,00,000**
Reserves and surplus	**5,00,000**
7% debentures	**10,00,000**

Current liabilities	5,00,000
Total	30,00,000

Navya Ltd. has decided to undertake an expansion project to use the market potential, that will involve ₹ 10 lakhs. The company expects an increase in output by 50%. Fixed cost will be increased by ₹ 5,00,000 and variable cost per unit will be decreased by 10%. The additional output can be sold at the existing selling price without any adverse impact on the market.

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

i. Entirely by equity shares of ₹ 10 each at par.
ii. ₹ 5 lakh by issue of equity shares of ₹ 10 each and the balance by issue of 6% debentures of ₹ 100 each at par.
iii. Entirely by 6% debentures of ₹ 100 each at par.

Find out which of the above-mentioned alternatives would you recommend for Navya Ltd. with reference to the risk and return involved, assuming a corporate tax of 40%.

SOLUTION:

Statement showing Profitability of Alternative Schemes for Financing

(₹ in '00,000)

Particulars	Existing	Alternative Schemes		
		(i)	(ii)	(iii)
Equity Share capital Existing (Given)	10	10	10	10
New issues (Given)	-	10	5	-
Total (Existing + New Issues)	**10**	**20**	**15**	**10**
7% debentures (Given)	10	10	10	10
6% debentures (Given)	-	-	5	10
Total (Equity + Debentures)	**20**	**30**	**30**	**30**
Debenture interest (10 x 7%)	0.7	0.7	0.7	0.7
Debenture interest (6%)	-	-	0.3 (5 x 6%)	0.6 (10 x 6%)
Total Debenture Interest (7% + 6%)	**0.7**	**0.7**	**1.0** (0.7 + 0.3)	**1.3** (0.7 + 0.6)
Output (units in lakh)	1	1.5	1.5	1.5
Contribution per unit (₹) (Selling price - Variable Cost)	20 (40 - 20)	22 (40 – 18)	22 (40 - 18)	22 (40 - 18)
Contribution (₹ lakh)	**20**	**33**	**33**	**33**
Less: Fixed cost	10 (Given)	15 (10 + 5)	15 (10 + 5)	15 (10 + 5)
EBIT (Contribution - Fixed Cost)	**10**	**18**	**18**	**18**
Less: Interest (as calculated above)	0.7	0.7	1.0	1.3
EBT (EBIT – Interest)	**9.3**	**17.3**	**17**	**16.7**

Less: Tax (40%)	3.72	6.92	6.8	6.68
EAT (EBT - Tax Amount)	**5.58**	**10.38**	**10.20**	**10.02**
Operating Leverage (Contribution ÷ EBIT)	2.00	1.83	1.83	1.83
Financial Leverage (EBIT ÷ EBT)	1.08	1.04	1.06	1.08
Combined Leverage (Contribution ÷ EBT)	2.15	1.91	1.94	1.98
EPS (EAT ÷ No. of shares) (₹)	5.58	5.19	6.80	10.02
Risk	**-**	**Lowest**	**Lower than option (3)**	**Highest**
Return	**-**	**Lowest**	**Lower than option (3)**	**Highest**

From the above figures, we can see that the Operating Leverage is same in all alternatives though Financial Leverage differ Alternative (iii) uses the maximum amount of debt and result into the highest degree of financial leverage, followed by alternative (ii). Accordingly, risk of the company will be maximum in these options. Corresponding to this scheme, however, maximum EPS (i.e., ₹ 10.02 per share) will be also in option (iii).

So, if Navya Ltd. is ready to take a high degree of risk, then alternative (iii) is strongly recommended. In case of opting for less risk, alternative (ii) is the next best option with a reduced EPS of ₹ 6.80 per share. In case of alternative (i), EPS is even lower than the existing option, hence not recommended.

Multiple Choice Questions

1. Given

Operating fixed costs	Rs. 20,000
Sales	Rs. 1,00,000
P/ V ratio	40%

The operating leverage is:

a. 2.00

b. 2.50

c. 2.67

d. 2.47

2. If EBIT is Rs. 15,00,000, interest is Rs. 2,50,000, corporate tax is 40%, degree of financial leverage is;

a. 1.11

b. 1.20

c. 1.31

d. 1.41

3. If DOL is 1.24 and DFL is 1.99, DCL would be:

a. 2.14

b. 2.18

c. 2.31

d. 2.47

4. Operating Leverage is calculated as:

a. Contribution ÷ EBIT

b. EBIT ÷ PBT

c. EBIT ÷ Interest

d. EBIT ÷ Tax

5. Financial Leverage is calculated as:

a. EBIT ÷ Contribution

b. EBIT ÷ PBT

c. EBIT ÷ Sales

d. EBIT ÷ Variables Cost

6. **Which of the following is correct?**
   a. CL = OL + FL
   b. CL = OL – FL
   c. CL = OL × FL
   d. OL = OL ÷ FL

7. **Which of the following indicates business risk?**
   a. Operating leverage
   b. Financial leverage
   c. Combined leverage
   d. Total leverage

8. **Degree of combined leverage is the fraction of:**
   a. Percentage change in EBIT on Percentage change in Sales.
   b. Percentage change in EPS on Percentage change in Sales.
   c. Percentage change in Sales on Percentage change in EPS.
   d. Percentage change in EPS on Percentage change in EBIT.

9. **From the following information, calculate combined leverage: Sales Rs. 20,00,000**

Variable Cost	**40%**
Fixed Cost	**Rs. 10,00,000**
Borrowings	**Rs. 10,00,000 @ 8% p.a.**

   a. 10 times
   b. 6 times
   c. 1.667 times
   d. 0.10 times

10. **Operating leverage is a function of which of the following factors?**
   a. Amount of variable cost.
   b. Variable contribution margin.
   c. Volume of purchases.
   d. Amount of semi-variable cost.

11. **Financial leverage may be defined as:**
    a. Use of funds with a product cost in order to increase earnings per share.
    b. Use of funds with a contribution cost in order to increase earnings before interest and taxes.
    c. Use of funds with a fixed cost in order to increase earnings per share.
    d. Use of funds with a fixed cost in order to increase earnings before interest and taxes.

12. **If Margin of Safety is 0.25 and there is 8% increase in output, then EBIT will be:**
    a. Decrease by 2%
    b. Increase by 32%
    c. Increase by 2%
    d. Decrease by 32%

13. **If degree of financial leverage is 3 and there is 15% increase in Earning per share (EPS), then EBIT will be:**
    a. Decrease by 15%
    b. Increase by 45%
    c. Decrease by 45%
    d. Increase by 5%

14. **When EBIT is much higher than Financial break-even point, then degree of financial leverage will be slightly:**
    a. Less than 1
    b. Equals to 1
    c. More than 1
    d. Equals to 0

15. **Firm with high operating leverage will have:**
    a. Higher breakeven point
    b. Lower business risk
    c. Higher margin of safety
    d. All of above

16. When sales are at breakeven point, the degree of operating leverage will be:

a. Zero

b. Infinite

c. One

d. None of above

17. If degree of combined leverage is 3 and margin of safety is 0.50, then degree of financial leverage is:

a. 6.00

b. 3.00

c. 0.50

d. 1.50

Answers to the MCQs

1.	(a)	2.	(b)	3.	(d)	4.	(a)	5.	(b)	6.	(c)
7.	(a)	8.	(b)	9.	(a)	10.	(b)	11.	(c)	12.	(b)
13.	(d)	14.	(c)	15.	(a)	16.	(b)	17.	(d)		

Case Scenarios

BEST Limited, a prominent company in semi-conductors' industry, aims to understand the impact of operating and combined leverage on its financial performance for the year ended 31st March 2024. By examining the provided financial details, the company seeks to make informed decisions regarding its cost structure and financing mix.

BEST Limited is a well-established firm known for its products in the market.

With a focus on innovation and customer satisfaction, the company has achieved significant growth and success over the years.

Financial Analysis: For the financial year ending 31st March 2024, BEST Limited provides the following financial details:

- Fixed Cost (Excluding interest): ₹2,040 Lakhs
- Sales: ₹30,000 Lakhs
- 12% Debentures of ₹100 each: ₹21,250 Lakhs
- Equity Share Capital of ₹10 each: ₹17,000 Lakhs
- Income tax rate: 30%

Mr. Pallav Kumar, an Executive Director from engineering background discussed following analysis with CA Nagarjuna, Additional Director – Finance of the company:

1. Operating Leverage: Operating leverage, which is currently at 1.4, measures the impact of fixed costs on the company's operating income.
2. Combined Leverage: Combined leverage considers both operating and financial leverage. It is calculated as the product of operating leverage and financial leverage. And company's combined leverage is 2.8.

CA Nagarjuna explained to Mr. Pallav that the Finance department is already analysing the various leverages like Operating Leverage, Financial Leverage and Combined Leverage. Due to these, BEST Limited gains insights into its cost structure and financial risk. These information enables the company to make strategic decisions regarding its operating expenses, financing options, and overall business strategy. Continuous monitoring and evaluation of leverage ratios will be essential for BEST Limited to maintain financial stability and drive sustainable growth in the competitive market landscape.

Calculate the ratios to understand the financial health of BEST Ltd and CA Nagarjuna can submit his report to Mr. Pallav Kumar.

1. Calculate the Financial Leverage.
   a. 0.5
   b. 2

c. 3.92

d. 4

2. **Calculate the Profit Volume Ratio.**

a. 47.60%

b. 15.86%

c. 23.8%

d. 17.43%

3. **Calculate the Earnings Per Share.**

a. ₹ 1.5

b. ₹ 1.05

c. ₹ 4.2

d. ₹ 2.1

4. **Calculate the Asset Turnover ratio of BEST Ltd.**

a. 1

b. 0.5

c. 0.784

d. 1.41

5. **Calculate the minimum level of Sales which must be attained to at least pay finance cost of BEST Ltd.**

a. ₹19,286 Lakhs

b. ₹8,574 Lakhs

c. ₹24,000 Lakhs

d. ₹27,000 Lakhs

Answers to the Case Scenarios

1.	(b)	**2.**	(c)	**3.**	(b)	**4.**	(c)	**5.**	(a)

(i) Financial leverage

Combined Leverage = Operating Leverage (OL) × Financial Leverage (FL)

2.8 = 1.4 × FL

FL = 2

Financial Leverage = 2

(ii) P/V Ratio

$$\text{P/V ratio} = \frac{\text{Contribution (c)}}{\text{Sales (S)}} \times 100$$

$$\text{Operating Leverage} = \frac{C}{C - \text{Fixed Cost (FC)}}$$

$$1.4 = \frac{C}{C - 2040}$$

$$1.4\,(C - 2{,}040) = C$$

$$1.4\,C - 2{,}856 = C$$

$$C = \frac{2{,}856}{0.4}$$

$$C = ₹\ 7{,}140 \text{ Lakhs}$$

$$\text{P/V} = \frac{7{,}140}{30{,}000} \times 100 = 23.8$$

Therefore, P/V Ratio = 23.8%

(iii) EPS

$$\text{EPS} = \frac{\text{Profit after tax}}{\text{No. of equity shares}}$$

EBT = C – FC – Interest

= 7140 – 2,040 – 2,550

= ₹ 2,550 Lakhs

PAT = EBT – Tax

= 2,550 – 765 = ₹ 1,785 Lakhs

$$\text{EPS} = \frac{1{,}785}{1{,}700} = 1.05$$

(iv) Assets turnover

$$\text{Assets turnover} = \frac{\text{Sales}}{\text{Total Assets}} = \frac{30{,}000}{38{,}250} = 0.784$$

Total Assets = Debt + Equity = ₹ 21,250 Lakhs + ₹ 17,000 Lakhs

= ₹ 38,250 Lakhs

(v) The minimum level of Sales which must be attained to at least pay finance cost of BEST Ltd. EBT zero means 100% reduction in EBT. Since the combined leverage is 2.8, sales will be dropped by 100/2.8=35.714%. Hence new sales will be;

₹ 30,000 Lakhs × (100 – 35.714) = ₹ 19,286 Lakhs.

Therefore, at ₹ 19,286 Lakhs level of sales, the Earnings before Tax of the company will be equal to zero.

CHAPTER 04: CAPITAL STRUCTURE

PROBLEM – 1

Calculate the level of earnings before interest and tax (EBIT) at which the EPS indifference point between the following financing alternatives will occur.

i. **Equity shares capital of ₹ 6,00,000 & 12% debentures of ₹ 4,00,000 Or**

ii. **Equity share capital of ₹ 4,00,000,14% preference share capital of ₹ 2,00,000 & 12% debentures of ₹ 4,00,000. Assume the tax rate is 35% & par value of the equity share is ₹ 10 in each case.**

SOLUTION:

Financial plans

Plan – 1	Plan – 2
ESC = ₹ 6,00,000	ESC = ₹ 4,00,000
12% Deb = ₹ 4,00,000	14% PSC = ₹ 2,00,000
₹ 10,00,000	12% Deb = ₹ 4,00,000
	₹ 10,00,000

$$EPS\ (P-1) = \frac{(EBIT - ₹\ 48,000)(1 - 0.35)}{60,000}$$

$$EPS\ (P-2) = \frac{(EBIT - ₹\ 48,000)(1 - 0.35) - ₹\ 28,000}{40,000}$$

$$= \frac{(EBIT - ₹\ 48,000)(1 - 0.35)}{60,000} = \frac{(EBIT - ₹\ 48,000)(1 - 0.65) - ₹28,000}{40,000}$$

$0.65EBIT - ₹\ 31,200 = 0.65\ EBIT - ₹\ 31200 - ₹\ 28000$

$2.6\ EBIT - ₹\ 1,24,800 = 3.9\ EBIT - ₹\ 3,55,200$

$₹\ 230400 = 1.3\ EBIT$

$EBIT = ₹\ 1,77,231$

PROBLEM – 1A **(Concept Similar to Problem – 1)**

Ganesha Limited is setting up a project with a capital outlay of ₹ 60,00,000. It has two alternatives in financing the project cost.

Alternative-I: 100% equity finance by issuing equity shares of ₹ 10 each

Alternative-II: Debt-equity ratio 2:1 (issuing equity shares of ₹ 10 each)

The rate of interest payable on the debts is 18% p.a. The corporate tax rate is 40%. CALCULATE the indifference point between the two alternative methods of financing.

SOLUTION:

Calculation of Indifference point between the two alternatives of financing

Alternative-I By issue of 6,00,000 equity shares of ₹ 10 each amounting to ₹ 60 lakhs. No financial charges are involved.

Alternative-II By raising the funds in the following way:

Debt = ₹ 40 lakhs

Equity = ₹ 20 lakhs (2,00,000 equity shares of ₹ 10 each)

Interest payable on debt = ₹ 40,00,000 × $\frac{18}{100}$ = ₹ 7,20,000

The difference point between the two alternatives is calculated by:

$$\frac{(EBIT - I_1)(1 - T)}{E_1} = \frac{(EBIT - I_2)(1 - T)}{E_2}$$

Where,

EBIT = Earnings before interest and taxes

I1 = Interest charges in Alternative - I

I2 = Interest charges in Alternative - II

T = Tax rate

E_1 = Equity shares in Alternative - I

E_2 = Equity shares in Alternative - II

Putting the values, the break-even point would be as follows:

$$\frac{(EBIT - 0)(1 - 0.40)}{6,00,000} = \frac{(EBIT - ₹\ 7,20,000)(1 - 0.40)}{2,00,000}$$

$$\frac{(EBIT - 0)(0.60)}{6,00,000} = \frac{(EBIT - ₹\ 7,20,000)(0.60)}{2,00,000}$$

$$\frac{(EBIT - 0)(0.60)}{3} = \frac{(0.60)(EBIT - ₹\ 7,20,000)}{1}$$

EBIT = 3EBIT– ₹ 21,60,000

- 2 EBIT = – ₹ 21,60,000

$$EBIT = \frac{₹\ 21,60,000}{2}$$

EBIT = ₹ 10,80,000

Therefore, at EBIT of ₹ 10,80,000 earnings per share for the two alternatives is equal.

PROBLEM – 1B **(Concept Similar to Problem – 1)**

Alpha Limited requires funds amounting to ₹ 80 lakh for its new project. To raise the funds, the company has following two alternatives:

i. **To issue Equity Shares of ₹ 100 each (at par) amounting to ₹ 60 lakh and borrow the balance amount at the interest of 12% p.a., or**

ii. **To issue Equity Shares of ₹ 100 each (at par) and 12% Debentures in equal proportion.**

The Income-tax rate is 30%.
IDENTIFY the point of indifference between the available two modes of financing and state which option will be beneficial in different situations.

SOLUTION:

(i) Amount = ₹ 80,00,000

Plan I = Equity of ₹ 60,00,000 + Debt of ₹ 20,00,000

Plan II = Equity of ₹ 40,00,000 + 12% Debentures of ₹ 40,00,000

Plan I: Interest Payable on Loan

= 12% × ₹ 20,00,000 = ₹ 2,40,000

Plan II: Interest Payable on Debentures

= 12% × ₹ 40,00,000 = ₹ 4,80,000

Computation of Point of Indifference

$$\frac{(EBIT - I_1)(1-t)}{E_1} = \frac{(EBIT - I_2)(1-t)}{E_2}$$

$$\frac{(EBIT - ₹\ 2,40,000)(1-0.3)}{60,000} = \frac{(EBIT - ₹\ 4,80,000)(1-0.3)}{40,000}$$

2 (EBIT – ₹ 2,40,000) = 3 (EBIT – ₹ 4,80,000)

2 EBIT – ₹ 4,80,000 = 3 EBIT – ₹ 14,40,000

2 EBIT – 3 EBIT = - ₹ 14,40,000 + ₹ 4,80,000

EBIT = ₹ 9,60,000

(ii) Earnings per share (EPS) under Two Situations for both the Plans

Situation A (EBIT is assumed to be ₹ 9,50,000)		
Particulars	**Plan I (₹)**	**Plan II (₹)**
EBIT	9,50,000	9,50,000
Less: Interest @ 12%	(2,40,000)	(4,80,000)
EBT (EBIT – Interest)	**7,10,000**	**4,70,000**
Less: Taxes @ 30%	(2,13,000)	(1,41,000)
EAT (EBT – Tax)	**4,97,000**	**3,29,000**
No. of Equity Shares	60,000	40,000
EPS (EAT ÷ No of Equity Shares)	**8.28**	**8.23**

Comment: In Situation A, when expected EBIT is less than the EBIT at indifference point then, Plan I is more viable as it has higher EPS. The advantage of EPS would be available from the use of equity capital and not debt capital.

Situation B (EBIT is assumed to be ₹ 9,70,000)		
Particulars	**Plan I (₹)**	**Plan II (₹)**
EBIT	9,70,000	9,70,000
Less: Interest @ 12%	(2,40,000)	(4,80,000)

EBT (EBIT – Interest)	**7,30,000**	**4,90,000**
Less: Taxes @ 30%	(2,19,000)	(1,47,000)
EAT (EBT – Tax)	**5,11,000**	**3,43,000**
No. of Equity Shares	60,000	40,000
EPS (EAT ÷ No of Equity Shares)	**8.52**	**8.58**

Comment: In Situation B, when expected EBIT is more than the EBIT at indifference point then, Plan II is more viable as it has higher EPS. The use of fixed-cost source of funds would be beneficial from the EPS viewpoint. In this case, financial leverage would be favorable.

(Note: The problem can also be worked out assuming any other figure of EBIT which is more than ₹ 9,60,000 and any other figure less than ₹ 9,60,000. Alternatively, the answer may also be based on the factors/governing the capital structure like the cost, risk, control, etc. Principles).

PROBLEM – 1C **(MTP 2 SEPT 24 5M)**

X Ltd is willing to raise funds for its New Project which requires an investment of ₹ 84 Lakhs. The Company has two options:

Option I: To issue Equity Shares (₹ 10 each) only

Option II: To avail Term Loan at an interest rate of 12%. But in this case, as insisted by the Financing Agencies, the Company will have to maintain a Debt–Equity proportion of 2:1.

The Corporate Tax Rate is 30%. FIND out the point of indifference for the project.

SOLUTION:

Let the EBIT at the Indifference Point level be E

Particulars	**Alternative 1**	**Alternative 2**
Description	**Fully Equity of 84 Lakhs**	**Debt = 56 Lakhs, Equity = 28 Lakhs**
EBIT	E	E
Less: Interest at 12% of ₹ 56 Lakhs	Nil	₹ 6.72
EBT (EBIT – Interest)	**E**	**E – ₹ 6.72**
Less: Tax at 30%	0.3 E	0.3 E – ₹ 2.016
EAT (EBT – Tax)	**0.7 E**	**0.7 E – ₹ 4.704**
Less: Preference Dividend	Nil	Nil
Residual Earnings	0.7 E	0.7 E – ₹ 4.704
No. of Equity Shares (Face Value ₹ 10)	8.4 Lakh Shares	2.8 Lakh Shares
EPS = Residual Earnings / No. of Equity Shares	**0.7 E / 8.4 Lakh Shares**	**0.7 E – ₹ 4.704 / 2.8 Lakh Shares**

For indifference between the above alternatives, EPS should be equal.

So, 0.7 E / 8.4 Lakh Shares = 0.7 E - 4.704 / 2.8 Lakh Shares

On cross multiplication and simplification, 2.1 E – 14.112 = 0.7 E. So,

1.4 E = 14.112

So, E = 14.112 ÷ 1.4 = 10.08

So, for same EPS, required EBIT = ₹ 10.08 Lakhs. EPS at that level = ₹ 0.84

Note: Presentation of solution may differ.

PROBLEM – 2

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. The 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 – Preference Dividend

Preference Dividend = ₹ 3,36,000 – ₹ 3,02,400 = ₹ 33,600

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

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

PROBLEM – 3

Yoyo Limited presently has ₹ 36,00,000 in debt outstanding bearing an interest rate of 10 per cent. It wishes to finance a ₹ 40,00,000 expansion programme and is considering three alternatives:

1. **Additional debt at 12 per cent interest,**
2. **Preference shares with an 11% dividend**
3. **The issue of equity shares at ₹ 16 per share.**

The company has 8,00,000 shares outstanding and is in the 40 per cent tax bracket.

a. **If earnings before interest and taxes are presently ₹ 15,00,000, what would be earnings per share for the three alternatives, assuming no immediate increase in profitability?**

b. Analyse which alternative do you prefer. Compute How much would EBIT need to increase before the next alternative would be best?

SOLUTION:

Part 1 Calculation of EPS under 3 alternatives:

Particulars	Alternatives		
	Alternative - I: Take additional Debt	**Alternative- II: Issue 11% Preference Shares**	**Alternative - III: Issue further Equity Shares**
	(₹)	**(₹)**	**(₹)**
EBIT	15,00,000	15,00,000	15,00,000
Less: Interest on Debts:			
- on existing debt @10%	(3,60,000)	(3,60,000)	(3,60,000)
- on new debt @ 12%	(4,80,000)	---	---
Profit before taxes	**6,60,000**	**11,40,000**	**11,40,000**
Less: Taxes @ 40%	(2,64,000)	(4,56,000)	(4,56,000)
Profit after taxes	**3,96,000**	**6,84,000**	**6,84,000**
Less: Preference shares dividend	---	(4,40,000)	---
Earnings available to equity Shareholders	**3,96,000**	**2,44,000**	**6,84,000**
Number of shares	8,00,000	8,00,000	10,50,000
Earnings per share	**0.495**	**0.305**	**0.651**

Part 2 For the present EBIT level equity shares are clearly preferable. EBIT would need to increase by ₹ 2376 – ₹ 1500 = ₹ 876 before an indifference point with debt is reached. One would want to be comfortably above this indifference point before a strong case for debt should be made. The lower the profitability that actual EBIT will fall below the indifference point the stronger the case that can be made for debt all other things remain the same.

WN:

Calculation of indifference point between debt and equity shares (₹ in thousands)

(EBIT – ₹840) ÷ 800 = (EBIT – ₹360) ÷ 1050

(EBIT x 1050) – (₹840 x 1050) = EBIT (800) – (₹360 x 800)

250 EBIT = ₹ 594000

EBIT = ₹ 2376

PROBLEM – 4

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

a. Total investment to be raised ₹ 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)
Earnings available for Equity shareholders (A)	**40,000**	**36,000**	**32,000**
No. of Equity shares (B)	10,000 (₹ 2 lakh ÷ ₹ 20)	5,000 (₹ 1 lakh ÷ ₹ 20)	5,000 (₹ 1 lakh ÷ ₹ 20)
EPS [(A) ÷ (B)]	**4**	**7.20**	**6.40**

(ii) Calculation of Financial Break-even point

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

Plan A:	Under this plan there is no interest or preference dividend payment hence, the Financial Break-even point will be zero.
Plan B:	Under this plan there is an interest payment of ₹ 8,000 and no preference dividend, hence, the Financial Break-even point will be ₹ 8,000 (Interest charges).
Plan C:	Under this plan there is no interest payment but an after-tax preference

	dividend of ₹ 8,000 is paid. Hence, the Financial Break- even point will be before tax earnings of ₹ 16,000 (i.e. ₹ 8,000 ÷ (1 - 0.5) = ₹ 16,000)

(iii)Computation of indifference point between the plans

The indifference between two alternative methods of financing is calculated by applying the following formula:

$$\frac{(EBIT - I_1)(1 - T)}{E_1} = \frac{(EBIT - I_2)(1 - T)}{E_2}$$

i. Indifference point where EBIT of Plan A and Plan B is equal.

$$\frac{(EBIT - 0)(1 - 0.5)}{10,000} = \frac{(EBIT - ₹\ 8,000)(1 - 0.5)}{5,000}$$

0.5 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.

$$\frac{(EBIT - 0)(1 - 0.5)}{10,000} = \frac{(EBIT - 0)(1 - 0.5) - ₹8,000}{5,000}$$

$$\frac{0.5\,EBIT}{10,000} = \frac{0.5\,EBIT - ₹\ 8,000}{5,000}$$

0.5 EBIT = 2 (0.5 EBIT) - ₹ 16000

0.5 EBIT = EBIT - ₹ 16000

EBIT = ₹ 32,000

iii. Indifference point where EBIT of Plan B and Plan C are equal.

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.

PROBLEM – 5

Best of Luck Ltd., a profit-making company, has a paid-up capital of ₹ 100 lakhs consisting of 10 lakhs ordinary shares of ₹ 10 each. Currently, it is earning an annual pre-tax profit of ₹ 60 lakhs. The company's shares are listed and are quoted in the range of ₹ 50 to ₹ 80. The management wants to diversify production and has approved a project which will cost ₹ 50 lakhs and which is expected to yield a pre-tax income of ₹ 40 lakhs per annum. To raise this additional capital, the following options are under consideration of the management:

a. To issue equity share capital for the entire additional amount. It is expected that the new shares (face value of ₹ 10) can be sold at a premium of ₹ 15.
b. To issue 16% non-convertible debentures of ₹ 100 each for the entire amount.
c. To issue equity capital for ₹ 25 lakhs (face value of ₹ 10) and 16% non- convertible debentures for the balance amount. In this case, the company can issue shares at a premium of ₹ 40 each.

ADVISE which option is the most suitable to raise the additional capital, keeping in mind that the management wants to maximize the earnings per share to maintain its goodwill. The company is paying income tax at 50%.

SOLUTION:

Calculation of Earnings per share under the three options:

Particulars	Options		
	Option I: Issue Equity shares only	Option II: Issue 16% Debentures only	Option III: Issue Equity Shares and 16% Debentures of equal amount
Number of Equity Shares			
- Existing	10,00,000	10,00,000	10,00,000
- Newly issued	2,00,000 (₹ 50,00,000 / ₹ (10 + 15))	---	50,000 (₹ 25,00,000 / ₹ (10 + 40))
Total	**12,00,000**	**10,00,000**	**10,50,000**
16% Debentures (₹)	---	50,00,000	25,00,000

	₹	₹	₹
Profit Before Interest and Tax:			
- Existing pre-tax profit	60,00,000	60,00,000	60,00,000
- From new projects	40,00,000	40,00,000	40,00,000
	1,00,00,000	1,00,00,000	1,00,00,000
Less: Interest on 16% Debentures	---	8,00,000 (16% × ₹50,00,000)	4,00,000 (16% on ₹ 25 Lakhs)
Profit Before Tax	**1,00,00,000**	**92,00,000**	**96,00,000**
Less: Tax at 50%	50,00,000	46,00,000	48,00,000
Profit After Tax	50,00,000	46,00,000	48,00,000
Earnings Per Share (EPS) (PAT ÷ No of Shares)	4.17 (₹ 50,00,000 / 12,00,000)	4.60 (₹ 46,00,000 / 10,00,000)	4.57 (₹ 48,00,000 / 10,50,000)

Advise: Option II i.e., issue of 16% Debentures is most suitable to maximize the earnings per share.

PROBLEM – 5A

Suppose that a firm has an all equity capital structure consisting of 1,00,000 ordinary shares of ₹ 10 per share. The firm wants to raise ₹ 2,50,000 to finance its investments and is considering three alternative methods of financing –

(i) to issue 25,000 ordinary shares at ₹ 10 each,

(ii) to borrow ₹ 2,50,000 at 8 per cent rate of interest,

(iii) to issue 2,500 preference shares of ₹ 100 each at an 8 per cent rate of dividend. If the firm's earnings before interest and taxes after additional investment are ₹ 3,12,500 and the tax rate is 50 per cent, FIND the effect on the earnings per share under the three financing alternatives.

SOLUTION:

EPS under alternative financing plans:

Particulars	Equity Financing (₹)	Debt Financing (₹)	Preference Financing (₹)
EBIT	3,12,500	3,12,500	3,12,500
Less: Interest	0	20,000	0
PBT	**3,12,500**	**2,92,500**	**3,12,500**
Less: Taxes	1,56,250	1,46,250	1,56,250
PAT	**1,56,250**	**1,46,250**	**1,56,250**
Less: Preference dividend	0	0	20,000
Earnings available to ordinary shareholders	**1,56,250**	**1,46,250**	**136,250**
Shares outstanding	1,25,000	1,00,000	1,00,000
EPS	**1.25**	**1.46**	**1.36**

The firm is able to maximize the earnings per share when it uses debt financing. Though the rate of preference dividend is equal to the rate of interest, EPS is high in case of debt financing because interest charges are tax deductible while preference dividends are not. With increasing levels of EBIT, EPS will increase at a faster rate with a high degree of leverage.

We know that market price per share is equal to earning per share multiplied by price earning (PE) ratio. If PE ratio is same for all three plans, then the plan which has highest EPS will also have highest MPS and it will be selected. On the other hand, if PE ratio for equity plan is 10 times, for debt plan it is 8 times and for preference plan it is 7 times then:

EPS	₹ 1.25	₹ 1.46	₹ 1.36
PE Ratio	10	8	7
MPS (PE Ratio x EPS)	₹ 12.50	₹ 11.68	₹ 9.52

Now despite of lower EPS, equity plan will be selected because it has highest MPS.

However, if a company is not able to earn a rate of return on its assets higher than the interest rate (or the preference dividend rate), debt (or preference financing) will have an adverse impact on EPS.

PROBLEM – 6

The following data are presented in respect of Quality Automation Ltd.:

	(₹)
Profit before interest and tax	52,00,000
Less: Interest on debentures @ 12%	12,00,000
Profit before tax	40,00,000
Less: Income tax @ 50%	20,00,000
Profit After tax	20,00,000
No. of equity shares (of ₹ 10 each)	8,00,000
EPS	2.5
PE Ratio	10
Market price per share	25

The company is planning to start a new project requiring a total capital outlay of ₹ 40,00,000. You are informed that a debt equity ratio (D/D+E) higher than 35%, pushes the Ke up to 12.5%, means reducing the PE ratio to 8 and rises the interest rate on additional amount borrowed to 14%.

FIND OUT the probable price of share if:

i. **the additional funds are raised as a loan.**

ii. **the amount is raised by issuing equity shares. (Note: Retained earnings of the company is ₹ 1.2 crore)**

SOLUTION:

In this question, EBIT after proposed extension is not given. Therefore, we can assume that existing return on capital employed will be maintained.

Working notes:

1. Return on Capital Employed $= \frac{\text{EBIT}}{\text{Capital Employed}} = \frac{₹\ 52,00,000}{₹\ 3,00,00,000} = 17.33\%$

   Capital Employed = Debt + Equity
   = ₹ 1,00,00,000 + ₹ 80,00,000 + ₹ 1,20,00,000
   = ₹ 3,00,00,000

   Note: Debt = ₹ 12,00,000 ÷ 12% = ₹ 100,00,000

2. Proposed EBIT = Proposed Capital Employed x Return on capital employed
   = (₹ 3,00,00,000 + ₹ 40,00,000) x 17.33%
   = ₹ 58,92,200

   (If you take return on capital employed in full digits then accurate EBIT will be

₹ 58,93,333.)

3. Debt Equity Ratio = $\frac{\text{Debt}}{\text{Debt + Equity}}$

Option1: Loan option

Debt = ₹ 1,00,00,000 + ₹ 40,00,000 = ₹ 1,40,00,000

Equity = ₹ 2,00,00,000

Deb Equity ratio = $\frac{1.4 \text{ cr}}{1.4\text{cr} + 2 \text{ cr}}$ = 41.18%

Debt equity ratio has crossed the limit of 35%, hence, PE ratio in this case will be 8 times and additional borrowing will be at the rate of 14%.

Option2: Equity option

Debt = ₹ 1,00,00,000

Equity = ₹ 2,00,00,000 + ₹ 40,00,000 = ₹ 2,40,00,000

Debt Equity ratio = $\frac{₹ 1 \text{ cr}}{1 \text{ cr} + ₹ 2.4 \text{ cr}}$ = 29.41%

Debt equity ratio has not crossed the limit of 35% hence PE ratio in this case will remain at 10 times.

4. Number of equity shares to be issued in case of equity option @ ₹ 25 per share

= ₹ 40,00,000 ÷ ₹ 25 = 1,60,000 Shares

Calculation of EPS and MPS under two financial options

Particulars	Financial Options	
	Option I 14% additional loan of 40,00,000 (₹)	**Option II 8,00,000 equity shares @ ₹ 10 i.e 1,60,000 equity shares @ ₹ 25 (₹)**
Profit before interest and Tax (PBIT)	58,92,200	58,92,200
Less: Interest on old debentures @ 12%	12,00,000	12,00,000
Less: Interest on additional loan (new) 14% on ₹ 40,00,000	5,60,000	Nil
Profit before tax	**41,32,200**	**46,92,000**
Less: Taxes @ 50%	20,66,100	23,46,100
Earnings for equity shareholders (EAT ÷ Profit after tax)	**20,66,100**	**23,46,100**
Number of Equity Shares	8,00,000	9,60,000
Earnings per Share (EPS)	**2.58**	**2.44**

Price/ Earnings ratio	8	10
Market price per share (MPS) (EPS X PE ratio)	20.66	24.44

Decision: Though loan option has higher EPS but equity option has higher MPS therefore company should raise additional fund through equity option.

PROBLEM – 7

Shahji Steel Limited requires ₹ 25,00,000 for a new plant. This plant is expected to yield earnings before interest and taxes of ₹ 5,00,000. While deciding about the financial plan, the company considers the objective of maximizing earnings per share. It has three alternatives to finance the project - by raising debt of ₹ 2,50,000 or ₹ 10,00,000 or ₹ 15,00,000 and the balance, in each case, by issuing equity shares. The company's share is currently selling at ₹ 150 but is expected to decline to ₹ 125 in case the funds are borrowed in excess of ₹ 10,00,000. The funds can be borrowed at the rate of 10 percent upto ₹ 2,50,000, at 15 percent over ₹ 2,50,000 and upto ₹ 10,00,000 and at 20 percent over ₹ 10,00,000. The tax rate applicable to the company is 50 percent. ANALYSE which form of financing should the company choose?

SOLUTION:

Plan I = Raising Debt of ₹ 2.5 lakh + Equity of ₹ 22.5 lakh

Plan II = Raising Debt of ₹ 10 lakh + Equity of ₹ 15 lakh

Plan III = Raising Debt of ₹ 15 lakh + Equity of ₹ 10 lakh

Calculation of Earnings per share (EPS):

Particulars	FINANCIAL PLANS		
	Plan I	Plan II	Plan III
	₹	₹	₹
Expected EBIT	5,00,000	5,00,000	5,00,000
Less: Interest [a]	(25,000)	(1,37,500)	(2,37,500)
Earnings before taxes	**4,75,000**	**3,62,500**	**2,62,500**
Less: Taxes @ 50%	(2,37,500)	(1,81,250)	(1,31,250)
Earnings after taxes (EAT)	**2,37,500**	**1,81,250**	**1,31,250**
Number of shares [b]	15,000	10,000	8,000
Earnings per share (EPS)	**15.83**	**18.13**	**16.41**

Financing Plan II (i.e. Raising debt of ₹ 10 lakh and issue of equity share capital of ₹ 15 lakh) is the option which maximises the earnings per share.

Working Notes:

(a) Calculation of interest on Debt

Plan		₹	₹
I	(₹ 2,50,000 x 10%)		25,000
II	(₹ 2,50,000 x 10%)	25,000	

	(₹ 7,50,000 x 15%)	1,12,500	1,37,500
III	(₹ 2,50,000 x 10%)	25,000	
	(₹ 7,50,000 x 15%)	1,12,500	
	(₹ 5,00,000 x 20%)	1,00,000	2,37,500

(b) Number of equity shares to be issued

$$\text{Plan I} = \frac{₹\ 22,50,000}{₹\ 150\ (\text{Market price of share})} = 15{,}000\text{shares}$$

$$\text{Plan II} = \frac{₹\ 15,00,000}{₹\ 150} = 10{,}000\text{shares}$$

$$\text{Plan III} = \frac{₹\ 10,00,000}{₹\ 125} = 8{,}000\text{shares}$$

PROBLEM – 8

Rupa Ltd.'s EBIT is ₹ 5,00,000. The company has 10%, ₹ 20 lakh debentures. The equity capitalization rate (Ke) is 16%.

You are required to CALCULATE:

i. Market value of equity and value of firm

ii. Overall cost of capital

SOLUTION:

i) Statement showing Market value of equity and value of firm

	₹
EBIT	5,00,000
Less: Interest on debentures (10% of ₹ 20,00,000)	(2,00,000)
Earnings available for equity holders i.e. Net Income (NI)	**3,00,000**
Equity capitalization rate (Ke)	16%
Market value of equity (S) = $\frac{NI}{K_e} = \left(\frac{3,00,000}{16} \times 100\right)$	18,75,000
Market value of debt (D)	20,00,000
Total value of firm V = S + D	**38,75,000**

ii) Overall cost of capital = $\frac{\text{EBIT}}{\text{Value of firm}} = \frac{₹\ 5,00,000}{₹\ 38,75,000} = 12.90\%$

PROBLEM – 8A

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:

Calculation of Total Value of the firm

	₹
EBIT	1,00,000
Less: Interest (@10% on ₹ 5,00,000)	50,000
Earnings available for equity holders	**50,000**
Equity capitalization rate i.e. Ke	15%

$$\text{Value of equity (S)} = \frac{\text{Earnings available for equity holders}}{K_e}$$

$$= \frac{₹\ 50,000}{0.15} = ₹\ 3,33,333$$

Value of Debt (D) (given) ₹ 5,00,000

Total value of the firm (V) = D + S (₹ 5,00,000 + ₹ 3,33,333) ₹ 8,33,333

$$\text{Overall cost of capital } (K_o) = K_e\left(\frac{S}{V}\right) + K_d\left(\frac{D}{V}\right)$$

$$= 0.15\left(\frac{₹\ 3,33,333}{₹\ 8,33,333}\right) + 0.10\left(\frac{₹\ 5,00,000}{₹\ 8,33,333}\right)$$

$$= \frac{1}{₹\ 8,33,333}[₹\ 50,000 + ₹\ 50,000] = 12.00\%$$

$$\text{Or, } K_0 = \frac{EBIT}{V} = \frac{₹\ 1,00,000}{₹\ 8,33,333} = 12.00\%$$

PROBLEM – 8B **(MTP 2 JAN 25 5M)**

Theta Limited is expecting an annual earning of ₹3 Lakhs before paying any interest and taxes. The company has ₹10 lakhs of 10% debentures in its capital structure. The capitalisation rate is 12.5%. You are required to calculate the value of Theta Limited as per the NI approach. Also, COMPUTE the overall cost of capital.

SOLUTION:

EBIT	= ₹ 3,00,000
Less: Interest = ₹ 10,00,000 × 10%	= ₹ 1,00,000
Earnings available to equity shareholders	= ₹ 2,00,000
Equity capitalization rate	= 12.5%
Market value of equity = ₹ 2,00,000 ÷ 12.5%	= ₹ 16,00,000
Market value of debt	= ₹ 10,00,000
Market value of the firm	= ₹ 26,00,000
Overall cost of capital	= (₹ 3,00,000 x 100) ÷ ₹ 26,00,000 = 11.54%

PROBLEM – 9

A Ltd. is financed entirely with 1,00,000 shares of common stock selling at 50 per share. The firm's EBIT is expected to be ₹ 4,00,000.

a. **Using the NI approach, compute the total value of firm, cost of equity and overall cost of capital.**
b. **The company has decided to retire (replace) 1 million of common stock (equity), replacing it with 6% Long- term debt. Compute the total value of firm and the overall cost of capital after refinancing.**

SOLUTION:

Part – I

V_E = 1,00,000 x ₹ 50 = ₹ 50,00,000

V_d = 0

$V_f = V_E + V_d$

V_f = ₹ 50,00,000

$$V_f = \frac{EBIT}{K_o}$$

$$₹\ 50,00,000 = \frac{₹\ 4,00,000}{K_o} \text{ (Given)}$$

K_o = 8%

Since A ltd. Is financed entirely by equity

$K_e = K_o$

$\therefore K_e$ = 8%

Part – II:

Under NI approach K_e and K_d will remain constant

EBIT	=	₹ 4,00,000
(-) Interest	=	₹ (60,000)
EBIT / EFE		₹ 3,40,000

K_e = 8%

Value of equity = ₹ 42,50,000

$$\left(\frac{EFE}{8\%}\right)$$

Value of debt $\left(\frac{Int}{Kd}\right)$ = ₹ 10,00,000

V_f = ₹ 52,50,000

$$₹\ 52,50,000 = \frac{EBIT}{Ko}(₹\ 4,00,000)$$

K_o = 7.619% (or) 7.62%

PROBLEM – 10

A Ltd. is expecting earnings before interest & tax of ₹ 4,00,000 and Ko is 10%. You are required to find out the value of firm & cost of equity capital according to NOI approach if it employs 8% debt to the extent of 20%, 35% of 50% of the total financial requirement of ₹ 20,00,000.

SOLUTION:

Particulars	I (₹)	II (₹)	III (₹)
Debt	4,00,000	7,00,000	10,00,000
Equity	16,00,000	13,00,000	10,00,000
Total	**20,00,000**	**20,00,000**	**20,00,000**
EBIT	4,00,000	4,00,000	4,00,000
(Less:) Interest 8%	(32,000)	(56,000)	(80,000)
EBT / EFE / EAT	**3,68,000**	**3,44,000**	**3,20,000**
K_o 10%	10%	10%	10%
Value of firm	40,00,000	40,00,000	40,00,000
Value of equity (Value of Firm – Debt)	36,00,000	33,00,000	30,00,000
K_e	**10.22%**	**10.424%**	**10.67%**
$\left(\frac{EFE}{VE}\right)$	$\left(\frac{3,68,000}{36L}\right)$	$\left(\frac{3,44,000}{33L}\right)$	$\left(\frac{3,20,000}{30L}\right)$

Note: Under NOI V_f always he constant in all the debt equity proportion.

PROBLEM – 11

A Ltd. is expecting an EBIT of ₹ 3,00,000. The company presently raised its entire fund requirement of ₹ 20 lakhs by the issue of equity with equity capitalization rate of 16%. The firm is now contemplating to redeem a part of capital by introducing debt financing. The firm has two options- to raise debt to the extent of 30% or 50% of total funds. It is expected that for debt financing up to 30% the rate of interest will be 10% and equity rate is expected to increases to 17%. However, if firm opts for 50% debt, then interest rate will be 12% and equity rate will be 20%. You are required to compute value of firm and its overall cost of capital under Present situation and under two different options if the traditional approach is held valid. Also suggest which is the best Option.

SOLUTION:

Particulars	Situation (0% Debt)	OP – 1 (30% Debt)	OP – 2 (50% Debt)
Debt	0	6,00,000	10,00,000
Equity	20,00,000	14,00,000	10,00,000
Total Capital	**20,00,000**	**20,00,000**	**20,00,000**
K_e	16%	17%	20%

K_d	-	10%	12%
EBIT	₹ 3,00,000	₹ 3,00,000	₹ 3,00,000
(-) Interest	-	₹ (60,000)	₹ (1,20,000)
EBT / EAT / EFE	**₹ 3,00,000**	**₹ 2,40,000**	**₹ 1,80,000**
Value of equity ($EFE \div K_e$)	₹ 18,75,000	₹ 14,11,765	₹ 9,00,000
Value of firm	**₹ 18,75,000**	**₹ 20,11,765**	**₹ 19,00,000**
K_o (EBIT ÷ value of firm)	16%	14.91%	15.789%

Comment: Option – 1 is the best alternative service V_f is maximum and K_o is minimum

PROBLEM – 12

One-third of the total market value of Sanghmani Limited consists of loan stock, which has a cost of 10 percent. Another company, Samsui Limited, is identical in every respect to Sanghmani Limited except that its capital structure is all-equity, and its cost of equity is 16 per cent. According to Modigliani and Miller, if we ignored taxation and tax relief on debt capital, what would be the cost of equity of Sanghmani Limited?

SOLUTION:

Here we are assuming that MM Approach 1958: Without tax, where capital structure has no relevance with the value of company and accordingly overall cost of capital of both levered as well as unlevered company is same. Therefore, the two companies should have similar WACCs. Because Samsui Limited is all-equity financed, its WACC is the same as its cost of equity finance, i.e. 16 per cent. It follows that Sanghmani Limited should have WACC equal to 16 per cent also.

As per Proposition 2 of MM Approach:

Ke = ko + (Ko – kd) x (Debt ÷ Equity)

Ke = 16% + (16% - 10%) x (1 ÷ 2) = 18.95% or 19%

PROBLEM – 12A

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:

Part – I: Amount of debt to the employed as per traditional approach

Total Capital	Debt (₹)	Equity (₹)	Ke %	We	Kd	Wd	Ko
50L	0	50L	10	1	-	-	10%
50L	5L	45L	10.5	0.9	6%	0.1	10.05%
50L	10L	40L	11	0.8	6%	0.2	10%
50L	15L	35L	11.3	0.7	6.2%	0.3	9.77%
50L	20L	30L	12.4	0.6	7%	0.4	10.24%
50L	25L	25L	13.5	0.5	7.5%	0.5	10.5%
50L	30L	20L	16	0.4	8%	0.6	11.2%
	50L						

The amount of debt to he employed is ₹ 15L which K_o is minimum at this level of point 19.77%

Part – II: MM approach:

Calculation of Ke

As per mm approach K_o remains constant and K_e increases linear with debt.

MM (without tax)

$V_f = EBIT \div K_o$

₹ 50,00,000 = ₹ 5,00,000 ÷ K_o

$K_o = 10\%$

Under mm approach $K_e = K_o + (K_o - K_d) \times$ Debt / equity

Statement of Ke under MM approach:

Debt (₹)	Equity (₹)	Ko %	Kd %	(Ko – Kd)	D ÷ E	Ke %
0	50L	10%	-	10%	0	0
5L	45L	10%	6%	4%	0.11	10.44%
10L	40L	10%	6%	4%	0.25	11%
15L	35L	10%	6.2%	3.8%	0.42	11%
20L	30L	10%	7%	3%	0.667	62%
25L	25L	10%	7.5%	2.5%	1	12.5%
30L	20L	10%	8%	2%	1.5	13%

PROBLEM – 13
Company X and Company Y are in the same risk class and are identical in every manner except that company X used debt while company Y does not. The levered firm has ₹ 9,00,000 debenture carrying 10% rate of interest. Both the firm earn 20% before

interest and taxes on their total assets of ₹ 15 lakhs. Assume perfect capital market rational investor and so on; a tax rate of 50% & capitalisation rate 15% for an all-equity company. Compute the Value of each firm using the Net Operating Income (NOI) Approach or MM Approach?

SOLUTION:

Given data:

	X Ltd. (Levered)	**Y Ltd. (Unlevered)**
Debt	₹ 9,00,000	-
Interest @ 10%	₹ 90,000	
EBIT (15Lakhs x 20%)	3,00,000	23,00,000
Tax rate	50%	50%
K_e	-	15%
V_f	?	?

Step 1: Income statement

Particulars	**Company X Ltd. (Levered)** (₹)	**Company Y Ltd. (Unlevered)** (₹)
EBIT	₹ 3,00,000	₹ 3,00,000
(-) Interest	₹ (90,000)	-
EBT	**₹ 2,10,000**	**₹ 3,00,000**
(-) Tax @ 50%	₹ (1,05,000)	₹ (1,50,000)
EAT / EFE	**₹ 1,05,000**	**₹ 1,50,000**

Since company Y is an unlevered Company $K_e = K_o = 15\%$

Value of unlevered EFE ÷ K_e

Firm = ₹ 1,50,000 ÷ 15% = ₹ 10,00,000

As per MM approach with tax

Value of levered firm

= Value of unlevered firm + (Debt x Tax rate)

= ₹ 10,00,000 + (₹ 9,00,000 x 50%)

= ₹ 10,00,000 + ₹ 4,50,000

Value of levered (X) = ₹ 14,50,000

PROBLEM – 13A **(RTP SEPT 24)**

Company XYZ is unlevered and has a cost of equity of 20 percent and a total market value of ₹ 10,00,00,000. Company ABC is identical to XYZ in all respects except that it uses debt finance in its capital structure with a market value of ₹ 4,00,00,000 and a cost of 10 percent. FIND the market value of equity, weighted average cost of capital and cost of equity of ABC if the tax advantage of debt is 25 percent.

SOLUTION:

Computation of Market Value of Equity of Company ABC

Total market value of Company ABC

$V_{ABC} = V_{XYZ} + Bt$..... Equation (i)

Where,

V_{ABC} = Market value of leveraged company.

V_{XYZ} = Market value of unleveraged company.

B = Market value of debt.

t = Tax rate.

Now, given

V_{xyz} = ₹ 10,00,00,000

B = ₹ 4,00,00,000

t = 25%

By substituting values in equation (i) above, we have

VABC = ₹ 10,00,00,000 + ₹ 4,00,00,000 × 0.25%

= ₹ 11,00,00,000

The Market Value of Equity (s) of Company ABC,

= ₹ 11,00,00,000 – ₹ 4,00,00,000

= ₹ 7,00,00,000

Weighted Average Cost of Capital of Company ABC

$WACC_{ABC} = WACC_{XYZ} [1- (Bt \div V_{ABC})]$

$$=20\% \left[1 - \frac{₹\ 4,00,00,000}{₹\ 11,00,00,000} \times 0.25\right]$$

= 18.18%

Where,

$WACC_{ABC}$ is the weighted average cost of capital of the levered company ABC

$WACC_{XYZ}$ is the weighted average cost of capital of the unlevered company XYZ.

Cost of Equity of company ABC

$RE_{abc} = RE_{xyz} + [(1 - t) (B \div E) (RE_{xyz} - R_B)]$

20% + [(1-0.25) x 4,00,00,000 ÷ 7,00,00,000 x (0.20 - 0.10)]

24.28% approx.

Where,

R_{EABC} is the cost of equity in the levered Company ABC.

$R_{E\ xyz}$ is the cost of equity in the unlevered Company XYZ.

E is the market value of equity.

B is the market value of debt.

RB is the cost of debt

PROBLEM – 14

Blue Ltd., an all equity financed company is considering the repurchase of ₹ 275 lakhs equity shares and to replace it with 15% debentures of the same amount. Current market value of the company is ₹ 1,750 lakhs with its cost of capital of 20%. The company's Earnings before Interest and Taxes (EBIT) are expected to remain constant in future years. The company also has a policy of distributing its entire earnings as dividend.

Assuming the corporate tax rate as 30%, you are required to CALCULATE the impact on the following on account of the change in the capital structure as per Modigliani and Miller (MM) Approach:

i. **Market value of the company**
ii. **Overall Cost of capital**
iii. **Cost of equity**

SOLUTION:

Workings:

$$\text{Market Value of Equity} = \frac{\text{Net income (NI) for equity holders}}{K_e}$$

$$₹\ 1{,}750 \text{ lakhs} = \frac{\text{Net income (NI) for equity holders}}{0.20}$$

Net Income to equity holders / EAT = ₹ 350 lakhs

$$\text{Therefore, EBIT} = \frac{\text{EAT}}{(1-t)} = \frac{₹\ 350 \text{ Lakhs}}{(1-0.3)} = ₹\ 500 \text{ lakhs}$$

Income Statement

	All Equity (₹ In lakhs)	**Equity & Debt (₹ In lakhs)**
EBIT (as calculated above)	500	500
Interest on ₹ 275 lakhs @ 15%	-	41.25
EBT	**500**	**458.75**
Tax @ 30%	150	137.63
Income available to equity holders	**350**	**321.12**

(i) Market value of the company

Market value of levered firm = Value of unlevered firm + (Debt x Tax Rate)
= ₹ 1,750 lakhs + (₹ 275 lakhs x 0.3)
= ₹ 1,832.5 lakhs

Change in market value of the company = ₹ 1,832.5 lakhs – ₹ 1,750 lakhs
= ₹ 82.50 lakhs

The impact is that the market value of the company has increased by ₹ 82.50 lakhs due to replacement of equity with debt.

(ii) Overall Cost of Capital

Market Value of Equity = Market value of levered firm – Value of Debt

= ₹ 1,832.50 lakhs – ₹ 275 lakhs = ₹ 1,557.50 lakhs

$$\text{Cost of Equity } (K_e) = \frac{\text{Net Income to equity holders}}{\text{Market value of equity}} \times 100$$

$$= \frac{₹\ 321.12\ \text{Lakhs}}{₹\ 1{,}557.50\ \text{Lakhs}} \times 100 = 20.62\%$$

Cost of debt (Kd) = I (1 - t) = 15 (1 - 0.3) = 10.50%

Components	**Amount (₹ In lakhs)**	**Cost of Capital %**	**Weight**	**WACC (K_o) %**
Equity	1,557.50	20.62	0.85	17.53
Debt	275.00	10.50	0.15	1.58
	1,832.50		**1**	**19.11**

The impact is that the Overall Cost of Capital or K_o has fallen by 0.89% (20% - 19.11%) due to the benefit of tax relief on debt interest payment.

(iii)Cost of Equity

The impact is that cost of equity has risen by 0.62% (20.62% - 20%) due to the presence of financial risk i.e. introduction of debt in capital structure.

PROBLEM – 15

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 (Vu) = [NOI ÷ ke] = 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 = ke as there is no debt) = 0.18

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

Total Value of Levered Firm (VL) = Vu + (Debt × Nil)

= ₹ 1,00,00,000 + (₹ 54,00,000 × nil)

= ₹ 1,00,00,000

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

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

***Computation of WACC A Ltd**

Component of Capital	Amount	Weight	Cost of Capital	WACC
Equity	₹ 46,00,000	0.46	0.2504	0.1152
Debt	₹ 54,00,000	0.54	0.12*	0.0648
Total	₹ 1,00,00,000			0.18

*K_d = 12% (since there is no tax)

WACC = 18%

(b) Assuming 40% taxes as per MM Approach

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

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

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

= ₹ 60,00,000

K_e of unlevered Firm (given) = 0.18

K_o of unlevered Firm (Same as above = k_e as there is no debt) = 0.18

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

Total Value of Levered Firm (VL) = Vu + (Debt × Tax)

= ₹ 60,00,000 + (₹ 54,00,000 × 0.4)

= ₹ 81,60,000

Computation of Weighted Average Cost of Capital (WACC) of 'B Ltd.'

= 18% (i.e. K_e = K_o)

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

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

***Computation of WACC A Ltd**

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

*K_d= 12% (1 - 0.4) = 12% × 0.6 = 7.2%

WACC = 13.23%

PROBLEM – 16

There are two firms N and M, having same earnings before interest and taxes i.e. EBIT of ₹ 20,000. Firm M is levered company having a debt of ₹ 1,00,000 @ 7% rate of interest. The cost of equity of N company is 10% and of M company is 11.50%. Compute how arbitrage process will be carried on?

SOLUTION:

	Company	
	M Ltd.	N Ltd.
EBIT (NOI)	₹ 20,000	₹ 20,000
Debt (D)	₹ 1,00,000	--
Ke	11.50%	10%
Kd	7%	--

$$\text{Value of equity (S)} = \frac{\text{NOI - Interest}}{\text{Cost of Equity}}$$

$$S_M = \frac{₹\ 20,000 - ₹\ 7,000}{11.50\%} = ₹\ 1,13,043$$

$$S_N = \frac{₹\ 20,000}{10\%} = ₹\ 2,00,000$$

Value of Firm (V) = S + D

V_M = ₹ 1,13,043 + ₹ 1,00,000 = ₹ 2,13,043

V_N = ₹ 2,00,000

Arbitrage Process;

1. Assume you hold 10% shares of levered firm M
   Present income (₹ 13000 * 10%) = ₹1300
   Where (₹ 20000 - ₹ 7000) = ₹ 13000
2. Sell your 10% shares oof levered firm and realise ₹ 11304.30 (10% on ₹113043)
   Borrowing ₹ 10000 @ 7% Interest
   Total Money available = ₹ 11304.3 + ₹ 10000 = ₹ 21304.30
3. Buy 10% shares of unlevered firm and pay ₹ 20000 (200000 x 10%)
   New Income = (₹ 20000 x 10%) = ₹ 2000
   Less: Interest paid on personal loan (₹ 10000 x 7%) = (₹ 700)
   New Net Return = ₹ 1300 (₹ 2000 - ₹ 700)
4. Surplus cash avail (₹ 21304.30 - ₹ 20000) = ₹ 1304.30
   Conclusion: Your return remains the same as before ₹ 1300 but you still have an excess money of ₹ 1304.3 hence you have made a profit using arbitrage.
   Alternative solution of the above arbitrage process is possible:
   Money available = ₹ 21304.30
   Invest the full amount in unlevered firm
   New return (₹21304.30 ÷ ₹200000) x ₹ 20000 = ₹ 2130.40
   Less: Interest on personal loan (₹ 10000 x 7%) = (₹ 700)
   Net New return = ₹ 1430.40
   Conclusion; We are able to increase our return due to arbitrage process.

PROBLEM – 16A **(RTP MAY 24)**

Following data is available in respect of two companies having same business risk:

Capital employed = ₹ 3,00,000, EBIT = ₹ 45,000 and Ke = 12.5%

Sources	A Ltd	B Ltd
	Levered Company (₹)	Unlevered Company (₹)
Debt (@10%)	1,50,000	Nil
Equity	1,50,000	3,00,000

An investor is holding 20% shares in levered company. CALCULATE the increase in annual earnings of investor if he switches his holding from Levered to Unlevered company.

Solution:

(i)

Particulars	A Ltd	B Ltd
	Levered Firm (₹)	Unlevered Firm (₹)
EBIT	45,000	45,000
Less: Interest on debt (10% × ₹ 1,50,000)	15,000	Nil
Earnings available to Equity shareholders	**30,000**	**45,000**

Ke	12.5%	12.5%
Value of Equity (S)	**2,40,000**	**3,60,000**
(Earnings available to Equity shareholders/Ke)		
Debt (D)	1,50,000	Nil
Value of Firm (V) = S + D	**3,90,000**	**3,60,000**

Value of Levered company is more than that of unlevered company. Therefore, investor will sell his shares in levered company and buy shares in unlevered company. To maintain the level of risk he will borrow proportionate amount and invest that amount also in shares of unlevered company.

(ii) Investment & Borrowings

	₹
Sell shares in Levered company (₹ 2,40,000 x 20%)	48,000
Borrow money (₹ 1,50,000 x 20%)	30,000
Buy shares in Unlevered company	78,000

(iii) Change in Return

	₹
Income from shares in Unlevered company (₹ 78,000 x 12.5%)	9,750
Less: Interest on loan (₹ 30,000 x 10%)	3,000
Net Income from unlevered firm	**6,750**
Less: Income from Levered firm (₹ 48,000 x 12.5%)	6,000
Incremental Income due to arbitrage	**750**

PROBLEM – 16B **(PEP MAY 24 4M)**

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**
Ke	12.5%	12.5%
Value of Equity (S)	1,52,000	2,00,000

(Earnings available to Equity shareholders/ Ke)		
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 x 12%)	18,240
Borrow money (₹ 75,000 x 12%)	9,000
Buy shares in Unlevered company	27,240

3. **Change in Return** ₹

Income from shares in Unlevered company (₹ 27,240 x 12.5%)	3,405
Less: Interest on loan (₹ 9,000 x 8%)	720
Net Income from unlevered firm	**2,685**
Less: Income from Levered firm (₹ 18,240 x 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 /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.

PROBLEM – 17
There are two firms U and L having same NOI (Net Operating Income) of ₹ 20,000 except that the firm L is a levered company having a debt of ₹ 1,00,000 @ 7% and cost of equity of U & L are 10% and 18% respectively.
Compute how arbitrage process will work.

SOLUTION:

Particulars	Company	
	U Ltd.	**L Ltd.**
EBIT	₹ 20,000	₹ 20,000
Debt (D)	–	₹ 1,00,000
K_d	–	7%
K_e	10%	18%
Value of equity capital (S) $\left(\frac{EBIT - Interest}{K_e}\right)$	₹ 2,00,000 $\left(\frac{20,000}{0.10}\right)$	₹ 72,222 $\left(\frac{20,000-7,000}{0.18}\right)$
Total value of the firm (V) = S + D	**₹ 2,00,000**	**₹ 1,72,222** (₹ 72,222 + ₹ 1,00,000)

Arbitrage Process;
1.Assume you hold 10% shares of unlevered firm U Ltd
Present income (₹ 20000 * 10%) = ₹ 2000
2. Sell your 10% shares of L Ltd and realise ₹ 20000 (10% on ₹20000)
3. 10% of equity shares and 10% of debentures of levered firm.
10% of equity shares of L ltd = (₹ 72222 x 10%) = ₹ 7222
10% of debentures of L ltd = (₹ 100000 x 10%) = ₹ 10000
Total Investment = ₹ 17222
Surplus cash avail (₹ 20000 - ₹ 17222) = ₹ 2778
4. New Earnings of Equity (₹ 13000 x 10%) + Debentures (₹ 7000 x 10%) = ₹ 1300 + ₹700 = ₹ 2000

Conclusion: Your return remains the same as before ₹ 2000 but you still have an excess money of ₹ 2778 hence you have made a profit using arbitrage.

Alternative solution:
Cash available= ₹ 20000
Invest this ₹ 20000 fully in levered firm

Equity investment = (₹ 20000 ÷ ₹ 172222) x ₹ 72222 = ₹ 8387.08
Debenture investment = (₹ 20000 ÷ ₹ 172222) x ₹ 100000 = ₹ 11612.92

New earnings:
Equity = (₹ 13000 ÷ ₹ 72222) x ₹ 8387.08 = ₹ 1509.68
Debenture (₹ 11612.92 x 7%) = ₹ 812.90
Total earnings = ₹ 2322.58
Conclusion: We are able to increase our earnings by ₹ 322.57 (₹ 2322.58 - ₹ 2000) through arbitrage process

PROBLEM – 17A
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**
Ke	**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 For Equity SHs (EFE)	**20,000**	**30,000**
K_e	20%	12.5%
Value of Equity (S) – [EFE/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 x 15%)	36,000
Lend money (₹ 36,000 x 50%)	18,000
Buy shares in Levered company (₹ 36,000 x 50%)	18,000
Total	36,000

3. Change in Return

	₹
Income from shares in Levered company (₹ 18,000 x 20%)	3,600

Interest on money lent (₹ 18,000 x 10%)	1,800
Total Income after switch over	5,400
Less: Income from Unlevered firm (₹ 36,000 x 12.5%)	4,500
Incremental Income due to arbitrage	900

PROBLEM – 18

Alpha Ltd and Beta Ltd are identical except for capital structures. C Ltd has 50 per cent debt and 50 per cent equity, whereas Beta Ltd has 20 percent debt and 80 percent equity. (All percentages are in market-value terms). The borrowing rate for both companies is 8 per cent in a no-tax world, and capital markets are assumed to be perfect.

a. i. If you own 2 per cent of the stock of Alpha Ltd, what is your return if the company has net operating income of ₹ 3,60,000 and the overall capitalisation rate of the company, Ko is 18 per cent?

ii. What is the implied required rate of return on equity of Alpha Ltd?

b. Z Ltd has the same net operating income as of Alpha Ltd.

i. What is the implied required equity return of Beta Ltd?

ii. Why does it differ from that of Alpha Ltd?

SOLUTION:

a) Value of the Alpha Ltd $\frac{NOI}{K_0} = \frac{₹\ 3,60,000}{18\%} = ₹\ 20,00,000$

i. Return on Equity shares of Alpha Ltd.

	(₹)
Value of the company	20,00,000
Market value of debt (50% × ₹ 20,00,000)	10,00,000
Market value of equity (50% × ₹ 20,00,000)	10,00,000
	(₹)
Net operating income	3,60,000
Less: Interest on debt (8% × ₹ 10,00,000)	80,000
Earnings available to equity shareholders	**2,80,000**
Return on 2% equity shares (2% × ₹ 2,80,000)	5,600

ii. Implied required rate of return on equity of Alpha Ltd.

$$\frac{\text{Earnings available for equity shareholders}}{\text{Market value of Equity}} = \frac{₹\ 2,80,000}{₹\ 10,00,000} = 28\%$$

b)

i. Calculation of Implied rate of return on equity of Beta Ltd.

	(₹)
Total value of company	20,00,000
Market value of debt (20% × ₹ 20,00,000)	4,00,000
Market value of equity (80% × ₹ 20,00,000)	16,00,000

	(₹)
Net operating income	3,60,000
Less: Interest on debt (8%× ₹ 4,00,000)	32,000
Earnings available to shareholders	**3,28,000**

Implied required rate of return on equity

$$= \frac{\text{Earnings available for equity shareholders}}{\text{Market value of Equity}} = \frac{₹\ 3,28,000}{₹\ 16,00,000} = 20.5\%$$

(ii) Implied required rate of return on equity of Beta Ltd. is lower than that of Alpha Ltd. because Beta Ltd. uses less debt in its capital structure. As the equity capitalization is a linear function of the 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.

PROBLEM – 19

Axar Ltd. has a Sales of ₹ 68,00,000 with a Variable cost Ratio of 60%.
The company has fixed cost of ₹ 16,32,000. The capital of the company comprises of 12% long term debt, ₹ 1,00,000 Preference Shares of ₹ 10 each carrying dividend rate of 10% and 1,50,000 equity shares.
The tax rate applicable for the company is 30%.
At current sales level, DETERMINE the Interest, EPS and amount of debt for the firm if a 25% decline in Sales will wipe out all the EPS.

SOLUTION:

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

Income Statement

	Original (₹)	Calculation of Interest at BEP (backward calculation) (₹)	Now at present level (₹)
Sales	68,00,000	51,00,000	68,00,000
Less: Variable Cost	40,80,000	30,60,000	40,80,000
Contribution	**27,20,000**	**20,40,000**	**27,20,000**
Less: Fixed Cost	16,32,000	16,32,000	16,32,000
EBIT	**10,88,000**	**4,08,000**	**10,88,000**
Less: Interest (Balancing Figure)	?	**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

PROBLEM – 20

The financial advisor of Sun Ltd. is confronted with following two alternative financing plans for raising ₹ 10 lakhs that is needed for plant expansion and modernization

Alternative I: Issue 80% of funds with 14% Debenture [Face value (FV) ₹ 100] at par and redeem at a premium of 10% after 10 years and balance by issuing equity shares at 33 1/3 % premium.

Alternative II: Raise 10% of funds required by issuing 8% Irredeemable Debentures [Face value (FV) ₹ 100] at par and the remaining by issuing equity shares at current market price of ₹ 125.

Currently, the firm has an Earnings per share (EPS) of ₹ 21

The modernization and expansion programme is expected to increase the firm's Earnings before Interest and Taxation (EBIT) by ₹ 200,000 annually.

The firm's condensed Balance Sheet for the current year is given below:

Balance Sheet as on 31.3.20x2

Liabilities	(₹)	Assets	(₹)
Current Liabilities	5,00,000	Current Assets	16,00,000
10% Long Term Loan	15,00,000	Plant & Equipment (Net)	34,00,000
Reserves & Surplus	10,00,000		
Equity Share Capital (FV: ₹ 100 each)	20,00,000		
TOTAL	50,00,000	TOTAL	50,00,000

However, the finance advisor is concerned about the effect that issuing of debt might have on the firm. The average debt ratio for firms in industry is 35%. He believes if this ratio is exceeded, the P/E ratio of the company will be 7 because of the potentially greater risk.

If the firm increases its equity capital by more than 10 %, he expects the P/E ratio of the company will increase to 8.5 irrespective of the debt ratio.

Assume Tax Rate of 25%. Assume target dividend pay-out under each alternative to be 60% for the next year and growth rate to be 10% for the purpose of calculating Cost of Equity.

SUGGEST with reason which alternative is better on the basis of each of the below given criteria:

I. Earnings per share (EPS) & Market Price per share (MPS)

II. Financial Leverage

III. Weighted Average Cost of Capital & Marginal Cost of Capital (using Book Value

weights)

SOLUTION:

Calculation of Equity Share capital and Reserves and surplus:

Alternative 1:

$$\text{Equity Share capital} = ₹\ 20,00,000 + \frac{₹\ 2,00,000 \times 100}{133.3333} = ₹\ 21,50,000$$

$$\text{Reserves} = ₹10,00,000 + \frac{₹\ 2,00,000 \times 33.3333}{133.3333} = ₹\ 10,50,000$$

Alternative 2:

$$\text{Equity Share capital} = ₹\ 20,00,000 + \frac{₹\ 9,00,000 \times 100}{125} = ₹\ 27,20,000$$

$$\text{Reserves} = ₹\ 10,00,000 + \frac{₹\ 9,00,000 \times 25}{125} = ₹\ 11,80,000$$

Capital Structure Plans

(Amount in ₹)

Capital	Alternative 1 (₹)	Alternative 2 (₹)
Equity Share capital	21,50,000	27,20,000
Reserves and surplus	10,50,000	11,80,000
10% long term debt	15,00,000	15,00,000
14% Debentures	8,00,000	-
8% Irredeemable Debentures	-	1,00,000
Total Capital Employed	**55,00,000**	**55,00,000**

Computation of Present Earnings before interest and tax (EBIT)

EPS	₹ 21
No. of equity shares	20,000
Earnings for equity shareholders (₹ 21 x 20000 shares)	₹ 4,20,000
Profit Before Tax (₹ 420000 ÷ 75%)	₹ 5,60,000
Interest on long term loan (1500000 x 10%)	₹ 1,50,000
EBIT (₹ 560000 + ₹ 150000)	₹ 7,10,000

EBIT after expansion = ₹ 7,10,000 + ₹ 2,00,000 = ₹ 9,10,000

Evaluation of Financial Plans on the basis of EPS, MPS and Financial Leverage

(Amount in ₹)

Particulars	Alternative I	Alternate II
EBIT	9,10,000	9,10,000
Less: Interest: 10% on long term loan	(1,50,000)	(1,50,000)
14% on Debentures	(1,12,000)	Nil
8% on Irredeemable Debentures	Nil	(8000)
PBT	**6,48,000**	**7,52,000**
Less: Tax @25%	(1,62,000)	(1,88,000)

PAT	**4,86,000**	**5,64,000**
No. of equity shares	21,500	27,200
EPS	**22.60**	**20.74**
Applicable P ÷ E ratio (Working Note 1)	7	8.5
MPS (EPS x P ÷ E ratio)	**158.2**	**176.29**
Financial Leverage EBIT ÷ PBT	**1.40 Times**	**1.21 Times**

Working Note 1

	Alternative I	**Alternative II**
Debt:		
₹ 15,00,000 + ₹ 8,00,000	₹ 23,00,000	-
₹ 15,00,000 + ₹ 1,00,000	-	₹ 16,00,000
Total capital Employed	₹ 55,00,000	₹ 55,00,000
Debt Ratio (Debt ÷ Capital employed)	=0.4182	=0.2909
	= 41.82%	**= 29.09%**
Change in Equity:	₹ 1,50,000 (₹ 21,50,000 - ₹ 20,00,000)	₹ 7,20,000 (₹ 27,20,000 - ₹ 20,00,000)
Percentage change in equity	7.5%	36%
Applicable P/E ratio	**7**	**8.5**

Calculation of Cost of equity and various type of debt

	Alternative I	**Alternative II**
A) Cost of equity		
EPS	₹ 22.60	₹ 20.74
DPS (EPS X 60%)	₹ 13.56	₹ 12.44
Growth (g)	10%	10%
Po (MPS)	158.2	176.29
Ke= Do (1 + g) ÷ (Po + g)	$\frac{13.56\ (1.1)}{158.2} + 10\%$	$\frac{12.44\ (1.1)}{176.29} + 10\%$
	=19.43%	=17.76%
B) Cost of Debt:		
10% long term debt	10% + (1-0.25)	10% +(1-0.25)
	= 7.5%	= 7.5%
14% redeemable debentures	$\frac{₹\ 14\ (1 - 0.25) + (₹\ 110 - ₹\ 100 \div 10)}{(₹\ 110 + ₹\ 100) \div 2}$	
	(10.5 + 1) ÷ 10.5	
	= 10.95%	
8% irredeemable debenture		Interest x (1 – Tax rate)
		8% x (1 – 0.25)

		=6%

Calculation of Weighted Average cost of capital (WACC)

	Alternative 1			Alternative 2		
Capital	**Weights**	**Cost (%)**	**WACC**	**Weights**	**Cost (%)**	**WACC**
Equity Share Capital	0.3909	19.43	7.60%	0.4945	17.76	8.78%
Reserves and Surplus	0.1909	19.43	3.71%%	0.2145	17.76	3.81%
10% Long term Debt	0.2727	7.50	2.05%	0.2727	7.50	2.05%
14% Debenture	0.1455	10.95	1.59%			
8% Irredeemable Debentures	-			0.0182	6	0.11%
			14.94%			**14.75%**

Calculation Marginal Cost of Capital (MACC)

	Alternative 1			Alternative 2		
Capital	**(weight)**	**Cost (%)**	**MACC**	**(weight)**	**Cost (%)**	**MACC**
Equity Share Capital	₹ 1,50,000 (0.15)	19.43	2.91%	₹ 7,20,000 (0.72)	17.76	12.79%
Reserves and Surplus	₹ 50,000 (0.05)	19.43	0.97%	₹ 1,80,000 (0.18)	17.76	3.20%
14% Debenture	₹ 8,00,000 (0.80)	10.95	8.76%	-		0.00%
8% Irredeemable Debentures	-			₹ 1,00,000 (0.10)	6	0.60%
Total Capital Employed	₹ 10,00,000		**12.64%**	₹10,00,000		**16.59%**

Summary of solution:

	Alternate I	**Alternate II**
Earning per share (EPS) ₹	22.60	20.74
Market price per share (MPS) ₹	158.20	176.29
Financial leverage	1.4043	1.2101
Weighted Average cost of capital (WACC)	14.94%	14.75%
Marginal cost of capital (MACC)	12.64%	16.59%

Alternative 1 of financing will be preferred under the criteria of EPS, whereas Alternative II of financing will be preferred under the criteria of MPS, Financial leverage, WACC and marginal cost of capital.

PROBLEM – 20A **(Sep 2024 5M)**

ER Private Limited has a paid-up capital ₹ 2,50,000 consisting of 25,000 Equity shares of ₹ 10 each. The Market price per share is ₹ 24 with PE ratio of 8. The company is planning to purchase a plant which will cost ₹ 5,00,000. This plant is expected to yield earnings before interest and taxes of ₹ 2,00,000 per annum. It has two alternatives to finance the plant:

Alternatives	Equity	Debt
A	100%	-
B	50%	50%

Other information is as under:

(i) Cost of debt is 12%.

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

(iii)PE ratio of Leveraged company will be 7.

(iv)Tax rate -40%.

Advise which alternative is the most suitable to raise the funds for additional capital, keeping in mind to maximize the benefit to its Shareholder

SOLUTION:

Calculation of No. of Equity Shares and Existing Earnings before Interest and Taxes

Particulars	Existing	Alternative A: Issue Equity shares only	Alternative B: Issue Equity Shares and 12% Debentures of equal amount
Number of Equity Shares			
-Existing	25,000	25,000	25,000
-Newly issued		25,000 ₹ 5,00,000 ₹ (10 + 10)	12,500 ₹ 2,50,000 ₹ (10 + 10)
Total no of Equity Shares	**25,000**	**50,000**	**37,500**
Calculation of Existing Earnings before Interest and Taxes (EBIT)			
Market Price per share (MPS)	₹ 24		
Price-Earnings Ratio (PE Ratio)	8 times	8 times	7 times
Earning per share (EPS) = MPS ÷ PE Ratio	3		
Earnings after Tax (EAT) = EPS x No. of Equity shares	75,000		
Earning before Tax (EBT) = EAT ÷ 0.6 (or EBIT as Interest nil)	1,25,000		

Calculation of EPS and MPS under two financial alternatives

Particulars	Existing ₹	Alternative A ₹	Alternative B ₹
Earnings before Interest			
and Tax:			
- Existing EBIT	1,25,000	1,25,000	1,25,000
- From New Project		2,00,000	2,00,000
Less: Interest on 12%	1,25,000	3,25,000	3,25,000
Debentures	-	-	30,000
Earnings before Tax (EBT)	**1,25,000**	**3,25,000**	**2,95,000**
Less: Tax @ 40%	50,000	1,30,000	1,18,000
Earnings after Tax (EAT)	**75,000**	**1,95,000**	**1,77,000**
EPS = EAT/ No. of Equity Shares	3.00	3.90	4.72
Market Price per share (MPS) = EPS x Price- Earning Ratio	**24.00**	**31.20**	**33.04**

Advise: Alternative B i.e., issue of 12% Debentures is most suitable to maximize the market price per share.

Alternatively, Solution can also be presented in following way:

Calculation of EPS and MPS under two financial alternatives

Particulars	Existing	Alternative A ₹	Alternative B ₹
Earnings before Interest and Tax:		2,00,000	2,00,000
- From New Project		2,00,000	2,00,000
Less: Interest on 12% Debentures	-	-	30,000
Earnings before Tax (EBT)		**2,00,000**	**1,70,000**
Less: Tax @ 40%		80,000	68,000
Earnings after Tax (EAT) from new project		**1,20,000**	**1,02,000**
Earnings from Existing (PAT)	75,000	75,000	75,000
Total Earnings After Tax (EAT)	**75,000**	**1,95,000**	**1,77,000**
Number of Shares	25,000	50,000	37,500
EPS = EAT ÷ No. of Equity Shares	3.00	3.90	4.72
Market Price per share (MPS) = EPS x Price- Earning Ratio	**24.00**	**31.20**	**33.04**

Advise: Alternative B i.e., issue of 12% Debentures is most suitable to maximize the market price per share.

PROBLEM – 20B **(MTP 2 MAY 24 6M)**

The GT Limited is willing to expand its business for which it requires an additional finance of ₹ 50,00,000. At present, the capital structure of the company is as under:

- **7,00,000 Equity shares of ₹ 10 each**

- **10% Debentures** ₹ 63,00,000
- **12% Term loan** ₹ 54,00,000
- **Retained earnings** ₹ 1,30,00,000

At present, the company's EBIT is ₹ 54,00,000. However, the company, after expansion, expects ROI 2% greater than the present ROI, Income Tax Rate is 30%.

Following two options, for getting additional finance, are available-

(a) To raise funds as term loan @ 12%

(b) To raise funds by issuing 1,00,000 equity shares at ₹ 20 per share and balance by issuing 11% debentures at par.

Required:

(i) FIND out the market price of shares, if the P/E ratio is 10.

(ii) RECOMMEND the suitable option of raising funds with reason.

SOLUTION:

Expected return on capital employed

Capital Employed = Debt + Equity

= (₹ 63,00,000 + ₹ 54,00,000) + (₹ 70,00,000 + ₹ 1,30,00,000)

= ₹ 3,17,00,000

$$\text{Return on capital employed/ROI} = \left(\frac{\text{EBIT}}{\text{Capital employed}}\right) \times 100$$

At present:

$$= \left(\frac{₹\ 54,00,000}{₹\ 3,17,00,000}\right) \times 100$$

= 17.03%

Now company expects 2% more as ROI

So, Expected ROI = 17.03% + 2%

= 19.03%

Proposed EBIT = Proposed Capital Employed x Return on capital employed

= (₹ 3,17,00,000 + ₹ 50,00,000) x 19.03% = ₹ 69,84,010

(i) Market Price per Share:

Particular	Financial Options	
	Option – I 12% term loan of ₹ 50,00,000	**Option II 1,00,000 equity shares ₹ 20 and 11% debentures of ₹ 30,00,000**
	(₹)	**(₹)**
EBIT	69,84,010	69,84,010
Less: Interest		
- 10% on old debentures	6,30,000	6,30,000
- 11% on new debentures	-	3,30,000

- 12% on old term loan	6,48,000	6,48,000
- 12% on new term loan	6,00,000	
Total Interest	18,78,000	16,08,000
EBT	**51,06,010**	**53,76,010**
Less Tax @ 30%	15,31,803	16,12,803
EAT	**35,74,207**	**37,63,207**
No. of equity shares	7,00,000	8,00,000
Earnings per share	**5.11**	**4.70**
P/E ratio	10	10
Market Price per Share = EPS x P/E ratio	**51.06**	**47.04**

Recommendation:

The option I is better and may be opted as both EPS and MPS are higher.

PROBLEM – 21

Kalyanam Ltd. has an operating profit of ₹ 34,50,000 and has employed Debt which gives total Interest Charge of ₹ 7,50,000. The firm has an existing Cost of Equity and Cost of Debt as 16% and 8% respectively. The firm has a new proposal before it, which requires funds of 75 Lakhs and is expected to bring an additional profit of ₹ 14,25,000. To finance the proposal, the firm is expecting to issue an additional debt at 8% and will not be issuing any new equity shares in the market. Assume no tax culture.

You are required to calculate the WACC of Kalyanam Ltd:

i. Before the New Proposal

ii. After the New Proposal

SOLUTION:

Workings:

a) Value of Debt = $\frac{\text{Interest}}{\text{Cost of debt } (K_d)}$

$= \frac{₹\ 7,50,000}{0.08} = ₹\ 93,75,000$

b) Value of equity capital = $\frac{\text{Operating profit - Interest}}{\text{Cost of equity } (K_e)}$

$= \frac{₹\ 34,50,000 - ₹\ 7,50,000}{0.16}$

$=$ **₹ 1,68,75,000**

c) New Cost of equity (Ke) after proposal

EBIT = ₹ 487500

Interest = ₹ 135000 (₹ 750000 + ₹ 600000)

EBT / EFE = ₹ 352500

New Ke = EFE ÷ Value of Equity = ₹ 352500 ÷ ₹ 16875000 = 20.889%

(i) Calculation of Weighted Average Cost of Capital (WACC) before the new proposal

Sources	(₹)	Weight	Cost of Capital	WACC
Equity	1,68,75,000	0.6429	0.16	0.1029
Debt	93,75,000	0.3571	0.08	0.0286
Total	**2,62,50,000**	**1**		**0.1315 or 13.15 %**

(ii) Calculation of Weighted Average Cost of Capital (WACC) after the new proposal

Sources	(₹)	Weight	Cost of Capital	WACC
Equity	1,68,75,000	0.5	0.209	0.1045
Debt	1,68,75,000	0.5	0.080	0.0400
Total	**3,37,50,000**	**1**		**0.1445 or 14.45 %**

PROBLEM – 22 **(MTP 2 SEPT 24 5M)**

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 repurchase.

SOLUTION:

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

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

Now,

Total BV of Equity (after buyback) = Total BV of Equity (before buyback) (-) Amt of buyback

₹ 1,93,20,000 = x (-) (20,000 X ₹ 297)

Therefore x = Total BV (before buyback)
= ₹ 2,52,60,000

BV per share (before buyback) = ₹ 2,52,60,000 / 1,20,000
= ₹ 210.50 per share

Multiple Choice Questions

1. **The assumptions of MM hypothesis of capital structure do not include the following:**
   a. Capital markets are imperfect
   b. Investors have homogeneous expectations
   c. All firms can be classified into homogeneous risk classes
   d. The dividend-payout ratio is cent percent, and there is no corporate tax

2. **Which of the following is irrelevant for optimal capital structure?**
   a. Flexibility
   b. Solvency
   c. Liquidity
   d. Control

3. **Financial Structure refers to:**
   a. All financial resources
   b. Short-term funds
   c. Long-term funds
   d. None of these

4. **An EBIT-EPS indifference analysis chart is used for:**
   a. Evaluating the effects of business risk on EPS
   b. Examining EPS results for alternative financial plans at varying EBIT levels
   c. Determining the impact of a change in sales on EBIT
   d. Showing the changes in EPS quality over time

5. **The term "capital structure" means:**
   a. Long-term debt, preferred stock, and equity shares
   b. Current assets and current liabilities
   c. Net working capital
   d. Shareholder's equity

6. **The cost of monitoring management is considered to be a (an):**
   a. Bankruptcy cost
   b. Transaction cost
   c. Agency cost

d. Institutional cost

7. **The traditional approach towards the valuation of a firm assumes:**
   a. That the overall capitalization rate changes in financial leverage.
   b. That there is an optimum capital structure.
   c. That the total risk is not changed with the changes in the capital structure.
   d. That the markets are perfect.

8. **Market values are often used in computing the weighted average cost of capital because:**
   a. This is the simplest way to do the calculation.
   b. This is consistent with the goal of maximizing shareholder value.
   c. This is required by SEBI.
   d. This is a very common mistake.

9. **A firm's optimal capital structure:**
   a. Is the debt-equity ratio that results in the minimum possible weighted average cost of capital
   b. 40 percent debt and 60 percent equity
   c. When the debt-equity ratio is 0.50
   d. When Cost of equity is minimum

10. **Capital structure of a firm influences the:**
   a. Risk
   b. Return
   c. Both Risk and Return
   d. Return but not Risk

11. **Consider the below mentioned statements:**
   1. **A company is considered to be over-capitalised when its actual capitalisation is lower than the proper capitalisation as warranted by the earning capacity.**
   2. **Both over-capitalisation and under-capitalisation are detrimental to the interests of the society.**

   State True or False:
   a. 1-True, 2-True
   b. 1-False, 2-True

c. 1-False, 2-False

d. 1-True, 2-False

12. A critical assumption of the Net Operating Income (NOI) approach to valuation is:

a. That debt and equity levels remain unchanged.

b. That dividends increase at a constant rate.

c. That ko remains constant regardless of changes in leverage.

d. That interest expense and taxes are included in the calculation.

13. Which of the following steps may be adopted to avoid the negative consequences of over-capitalisation?

a. The shares of the company should be split up. This will reduce dividend per share, though EPS shall remain unchanged.

b. Issue of Bonus Shares.

c. Revising upward the par value of shares in exchange of the existing shares held by them.

d. Reduction in claims of debenture-holders and creditors.

Answers to the MCQs

1.	(a)	2.	(b)	3.	(a)	4.	(b)	5.	(a)	6.	(c)
7.	(b)	8.	(b)	9.	(a)	10.	(c)	11.	(b)	12.	(c)
13.	(d)										

Case Scenarios

XYZ Industries Ltd., a renowned player in the manufacturing sector, has been contemplating an ambitious expansion program. To finance this growth, the company scrutinizes its current capital structure, which is a blend of equity, retained earnings, preference shares, and debentures.

The equity base of XYZ Industries Ltd., is robust with 40,000 equity shares valued at ₹ 100 each, amounting to a substantial ₹ 40,00,000. This equity foundation is bolstered by retained earnings of ₹ 10,00,000, reflecting the company's prudent profit reinvestment strategy.

In addition to equity, XYZ Industries Ltd., has diversified its financing through 9% preference shares and 7% debentures, each contributing ₹ 25,00,000 to the capital pool. This strategic mix of debt and equity showcases the company's balanced approach to leveraging and risk management.

The company's capital yields a healthy return rate of 12% on capital employed, indicative of its operational efficiency and market competitiveness.

However, it operates in a high-tax environment with an income-tax rate of 50%, which significantly impacts its net earnings and available reinvestment capital.

Faced with the need to raise an additional ₹ 25,00,000 for its expansion program, XYZ Industries Ltd., stands at a crossroads. The decision to fund this venture will require careful consideration of the cost of capital, tax implications, and the impact on shareholder value.

The management must evaluate whether to issue more equity shares, preference shares or debentures. Issuing equity could dilute current shareholders' value but would not increase the company's debt burden.

Preference shares offer a fixed return to investors and have priority over equity in profit distribution but come at a higher cost than debt. Debentures are less expensive due to tax-deductible interest expenses but increase financial risk. XYZ Industries Ltd.'s journey towards expansion is not just about raising funds but also about maintaining a delicate balance between growth aspirations and financial stability. The company's choice will set a precedent for its future financial strategies and market reputation.

Faced with the challenge of capital structure decision making to finance the expansion programme the finance manager is considering the following alternatives:

i. Issue of 20,000 equity shares at a premium of ₹ 25 per share.

ii. Issue of 10% preference shares.

iii. Issue of 8% debentures

The manufacturing company has estimated that the PE ratios in the cases of equity preference and debenture financing would be 20, 17 and 16 respectively. You are required to evaluate the various financial alternatives considering three plans proposed i.e. Plan I (Equity), Plan II (Preference Shares) and Plan III (Debentures).

Based on the information provided above you are required to answer the following MCQ's:

1. What will be the amount of PAT under the three plans i.e. Plan I (Equity), Plan II (Preference Shares) and Plan III (Debentures) respectively from the following?
   a. ₹ 13,25,000, ₹ 13,25,000 and ₹ 11,25,000
   b. ₹ 8,62,500, ₹ 9,62,500 and ₹ 10,62,500
   c. ₹ 15,00,000, ₹ 15,00,000 and ₹ 15,00,000
   d. ₹ 6,62,500, ₹ 6,62,500 and ₹ 5,62,500

2. What will be the amount of total preference dividend under the three plans i.e. Plan I (Equity), Plan II (Preference Shares) and Plan III (Debentures) respectively from the following?
   a. ₹ 3,25,000, ₹ 3,25,000 and ₹ 5,25,000
   b. ₹ 8,62,500, ₹ 9,62,500 and ₹ 10,62,500
   c. ₹ 2,25,000, ₹ 4,75,000 and ₹ 2,25,000
   d. ₹ 2,25,000, ₹ 2,25,000 and ₹ 2,25,000

3. What will be the amount of earnings available for equity shareholders under the three plans i.e. Plan I (Equity), Plan II (Preference Shares) and Plan III (Debentures) respectively from the following?
   a. ₹ 3,47,500, ₹ 5,77,500 and ₹ 3,98,000
   b. ₹ 9,37,500, ₹ 8,87,500 and ₹ 7,37,500
   c. ₹ 4,37,500, ₹ 1,87,500 and ₹ 3,37,500
   d. ₹ 5,37,500, ₹ 2,87,500 and ₹ 4,37,500

4. What will be the EPS under the three plans i.e. Plan I (Equity), Plan II (Preference Shares) and Plan III (Debentures) respectively from the following?
   a. 4.44, 7.66 and 7.29
   b. 7.00, 6.88 and 7.29
   c. 7.29, 4.69 and 8.44
   d. 8.44, 9.88 and 6.78

5. What will be the market price per share under the three plans i.e. Plan I (Equity), Plan II (Preference Shares) and Plan III (Debentures) respectively from the following?

   a. 134.50, 123.45 and 78.98

   b. 145.80, 79.73 and 135.04

   c. 148.8, 187.96 and 118.48

   d. 168.8, 167.96 and 108.48

Answers to the Case Scenarios

1.	(d)	**2.**	(c)	**3.**	(c)	**4.**	(c)	**5.**	(b)

Evaluation of various financial alternatives	Plan I (Equity) (₹)	Plan II (Preference Shares) (₹)	Plan III (Debentures) (₹)
1. EBIT**	15,00,000	15,00,000	15,00,000
2. Interest:			
Existing	1,75,000	1,75,000	1,75,000
Additional	-	-	2,00,000
Total Interest	1,75,000	1,75,000	3,75,000
3. PBT (1-2)	13,25,000	13,25,000	11,25,000
4. TAX 50%	6,62,500	6,62,500	5,62,500
5. PAT (3-4)	6,62,500	6,62,500	5,62,500
6. Preference dividend			
Existing	2,25,000	2,25,000	2,25,000
Additional	-	2,50,000	-
Total Preference Dividend	2,25,000	4,75,000	2,25,000
7. Equity earnings (5-6)	4,37,500	1,87,500	3,37,500
8. No. of equity shares	*60,000	40,000	40,000
9. EPS [7/8]	7.29	4.69	8.44
10. P/E Ratio (Given)	20	17	16
11. Market Price per share	145.80	79.73	135.04

*40,000 + 20,000 new shares = 60,000 shares

**EBIT = 12% of (100 lakhs existing + new 25 lakhs) = ₹ 15,00,000

CHAPTER 05: INVESTMENT DECISIONS

PROBLEM – 1

ABC Ltd is evaluating the purchase of a new machinery with a depreciable base of ₹ 1,00,000; expected economic life of 4 years and change in earnings before taxes and depreciation of ₹ 45,000 in year 1, ₹ 30,000 in year 2, ₹ 25,000 in year 3 and ₹ 35,000 in year 4. Assume straight-line depreciation and a 20% tax rate. You are required to COMPUTE relevant cash flows.

SOLUTION:

Note:

Depreciation = ₹ 1,00,000 ÷ 4 years = ₹ 25,000

Amount in (₹)

	Years			
	1 (₹)	**2 (₹)**	**3 (₹)**	**4 (₹)**
Earnings before tax and depreciation (Given)	45,000	30,000	25,000	35,000
Less: Depreciation (Note)	(25,000)	(25,000)	(25,000)	(25,000)
Earnings before tax (Earnings before tax and depreciation – Depreciation)	**20,000**	**5,000**	**0**	**10,000**
Less: Tax @20% (Tax Rate x EBT)	(4,000)	(1,000)	0	(2,000)
Earnings after tax (EBT – Tax Amount)	**16,000**	**4,000**	**0**	**8,000**
Add: Depreciation (Note)	25,000	25,000	25,000	25,000
Net Cash flow (EAT + Depreciation)	**41,000**	**29,000**	**25,000**	**33,000**

PROBLEM – 2

A project requiring an investment of ₹10,00,000 and it yields profit after tax and depreciation which is as follows:

Years	Profit after tax and depreciation (₹)
1	50,000
2	75,000
3	1,25,000
4	1,30,000
5	80,000
Total	4,60,000

Suppose further that at the end of the 5th year, the plant and machinery of the project can be sold for ₹80,000. DETERMINE Average Rate of Return.

SOLUTION:

In this case the rate of return can be calculated as follows:

$$\frac{\text{Total Profit} \div \text{No. of years}}{\text{Average investment or Initial Investment}} \times 100$$

(a) If Initial Investment is considered then,

$$= \frac{₹\ 4,60,000 \div 5 \text{years}}{₹\ 10,00,000} \times 100 = \frac{₹\ 92,000}{₹\ 10,00,000} \times 100 = 9.2\%$$

(b) If Average investment is considered, then,

$$= \frac{₹\ 92,000}{\text{Average Investment}} \times 100 = \frac{₹\ 92,000}{₹\ 5,40,000} \times 100 = 17.04\%$$

Where,

Average Investment = $\frac{1}{2}$ (Initial investment – Salvage value) + Salvage value

= $\frac{1}{2}$ (₹ 10,00,000 – ₹ 80,000) + ₹ 80,000

= ₹ 4,60,000 + ₹ 80,000 = ₹ 5,40,000

PROBLEM – 3

COMPUTE the net present value for a project with a net investment of ₹ 1,00,000 and net cash flows for year one is ₹ 55,000; for year two is ₹ 80,000 and for year three is ₹ 15,000. Further, the company's cost of capital is 10%.

[PVIF @ 10% for three years is 0.909, 0.826 and 0.751]

SOLUTION:

Year	Net Cash Flows (₹) (Given)	PVIF @ 10% (Given)	Discounted Cash Flows (₹) (Net Cash Flow x PVIF@ 10%)
0	(1,00,000)	1.000	(1,00,000)
1	55,000	0.909	49,995
2	80,000	0.826	66,080
3	15,000	0.751	11,265
Net Present Value			**27,340**

Recommendation: Since the net present value of the project is positive, the company should accept the project.

PROBLEM – 4

ABC Ltd. is a small company that is currently analysing capital expenditure proposals for the purchase of equipment; the company uses the net present value technique to evaluate projects. The capital budget is limited to ₹ 500,000 which ABC Ltd. believes is the maximum capital it can raise. The initial investment and projected net cash flows for each project are shown below. The cost of capital of ABC Ltd is 12%. You are required to COMPUTE the NPV of the different projects.

	Project A (₹)	Project B (₹)	Project C (₹)	Project D (₹)
Initial Investment	2,00,000	1,90,000	2,50,000	2,10,000
Project Cash Inflows:				
Year 1	50,000	40,000	75,000	75,000

2	50,000	50,000	75,000	75,000
3	50,000	70,000	60,000	60,000
4	50,000	75,000	80,000	40,000
5	50,000	75,000	100,000	20,000

SOLUTION:

Calculation of Net Present Value:

Period	PV Factor @12%	Project A (₹)	Project B (₹)	Project C (₹)	Project D (₹)
0	1.000	(2,00,000)	(1,90,000)	(2,50,000)	(2,10,000)
1	0.893	44,650	35,720	66,975	66,975
2	0.797	39,850	39,850	59,775	59,775
3	0.712	35,600	49,840	42,720	42,720
4	0.636	31,800	47,700	50,880	25,440
5	0.567	28,350	42,525	56,700	11,340
Net Present Value		**(19,750)**	**25,635**	**27,050**	**(3,750)**

PROBLEM – 5

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:

Working Notes:

Depreciation on Initial Equipment = Cost of the Project ÷ Project Life
₹ 3 Crores ÷ 8 years = ₹ 4375000

Depreciation on Additional Equipment = (Cost of the Additional Equipment – Scarp value) ÷ Remaining Useful Life
= (₹ 2500000 - ₹ 250000) ÷ 5 Years = ₹ 450000.

Calculation of Tax in Year 2 = Profit of 2nd year = ₹ 23.93
Loss of 1st year = (₹ 10.63)
Tax of 2nd year = ₹ 23.93 - ₹ 10.63 = ₹ 13.3 x 30% = ₹ 3.99

Initial Cash Outflow = Cost of New Equipment + Working Capital
= ₹ 350 Lakhs + ₹ 40 Lakhs = ₹ 390 Lakhs

Year	1. Sales	2. Variable Cost	3. Cash Fixed Cost	4. Depreciation (Working Note)	5. Profit = (1 - 2 - 3 - 4)	6. (Tax @ 30% x 5)	7. PAT (5-6)	8. Depreciation	9. CFAT (7+8)
1	172.8	103.68	36	43.75	-10.63	0	-10.63	43.75	33.12
2	259.2	155.52	36	43.75	23.93	3.99	19.94	43.75	63.69
3	624	374.4	36	43.75	169.85	50.955	118.895	43.75	162.645
4-5 Years	648	388.8	36	48.25	174.95	52.485	122.465	48.25	170.715
6-8 Years	432	259.2	36	48.25	88.55	26.565	61.985	48.25	110.235

Calculation of NPV (₹in lakh)

Year	Cash flows ₹	PV factor @12%	PV of cash- flows ₹	Remark
0	(390)	1.000	(390.00)	Initial equipment cost
1	33.12	0.893	29.57	
2	63.69	0.797	50.76	
3	162.645	0.712	115.80	
3	(25.00)	0.712	(17.80)	Additional equipment cost
4	170.715	0.636	108.57	
5	170.715	0.567	96.79	
6	110.235	0.507	55.89	
7	110.235	0.452	49.83	
8	110.235	0.404	44.53	
8	40.00	0.404	16.16	Release of working capital
8	2.50	0.404	1.01	Additional equipment salvage value
Net Present Value			**161.11**	

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

PROBLEM – 5A

Cello Limited is considering buying a new machine which would have a useful economic life of five years, a cost of ₹ 1,25,000 and a scrap value of ₹ 30,000, with 80 per cent of the cost being payable at the start of the project and 20 per cent at the end of the first year. The machine would produce 50,000 units per annum of a new product with an estimated selling price of ₹ 3 per unit. Direct costs would be ₹ 1.75 per unit and annual fixed costs, including depreciation calculated on a straight- line basis, would be ₹ 40,000 per annum.

In the first year and the second year, special sales promotion expenditure, not included in the above costs, would be incurred, amounting to ₹ 10,000 and ₹ 15,000 respectively.

CALCULATE NPV of the project for investment appraisal, assuming that the company's cost of capital is 10 percent.

SOLUTION:

Calculation of Net Cash Flow:

Working Note:

Contribution = (Selling Price – Variable Cost) x Units Sold

(₹ 3.00 – ₹ 1.75) x 50,000 = ₹ 62,500

Depreciation = (Cost of the Machine – Salvage Value) ÷ No of years.

= (₹ 125000 - ₹ 30000) ÷ 5 Years = ₹ 19000

Fixed costs = Annual Fixed Cost – Depreciation

₹ 40,000 - ₹ 19000 = ₹ 21000

Capital = Total Cost of Project = ₹ 125000

Cost to be Paid at the end of 1st year = ₹ 125000 x 80% = ₹ 100000

Cost to be Paid at the end of 2st year = ₹ 125000 x 20% = ₹ 25000

Salvage Value (Given) at the end of 5th Year = ₹ 30000

Year I.	A. Capital (₹) (Working Note)	B. Contribution (₹) (Working Note)	C. Fixed costs (₹) (Working Note)	D. Advertisement (₹) (Given)	E. Net cash flow (₹) E = (A – B – C- D)
0	(1,00,000)	-	-	-	(1,00,000)
1	(25,000)	62,500	(21,000)	(10,000)	6,500
2	-	62,500	(21,000)	(15,000)	26,500
3	-	62,500	(21,000)	-	41,500
4	-	62,500	(21,000)	-	41,500
5	30,000	62,500	(21,000)	-	71,500

Calculation of Net Present Value

Year	Net Cash Flow (₹)	10% Discount Factor	Present Value (₹) (Net Cash Flow x 10% Discount Factor)
0	(1,00,000)	1.000	(1,00,000)
1	6,500	0.909	5,909
2	26,500	0.826	21,889
3	41,500	0.751	31,167
4	41,500	0.683	28,345
5	71,500	0.621	44,402
NPV			**31,712**

The net present value of the project is ₹ 31,712.

PROBLEM – 6

Elite Cooker Company is evaluating three investment situations: (1) Produce a new line of aluminium skillets, (2) Expand its existing cooker line to include several new sizes, and (3) Develop a new, higher-quality line of cookers. If only the project in question is undertaken, the expected present values and the amounts of investment required are:

Project	Investment required (₹)	Present value of Future Cash-Flows (₹)
1	2,00,000	2,90,000
2	1,15,000	1,85,000
3	2,70,000	4,00,000

If projects 1 and 2 are jointly undertaken, there will be no economies; the investments required and present values will simply be the sum of the parts. With projects 1 and 3, economies are possible in investment because one of the machines acquired can be used in both production processes. The total investment required for projects 1 and 3 combined is ₹ 4,40,000. If projects 2 and 3 are undertaken, there are economies to be achieved in marketing and producing the products but not in investment. The expected present value of future cash flows for projects 2 and 3 is ₹ 6,20,000. If all three projects are undertaken simultaneously, the economies noted will still hold. However, a ₹ 1,25,000 extension on the plant will be necessary, as space is not available for all three projects. CALCULATE NPV of the projects and STATE which project or projects should be chosen?

SOLUTION:

Calculation of NPV

Project	A. Investment Required ₹	B. Present value of Future Cash Flows ₹	C = A - B Net Present Value ₹
1	2,00,000	2,90,000	90,000
2	1,15,000	1,85,000	70,000

3	2,70,000	4,00,000	1,30,000
1 and 2	3,15,000	4,75,000	1,60,000
1 and 3	4,40,000	6,90,000	2,50,000
2 and 3	3,85,000	6,20,000	2,35,000
1, 2 and 3 (Refer Working note)	6,80,000*	9,10,000*	2,30,000

Working Note:

(i) Total Investment required if all the three projects are undertaken simultaneously:

	(₹)
Project 1 & 3	4,40,000
Project 2	1,15,000
Plant extension cost	1,25,000
Total	**6,80,000**

(ii) Total of Present value of Cash flows if all the three projects are undertaken simultaneously:

	(₹)
Project 2 & 3	6,20,000
Project 1	2,90,000
Total	9,10,000

Projects 1 and 3 should be chosen, as they provide the highest Net Present Value.

PROBLEM – 7

Suppose we have three projects involving discounted cash outflow of ₹ 5,50,000, ₹ 75,000 and ₹ 1,00,20,000 respectively. Suppose further that the sum of discounted cash inflows for these projects are ₹ 6,50,000, ₹ 95,000 and ₹ 1,00,30,000 respectively.

CALCULATE the desirability factors for the three projects.

SOLUTION:

The desirability factors for the three projects would be as follows:

Desirability Factor = PV of Cash Inflow ÷ PV of Cash Outflow

1. $= \frac{₹\ 6,50,000}{₹\ 5,50,000} = 1.182$

2. $= \frac{₹\ 95,000}{₹\ 75,000} = 1.267$

3. $= \frac{₹\ 1,00,30,000}{₹\ 1,00,20,000} = 1.001$

PROBLEM – 8

NavJeevani hospital is considering to purchase a machine for medical protectional radiography which is priced at ₹ 2,00,000. The projected life of the machine is 8 years and has an expected salvage value of ₹ 18,000 at the end of 8th year. The annual operating cost of the machine is ₹ 22,500. It is expected to generate revenues of ₹ 1,20,000 per year for eight years. Presently, the hospital is outsourcing the radiography work to its neighbour Test Center and is earning commission income of ₹36,000 per annum, net of taxes.

Required:

ANALYSE whether it would be profitable for the hospital to purchase the machine. Give your recommendation under:

i. Net Present Value method

ii. Profitability Index method

Consider tax @30%. PV factors at 10% are given below:

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
0.909	0.826	0.751	0.683	0.621	0.564	0.513	0.467

SOLUTION:

Determination of Cash inflows

Particulars	(₹)
Sales Revenue (Given)	1,20,000
Less: Operating Cost (Given)	22,500
Less: Depreciation (Cost of Machine- Salvage Value) ÷ No of years (₹ 2,00,000 – ₹ 18,000) ÷ 8 Years	22,750
Net Income (Sales – Operating Cost – Depreciation)	**74,750**
Less: Tax @ 30% (Net Income x Tax rate)	22,425
Earnings after Tax (EAT) (Net Income – Tax Rate)	**52,325**
Add: Depreciation	22,750
Cash inflow after tax per annum	**75,075**
Less: Loss of Commission Income (Given)	36,000
Net Cash inflow after tax per annum	**39,075**
In 8th Year:	
New Cash inflow after tax	**39,075**
Add: Salvage Value of Machine (Given)	18,000
Net Cash inflow in year 8	**57,075**

(i) Calculation of Net Present Value (NPV)

Year	CFAT (₹)	PV Factor @10%	Present Value of Cash inflows (₹) CFAT X PV Factor @10%
1 to 7	39,075	4.867	1,90,178.03

8	57,075	0.467	26,654.03
			2,16,832.06
Less: Cash Outflows (Given)			2,00,000.00
NPV			**16,832.06**

(ii) Calculation of Profitability Index

$$\text{Profitability Index} = \frac{\text{Sum of discounted cash in flows}}{\text{Present value of cash out flows}} = \frac{₹\ 2,16,832.06}{₹\ 2,00,000} = 1.084$$

Advise: Since the net present value (NPV) is positive and profitability index is also greater than 1, the hospital may purchase the machine.

PROBLEM – 9

A Ltd. is evaluating a project involving an outlay of ₹ 10,00,000 resulting in an annual cash inflow of ₹ 2,50,000 for 6 years. Assuming salvage value of the project is zero; DETERMINE the IRR of the project.

SOLUTION:

IRR is the rate at which Present Value of Cash Outflow = Present Value of Cash Inflow

₹ 10,00,000 = ₹ 250000 x $(1+ r)^n$ (PVIFA)

₹ 4 = $(1 + r)^6$

Let r = 12%

NPV = (₹ 250000 x 4.111) - ₹ 1000000 = + ₹ 27750

Let r = 13%

NPV = (₹ 250000 x 3.998) - ₹ 1000000 = - ₹ 500

$$IRR = LR + \frac{NPV_{LR}}{NPV_{LR} - NPV_{HR}} \times (HR - LR)$$

$$= 12 + \frac{₹\ 27750}{₹\ 27750 - (-₹\ 500)} \times (13 - 12) = 12 + \frac{₹\ 27750}{₹\ 28250} \times (13 - 12) = 12 + 0.9823$$

IRR = 12.982 %

PROBLEM – 10

CALCULATE the internal rate of return of an investment of ₹1,36,000 which yields the following cash inflows:

Year	Cash Inflows (₹)
1	30,000
2	40,000
3	60,000
4	30,000
5	20,000

SOLUTION:

Year	Cash Flow	PVIF @ 10%	PVIF @ 12%	Discounted Cash Flow @ 10%	Discounted Cash Flow @ 12%
0	-1,36,000	1	1	-1,36,000	-1,36,000
1	30,000	0.909	0.893	27,270	26,790
2	40,000	0.826	0.797	33,040	31,880
3	60,000	0.751	0.712	45,060	42,720
4	30,000	0.683	0.636	20,490	19,080
5	20,000	0.621	0.567	12,420	11,340
Total				**2,280**	**-4,190**

The internal rate of return is, thus, more than 10% but less than 12%. The exact rate can be obtained by interpolation:

$$IRR = LR + \frac{NPV_{LR}}{NPV_{LR} - NPV_{HR}} \times (HR - LR)$$

$$= 10 + \frac{₹\ 2,280}{₹\ 2,280 - (-₹\ 4,190)} \times (12\% - 10\%)$$

$$= 10 + \frac{₹\ 2,280}{₹\ 6,470} \times (12\% - 10\%) = 10 + 0.704$$

IRR = 10.704%

PROBLEM – 11

A company proposes to install machine involving a capital cost of ₹ 3,60,000. The life of the machine is 5 years and its salvage value at the end of the life is nil. The machine will produce the net operating income after depreciation of ₹ 68,000 per annum. The company's tax rate is 45%.

The Net Present Value factors for 5 years are as under:

Discounting rate	14	15	16	17	18
Cumulative factor	3.43	3.35	3.27	3.20	3.13

You are required to COMPUTE the internal rate of return of the proposal.

SOLUTION:

Computation of Cash inflow per annum

Particulars	(₹)
Net operating income per annum (Given)	68,000
Less: Tax @ 45% (Net operating Income x Tax Rate)	(30,600)
Profit after tax (Net operating Income - Tax Amount)	**37,400**
Add: Depreciation (Cost of Machine ÷ No of years) (₹ 3,60,000 ÷ 5 years)	72,000
Cash Flow After Tax	**1,09,400**

At IRR, NPV = 0.

NPV = Present Value of Cash Outflow - Present Value of Cash Inflow

= ₹ 109400 x PVIFA (%, 5 Years) - ₹ 360000

₹ 360000 = ₹ 109400 x PVIFA (%, 5 Years)

PVIFA (%, 5 Years) = ₹ 360000 ÷ ₹ 109400 = 3.2906

As 3.2906 falls between 15% and 16% IRR Computation as follows:

Let r = 15%

NPV = (₹ 109400 x 3.35) - ₹ 360000 = + ₹ 6490

Let r = 16%

NPV = (₹ 109400 x 3.27) - ₹ 360000 = - ₹ 2262

$$IRR = LR + \frac{NPV_{LR}}{NPV_{LR} - NPV_{HR}} \times (HR - LR)$$

$$= 15 + \frac{₹\ 6490}{₹\ 6490 - (-₹\ 2262)} \times (16 - 15)$$

$$= 15 + \frac{₹\ 6490}{₹\ 8752} \times (16\% - 15\%) = 12 + 0.9823$$

IRR = 15.7415 %

PROBLEM – 12

Hind lever Company is considering a new product line to supplement its range of products. It is anticipated that the new product line will involve cash investments of ₹ 7,00,000 at time 0 and ₹ 10,00,000 in year 1. After-tax cash inflows of ₹ 2,50,000 are expected in year 2, ₹ 3,00,000 in year 3, ₹ 3,50,000 in year 4 and ₹ 4,00,000 each year thereafter through year 10. Although the product line might be viable even after year 10, the company prefers to be conservative and end all calculations at that time.

a. If the required rate of return is 15 per cent, COMPUTE net present value of the project. Is it acceptable?

b. ANALYSE what would be the case if the required rate of return were 10 per cent.

c. CALCULATE its internal rate of return.

d. COMPUTE the project's payback period.

SOLUTION:

Year	Cash Flow	PVIF @ 15%	PVIF @ 10%	Discounted Cash Flow @ 15%	Discounted Cash Flow @ 10%
0	(7,00,000)	1	1	(7,00,000)	(7,00,000)
1	(10,00,000)	0.87	0.909	(8,70,000)	(9,09,000)
2	2,50,000	0.756	0.826	1,89,000	2,06,500
3	3,00,000	0.658	0.751	1,97,400	2,25,300
4	3,50,000	0.572	0.683	2,00,200	2,39,050
5-10 Years	4,00,000	2.163	2.974	8,65,200	11,89,600

Total	(1,18,200)	2,51,450

Part A: Since NPV = ₹2,51,450 is positive at 15% hence the project would be acceptable.

Part B: Since NPV = (₹ 118200) is negative at 10% hence the project would not be acceptable.

Part C: Calculation of IRR:

$$IRR = LR + \frac{NPV_{LR}}{NPV_{LR} - NPV_{HR}} \times (HR - LR)$$

$$=10\% + \frac{₹2,51,450}{₹2,51,450 - (-)₹1,18,200} \times (15\% - 10\%)$$

= 10% + 3.4012 or 13.40%

Part D: pay Back Period:

Year	Cash Flow ₹	Cumulative Cash Flow ₹
2	2,50,000	2,50,000
3	3,00,000	5,50,000
4	3,50,000	9,00,000
5	4,00,000	13,00,000
6	**4,00,000**	**17,00,000**
7	4,00,000	21,00,000
8	4,00,000	25,00,000
9	4,00,000	29,00,000
10	4,00,000	33,00,000

Investment of ₹ 1700000 is paid back in 6 years.

PROBLEM – 13

Following data has been available for a capital project:

Annual cash inflows	**₹1,00,000**
Useful life	**4 years**
Salvage value	**0**
Internal rate of return	**12%**
Profitability index	**1.064**

You are required to CALCULATE the following for this project:

1. **Cost of project**
2. **Cost of capital**
3. **Net present value**
4. **Payback period**

PV factors at different rates are given below:

Discount factor	12%	11%	10%	9%
1 year	0.893	0.901	0.909	0.917
2 years	0.797	0.812	0.826	0.842
3 years	0.712	0.731	0.751	0.772

4 years	0.636	0.659	0.683	0.708

SOLUTION:

i. Cost of the Project

At 12% internal rate of return (IRR),

The Sum of Total Cash Inflows = Cost of the Project (Initial cash outlay)

Annual cash inflows = ₹ 1,00,000

Useful life = 4 years

Considering the discount factor table @ 12%, cumulative present value of cash inflows for 4 years is 3.038 (0.893 + 0.797 + 0.712 + 0.636).

Hence, Total Cash inflows for 4 years for the Project is:

₹ 1,00,000 × 3.038 = ₹ 3,03,800

Hence, Cost of the Project = ₹ 3,03,800

ii. Cost of Capital

$$\text{Profitability index} = \frac{\text{Sum of Discounted Cash inflows}}{\text{Cost of the project}}$$

$$1.064 = \frac{\text{Sum of Discounted Cash inflows}}{₹\ 3,03,800}$$

$\therefore$ Sum of Discounted Cash inflows = ₹ 3,23,243.20

Since, Annual Cash Inflows = ₹ 1,00,000

$$\text{Hence, cumulative discount factor for 4 years} = \frac{₹\ 3,23,242.20}{₹\ 1,00,000} = 3.232$$

From the discount factor table, at discount rate of 9%, the cumulative discount factor for 4 years is 3.239 (0.917 + 0.842 + 0.772 + 0.708).

Hence, Cost of Capital = 9% (approx.)

iii. Net Present Value (NPV)

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

= ₹ 3,23,243.20 – ₹ 3,03,800 = ₹ 19,443.20

iv. Payback Period

$$\text{Payback period} = \frac{\text{Cost of the Project}}{\text{Annual Cash Inflows}} = \frac{₹\ 3,03,800}{₹\ 1,00,000} = 3.038 \text{ years}$$

PROBLEM – 14

An investment of ₹ 1,36,000 yields the following cash inflows (profits before depreciation but after tax). DETERMINE MIRR considering 8% as cost of capital.

Year	(₹)
1	30,000
2	40,000
3	60,000
4	30,000

5	20,000
	1,80,000

SOLUTION:

Year 0 – Cash outflow = ₹ 1,36,000

The MIRR is calculated on the basis of investing the inflows at the cost of capital. The table below shows the value of the inflows, if they are immediately reinvested at 8%.

Year	Cash flow	@ 8% reinvestment rate factor	(₹)
1	30,000	1.3605*	40,815
2	40,000	1.2597	50,388
3	60,000	1.1664	69,984
4	30,000	1.08	32,400
5	20,000	1	20,000
		Terminal Value	**2,13,587**

₹ 136000 = ₹ 213587 ÷ $(1 + r)^5$

₹ 136000 $(1 + r)^5$ = ₹ 213587

$(1 + r)^5 = 1.57049$

$(1 + r) = (1.57049)^{0.2}$

R = 9%

PROBLEM – 15

Suppose there are two Project A and Project B are under consideration. The cash flows associated with these projects are as follows:

Year	Project A (₹)	Project B (₹)
0	(1,00,000)	(3,00,000)
1	50,000	1,40,000
2	60,000	1,90,000
3	40,000	1,00,000

Assuming Cost of Capital equal to 10%

IDENTIFY which project should be accepted as per NPV Method and IRR Method.

SOLUTION:

Net Present Value (NPV) of Projects

Year	Cash Inflows of Project A (₹)	Cash Inflows of Project B (₹)	Present Value Factor @ 10%	PV of Project A (₹)	PV of Project B (₹)
0	(1,00,000)	(3,00,000)	1	(1,00,000)	(3,00,000)
1	50,000	1,40,000	0.909	45,450	1,27,260
2	60,000	1,90,000	0.826	49,560	1,56,940
3	40,000	1,00,000	0.751	30,040	75,100
NPV				**25,050**	**59,300**

Internal Rate of Returns (IRR) of projects

Since by discounting cash flows at 10%, we are getting values very far from zero. Therefore, let us discount cash flows using 20% discounting rate.

Year	Cash Inflows of Project A (₹)	Cash Inflows of Project B (₹)	Present Value Factor @ 20%	PV of Project A (₹)	PV of Project B (₹)
0	(1,00,000)	(3,00,000)	1	(1,00,000)	(3,00,000)
1	50,000	1,40,000	0.833	41,650	1,16,620
2	60,000	1,90,000	0.694	41,640	1,31,860
3	40,000	1,00,000	0.579	23,160	57,900
NPV				**6,450**	**6,380**

Even by discounting cash flows at 20%, we are getting values far from zero. Therefore, let us discount cash flows using 25% discounting rate.

Year	Cash Inflows of Project A (₹)	Cash Inflows of Project B (₹)	Present Value Factor @ 25%	PV of Project A (₹)	PV of Project B (₹)
0	(1,00,000)	(3,00,000)	1	(1,00,000)	(3,00,000)
1	50,000	1,40,000	0.8	40,000	1,12,000
2	60,000	1,90,000	0.640	38,400	1,21,600
3	40,000	1,00,000	0.512	20,480	51,200
NPV				**(1,120)**	**(15,200)**

The internal rate of return is, thus, more than 20% but less than 25%. The exact rate can be obtained by interpolation:

$$IRR_A = 20\% + \frac{₹\ 6,450}{₹\ 6,450 - (₹\ 1,120)} \times (25\% - 20\%) = 20\% + \left(\frac{₹\ 6,450}{₹\ 7,570} \times 5\%\right) = 24.26\%$$

$$IRR_B = 20\% + \frac{₹\ 6,380}{₹\ 6,380 - (₹\ 15,200)} \times (25\% - 20\%) = 20\% + \left(\frac{₹\ 6,380}{₹\ 21,580} \times 5\%\right) = 21.48\%$$

Overall Position

	Project A	Project B
NPV @ 10%	₹ 25,050	₹ 59,300
IRR	24.26%	21.48%

Thus, there is contradiction in ranking by two methods.

PROBLEM – 16

Suppose ABC Ltd. is considering two Project X and Project Y for investment. The cash flows associated with these projects are as follows:

Year	Project X (₹)	Project Y (₹)
0	(2,50,000)	(3,00,000)
1	2,00,000	50,000

2	1,00,000	1,00,000
3	50,000	3,00,000

Assuming Cost of Capital be 10%

IDENTIFY which project should be accepted as per NPV Method and IRR Method.

SOLUTION:

Net Present Value of Projects:

Year	Cash Inflows of Project X (₹)	Cash Inflows of Project Y (₹)	Present Value Factor @ 10%	PV of Project X (₹)	PV of Project Y (₹)
0	(2,50,000)	(3,00,000)	1.000	(2,50,000)	(3,00,000)
1	2,00,000	50,000	0.909	1,81,800	45,450
2	1,00,000	1,00,000	0.826	82,600	82,600
3	50,000	3,00,000	0.751	37,550	2,25,300
NPV				**51,950**	**53,350**

Internal Rate of Returns of projects

Since, by discounting cash flows at 10%, we are getting values far from zero. Therefore, let us discount cash flows using 20% discounting rate.

Year	Cash Inflows of Project X (₹)	Cash Inflows of Project Y (₹)	Present Value Factor @ 20%	PV of Project X (₹)	PV of Project Y (₹)
0	(2,50,000)	(3,00,000)	1.000	(2,50,000)	(3,00,000)
1	2,00,000	50,000	0.833	1,66,600	41,650
2	1,00,000	1,00,000	0.694	69,400	69,400
3	50,000	3,00,000	0.579	28,950	1,73,700
NPV				**14,950**	**(15,250)**

Since, by discounting cash flows at 20% we are getting that value of Project X is positive and value of Project Y is negative. Therefore, let us discount cash flows of Project X using 25% discounting rate and Project Y using discount rate of 15%.

Year	Cash Inflows of Project X (₹)	Present Value Factor @ 25%	PV of Project X (₹)	Cash Inflows of Project Y (₹)	Present Value Factor @ 15%	PV of Project Y (₹)
0	(2,50,000)	1.000	(2,50,000)	(3,00,000)	1.000	(3,00,000)
1	2,00,000	0.800	1,60,000	50,000	0.870	43,500
2	1,00,000	0.640	64,000	1,00,000	0.756	75,600
3	50,000	0.512	25,600	3,00,000	0.658	1,97,400
NPV			**(400)**			**16,500**

The internal rate can be obtained by interpolation:

$$IRR_X = 20\% + \frac{₹\ 14,950}{₹\ 14,950 - (-₹\ 400)} \times (25\% - 20\%)$$

$$= 20\% + \left(\frac{₹\ 14,950}{₹\ 15,350} \times 5\%\right) = 24.87\%$$

$$IRR_Y = 15\% + \frac{₹\ 16,500}{₹\ 16,500 - (-₹\ 15,250)} \times (25\% - 15\%)$$

$$= 15\% + \left(\frac{₹\ 16,500}{₹\ 31,750} \times 5\%\right) = 17.60\%$$

Overall Position

	Project A	Project B
NPV @ 10%	₹ 51,950	₹ 53,350
IRR	24.87%	17.60%

Thus, there is contradiction in ranking by two methods.

PROBLEM – 17

Suppose MVA Ltd. is considering two Project A and Project B for investment. The cash flows associated with these projects are as follows:

Year	Project A (₹)	Project B (₹)
0	(5,00,000)	(5,00,000)
1	7,50,000	2,00,000
2	0	2,00,000
3	0	7,00,000

Assuming Cost of Capital equal to 12%

ANALYSE which project should be accepted as per NPV Method and IRR Method?

SOLUTION:

Net Present Value of Projects

Year	Cash Inflows of Project A (₹)	Cash Inflows of Project B (₹)	Present Value Factor @ 12%	PV of Project A (₹)	PV of Project B (₹)
0	(5,00,000)	(5,00,000)	1.000	(5,00,000)	(5,00,000)
1	7,50,000	2,00,000	0.893	6,69,750	1,78,600
2	0	2,00,000	0.797	0	1,59,400
3	0	7,00,000	0.712	0	4,98,400
NPV				**1,69,750**	**3,36,400**

Internal Rate of Returns of projects

Let us discount cash flows using 50% discounting rate.

Year	Cash Inflows of Project A (₹)	Cash Inflows of Project B (₹)	Present Value Factor @ 50%	PV of Project A (₹)	PV of Project B (₹)
0	(5,00,000)	(5,00,000)	1.000	(5,00,000)	(5,00,000)
1	7,50,000	2,00,000	0.667	5,00,250	1,33,400
2	0	2,00,000	0.444	0	88,800
3	0	7,00,000	0.296	0	2,07,200
NPV				**250**	**(70,600)**

Since, IRR of project A shall be 50% as NPV is very small. Further, by discounting cash flows at 50%, we are getting NPV of Project B negative. Therefore, let us discount cash flows of Project B using 15% discounting rate.

Year	Cash Inflows of Project B (₹)	Present Value Factor @ 15%	PV of Project B (₹)
0	(5,00,000)	1.000	(5,00,000)
1	2,00,000	0.870	1,74,000
2	2,00,000	0.756	1,51,200
3	7,00,000	0.658	4,60,600
NPV			**2,85,800**

The internal rate can be obtained by interpolation:

$$IRR_B = 15\% + \frac{₹\ 2,85,800}{₹\ 2,85,800 - (₹\ 70,600)} \times (50\% - 15\%)$$

$$= 15\% + \left(\frac{₹\ 2,85,800}{₹\ 3,56,400} \times 35\%\right) = 43.07\%$$

Overall Position

	Project A	Project B
NPV @ 12%	₹ 1,69,750	₹ 3,36,400
IRR	50%	43.07%

There is a Conflict in Ranking Between NPV and IRR due to Disparity in the Life of Proposals (Unequal Life)

PROBLEM – 18

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

Project	Investment (₹)	NPV @ 15% (₹)
A	(50,000)	15,400
B	(40,000)	18,700

C	(25,000)	10,100
D	(30,000)	11,200
E	(35,000)	19,300

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

You are required to ILLUSTRATE the returns from a package of projects within the capital spending limit. The projects are independent of each other and are divisible (i.e., part- project is possible).

SOLUTION:

Computation of NPVs Per Rupee of Investment and Ranking of the Projects

Project	Investment (₹) (Given)	NPV @ 15% (₹) (Given)	NPV Per Rupee invested	Ranking
A	(50000)	15400	0.308	5
B	(40000)	18700	0.4675	2
C	(25000)	10100	0.404	3
D	(30000)	11200	0.373	4
E	(35000)	19300	0.551	1

Building up of a Programme of Projects based on their Rankings

Project	Investment (₹)	NPV @ 15% ₹
E	(35000)	19300
B	(40000)	18700
C	(25000)	10100
D	(20000)	7467 (₹ 11200 ÷ ₹ 30000) x ₹ 20000
Total	**120000**	**55567**

Thus, Project A should be rejected and only two-third of Project D be undertaken.

Capital Rationing (Projects are Indivisible)

Projects	Investment	NPV @ 15%
E	35,000	19,300
B	40,000	18,700
C	25,000	10,100
Total	**1,00,000**	**48,100**

Projects	Investment	NPV @ 15%
E+B+D	1,05,000	49,200
E+B+C	1,00,000	48,100

In this case E+B+D is preferable as it provides a higher NPV despite D ranking lower than C.

PROBLEM – 19

R Pvt. Ltd. is considering modernizing its production facilities and it has two proposals under consideration. The expected cash flows associated with these projects and their NPV as per discounting rate of 12% and IRR is as follows:

Year	Cash Flow	
	Project A (₹)	Project B (₹)
0	(40,00,000)	(20,00,000)
1	8,00,000	7,00,000
2	14,00,000	13,00,000
3	13,00,000	12,00,000
4	12,00,000	0
5	11,00,000	0
6	10,00,000	0
NPV @12%	6,49,094	5,15,488
IRR	17.47%	25.20%

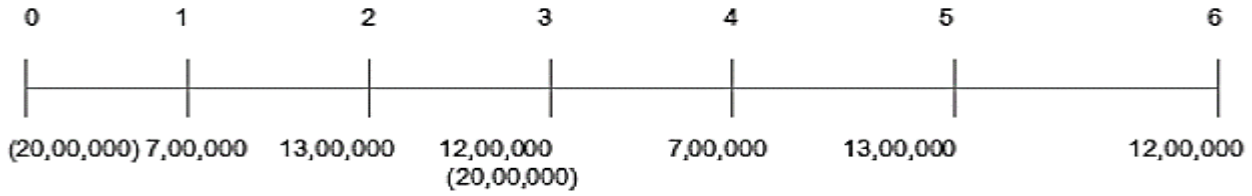
IDENTIFY which project should R Pvt. Ltd accept?

SOLUTION:

Method 1: Replacement Chain Method

Since the life of Project A is 6 years and B is 3 years to equalize the life, we have second opportunity of investing in Project B after 1 Time Investing.

The Position of Cash Flows in such situation is as follows:



Cash Flow (₹ in Lakhs)	PVF @12%	DCF (₹)
(20 Lakhs)	1	(20 Lakhs)
7 Lakhs	0.893	625100
13 Lakhs	0.797	1036100
(8 Lakhs)	0.712	(569600)
7 Lakhs	0.636	445200
13 Lakhs	0.567	737100
12 Lakhs	0.507	608400
	NPV	**882300**

NPV of Project B with an extended life of 6 years ₹ 882300 while NPV of Project A is with a life of 6 years ₹ 649094. Accordingly project B with an extended life of 6 years appears to be more attractive.

Method 2: Equivalent Annualised Criterion:

	Project A	Project B
NPV @ 12%	₹6,49,094	₹5,15,488
PVAF @12%	4.112	2.402
Equivalent Annualized Criterion	₹1,57,854	₹2,14,608

Thus, Project B should be selected.

PROBLEM – 20

Alpha Company is considering the following investment projects:

	Cash Flows (₹)			
Projects	C_0	C_1	C_2	C_3
A	**-10,000**	**+10,000**		
B	**-10,000**	**+7,500**	**+7,500**	
C	**-10,000**	**+2,000**	**+4,000**	**+12,000**
D	**-10,000**	**+10,000**	**+3,000**	**+3,000**

a. ANALYSE and rank the projects according to each of the following methods: (i) Payback, (ii) ARR, (iii) IRR and (iv) NPV, assuming discount rates of 10 and 30 per cent.

b. Assuming the projects are independent, which one should be accepted? If the projects are mutually exclusive, IDENTIFY which project is the best?

SOLUTION:

a.

i. Payback Period

Project A: ₹ 10,000 ÷ ₹ 10,000 = 1 year

Project B: ₹ 10,000 ÷ ₹ 7,500 = $1\frac{1}{3}$ years

Project C:

Year	Cash Flow (₹)	Cumulative Cash Flow (₹)
C1	2,000	2,000
C2	4,000	6,000
C3	12,000	18,000

Pay Back Period = 2 years + (₹ 10000 - ₹ 6000) ÷ ₹ 12000

= 2 + 0.333 = 2.333 Years.

Project D: 1 year

ii. ARR (Figures in ₹) = Average Profit ÷ Average Investment

Project A: $\frac{(₹\ 10,000 - ₹\ 10,000)\ 1 \div 2}{(₹\ 10,000)\ 1 \div 2} = 0$

Project B: $\frac{(₹\ 15,000 - ₹\ 10,000)\ 1 \div 2}{(₹\ 10,000) 1 \div 2} = \frac{₹\ 2,500}{₹\ 5,000} = 50\%$

Project C: $\frac{(₹\ 18,000 - ₹\ 10,000)\ 1 \div 3}{(₹\ 10,000) 1 \div 2} = \frac{₹\ 2,667}{₹\ 5,000} = 53\%$

Project D: $\frac{(₹\ 16,000 - ₹\ 10,000)\ 1 \div 3}{(₹\ 10,000)\ 1 \div 2} = \frac{₹\ 2,000}{₹\ 5,000} = 40\%$

Note: Since the profit figures are not available, they have been computed by Adjusting the Initial Investment against the Annual Cash Inflows.

iii. IRR

Project A:	The net cash proceeds in year 1 are just equal to investment. Therefore, r = 0%.
Project B:	This project produces an annuity of ₹ 7,500 for two years. Therefore, the required PVAF is: ₹ 10,000 ÷ ₹ 7,500 = 1.33. This factor is found under 32% column. Therefore, r = 32%
Project C:	Since cash flows are uneven, the trial-and-error method will be followed. Using 20% rate of discount, the NPV is + ₹ 1,389. At 30% rate of discount, the NPV is - ₹ 633. The true rate of return should be less than 30%. At 27% rate of discount, it is found that the NPV is - ₹86 and + ₹ 105 at 26%. Through interpolation, we find r = 26.5%
Project D:	In this case also by using the trial-and-error method, it is found that at 37.6% rate of discount, NPV becomes almost zero. Therefore, r = 37.6%.

iv. NPV @ 10% Discount Rate

Project A = (₹ 10000 x 0.909) - ₹ 10000 = - ₹ 910

Project B = (₹ 7500 x 1.736) - ₹ 10000 = ₹ 3020

Project C =

Year	Cash Flow (₹)	Discount Factor @10%	Discounted Cash Flow (₹)
0	-10,000	1	-10,000
1	2,000	0.909	1,818
2	4,000	0.826	3,304
3	12,000	0.751	9,012
NPV			**4,134**

Project D =

Year	Cash Flow (₹)	Discount Factor @10%	Discounted Cash Flow (₹)
0	-10,000	1	-10,000
1	10,000	0.909	9,090
2	3,000	0..826	2,478
3	3,000	0.751	2,253
NPV			**3,821**

v. NPV @ 30% Discount Rate

Project A = (₹ 10000 x 0.769) - ₹ 10000 = - ₹ 2310

Project B = (₹ 7500 x 1.361) - ₹ 10000 = ₹ 207.5

Project C =

Year	Cash Flow (₹)	Discount Factor @30%	Discounted Cash Flow (₹)
0	-10,000	1	-10,000
1	2,000	0.769	1538
2	4,000	0.592	2368
3	12,000	0.455	5460
NPV			**-634**

Project D =

Year	Cash Flow (₹)	Discount Factor @30%	Discounted Cash Flow (₹)
0	-10,000	1	-10,000
1	10,000	0.769	7690
2	3,000	0.592	1776
3	3,000	0.455	1365
NPV			**+831**

Ranking of Projects under various methods:

Projects	Pay Back	ARR	IRR	NPV @10%	NPV @30%
A	1	4	4	4	4
B	2	2	2	3	2
C	3	1	3	1	3
D	1	3	1	2	1

Comments:

When the project are independent:

1. Between NPV and IRR, NPV gives consistent results in conformity with wealth maximisation principle.
2. If the Projects are independent either IRR or NPV can be used since the same set of Projects will be accepted by any of the methods.
3. In the present case except Project A all the three Projects should be accepted if the discount rate is 10%. Only Projects B and D is undertaken if the Discount rate is 30%.

When the project are mutually exclusive:

1. Under NPV 30% Rate the choice is between B and D. Since A and C are unprofitable.
2. Both IRR and NPV gives the same result that is D is the best.
3. How ever there is a conflict in Ranking according to IRR and NPV 10% if IRR Rule is followed Project D should be accepted whereas If the NPV Rule is followed Project C should be accepted.

4. NPV Rule generally gives consistent results in conformity with the wealth maximisation principle. Project C must be accepted by following NPV rule.

PROBLEM – 20A

The expected cash flows of three projects are given below. The cost of capital is 10 per cent.

a. CALCULATE the payback period, net present value, internal rate of return and accounting rate of return of each project.

b. IDENTIFY the rankings of the projects by each of the four methods.

(₹ in '000)

Period	Project A (₹)	Project B (₹)	Project C (₹)
0	(5,000)	(5,000)	(5,000)
1	900	700	2,000
2	900	800	2,000
3	900	900	2,000
4	900	1,000	1,000
5	900	1,100	
6	900	1,200	
7	900	1,300	
8	900	1,400	
9	900	1,500	
10	900	1,600	

SOLUTION:

a) Payback Period Method:

A = 5 + (₹ 500 ÷ ₹ 900) = 5.56 years

B = 5 + (₹ 500 ÷ ₹ 1,200) = 5.42 years

C = 2 + (₹ 1,000 ÷ ₹ 2,000) = 2.5 years

Net Present Value Method:

NPV_A = (- ₹ 5,000) + (₹ 900 x 6.145) = ₹ (5,000) + ₹ 5,530.5 = ₹ 530.5

NPV_B is calculated as follows:

Year	Cash flow (₹)	10% discount factor	Present value (₹)
0	(5000)	1.000	(5,000)
1	700	0.909	636
2	800	0.826	661
3	900	0.751	676
4	1000	0.683	683
5	1100	0.621	683
6	1200	0.564	677
7	1300	0.513	667
8	1400	0.467	654

9	1500	0.424	636
10	1600	0.386	618
			1591

NPV C is calculated as follows:

Year	Cash flow (₹)	10% discount factor	Present value (₹)
0	(5000)	1.000	(5,000)
1	2000	0.909	1,818
2	2000	0.826	1,652
3	2000	0.751	1,502
4	1000	0.683	683
			655

Internal Rate of Return Project A

NPV at 12% = ₹ (5,000) + ₹ 900 x 5.650

= ₹ (5,000) + ₹ 5085 = ₹ 85

NPV at 13% = ₹ (5,000) + ₹ 900 x 5.426

= ₹ (5,000) + ₹ 4,883.40 = ₹ -116.60

$$IRR_A = 12 + \left[\frac{₹\ 85}{₹\ 85 - (-₹\ 116.60)}\right] \times (13\%-12\%) = 12 + 0.42 = 12.42\%$$

Project B

IRR_B

Year	Cash flow (₹)	10% discount factor	Present value (₹)	16% discount factor	Present value (₹)
0	(5,000)	1.000	(5,000)	1.000	(5,000)
1	700	0.909	636	0.862	603
2	800	0.826	661	0.743	595
3	900	0.751	676	0.641	577
4	1,000	0.683	683	0.552	552
5	1,100	0.621	683	0.476	524
6	1,200	0.564	677	0.410	493
7	1,300	0.513	667	0.354	460
8	1,400	0.467	654	0.305	427
9	1,500	0.424	636	0.263	394
10	1,600	0.386	618	0.227	363
			1,591		**(12)**

Interpolating: IRRB = $10\% + \frac{₹\ 1,591}{(₹\ 1,591 + ₹\ 12)} \times (16\% - 10\%) = 10\% + 5.94\% = 15.94\%$

Project C

IRR_C

Year	Cash flow (₹)	15% discount factor	Present value (₹)	18% discount factor	Present value (₹)
0	(5,000)	1.000	(5,000)	1.000	(5,000)
1	2,000	0.870	1,740	0.847	1,694
2	2,000	0.756	1,512	0.718	1,436
3	2,000	0.658	1,316	0.609	1,218
4	1,000	0.572	572	0.516	516
			140		(136)

Interpolating: $IRR_C = 15\% + \frac{₹\ 140}{(₹\ 140 + ₹\ 136)} \times (18\% - 15\%) = 15\% + 1.52\% = 16.52\%$

Accounting Rate of Return:

ARRA: Average capital employed = $\frac{₹\ 5000}{2} = ₹\ 2,500$

Average accounting profit = $\frac{(₹\ 9,000 - ₹\ 5,000)}{10} = ₹\ 400$

$ARR_A = \frac{(₹\ 400 \times ₹\ 100)}{₹\ 2,500} = 16\%$

ARR_B: Average accounting profit = $\frac{(₹\ 11,500 - ₹\ 5,000)}{10} = ₹\ 650$

$ARRB = \frac{(₹\ 650 \times ₹\ 100)}{₹\ 2,500} = 26\ \%$

ARRC: Average accounting profit = $\frac{(₹\ 7,000 - ₹\ 5,000)}{4} = ₹500$

$ARR_C = \frac{(₹\ 500 \times ₹\ 100)}{₹\ 2,500} = 20\ \%$

Summary of Results

	A	B	C
Payback (years)	5.5	5.4	2.5
NPV (₹)	530.50	1,591	655
IRR (%)	12.42	15.94	16.52
ARR (%)	16	26	20

Comparison of Rankings

Method	Payback	NPV	IRR	ARR
1	C	B	C	B
2	B	C	B	C
3	A	A	A	A

PROBLEM – 20B

X Limited is considering purchasing of new plant worth ₹80,00,000. The expected net cash flows after taxes and before depreciation are as follows:

Year	Net Cash Flows (₹)
1	14,00,000
2	14,00,000
3	14,00,000
4	14,00,000
5	14,00,000
6	16,00,000
7	20,00,000
8	30,00,000
9	20,00,000
10	8,00,000

The rate of cost of capital is 10%.

You are required to CALCULATE:

i. **Pay-back period**

ii. **Net present value at 10 discount factors**

iii. **Profitability index at 10 discount factors**

iv. **Internal rate of return with the help of 10% and 15% discount factor the following present value table is given for you:**

Year	Present value of ₹1 at 10% discount rate	Present value of ₹1 at 15% discount rate
1	0.909	0.87
2	0.826	0.756
3	0.751	0.658
4	0.683	0.572
5	0.621	0.497
6	0.564	0.432
7	0.513	0.376
8	0.467	0.327
9	0.424	0.284
10	0.386	0.247

SOLUTION:

Calculation of Pay-back Period

Cash Outlay of the Project	=	₹ 80,00,000
Total Cash Inflow for the first five years	=	₹ 70,00,000
Balance of cash outlay left to be paid back in the 6th year	=	₹ 10,00,000
Cash inflow for 6th year	=	₹ 16,00,000

So, the payback period is between 5th and 6th years, i.e.,

$$5 \text{ years} + \frac{₹\ 10,00,000}{₹\ 16,00,000} = 5.625 \text{ years or } 5 \text{ years } 7.5 \text{ months}$$

Calculation of Net Present Value (NPV) @10% discount rate:

Year	Net Cash Inflow (₹)	Present Value at Discount Rate of 10%	Present Value (₹)
	(a)	(b)	(c) = (a)× (b)
1	14,00,000	0.909	12,72,600
2	14,00,000	0.826	11,56,400
3	14,00,000	0.751	10,51,400
4	14,00,000	0.683	9,56,200
5	14,00,000	0.621	8,69,400
6	16,00,000	0.564	9,02,400
7	20,00,000	0.513	10,26,000
8	30,00,000	0.467	14,01,000
9	20,00,000	0.424	8,48,000
10	8,00,000	0.386	3,08,800
			97,92,200

Net Present Value (NPV) = Cash Outflow – Present Value of Cash Inflows

= ₹ 80,00,000 – ₹ 97,92,200 = ₹ 17,92,200

Calculation of Profitability Index @ 10% discount rate:

$$\text{Profitability Index} = \frac{\text{Present Value of Cash inflows}}{\text{Cost of the investment}}$$

$$= \frac{₹\ 97,92,200}{₹\ 80,00,000} = 1.224$$

Calculation of Internal Rate of Return:

Net present value @ 10% interest rate factor has already been calculated in (ii) above, we will calculate Net present value @15% rate factor.

Year	Net Cash Inflow (₹)	Present Value at Discount Rate of 15%	Present Value (₹)
	(a)	(b)	(c) = (a)× (b)
1	14,00,000	0.870	12,18,000
2	14,00,000	0.756	10,58,400
3	14,00,000	0.658	9,21,200
4	14,00,000	0.572	8,00,800
5	14,00,000	0.497	6,95,800
6	16,00,000	0.432	6,91,200
7	20,00,000	0.376	7,52,000
8	30,00,000	0.327	9,81,000
9	20,00,000	0.284	5,68,000

10	8,00,000	0.247	1,97,600
			78,84,000

Net Present Value at 15% = ₹78,84,000 – ₹80,00,000 = ₹-1,16,000

As the net present value @ 15% discount rate is negative, hence internal rate of return falls in between 10% and 15%. The correct internal rate of return can be calculated as follows:

$$IRR = L + \frac{NPV_{LR}}{NPV_{LR} - NPV_{HR}}(H - L)$$

$$=10\% + \frac{₹\ 17,92,200}{₹\ 17,92,200 - (-₹\ 1,16,000)}(15\% - 10\%)$$

$$=10\% + \frac{₹\ 17,92,200}{₹\ 19,08,200} \times 5\% = 14.7\%$$

PROBLEM – 21

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

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

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

	Old machine (₹)	New machine (₹)
Sales	8,10,000	8,10,000
Material cost	1,80,000	1,26,250
Labor 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: Trade in price of Old Machine	1,00,000
Cost of New Machine	**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**

3. **Depreciation on New Machine @7.5% under WDV:**

Year	Opening WDV (₹)	Depreciation @7.5% (₹)	Closing WDV (₹)
1	3,50,000.00	26,250.00	3,23,750.00
2	3,23,750.00	24,281.25	2,99,468.75
3	2,99,468.75	22,460.16	2,77,008.59
4	2,77,008.59	20,775.64	2,56,232.95
5	2,56,232.95	19,217.47	2,37,015.48
6	2,37,015.48	17,776.16	2,19,239.32
7	2,19,239.32	16,442.95	2,02,796.37
8	2,02,796.37	15,209.73	1,87,586.64
9	1,87,586.64	14,069.00	1,73,517.64
10	1,73,517.64	13,013.82	1,60,503.82

CALCULATION OF INCREMENTAL NPV:

Year	PVF @10%	PBTD (₹)	Depreciation (₹)	PBT (₹)	Tax @ 30%	CFAT (₹)	PVCF (₹)
	1	2	3 (WN-3)	4 = 2 - 3	5 = 4 x 30%	6 = 4 -5 + 3	7 = 6 x 1
1	0.909	80,000	26,250.00	53,750.00	16,125.00	63,875.00	58,062.38
2	0.826	80,000	24,281.25	55,718.75	16,715.63	63,284.38	52,272.89
3	0.751	80,000	22,460.16	57,539.84	17,261.95	62,738.05	47,116.27
4	0.683	80,000	20,775.64	59,224.36	17,767.31	62,232.69	42,504.93
5	0.621	80,000	19,217.47	60,782.53	18,234.76	61,765.24	38,356.21
6	0.564	80,000	17,776.16	62,223.84	18,667.15	61,332.85	34,591.73
7	0.513	80,000	16,442.95	63,557.05	19,067.12	60,932.88	31,258.57
8	0.467	80,000	15,209.73	64,790.27	19,437.08	60,562.92	28,282.88
9	0.424	80,000	14,069.00	65,931.00	19,779.30	60,220.70	25,533.58
10	0.386	80,000	13,013.82	66,986.18	20,095.85	59,904.15	23,123.00
						Total	**3,81,102.44**

Add: Incremental Present Value of Salvage Value (₹ 35000 - ₹ 0) = ₹ 13510

Total PV of Incremental Cash Inflow (₹ 381102.44 + ₹ 13510) = ₹ 394612.44

Less: Cost of New Machine Outflow = ₹ 350000

Incremental NPV = ₹ 44612.44

Since the incremental NPV is Positive the old Machine Should be Replaced with the New Machine.

PROBLEM – 21A (RTP MAY 24)

HMR Ltd. is considering replacing a manually operated old machine with a fully automatic new machine. The old machine had been fully depreciated for tax purpose but has a book value of ₹ 2,50,000 on 31st March. The machine has begun causing problems with breakdowns and it cannot fetch more than ₹ 40,000 if sold in the market at present. It will have no realizable value after 10 years The company has been offered ₹ 1,50,000 for the old machine as a trade in on the new machine which has a price (before allowance for trade in) of ₹ 6,00,000. The expected life of new machine is 10 years with salvage value of ₹ 35,000.

Further, the company follows written down value method depreciation @ 10% but for tax purpose, straight line method depreciation is used considering that this is the only machine in the block of assets. A working capital of ₹ 50,000 will be needed and it will be released at the end of tenth year.

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

	Old machine	New machine
Annual output	60,000 units	80,000 units
Selling price per unit	₹ 18	₹ 18
Annual operating hours	2,800	2,800
Material cost per unit	₹ 5	₹ 5
Labour cost per hour	₹ 50	₹ 75
Indirect cash cost per annum	₹ 1,00,000	₹ 1,75,000

From the above information, ANALYSE whether the old machine should be replaced or not if the opportunity cost of capital of the Company is 10%?

The Income tax rate is 30%. Further assume that book profit is treated as ordinary income for tax purpose.

Also ESTIMATE the internal rate of return of the replacement decision.

All calculations to be calculated to 3 decimal places.

SOLUTION:

Workings:

(i) Initial Cash Outflow:

	Amount (₹)
Cost of new machine	6,00,000
Less: Sale Price of existing machine	1,05,000
Net of Tax (₹ 150000 x 0.70)	**4,95,000**

(ii) Terminal Cash Flows:

New Machine

	Amount (₹)
Salvage value of Machine	35,000
Less: Depreciated WDV	35,000
{₹ 6,00,000 - (₹ 56,500 × 10 years)}	
Short Term Capital Gain (STCG)	Nil
Tax	Nil
Net Salvage Value (cash flows)	**35,000**

(iii) Computation of additional cash flows (yearly)

Particulars	**Existing machine**	**New Machine**	**Incremental**
(1)	(2)	(3)	(4) = (3)- (2)
Annual output	60,000 units	80,000 units	20,000 units
	₹	₹	₹
(A) Sales revenue @ ₹ 18 per unit	10,80,000	14,40,000	3,60,000
(B) Less: Cost of Operation			
Material @ ₹ 5 per unit	3,00,000	4,00,000	1,00,000
Labour			
Old = 2,800 x ₹ 50	1,40,000		70,000
New = 2,800 x ₹ 75		2,10,000	
Indirect cash cost	1,00,000	1,75,000	75,000
Total Cost (B)	5,40,000	7,85,000	2,45,000
Profit Before Tax and depreciation (PBTD) (A – B)	**5,40,000**	**6,55,000**	**1,15,000**
Less: Depreciation (₹ 6,00,000 – ₹ 35,000) ÷ 10 Years			56,500
Earning after depreciation before Tax			**58,500**
Less: Tax @30%			17,550
Earning after depreciation and Tax			**40,950**
Add: Depreciation			56,500
Net Cash inflow			**97,450**

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

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

(iv) Calculation of IRR

Computation of NPV @ 10%

	Period	Cash flow (₹)	PVF @ 10%	PV (₹)
Incremental cash flows	1-10	97,450	6.144	5,98,733
Add: Release of Working Capital	10	50,000	0.386	19,300
Add: Terminal year cash	10	35,000	0.386	13,510
				6,31,543
Less: Initial cash outflow	0	4,95,000	1	4,95,000
Less: Working capital	0	50,000	1	50,000
			NPV	**86,543**

Since NPV computed in Part (i) is positive. Let us discount cash flows at higher rate say at 20%

	Period	Cash flow (₹)	PVF @ 20%	PV (₹)
Incremental cash flows	1-10	97,450	4.192	4,08,510
Add: Release of Working Capital	10	50,000	0.162	8,100
Add: Terminal year cash	10	35,000	0.162	5,670
				4,22,280
Less: Initial cash outflow	0	4,95,000	1	4,95,000
Less: Working capital	0	50,000	1	50,000
			NPV	**(1,22,720)**

Now we use interpolation formula:

$$10\% + \frac{₹\ 86,543}{₹\ 86,543 - (-₹\ 1,22,720)} \times 10\%$$

$$10\% + \frac{₹\ 86,543}{₹\ 2,09,263} \times 10\%$$

IRR = 10% + 4.14% = 14.14%

Summary of Results

		Decision
Incremental Cash Flow	₹ 97,450	Accept
IRR	14.14% > Cost of Capital (10%)	Accept

PROBLEM – 22

Lockwood Limited wants to replace its old machine with a new automatic machine. Two models A and B are available at the same cost of ₹ 5 lakhs each. Salvage value of the old machine is ₹ 1 lakh. The utilities of the existing machine can be used if the company purchases model A. Additional cost of utilities to be purchased in this case will be ₹ 1

lakh. If the company purchases B, then all the existing utilities will have to be replaced with new utilities costing ₹ 2 lakhs. The salvage value of the old utilities will be ₹ 0.20 lakhs. The cash flows are expected to be:

Year	Cash inflows of A (₹)	Cash inflows of B (₹)	P.V. Factor @ 15%
1	1,00,000	2,00,000	0.870
2	1,50,000	2,10,000	0.756
3	1,80,000	1,80,000	0.658
4	2,00,000	1,70,000	0.572
5	1,70,000	40,000	0.497
Salvage Value at the end of Year 5	50,000	60,000	

The targeted return on capital is 15%.

You are required to

i. COMPUTE, for the two machines separately, net present value, discounted payback period and desirability factor

ii. STATE which of the machines is to be selected?

SOLUTION:

Working:

Calculation of Initial Cash Flow (Net)

Particulars	A (₹)	B (₹)
Cost of Machine	5,00,000	5,00,000
Cost of Utilities	1,00,000	2,00,000
Salvage value of Old Machine	(1,00,000)	(1,00,000)
Salvage of value Old Utilities	-	(20,000)
Total Expenditure (Net)	**5,00,000**	**5,80,000**

(i) (a) Calculation of NPV

Year	PV Factor @ 15%	Machine A		Machine B	
		Cash Inflows (₹)	Discounted value of inflows (₹)	Cash Inflows (₹)	Discounted value of inflows (₹)
0	1.000	(5,00,000)	(5,00,000)	(5,80,000)	(5,80,000)
1	0.870	1,00,000	87,000	2,00,000	1,74,000
2	0.756	1,50,000	1,13,400	2,10,000	1,58,760
3	0.658	1,80,000	1,18,440	1,80,000	1,18,440
4	0.572	2,00,000	1,14,400	1,70,000	97,240
5	0.497	1,70,000	84,490	40,000	19,880
Salvage	0.497	50,000	24,850	60,000	29,820
Net Present Value			**42,580**		**18,140**

Since the Net present Value of both the machines is positive both are acceptable.

(b) Discounted Pay-back Period **(Amount in ₹)**

Year	Machine A		Machine B	
	Discounted cash inflows ₹	Cumulative Discounted cash inflows ₹	Discounted cash inflows ₹	Cumulative Discounted cash inflows ₹
1	87,000	87,000	1,74,000	1,74,000
2	1,13,400	2,00,400	1,58,760	3,32,760
3	1,18,440	3,18,840	1,18,440	4,51,200
4	1,14,400	4,33,240	97,240	5,48,440
5	1,09,340*	5,42,580	49,700*	5,98,140

* Includes salvage value.

Discounted Payback Period (For A and B):

$$\text{Machine A} = 4\text{years} + \left(\frac{₹\ 5,00,000 - ₹\ 4,33,240}{₹\ 1,09,340}\right) = 4.61\text{years}$$

$$\text{Machine B} = 4\text{years} + \left(\frac{₹\ 5,80,000 - ₹\ 5,48,440}{₹\ 49,700}\right) = 4.63\text{years}$$

(c) Desirability Factor or Profitability Index:

Profitability Index (PI) = Sum of Present Value of Cash Inflow ÷ Sum of Cash Outflow

$$\text{Machine A} = \frac{₹\ 5,42,580}{₹\ 5,00,000} = 1.08;\ \text{Machine B} = \frac{₹\ 5,98,140}{₹\ 5,80,000} = 1.03$$

Decision: Since the NPV and PI are more in case of Machine A it is Better to Choose Machine A. The Discounted Pay Back Period in Both the Cases is Almost the Same.

PROBLEM – 22A **(MTP 1 SEPT 24 8M)**

Parmarth Limited is a manufacturer of computer 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.

SOLUTION:

Calculation of Present value of cash inflows (PVCI)

	Year 0 ₹	Year 1 ₹	Year 2 ₹	Year 3 ₹	Year 4 ₹	Year 5 ₹
Savings in cost due to Production Delays (Given)	-	3,50,000	3,50,000	3,50,000	3,50,000	3,50,000
Savings in Salaries (Given)	-	21,00,000	21,00,000	21,00,000	21,00,000	21,00,000
Reduction in lost sales (Given)	-	1,75,000	1,75,000	1,75,000	1,75,000	1,75,000
Gain due to timely billing (Given)	-	3,25,000	3,25,000	3,25,000	3,25,000	3,25,000
Total	**-**	**29,50,000**	**29,50,000**	**29,50,000**	**29,50,000**	**29,50,000**
Less:						
Salary of AI specialists	-	13,00,000	13,00,000	13,00,000	13,00,000	13,00,000
Annual Maintenance & Operating Cost	-	1,80,000	2,00,000	1,20,000	1,10,000	1,30,000
Net Profit Before Tax and Depreciation	**-**	**14,70,000**	**14,50,000**	**15,30,000**	**15,40,000**	**15,20,000**
(-) Depreciation	-	9,20,000	5,52,000	3,31,200	1,98,720	1,19,232
Net Profit Before Tax	-	**5,50,000**	**8,98,000**	**11,98,800**	**13,41,280**	**14,00,768**
(-) Tax @ 25%	-	1,37,500	2,24,500	2,99,700	3,35,320	3,50,192
Net Profit After Tax	**-**	**4,12,500**	**6,73,500**	**8,99,100**	**10,05,960**	**10,50,576**
(+) Depreciation	-	9,20,000	5,52,000	3,31,200	1,98,720	1,19,232
(+) Annual Maintenance & Operating Cost	-	1,80,000	2,00,000	1,20,000	1,10,000	1,30,000
Gross Cash Inflows	**-**	**15,12,500**	**14,25,500**	**13,50,300**	**13,14,680**	**12,99,808**
Annual Maintenance & Operating Cost actually paid	1,80,000	2,00,000	1,20,000	1,10,000	1,30,000	-
Net Cash Inflows	**-1,80,000**	**13,12,500**	**13,05,500**	**12,40,300**	**11,84,680**	**12,99,808**
(+) Sale Value at the end of life -	-	-	-	-	-	1,90,000
	-1,80,000	**13,12,500**	**13,05,500**	**12,40,300**	**11,84,680**	**14,89,808**
PV Factor @ 12%	1	0.8929	0.7`972	0.7118	0.6355	0.5674
PV of Cash Inflows	-1,80,000	11,71,875	10,40,737	8,82,821	7,52,886	8,45,357
Total PV of Cash Inflows	45,13,675					

Calculation of Present value of cash outflows (PVCO)

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 of Cash Outflow	₹ 17,25,000	₹ 5,13,418

(2) Total PV of Cash Outflow = ₹ 22,38,418

(3) PV of Tax on Capital Gains (Only asset in the block) - 5th Year end

Capital Gains = Sale Price (-) Closing WDV at 5th year
= ₹ 1,90,000 (-) ₹ 1,78,848
= ₹ 11,152

Tax @ 20% on above = ₹ 2230.40

PV = ₹ 2,230.40 x 0.5674 = ₹ 1,266

Net PV of Cash Inflow = PV of Cash Outflow - PV of Tax on Capital Gains
= ₹ 45,13,675 - ₹ 1,266 = ₹ 45,12,409

NPV = Net PV of Cash Inflow – PV of Cash Outflow
= ₹ 45,12,409 - ₹ 22,38,418
= ₹ 22,73,991

PI = PV of Cash Inflow ÷ PV of Cash Outflow
= ₹ 45,12,409 ÷ ₹ 22,38,418 = 2.0158

ARR = Average Net Profit After Tax ÷ Initial Investment
= 8,08,327.2 ÷ 23,00,000 x 100 = 35.145%

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

PROBLEM – 23

Xavly Ltd. has a machine which has been in operation for 3 years. The machine has a remaining estimated useful life of 5 years with no salvage value in the end. Its current market value is ₹ 2,00,000. The company is considering a proposal to purchase a new model of machine to replace the existing machine. The relevant information is as follows:

	Existing Machine	New Machine
Cost of machine	₹ 3,30,000	₹ 10,00,000
Estimated life	8 years	5 years
Salvage value	Nil	₹40,000
Annual output	30,000 units	75,000 units
Selling price per unit	₹ 15	₹ 15
Annual operating hours	3,000	3,000
Material cost per unit	₹ 4	₹ 4
Labour cost per hour	₹ 40	₹ 70
Indirect cash cost per annum	₹ 50,000	₹ 65,000

The company uses written down value of depreciation @ 20% and it has several other machines in the block of assets. The Income tax rate is 30 per cent and Xavly Ltd. does not make any investment, if it yields less than 12 per cent.

ADVISE Xavly Ltd. whether the existing machine should be replaced or not. PV factors @12%:

Year	1	2	3	4	5

PVF	0.893	0.797	0.712	0.636	0.567

SOLUTION:

(i) Calculation of Net Initial Cash Outflows:

	₹
Cost of new machine (Given)	10,00,000
Less: Sale proceeds of existing machine (Given)	2,00,000
Net initial cash outflows (Cost of New Machine – Sale Proceeds)	**8,00,000**

(ii) Calculation of Base for depreciation

Particulars	₹
WDV of Existing Machine	
Cost of existing machine (Given)	3,30,000
Less: Depreciation for year 1 (₹ 330000 * 20%)	66,000
Depreciation for Year 2 (₹ 330000 - ₹ 66000) * 20%	52,800
Depreciation for Year 3 (₹ 330000 - ₹ 66000 - ₹ 52800) * 20%	42,240
WDV of Existing Machine (i)	**1,68,960**
Depreciation base of New Machine	
Cost of new machine (Given)	10,00,000
Add: WDV of existing machine	1,68,960
Less: Sales value of existing machine (Given)	2,00,000
Depreciation base of New Machine (ii)	**9,68,960**
Base for incremental depreciation [(ii) – (i)]	**8,00,000**

(iii)Calculation of annual Profit Before Tax and depreciation

Particulars	Existing machine	New Machine	Differential
(1)	(2)	(3)	(4) = (3)– (2)
Annual output (Given)	30,000 units	75,000 units	45,000 units
	₹	₹	₹
(A) Sales revenue @ ₹ 15 per unit	4,50,000	11,25,000	6,75,000
(B) Less: Cost of Operation			
Material @ ₹ 4 per unit (Given)	1,20,000	3,00,000	1,80,000
Labor (120000 – 210000)			90,000
Old = 3,000 x ₹ 40	1,20,000		
New = 3,000 x ₹ 70		2,10,000	
Indirect cash cost (Given)	50,000	65,000	15,000
Total Cost (B)	2,90,000	5,75,000	2,85,000
Profit Before Tax and depreciation (PBTD) (A – B)	**1,60,000**	**5,50,000**	**3,90,000**

(iv) Calculation of Incremental Depreciation:

Year	Opening Balance (₹)	Depreciation (₹)	Closing WDV (₹)
1	8,00,000.00	1,60,000.00	6,40,000.00
2	6,40,000.00	1,28,000.00	5,12,000.00
3	5,12,000.00	1,02,400.00	4,09,600.00
4	4,09,600.00	81,920.00	3,27,680.00
5	3,27,680.00	65,536.00	2,62,144.00

year	Incremental PBTD (₹)	Incremental Depreciation (₹)	Incremental PBT (₹)	Tax @30% (₹)	CFAT (₹)	PVF @12%	PVCF (₹)
1	2	3	(4 = 2 – 3)	(5 = 4 X 30%)	(6 = 4 - 5 + 3)		(8 = 6 X 7)
1	3,90,000	1,60,000	2,30,000	69,000	3,21,000	0.893	2,86,653.00
2	3,90,000	1,28,000	2,62,000	78,600	3,11,400	0.797	2,48,185.80
3	3,90,000	1,02,400	2,87,600	86,280	3,03,720	0.712	2,16,248.64
4	3,90,000	81,920	3,08,080	92,424	2,97,576	0.636	1,89,258.34
5	3,90,000	65,536	3,24,464	97,339	2,92,661	0.567	1,65,938.67
							11,06,284.45

Cash Flow after Tax = ₹ 1106284.45

Add: Incremental Salvage Value (₹ 40000 - ₹ 0) x 0.567 = ₹ 22680

Less: Initial Cash Outflow (₹ 800000)

Incremental NPV = ₹ 328964.45

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

PROBLEM – 23A **(PEP MAY 24 7M)**

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 t 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.

Also calculate the discounted pay-back period.

SOLUTION:

Calculation of Net Initial Cash Outflows:

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) x 0.877	(3,15,720)
Net initial cash outflows	**21,04,280**

Calculation of Incremental Depreciation

Particulars	₹
Depreciation on existing machine (₹ 4,80,000÷ 6 Years) (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 6^{th} year	(3,20,000)
Depreciation base of New Machine	**19,20,000**
Depreciation on New Machine (₹ 19,20,000 ÷ 6Years) (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 workers)	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

Particulars	Year	Net Cashflow (₹)	PVF @ 14%	PV (₹)
Net initial cash outflows	0	(24,20,000)	1	(21,04,280)
Incremental CFAT	1 to 6	6,25,000	3.888	24,30,000
Salvage Value of New Machine	6	3,20,000	0.456	1,45,920
PV of inflows				25,75,920
Net Present Value				**4,71,640**

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

= ₹ 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

$$= 4 + \frac{₹\ 21,04,280 - ₹\ 18,20,625}{₹\ 3,24,375}$$

= **4.87 years**

If we take subsidy in cash inflow of 1st year, then solution can also be done in the following way:

Calculation of Net Initial Cash Outflows:

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
Net initial cash outflows	**24,20,000**

Note: However, Incremental Depreciation and CFAT will remain same.

Calculation of NPV

Particulars	Year	Net Cashflow (₹)	PVF @ 14%	PV (₹)
Net initial cash outflows	0	(24,20,000)	1	(24,20,000)
Subsidy	1	3,60,000	0.877	3,15,720
Incremental CFAT	1 to 6	6,25,000	3.888	24,30,000
Salvage Value of New Machine	6	3,20,000	0.456	1,45,920
PV of inflows				28,91,640
Net Present Value				**4,71,640**

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

= ₹ 28,91,640 ÷ ₹ 24,20,000 = 1.195

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	9,85,000	0.877	8,63,845	8,63,845
2	6,25,000	0.769	4,80,625	13,44,470
3	6,25,000	0.675	4,21,875	17,66,345
4	6,25,000	0.592	3,70,000	21,36,345
5	6,25,000	0.519	3,24,375	24,60,720
6	9,45,000	0.456	4,30,920	28,91,640

Discounted Payback Period

$$= 4 + \frac{₹\ 24,20,200 - ₹\ 21,36,345}{₹\ 3,24,375}$$

= 4.87 years

PROBLEM – 23B **(MTP 1 MAY 24 8M)**

NC Ltd. Is considering purchasing a new machine to increase its production facility. At present, it uses an old machine which can process 5,000 units of TVs per week. NC could replace it with new machine, which is product specific and can produce 15,000 units per week. New machine cost ₹ 100 crores and requires the working capital of ₹ 3 crores, which will be released at the end of 5th year. The new machine is expected to have a salvage value of ₹ 20 crores.

The company expects demand for TVs to be 10,000 units per week.

Each TV sells for ₹ 30,000 and has Profit Volume Ratio (PV) of 0.10. The company works for the 56 weeks in the year. Additional fixed costs (excluding depreciation) are estimated to increase by ₹ 10 crores. The company is subject to a 40% tax rate and its after-tax cost of capital is 20%. The relevant rate of depreciation is 25 % for both taxation and accounts. The company uses the WDV method of depreciation. The existing machine will have no scrap value.

You are required to:

ADVISE whether the company should replace the old machine.

(Decimal may be taken up to 2 units)

SOLUTION:

Cash Inflows After Tax (CFAT)

Particular	₹
Current production (units per week) (Given)	5,000 units
New capacity (units per week) (Given)	15,000 units
Demand (units per week) (Given)	10,000 units
A. Increase in sales (units per week) (Given)	5,000 units
Contribution per unit (₹ 30,000 x 0.10)	3,000
Increase in contribution A x B x 56 weeks	**84 crores**
Less: Additional fixed cost (Given)	10 crores
Increase in profit (Increase in Contribution – Additional Fixed Cost)	**74 crores**
Less: Tax @ 40%	29.6 crores
Profit After Tax	**44.4 crores**

Tax shield due to depreciation

Year	Depreciation (₹in Crore)	Tax Shield (₹ in Crore)	PV Factor @ 20%	Total Present Value (₹ in Crore)
1	25.00	10	0.83	8.33
2	18.75	7.5	0.69	5.18
3	14.06	5.62	0.58	3.26
4	10.55	4.22	0.48	2.03
5	7.91	3.16	0.40	1.27
Total				**20.07**

Tax shield on capital loss = (₹ 23.73 - ₹ 20.00) x 30% = ₹ 1.12 crores

Net Present Value (NPV)

Particulars	Year	Cash Flow (₹ in Crores)	PVAF @ 20%	Present Value (₹ in Crores)
Initial Investment	0	(100)	1	(100)
Working capital	0	(3)	1	(3)
Profit after tax	1-5	44.4	2.99	132.76
Salvage value	5	20	0.40	8.00

Tax shield on Depreciation	1-5			20.07
Tax shield on capital loss	5	1.12	0.40	0.45
Release of Working Capital	5	3	0.40	1.20
NPV				**59.47**

The company is advised to replace the old machine since the NPV of the new machine is positive.

PROBLEM – 23C **(MTP 2 MAY 24 5M)**

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.

SOLUTION:

Calculation of Cash Flow after Tax

	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Capacity (Given)	50%	65%	80%	100%	100%
Units (300000 x Capacity)	1,50,000	1,95,000	2,40,000	3,00,000	3,00,000
Contribution per unit (₹ 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 Asset	₹2,00,00,000	₹3,50,00,000	₹ 5,00,00,000	₹5,00,00,000	₹ 5,00,00,000
Less: Depreciation (Working Note)	₹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 @30%	₹ (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	3,19,65,280
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

Calculation of Depreciation

Year	Opening WDV ₹	Depreciation @40% ₹	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

PROBLEM – 23D **(RTP JAN 25)**

A company is considering the proposal to take up a new project which requires investment of ₹ 850 lakhs in plant & machinery and ₹ 150 lakhs in working capital. The project is expected to yield the following Cash flows before tax and depreciation over the next five years:

Year	Amount (₹in Lakhs)
1	290
2	320
3	360
4	390
5	270

The desired rate of return from the project is 14% and assets must be depreciated at 20% on a written down value basis. The scrap value at the end of the five-year period

may be taken as ₹ 140 lakhs. The income tax applicable to the company is 20%. This is the only asset in the entire block. Capital gains tax is at 15% (for capital loss as well) You are required to CALCULATE the net present value of the project and advise the management to take appropriate decisions. Also calculate the Internal Rate of Return and Desirability factor of the Project.

Note: Present values of Re. 1 at different rates of interest are as follows:

Year	14%	16%	20%
1	0.88	0.86	0.83
2	0.77	0.74	0.69
3	0.67	0.64	0.58
4	0.59	0.55	0.48
5	0.52	0.48	0.40

SOLUTION:

(A) Calculation of NPV

Working Note - 1: Calculation of Present Value of Cash Outflow

(i) Initial Investment = ₹ 850 lakhs

(ii) Working capital outlay = ₹ 150 lakhs

Therefore, total PV of Cash Outflow = ₹ 1000 lakhs

Working Note - 2: Calculation of Present Value of Cash Inflows

Cash Flows before tax are given i.e. nothing but Net Profit Before Depreciation and Tax.

Amount (₹in lakhs)

Year	1	2	3	4	5
Net Profit Before Depreciation and Tax	290.00	320.00	360.00	390.00	270.00
(-) Depreciation	170.00	136.00	108.80	87.04	69.63
Net Profit Before Tax	**120.00**	**184.00**	**251.20**	**302.96**	**200.37**
(-) Tax @20%	24.00	36.80	50.24	60.59	40.07
Net Profit After Tax	**96.00**	**147.20**	**200.96**	**242.37**	**160.29**
(+) Depreciation	170.00	136.00	108.80	87.04	69.63
Cash Flow After Tax	**266.00**	**283.20**	**309.76**	**329.41**	**229.93**
(+) Working Capital Release					150.00
(+) Scrap					140.00
PV Factor @ 14%	0.88	0.77	0.67	0.59	0.52
PV of Cash Inflow	**234.08**	**218.06**	**207.54**	**194.35**	**270.36**

Total PV of Cash Inflow = ₹ 1124.40 Lakhs

Working Note - 3: Calculation of Present Value of Tax Savings on Short Term Capital Loss.

	₹ in Lakhs

WDV at end of 5th year	278.53
(-) Sale value	140.00
Loss on sale	138.53
Tax savings on above @ 15%	**20.78**

PV of tax savings on short term capital loss (STCL) = Tax saving x PV factor (14%, 5th year)

= ₹ 20.78 x 0.52

= ₹ 10.81 lakhs

NPV = PV of Cash Inflow + PV of Tax Savings on STCL – PV of Cash Outflow.

= ₹ 1124.40 + ₹ 10.81 - ₹ 1000

NPV = ₹135.20 lakhs

Advise: Since the NPV of the project is positive, project should be accepted.

(B) Calculation of IRR

IRR is that discounting rate where NPV = 0 (point where PV of all Cash Inflow = PV of all Cash Outflow)

We know that @ 14%, NPV is ₹ 135.20, so by trial-and-error method we need to calculate that rate where NPV equals 0.

When Discounting rate is 16%

	1	2	3	4	5
Cash Flow After Tax (Working Note)	266.00	283.20	309.76	329.41	229.93
(+) Working Capital Release (Given)					150.00
(+) Scrap (Given)					140.00
PV Factor @ 14%	0.86	0.74	0.64	0.55	0.48
PV of Cash Inflow	**228.76**	**209.57**	**198.25**	**181.17**	**249.56**

PV of Cash Inflow = ₹ 1067.31

(+) PV of Tax Savings on Short Term Capital Loss = 9.97 {₹ 20.78 x 0.48}

(-) PV of Cash Outflow = (₹ 1000)

NPV = ₹ 77.29

Since NPV is positive at 16% as well, we need to go for Trial II at 20%

When Discounting rate is 20%

	1	2	3	4	5
Cash Flow After Tax (Working Note)	266.00	283.20	309.76	329.41	229.93
(+) Working Capital Release (Given)					150.00
(+) Scrap (Given)					140.00
PV Factor @ 14%	0.83	0.69	0.58	0.48	0.4
PV of Cash Inflow	**220.78**	**195.41**	**179.66**	**158.12**	**207.97**

PV of Cash Inflow = ₹ 961.94

(+) PV of tax savings on Short Term Capital Loss = ₹ 8.31 {₹ 20.78 x 0.40}

(-) PV of Cash Outflow = (₹ 1000)

NPV = (₹ 29.75)

Since NPV is negative at 20%, IRR lies somewhere between 16% and 20%

$$\textbf{IRR} = \textbf{LR} + \frac{\text{NPV at LR}}{\text{NPV at LR - NPV at HR}} \times \textbf{(HR - LR)}$$

LR = Lower Rate (16% here) HR = Higher Rate (20% here)

$$\textbf{IRR} = 16 + \frac{₹\ 77.29}{₹\ 77.29 - (₹\text{-}29.75)} \times (20\% - 16\%)$$

IRR = 18.89%

(C) Calculation of Desirability Factory (Profitability Index)

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

PI = ₹ 1135.21 ÷ ₹ 1000

PI = 1.13521

PROBLEM – 24

Ae Bee Cee Ltd. is planning to invest in machinery, for which it has to make a choice between the two identical machines, in terms of Capacity, 'X' and 'Y'. Despite being designed differently, both machines do the same job. Further, details regarding both the machines are given below:

Particulars	Machine 'X'	Machine 'Y'
Purchase Cost of the Machine (₹)	15,00,000	10,00,000
Life (years)	3	2
Running cost per year (₹)	4,00,000	6,00,000

The opportunity cost of capital is 9%. You are required to IDENTIFY the machine which the company should buy?

The present value (PV) factors at 9% are:

Year	t1	t2	t3
PVIF0.09.t	0.917	0.842	0.772

SOLUTION:

Statement Showing the Evaluation of Two Machines

	Particulars	Machine 'X'	Machine 'Y'
(i)	Purchase Cost	₹ 15,00,000	₹ 10,00,000
(ii)	Life of Machine	3 years	2 years
(iii)	Running Cost of Machine per year	₹ 4,00,000	₹ 6,00,000
(iv)	PVIFA (0.09, 3 Years)	2.531	
	PVIFA (0.09, 2 Years)		1.759
(v)	PV of Running Cost of Machine {(iii) × (iv)}	₹ 10,12,400	₹ 10,55,400
(vi)	Cash outflows of Machine {(i) + (v)}	₹ 25,12,400	₹ 20,55,400
(vii)	Equivalent PV of Annual Cash outflow {(vi) ÷(iv)}	₹ 9,92,651	₹ 11,68,505

Recommendation: Ae Bee Cee Ltd. should buy Machine 'X' since equivalent annual cash outflow is less than that of Machine 'Y'.

PROBLEM – 25

Alley Pvt Ltd. is planning to invest in a machinery that would cost ₹ 1,00,000 at the beginning of year 1. Net cash inflows from operations have been estimated at ₹ 36,000 per annum for 3 years. The company has two options for smooth functioning of the machinery – one is service, and another is replacement of parts. If the company opts to service a part of the machinery at the end of year 1 at ₹ 20,000, in such a case, the scrap value at the end of year 3 will be ₹ 25,000. However, if the company decides not to service the part, then it will have to be replaced at the end of year 2 at ₹ 30,800, and in this case, the machinery will work for the 4th year also and get operational cash inflow of ₹ 36,000 for the 4th year. It will have to be scrapped at the end of year 4 at ₹ 18,000. Assuming cost of capital at 10% and ignoring taxes, DETERMINE the purchase of this machinery based on the net present value of its cash flows.

If the supplier gives a discount of ₹ 10,000 for purchase, what would be your decision?

Note: The PV factors at 10% are:

Year	0	1	2	3	4	5	6
PV Factor	1	0.9091	0.8264	0.7513	0.6830	0.6209	0.5645

SOLUTION:

Option I: Purchase Machinery and Service Part at the end of Year 1.

Year	Cash Flows ₹	PVIF @10%	PVCF ₹
0	-1,00,000	1	-1,00,000.00
1	36,000	0.9091	32,727.60
1	-20,000	0.9091	-18,182.00
2	36,000	0.8264	29,750.40
3	36,000	0.7513	27,046.80
3	25,000	0.7513	18,782.50
NPV			**-9,874.70**

Since, Net Present Value is negative; therefore, this option is not to be considered.

If Supplier gives a discount of ₹ 10,000, then:

NPV (in ₹) = + 10,000 – 9,874.7 = + 125.3

In this case, Net Present Value is positive but very small; therefore, this option may not be advisable.

Option II: Purchase Machinery and Replace Part at the end of Year 2.

Year	Cash Flows ₹	PVIF @10%	PVCF ₹
0	-1,00,000	1	-1,00,000.00
1	36,000	0.9091	32,727.60

2	36,000	0.8264	29,750.40
2	-30,800	0.8264	-25,453.12
3	36,000	0.7513	27,046.80
4	36,000	0.683	24,588.00
4	18,000	0.683	12,294.00
NPV			**953.68**

Net Present Value is positive, but very low as compared to the investment.

If the Supplier gives a discount of ₹ 10,000, then:

NPV (in ₹) = 10,000 + 953.68 = ₹ 10,953.68

Decision: Option II is worth investing as the net present value is positive and higher as compared to Option I.

PROBLEM – 26

A large profit-making company is considering the installation of a machine to process the waste produced by one of its existing manufacturing processes 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:

Statement of Operating Profit from processing of waste **(₹ in lakh)**

Year	1	2	3	4
Sales (A) (Given)	966	966	1,254	1,254
Material consumption (Given)	90	120	255	255
Wages - Idle Time	180 (225-45)	195 (225 – 30)	255	300
Other expenses (Given)	120	135	162	210
Factory overheads (Insurance only) (Given)	90	90	90	90
Loss of rent on storage space (opportunity cost) (Given)	30	30	30	30
Depreciation (as per income tax rules) (Given)	150	114	84	63
Total cost (B)	660	684	876	948
Incremental Profit {(C)=(A) - (B)}	**306**	**282**	**378**	**306**
Less: Tax (30%) (Profit x 30%)	91.8	84.6	113.4	91.8
Profit after Tax (PAT)	**214.2**	**197.4**	**264.6**	**214.2**

Statement of Incremental Cash Flows **(₹in lakh)**

Year	0	1	2	3	4
Cost of Machine	(600)				
Material stock (Working Capital)	(60)	(105)	-	-	165
Compensation for contract	(90)	-	-	-	-
Contract payment saved	-	150	150	150	150
Tax Benefit Lost	-	(45)	(45)	(45)	(45)
Incremental Profit after Tax		214.2	197.4	264.6	214.2
Depreciation added back	-	150	114	84	63
Net Salvage Value	-	-	-	-	15
Total incremental cash flows	(750)	364.2	416.4	453.6	562.2
Present value factor	1.00	0.877	0.769	0.674	0.592
Present value of cash flows	(750)	319.40	320.21	305.73	332.82
Incremental NPV					**+ 528.16**

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

Notes:

1. Material Stock Increases are Considered in Cash Flows.
2. Idle Time Wages have also been Considered.
3. Apportioned Factory Overheads are not relevant only Insurance Charges of this Project are Relevant.
4. Sale of Machinery - Net Income after deducting Removal expenses are Considered Tax on Capital Gains is Ignored.
5. Saving in Contract Payment and Income tax thereon is considered in the cash flows.

PROBLEM – 26A

A chemical company is presently paying an outside firm ₹ 1 per gallon to dispose off the waste resulting from its manufacturing operations. At normal operating capacity, the waste is about 50,000 gallons per year. After spending ₹ 60,000 on research, the company discovered that the waste could be sold for ₹ 10 per gallon if it was processed further. Additional processing would, however, require an investment of ₹ 6,00,000 in new equipment, which would have an estimated life of 10 years with no salvage value. Depreciation would be calculated by straight line method.

Except for the costs incurred in advertising ₹ 20,000 per year, no change in the present selling and administrative expenses is expected, if the new product is sold. The details of additional processing costs are as follows:

Variable : ₹ 5 per gallon of waste put into process.

Fixed : (Excluding Depreciation) ₹ 30,000 per year.

There will be no losses in processing, and it is assumed that the total waste processed in a given year will be sold in the same year. Estimates indicate that 50,000 gallons of the product could be sold each year.

The management when confronted with the choice of disposing off the waste or processing it further and selling it, seeks your ADVICE. Which alternative would you recommend? Assume that the firm's cost of capital is 15% and it pays on an average 50% Tax on its income.

You should consider Present value of Annuity of ₹ 1 per year @ 15% p.a. for 10 years as 5.019.

SOLUTION:

Evaluation of Alternatives: Savings in disposing off the waste

Particulars	(₹)
Outflow (50,000 × ₹ 1)	50,000
Less: Tax Savings @ 50%	25,000
Net Outflow Per Year	**25,000**

Calculation of Annual Cash inflows in Processing of waste Material

Particulars	Amount (₹)	Amount (₹)
Sale value of waste		5,00,000
(₹ 10 × 50,000 gallon)		

Less: Variable processing cost	2,50,000	
(₹ 5 × 50,000 gallon)		
Less: Fixed processing cost (Given)	30,000	
Less: Advertisement cost (Given)	20,000	
Less: Depreciation (₹ 600000 ÷ 10 Years)	60,000	(3,60,000)
Earnings before tax (EBT)		**1,40,000**
Less: Tax @ 50%		(70,000)
Earnings after tax (EAT)		**70,000**
Add: Depreciation		60,000
Annual Cash inflows		**1,30,000**

Incremental CFAT = Annual Cash inflows + Net savings (adjusting tax) in disposal cost
= ₹ 1,30,000 + ₹ 25,000 = ₹ 1,55,000

Calculation of Incremental Net Present Value

Year	Cash Flow (₹)	Remarks
0	-6,00,000	Investment in New Equipment
1-10 Years	7,77,945	Incremental CFAT x PVAF
		(₹ 155000 x 5.019) (10 Years, 15%)
Incremental NPV	**₹ 1,77,945**	

Recommendation: Processing of waste is a better option as it gives a positive Net Present Value.

Note- Research cost of ₹ 60,000 is not relevant for decision making as it is sunk cost.

PROBLEM – 27

Manoranjan Ltd is a News broadcasting channel having its broadcasting Centre in Mumbai. There are total 200 employees in the organisation including top management. As a part of employee benefit expenses, the company serves tea or coffee to its employees, which is outsourced from a third-party. The company offers tea or coffee three times a day to each of its employees. 120 employees prefer tea all three times, 40 employees prefer coffee all three times and remaining prefer tea only once in a day. The third-party charges ₹10 for each cup of tea and ₹15 for each cup of coffee. The company works for 200 days in a year. Looking at the substantial amount of expenditure on tea and coffee, the finance department has proposed to the management an installation of a master tea and coffee vending machine which will cost ₹10,00,000 with a useful life of five years. Upon purchasing the machine, the company will have to enter into an annual maintenance contract with the vendor, which will require a payment of ₹75,000 every year. The machine would require electricity consumption of 500 units p.m. and current incremental cost of electricity for the company is ₹12 per unit. Apart from these running costs, the company will have to incur the following consumables expenditure also:

1. Packets of Coffee beans at a cost of ₹90 per packet.

2. Packet of tea powder at a cost of ₹70 per packet.

3. Sugar at a cost of ₹50 per Kg.
4. Milk at a cost of ₹50 per litre.
5. Paper cup at a cost of 20 paise per cup.

Each packet of coffee beans would produce 200 cups of coffee and same goes for tea powder packet. Each cup of tea or coffee would consist of 10g of sugar on an average and 100 ml of milk.

The company anticipate that due to ready availability of tea and coffee through vending machines its employees would end up consuming more tea and coffee.

It estimates that the consumption will increase by on an average 20% for all class of employees. Also, the paper cups consumption will be 10% more than the actual cups served due to leakages in them.

The company is in the 25% tax bracket and has a current cost of capital at 12% per annum. Straight line method of depreciation is allowed for the purpose of taxation. You as a financial consultant is required to ADVISE on the feasibility of acquiring the vending machine.

PV factors @ 12%:

Year	1	2	3	4	5
PVF	0.8929	0.7972	0.7118	0.6355	0.5674

SOLUTION:

Step 1: Computation of Quantity of consumables when the wending Machine is Purchased:

No. of Tea Cups

= [(120 Employees × 3 Tea × 200 days) + (40 Employees × 1 Tea × 200 days) × 1.2 = 96,000

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

$$\text{No. of coffee beans packet} = \frac{28,800}{200} = 144$$

$$\text{No. of Tea Powder Packets} = \frac{96,000}{200} = 480$$

$$\text{Qty of Sugar} = \frac{(96,000 + 28,800) \times 10g}{1,000g} = 1248 \text{ kgs}$$

$$\text{Qty of Milk} = \frac{(96,000 + 28,800) \times 100ml}{1,000ml} = 12,480 \text{litres}$$

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

Step 2: Computation of Incremental CFAT:

Particulars		Amount (₹)
(a) Savings in existing Tea & Coffee charges	(120 Employees × ₹ 10 ×3) + (40 Employees × ₹ 15 × 3) + (40 Employees × ₹ 10 × 1) × 200 days	11,60,000
(b) AMC of machine (Given)		(75,000)
(c) Electricity charges	(500 units × ₹ 12 ×12 months)	(72,000)
(d) Coffee Beans	144 Packets × ₹ 90	(12,960)

(e) Tea Powder	480 Packets × ₹ 70	(33,600)
(f) Sugar	1248 × ₹ 50	(62,400)
(g) Milk	12480 × ₹ 50	(6,24,000)
(h) Paper Cup	1,37,280 Cups × 0.2	(27,456)
(i) Depreciation	10,00,000 ÷ 5 Years	(2,00,000)
Profit before Tax		**52,584**
(-) Tax @ 25%		(13,146)
Profit after Tax		**39,438**
Depreciation		2,00,000
CFAT		**2,39,438**

Step 3: Computation of Incremental NPV

Year	Particulars	CF	PVF @ 12%	PV
0	Cost of machine	(₹ 10,00,00)	1	(₹ 10,00,000)
1-5	CFAT	₹ 2,39,438	3.6048	₹ 8,63,126
Incremental Net Present Value				**(₹ 1,36,874)**

Since NPV of the machine is negative, it should not be purchased.

PROBLEM – 28

A & Co. is contemplating whether to replace an existing machine or to spend money on overhauling it. A & Co. currently pays no taxes. The replacement machine costs ₹90,000 now and requires maintenance of ₹10,000 at the end of every year for eight years. At the end of eight years it would have a salvage value of ₹20,000 and would be sold. The existing machine requires increasing amounts of maintenance each year and its salvage value falls each year as follows:

Year	Maintenance (₹)	Salvage (₹)
Present	0	40,000
1	10,000	25,000
2	20,000	15,000
3	30,000	10,000
4	40,000	0

The opportunity cost of capital for A & Co. is 15%. REQUIRED:

When should the company replace the machine?

(Note: Present value of an annuity of Re. 1 per period for 8 years at interest rate of 15%: 4.4873; present value of Re. 1 to be received after 8 years at interest rate of 15%: 0.3269).

SOLUTION:

A & Co.

Equivalent cost of (EAC) of new machine

Particulars	Amount

Cost of New Machine	₹ 90,000
Add: PV of Annual Repairs (₹10000 x 4.4873)	44,873
Less: PV of Salvage Value (₹ 20000 x 0.3269)	6,538
PV of Outflow for New Machine	₹ 128335
PV Annuity (15% , 8 Years)	4.4873
EAC	**₹ 28599.6 or 28600**

PV of cost of replacing the old machine in each of 4 years with new machine

Scenario	Year	Cash Flow (₹)	PV @ 15%	PV (₹)
Replace Immediately	0	(28,600)	1.00	(28,600)
		40,000	1.00	40,000
				11,400
Replace in one year	1	(28,600)	0.870	(24,882)
	1	(10,000)	0.870	(8,700)
	1	25,0000	0.870	21,750
				(11,832)
Replace in two years	1	(10,000)	0.870	(8,700)
	2	(28,600)	0.756	(21,622)
	2	(20,000)	0.756	(15,120)
	2	15,000	0.756	11,340
				(34,102)
Replace in three years	1	(10,000)	0.870	(8,700)
	2	(20,000)	0.756	(15,120)
	3	(28,600)	0.658	(18,819)
	3	(30,000)	0.658	(19,740)
	3	10,000	0.658	6,580
				(55,799)
Replace in four years	1	(10,000)	0.870	(8,700)
	2	(20,000)	0.756	(15,120)
	3	(30,000)	0.658	(19,740)
	4	(28,600)	0.572	(16,359)
	4	(40,000)	0.572	(22,880)
				(82,799)

Advice: The company should replace the old machine immediately because the PV of cost of replacing the old machine with new machine is least.

PROBLEM – 29 **(MTP 1 JAN 25 5M)**

Vyom Limited, an IT conglomerate, is planning to take over Aryayash Limited, a startup company incorporated 2 years ago but holding a lot of prospects. To determine the buyout consideration, Vyom Limited has approached you as a Finance controller to estimate the fair value of the startup company today based on future earnings estimates. Following

details of the startup company are as below –
Expected Sales in the coming year are ₹ 25 lakhs with P/V ratio of 40%. The sales are expected to grow at a rate of 20% for the next 2 years, to 40% for another 2 years, 25% in the 6th year and thereafter cash flows will grow at a steady rate of 10%. Fixed cost for the upcoming year is expected to be 12 lakhs for the first two years, ₹ 10 lakhs thereafter. Loss in any year can be set-off only against the profits of the immediate next year.
Corporate taxes applicable are 25% & 20% to Vyom Limited & Aryayash Limited respectively. Vyom Limited's desired rate of return is 15% & Cost of Capital of Aryayash Limited is 17%. As a finance controller, CALCULATE the Fair value of Aryayash Limited.

SOLUTION:

Fair Value of Company = Present Value all future cash flows discounted at the expected Rate of return of acquiring company.

Working Note 1: – Calculation of Cash flows **₹ in Lakhs**

YEAR	1	2	3	4	5	6
Contribution (40% on sales)	10	12	14.4	20.16	28.22	35.28
(-) Fixed Cost	-12	-12	-10	-10	-10	-10
Net Profit Before Tax (A)	**-2**	**0**	**4.4**	**10.16**	**18.22**	**25.28**
(-) Losses Set Off	0	0	-2(Setoff)	0	0	0
Taxable Income	**0**	**0**	**2.4**	**10.16**	**18.22**	**25.28**
(-) Tax @ 25% **(B)**	0	0	0.6	2.54	4.55	6.32
Cash Flow (A – B)	**-2**	**0**	**3.8**	**7.62**	**13.66**	**18.96**
PV of Cash Flows @ 15%	-1.740	0	2.50	4.35	6.79	8.19

Total PV of cash flows (Year 1 to 6) = ₹ 20.08 lakhs
(+) PV of cash flow at terminal value (end of Year 6) = (₹ 18.96 + 10%) ÷ (0.15 - 0.10)
= ₹ 417.12 Lakhs

Therefore, PV of above = 417.12 x PV factor (15%, 6th Year) = ₹ 180.20 lakhs

Total fair value of Aryayash limited = ₹ 20.08 + ₹ 180.20 = ₹ 200.28 Lakhs

Note

1. Discounting rate should be the desired rate of acquiring company i.e. of Vyom Limited
2. Terminal value of cash flows means the cash flows at that point from where it would grow at constant rate. Here it assumed that from 7th year, Cash flows/Net Profit After Tax will grow at a constant rate and not sales

PROBLEM – 30 **(MTP 2 JAN 25 10M)**
Hemsparsh Private Limited is globally recognized consultancy firm having its presence in various countries across the globe and is currently headquartered at Ahmedabad, India. It plans to commence a new branch in the Australia owing to the untapped opportunities available there in the outsourcing business. The company hired a professional for the

preparation of the Project report and the fee paid was Rs 2,00,000. The company also incurred Rs 5,00,000 in the form R&D costs.

As per the project report, the Company will require an initial fund outlay of ₹25 crores for buying property & setting up the other infrastructure. It will also require working capital amounting to Rs 5 crore. The company is planning to operate for a very long period of time, however for the sake of simplicity, calculations shall end at the end of the 10th year. The Earnings before tax but after deducting Interest Exp (EBT) estimated would be as follows

YEAR	EBT (Amount in ₹)
1	2,00,00,000
2	2,50,00,000
3	4,00,00,000
4	4,75,00,000
5	6,00,00,000
6	6,40,00,000
7	6,15,00,000
8	5,25,00,000
9	3,80,00,000
10	2,90,00,000

The above amounts also include an allocated common cost of ₹ 12,50,000. Company will distribute 10% dividends every year on post-tax earnings. Company intends to borrow funds of 3 crores at a post-tax Interest rate of 6.5% in India. As per the tax treaty between India & Australia (Tax Agreement between two nations), first 3 years are tax free and from 4th year 75% of corporate taxes are to be paid in the country where it is headquartered and balance in the other nation. Total Corporate tax rate applicable to the company is 30%. However, tax on capital gains is to be paid at 15%, only in the headquarters Salvage value for depreciation purpose is estimated at ₹ 90,00,000. The assets would be disposed of in the market at ₹ 3,50,00,000 at the end. Hemsparsh Private Limited desires a premium of 3% to the current MCLR of 12% (Marginal Cost of Funds based Lending Rate). Assume no other assets in the block.

CALCULATE NPV for the project and advise only from Indian law perspective. If the company wishes to recoup its investment within 3.5 years, STATE any two measures that the company shall take.

SOLUTION:

Calculation of NPV (₹ Amount in crores)

Year	1	2	3	4	5	6	7	8	9	10
EBT (Given)	2.000	2.500	4.000	4.750	6.000	6.400	6.150	5.250	3.800	2.900
Add: Interest (Working Note 2)	0.195	0.195	0.195	0.252	0.252	0.252	0.252	0.252	0.252	0.252
Add: Allocated Common Cost (Given)	0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125

Project Profit Before Tax (EBIT – Interest – Common Cost)	**2.320**	**2.820**	**4.320**	**5.127**	**6.377**	**6.777**	**6.527**	**5.627**	**4.177**	**3.277**
Less: Tax (Working Note – 3)	-	-	-	1.154	1.435	1.525	1.469	1.266	0.940	0.737
Profit After Tax	**2.320**	**2.820**	**4.320**	**3.973**	**4.942**	**5.252**	**5.058**	**4.361**	**3.237**	**2.539**
Add: Depreciation	2.410	2.410	2.410	2.410	2.410	2.410	2.410	2.410	2.410	-
Cash Inflows	**4.730**	**5.230**	**6.730**	**6.383**	**7.352**	**7.662**	**7.468**	**6.771**	**5.647**	**2.539**
Add: Release of Working Capital	-	-	-	-	-	-	-	-	-	5.000
Add: Net Cash Inflow from sale of asset (Net of Tax) (Working Note -3)	-	-	-	-	-	-	-	-	-	3.471
Total Cash Inflows	**4.730**	**5.230**	**6.730**	**6.383**	**7.352**	**7.662**	**7.468**	**6.771**	**5.647**	**11.010**
DF @ 15%	0.870	0.756	0.658	0.572	0.497	0.432	0.376	0.327	0.284	0.247
PV Cash Inflow	**4.113**	**3.955**	**4.425**	**3.650**	**3.655**	**3.312**	**2.808**	**2.213**	**1.605**	**2.722**

Total PV of Cash Inflow = ₹ 32.458 Crores (-) ₹ 30 Crores (Initial Outlay + Working Capital)

NPV = ₹ 2.458 Crores

ADVISE - Since NPV is positive, company should go for the project.

Notes

1. Allocated common costs are to be excluded from cash inflows
2. Dividend distribution is deemed irrelevant for cash flow analysis
3. Discounting rate = MCLR + premium = 12 + 3 = 15%
4. Interest exp is to be excluded from the cash inflows as it is already getting covered in the discounting rate above
5. Professional fees paid for project report and R&D costs being sunk costs are irrelevant for decision making

Working Note 1 – Calculation of Applicable Taxes Each Year

For the first 3 years, tax will be zero and for the next 7 years tax rate applicable would 22.5% (30 x 0.75) as balance tax will be paid in Australia, so it will have no relevance under India perspective calculations.

Working Note – 2 Calculation of Interest Expense Each Year

Since post tax interest rate is given in the question, firstly it needs to be converted to pre-tax rate. However, for the first 3 years of the project, post-tax and pre-tax rate would be same owing to zero taxes

Interest Expense (first 3 years) = ₹ 3,00,00,000 X 6.5% = ₹ 19,50,000 or 0.195 Crores

Interest Expense (next 7 years) = ₹ 3,00,00,000 x 8.39% = ₹ 25,17,000 or 0.2517 crores

Pre-tax Interest Rate = Post tax Rate ÷ 1 – India Tax Rate = 6.5 ÷ (1 - 0.225) = 8.39%

Working Note 3 – Calculation of Capital Gains Income in Year 10:

Cost of Asset remaining in the block at the beginning of Year 10

= ₹ 3,31,00,000 (₹ 2,41,00,000 + ₹ 90,00,000)

(+) New Asset purchased during the year = 0
(-) Sale Value of the Asset = ₹ 3,50,00,000
Capital Gains Income before tax = ₹ 19,00,000
(-) Capital Gains tax = ₹ 19,00,000 x 15% = ₹ 2,85,000
Net Cash Inflow after tax = ₹ 3,50,00,000 - ₹ 2,85,000
= ₹ 3,47,15,000

B) Current Payback Period = (4 + 1.927) ÷ 7.352
= 4.262 years
Target Payback Period = 3.5 years

Some key measures to reduce your Payback period are as follows (Only illustrative):

i. Emphasizing on reduction of operational costs
ii. Improving marketing thereby resulting into higher sales
iii. Incorporate product-led growth strategies
iv. Judicious efforts in bringing down the overall cost of capital thereby reducing the discounting rate and in turn better Payback period.
v. Leveraging out the presence of the fixed cost

PROBLEM – 31 **(MTP 2 SEPT 24 5M)**

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

	Net Present Value			**36.14**

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

Multiple Choice Questions

1. **A capital budgeting technique which does not require the computation of cost of capital for decision making purposes is:**
   a. Net Present Value method
   b. Internal Rate of Return method
   c. Modified Internal Rate of Return method
   d. Payback Period method

2. **If two alternative proposals are such that the acceptance of one shall exclude the possibility of the acceptance of another then such decision making will lead to:**
   a. Mutually exclusive decisions
   b. Accept reject decisions
   c. Contingent decisions
   d. None of the above

3. **In case a company considers a discounting factor higher than the cost of capital for arriving at present values, the present values of cash inflows will be:**
   a. Less than those computed on the basis of cost of capital
   b. More than those computed on the basis of cost of capital
   c. Equal to those computed on the basis of the cost of capital
   d. None of the above

4. **If the cut off rate of a project is greater than IRR, we may:**
   a. Accept the proposal
   b. Reject the proposal
   c. Be neutral about it
   d. Wait for the IRR to increase and match the cut off rate

5. **While evaluating capital investment proposals, time value of money is used in which of the following techniques:**
   a. Payback Period method
   b. Accounting rate of return
   c. Net present value
   d. None of the above

6. **IRR would favour project proposals which have:**

a. Heavy cash inflows in the early stages of the project.
b. Evenly distributed cash inflows throughout the project.
c. Heavy cash inflows at the later stages of the project.
d. None of the above.

7. **The re-investment assumption in the case of the IRR technique assumes that:**
   a. Cash flows can be re-invested at the projects IRR.
   b. Cash flows can be re-invested at the weighted cost of capital.
   c. Cash flows can be re-invested at the marginal cost of capital.
   d. None of the above

8. **Multiple IRRs are obtained when:**
   a. Cash flows in the early stages of the project exceed cash flows during the later stages.
   b. Cash flows reverse their signs during the project.
   c. Cash flows are uneven.
   d. None of the above.

9. **Depreciation is included as a cost in which of the following techniques:**
   a. Accounting rate of return
   b. Net present value
   c. Internal rate of return
   d. None of the above

10. **Management is considering a Rs.1,00,000 investment in a project with a 5 year life and no residual value. If the total income from the project is expected to be Rs.60,000 and recognition is given to the effect of straight line depreciation on the investment, the average rate of return is:**
    a. 12%
    b. 24%
    c. 60%
    d. 75%

11. **Assume cash outflow equals Rs.1,20,000 followed by cash inflows of Rs.25,000 per year for 8 years and a cost of capital of 11%. What is the Net present value?**
    a. (Rs.38,214)
    b. Rs.9,653
    c. Rs.8,653
    d. Rs.38,214

12. **What is the Internal rate of return for a project having cash flows of Rs.40,000 per year for 10 years and a cost of Rs.2,26,009?**
    a. 8%
    b. 9%
    c. 10%
    d. 12%

13. **While evaluating investments, the release of working capital at the end of the project's life should be considered as:**
    a. Cash inflow
    b. Cash outflow
    c. Having no effect upon the capital budgeting decision
    d. None of the above

14. **Capital rationing refers to a situation where:**
    a. Funds are restricted and the management has to choose from amongst available alternative investments.
    b. Funds are unlimited and the management has to decide how to allocate them to suitable projects.
    c. Very few feasible investment proposals are available with themanagement.
    d. None of the above.

15. **Capital budgeting is done for:**
    a. Evaluating short term investment decisions.
    b. Evaluating medium term investment decisions.
    c. Evaluating long term investment decisions.
    d. None of the above.

Answers to the MCQs based Questions

1.	(d)	2.	(a)	3.	(a)	4.	(b)	5.	(c)	6.	(a)
7.	(a)	8.	(b)	9.	(a)	10.	(b)	11.	(c)	12.	(d)
13.	(a)	14.	(a)	15.	(c)						

Case Scenarios

Twigato Ltd is an all equity financed company in the food delivery business and is considering an expansion into quick grocery delivery business segment. It is the market leader in the current food delivery business with a valuation of ₹ 5750 crores. From the discussion in the recent fund-raising meeting with the venture capitalists, it has been noted that the quick delivery business is expected to be run for 6 years, after which it will be sold to another entity for a target valuation of 2 times of the investment made in the business segment. The new segment will be funded by debt, preference and equity shares in the ratio of 3:2:5. The quick grocery delivery would require ₹ 30 crores of investment to start with and subsequently it will require additional infusion of ₹ 20 crores in start of year 2 and ₹ 25 crores of fund infusion in start of year 4. The operating financials of the business is expected to be on following lines for the 1st year of operation.

No of quick orders = 10,000 per day

No of overnight orders = 2,000 per day

Ticket sizes quick orders: 5,000 orders below ₹ 500, 3,000 orders between ₹ 500 and ₹ 1,000 and 2,000 orders above ₹ 1000 with average ticket size being ₹ 700 per order.

Delivery charges are applicable for orders below ₹ 500, which is flat ₹ 40 per order.

The company would charge 5% of invoice value from the seller of the quick delivery products and 7% in case of overnight delivery.

Overnight deliveries would be available to only subscription-based customers and subscription charges are ₹ 5,000 p.a. Each overnight order is expected to be having an average ticket size of ₹ 750 per order. Each subscription-based customer is expected to place order every alternate day on an average.

The quantity of orders is expected to be growing at a rate of 20%, 15%,10%, 5% for 1st 4 years of operations. Beyond this it is expected to be remaining constant.

The proportion of orders is expected to remain unchanged.

To attract the prospective customers, it is likely to spend heavily on advertising in initial years. The advertising and promotional activities would cost ₹ ₹ 7 crores, ₹ 8 crores and ₹ 10 crores in year 1,2 and 3 respectively.

Remuneration to delivery partners will be ₹ 15,000 p.m. fixed plus ₹ 20 per delivery.

Each delivery partner can deliver an average of 30 orders per day. An additional provision of 50% of extra delivery partners to be made to consider the unexpected spike in orders

on special occasions and holidays. The IT infrastructure and customer care expenses would amount to ₹ 8 crores each year.

Income Tax allows 20% p.a. depreciation on straight line basis for any fresh investments. Applicable tax rate can be taken as 25%. The after-tax cost of debt, preference share, and equity share would amount to 10%, 11% and 15% respectively.

Assume 365 days in a year.

1. Which of the following is the best estimate of discounting rate for the project?
   (a) 12.00%
   (b) 11.55%
   (c) 12.70%
   (d) 13.75%

2. Which of the following is the best measure of delivery partners required in year 1?
   (a) 600
   (b) 720
   (c) 828
   (d) 911

3. Which of the following is the best measure of total revenue in year 3?
   (a) 30 crores
   (b) 25.78 crores
   (c) 33.66 crores
   (d) 25.91crores

4. Which of the following years best represents the years of loss?
   (a) Year 1 only
   (b) Year 1 and 2 only
   (c) Year 1,2 and 3 only
   (d) Year 1,2,3 and 4 only

5. Which of the following in the best measure of NPV of the project?
   (a) 39.35 crores
   (b) (25.63) crores
   (c) 23.76 cores

(d) (35.67) crores

Answers to the Case Scenarios

1.	(c)	2.	(a)	3.	(c)	4.	(d)	5.	(a)

(i) Calculation of cost of capital

Capital	Weight	Cost	Product
Debt	0.3	10%	3.00%
Preference	0.2	11%	2.20%
Equity	0.5	15%	7.50%
	Ko		**12.70%**

Calculation of CFAT

		1	2	3	4	5	6
A) No. of quick deliveries p.d.		10,000	12,000	13,800	15,180	15,939	15,939
B) No. of overnight deliveries p.d.		2,000	2,400	2,760	3,036	3,188	3,188
C) No. of quick deliveries p.a.		36,50,000	43,80,000	50,37,000	55,40,700	58,17,735	58,17,735
D) No. of overnight deliveries p.a.		7,30,000	8,76,000	10,07,400	11,08,140	11,63,547	11,63,547
E) Chargeable quick deliveries		18,25,000	21,90,000	25,18,500	27,70,350	29,08,868	29,08,868
F) No. of delivery partners	1.5x(A+B)/ 30	600	720	828	911	956	956
Revenue (₹ in crores)							
From quick deliveries (QD)	(E x 40)	7.30	8.76	10.07	11.08	11.64	11.64
From QD seller commission	(C x 700 x 5%)	12.775	15.330	17.630	19.392	20.362	20.362
From Overnight delivery subscription	(B/2 x 5000)	0.500	0.600	0.690	0.759	0.797	0.797
From OD seller commission	(C x 750 x 7%)	3.83	4.60	5.29	5.82	6.11	6.11
Total Revenue		**24.41**	**29.29**	**33.68**	**37.05**	**38.90**	**38.90**
Cost (in crores)							
Advertising		7	8	10	0	0	0
IT and customer care xxzX		8	8	8	8	8	8

Delivery partner salary	(F x 15000)	0.90	1.08	1.24	1.37	1.43	1.43
Delivery partner commission	(C+D) x 20	8.76	10.51	12.09	13.30	13.96	13.96
Depreciation	on investment in year 0	6	6	6	6	6	
	on investment in year 2	4	4	4	4	4	
	on investment in year 4				5	5	5
Total Cost		**30.66**	**37.59**	**41.33**	**37.66**	**38.40**	**32.40**
PBT		(6.25)	(8.30)	(7.65)	(0.61)	0.51	6.51
Less: Tax		1.56	2.08	1.91	0.15	(0.13)	(1.63)
PAT		(4.69)	(6.23)	(5.74)	(0.46)	0.38	4.88
Add: Depreciation		6.00	10.00	10.00	15.00	15.00	9.00
CFAT		**1.31**	**3.77**	**4.26**	**14.54**	**15.38**	**13.88**

Computation of NPV

Year	Particulars		Cash Flows (₹ in crores)	PVF @ 12.7%	PV (₹ in crores)
0	Investment		(30.00)	1.00	(30.00)
1	Investment		(20.00)	0.89	(17.75)
3	Investment		(25.00)	0.70	(17.46)
1	Operating CFAT		1.31	0.887	1.16
2	Operating CFAT		3.77	0.787	2.97
3	Operating CFAT		4.26	0.699	2.98
4	Operating CFAT		14.54	0.620	9.01
5	Operating CFAT		15.38	0.550	8.46
6	Operating CFAT		13.88	0.488	6.77
6	Sale Proceeds	(30+20+25) x 2	150	0.488	73.21
	NPV				**39.35**

CHAPTER 06: DIVIDEND DECISIONS

PROBLEM – 1

XYZ Ltd. earns ₹ 10/ share. Capitalization rate and return on investment are 10% and 12% respectively.

DETERMINE the optimum dividend payout ratio and the price of the share at the payout.

SOLUTION:

Since r > K_e , the optimum dividend pay-out ratio would 'Zero' (i.e. D = 0),Accordingly, value of a share:

$$P = \frac{D}{K_e} + \frac{r\,(E - D)}{K_e^{\,2}}$$

$$P = \frac{0}{0.1} + \frac{0.12\,(₹\,10 - 0)}{(0.1)^2}$$

P = ₹ 120

The optimality of the above payout ratio can be proved by using 25%, 50%, 75%and 100% as pay- out ratio:

At 25% pay-out ratio

$$P = \frac{₹\,2.5}{0.1} + \frac{0.12\,(₹\,10 - ₹\,2.5)}{(0.1)^2}$$

P = ₹ 25 + ₹ 90 = ₹ 115

At 50% pay-out ratio

$$P = \frac{₹\,5}{0.1} + \frac{0.12\,(₹\,10 - ₹\,5)}{(0.1)^2}$$

P = ₹ 50 + ₹ 60 = ₹ 110

At 75% pay-out ratio

$$P = \frac{₹\,7.5}{0.1} + \frac{0.12\,(₹\,10 - ₹\,7.5)}{(0.1)^2}$$

P = ₹ 75 + ₹ 30 = ₹ 105

At 100% pay-out ratio

$$P = \frac{₹\,10}{0.1} + \frac{0.12\,(₹\,10 - ₹\,10)}{(0.1)^2}$$

P = ₹ 100

PROBLEM – 1A

The following information pertains to M/s XY Ltd.

Earnings of the Company	**₹ 5,00,000**
Dividend Payout ratio	**60%**

No. of shares outstanding	1,00,000
Equity capitalization rate	12%
Rate of return on investment	15%

CALCULATE:

i. **Market value per share as per Walter's model.**

ii. **Optimum dividend payout ratio according to Walter's model and the market value of Company's share at that payout ratio.**

SOLUTION:

(i) As per Walter's model:

$$P = \frac{D}{K_e} + \frac{r\,(E - D)}{K_e^{\,2}}$$

Where,

P = Market price per share.

E = Earnings per share = ₹ 5,00,000 ÷ 1,00,000 Shares = ₹ 5

D = Dividend per share = ₹ 5* 60% = ₹ 3

R = Return earned on investment = 15%

Ke = Cost of equity capital = 12%

$$P = \frac{₹\ 3}{12\%} + \frac{15\%\ (₹\ 5 - ₹\ 3)}{(12)^2}$$

$$P = \frac{₹\ 3}{12\%} + \frac{₹\ 0.3}{(12)^2}$$

P = ₹ 45.833

(ii) According to Walter's model, when the return on investment is more than the cost of equity capital, the price per share increases as the dividend pay-out ratio decreases. Hence, the optimum dividend pay-out ratio in this case is nil.

So, at a pay-out ratio of zero, the market value of the company's share will be:

$$P = \frac{0}{Ke} + \frac{0.15\ (₹\ 15 - 0)}{(12)^2}$$

P = ₹ 52.08

PROBLEM – 2

The following figures are collected from the annual report of XYZ Ltd.:

Net Profit	₹ 30 lakhs
Outstanding 12% preference shares	₹ 100 lakhs
No. of equity shares	3 lakhs
Return on Investment	20%
Cost of capital i.e. (Ke)	16%

COMPUTE the approximate dividend pay-out ratio so as to keep the share price at ₹ 42

by using Walter's model?

SOLUTION:

	(₹) in lakhs
Net Profit	30
Less: Preference dividend	12
Earning for equity shareholders	**18**
Earning per share	18 ÷ 3 = ₹ 6.00

Let, the dividend per share be D to get share price of ₹ 42

$$P = \frac{D}{K_e} + \frac{r(E - D)}{K_e^2}$$

$$₹\ 42 = \frac{D}{16\%} + \frac{0.2\ (₹\ 6 - D)}{(16\%)^2}$$

$₹\ 42 = D\ (0.16) + 0.2\ (6 - D) \div (0.16)^2$

$1.0752 = 0.16D + 1.2 - 0.2D$

$1.0752 = -\ 0.04D + 1.2$

$-\ 0.1248 = -\ 0.04\ D$

$D = ₹\ 3.12$

$$\text{DP ratio} = \frac{DPS}{EPS} \times 100 = \frac{3.12}{6} \times 100 = 52\%$$

So, the required dividend payout ratio will be = 52%

PROBLEM – 3

The following information is supplied to you:

	₹
Total Earnings	**2,00,000**
No. of equity shares (of ₹ 100 each)	**20,000**
Dividend paid	**1,50,000**
Price/ Earnings ratio	**12.5**

Applying Walter's Model:

i. **ANALYSE whether the company is following an optimal dividend policy.**

ii. **COMPUTE P/E ratio at which the dividend policy will have no effect on the value of the share.**

iii. **Will your decision change, if the P/E ratio is 8 instead of 12.5? ANALYSE.**

SOLUTION:

Part 1:

The EPS of the firm is ₹ 10 (i.e., ₹ 2,00,000 ÷ 20,000)

ROE = ₹ 2,00,000 ÷ (20,000shares × ₹ 100) = 10%.

The P/E Ratio is given at 12.5 and the cost of capital (Ke) may be taken at the inverse of P/E

ratio. Therefore, Ke is 8% (i.e., 1 ÷ 12.5).

Current Dividend Payout Ratio = ₹ 150000 ÷ ₹ 200000 = 75%

As per Walter model when r > Ke the optimum dividend payout ratio should be 0.

In such a case MPS would be

$$P = \frac{0}{0.08} + \frac{0.1\ (₹\ 10 - 0)}{(0.08)^2}$$

P = ₹ 156.25

Theoretical the MP per share can be increased by adopting a zero payout ratio.

Present DP ratio

$$P = \frac{7.5}{0.08} + \frac{0.1\ (₹\ 10 - ₹\ 7.5)}{(0.08)^2}$$

$$P = \frac{7.5}{0.08} + \frac{0.25}{(0.08)^2}$$

P = ₹ 132.8125

Part 2:

The PE Ratio at which the DP will have no effect on the value of the share is at such a scenario.

Where Ke = r

When r = ke = 10% then PE ratio will be Ke = 1 ÷ PE ratio

PE ratio = 1 ÷ ke

PE ratio = 1 ÷ 0.1 = 10 Times

At PE ratio of 10 the dividend policy would have no effect on value of the share.

Part 3:

If PE Ratio is 8

Ke = 1 ÷ PE ratio

Ke = 1 ÷ 8 = 12.5%

r = 10%

In this situation Ke > r and MP under Walters model

$$P = \frac{D}{K_e} + \frac{r\ (E - D)}{K_e^2}$$

$$P = \frac{7.5}{0.125} + \frac{0.1\ (₹\ 10 - ₹\ 7.5)}{(0.125)^2}$$

P = ₹ 76

In this case the optimum dividend payout ratio is 100%.

PROBLEM – 4

The following figures are collected from the annual report of XYZ Ltd.:

Net Profit	**₹ 30 lakhs**
Outstanding 12% preference shares	**₹ 100 lakhs**
No. of equity shares	**3 lakhs**

Return on Investment	**20%**
Cost of capital i.e. (Ke)	**16%**

CALCULATE price per share using Gordon's Model when dividend pay-out is

i. 25%

ii. 50%

iii. 100%.

SOLUTION:

	(₹) in lakhs
Net Profit	30
Less: Preference dividend (12% on ₹ 100)	12
Earning for equity shareholders	**18**
No of equity shares	300000
Earnings per share (EFE ÷ No of equity shares)	**₹ 6.00**

Price per share according to Gordon's Model is calculated as follows:

$$P_o = \frac{E_1(1-b)}{K_e - br}$$

$E_1 = 6$

Ke = 16%

(i) When dividend pay-out is 25%

$$P_o = \frac{₹\ 6 \times 0.25}{0.16 - (0.75 \times 0.2)} = \frac{₹\ 1.5}{0.16 - 0.15} = ₹\ 150$$

(ii) When dividend pay-out is 50%

$$P_o = \frac{₹\ 6 \times 0.5}{0.16 - (0.5 \times 0.2)} = \frac{₹\ 3}{0.16 - 0.1} = ₹\ 50$$

(iii) When dividend pay-out is 100%

$$P_o = \frac{₹\ 6 \times 1}{0.16 - (0 \times 0.2)} = \frac{₹\ 6}{0.16} = ₹\ 37.50$$

PROBLEM – 4A

A firm had paid dividend at ₹ 2 per share last year. The estimated growth of the dividends from the company is estimated to be 5% p.a. DETERMINE the estimated market price of the equity share if the estimated growth rate of dividends (i) rises to 8%, and (ii) falls to 3%. Also FIND OUT the present market price of the share, given that the required rate of return of the equity investors is 15%.

SOLUTION:

In the present situation, the current MPS is as follows:

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

$$P = \frac{₹\ 2(1+0.05)}{0.15 - 0.05} = ₹\ 21$$

(i) The impact of changes in growth rate to 8% on MPS will be as follows:

$$P = \frac{₹\ 2\ (1 + 0.08)}{0.15 - 0.08} = ₹\ 30.86$$

(ii) The impact of changes in growth rate to 3% on MPS will be as follows:

$$P = \frac{₹\ 2\ (1 + 0.03)}{0.15 - 0.03} = ₹\ 17.17$$

So, the market price of the share is expected to vary in response to change inexpected growth rate of dividends.

PROBLEM – 4B

Taking an example of three different firms i.e., growth, normal and declining, CALCULATE the share price using Gordon's model.

Factors	Growth	Normal	Declining
	Firm r > Ke	Firm r = Ke	Firm r < Ke
r (rate of return on retained earnings)	15%	10%	8%
Ke (Cost of Capital)	10%	10%	10%
E (Earning Per Share)	₹ 10	₹ 10	₹ 10
b (Retained Earnings)	0.6	0.6	0.6
1- b (Dividend Payout)	0.4	0.4	0.4

SOLUTION:

$$P_0 = \frac{E\ (1 - b)}{k - br}$$

i) Situation-1: Growth Firm r > Ke

$$p_0 = \frac{₹\ 10\ (1 - 0.6)}{0.10 - (0.15 \times 0.6)} = \frac{₹\ 4}{0.10 - 0.09} = ₹\ 400$$

ii) Situation-2: Normal Firm r = Ke

$$p_0 = \frac{₹\ 10\ (1 - 0.6)}{0.10 - (0.10 \times 0.6)} = \frac{₹\ 4}{0.10 - 0.06} = ₹\ 100$$

iii) Situation-3: Normal Firm r < Ke

$$p_0 = \frac{₹\ 10\ (1 - 0.6)}{0.10 - (0.08 \times 0.6)} = \frac{₹\ 4}{0.10 - 0.048} = ₹\ 76.92$$

PROBLEM – 4C

The annual report of XYZ Ltd. provides the following information:

Particulars	Amount (₹)
Net Profit	50 lakhs
Outstanding 15% preference shares	100 lakhs
No. of equity shares	5 lakhs
Return on Investment	20%

Cost of capital i.e. (Ke)	16%

CALCULATE price per share using Gordon's Model when dividend pay-out is:

i. 25%;

ii. 50%;

iii. 100%.

SOLUTION:

Price per share according to Gordon's Model is calculated as follows:

Particulars	Amount in ₹
Net Profit	50 lakhs
Less: Preference dividend (₹ 100 Lakhs x 15%)	15 lakhs
Earnings for equity shareholders	**35 lakhs**
Earnings per share	35 lakhs ÷ 5 lakhs = ₹ 7.00

Price per share according to Gordon's Model is calculated as follows:

$$P_0 = \frac{E(1-b)}{k-br}$$

Here, E1 = 7, Ke = 16%

(i) When dividend pay-out is 25%

$$P_0 = \frac{₹\ 7 \times 0.25}{0.16 - (0.75 \times 0.2)} = \frac{₹\ 1.75}{0.16 - 0.15} = ₹\ 175$$

(ii) When dividend pay-out is 50%

$$P_0 = \frac{₹\ 7 \times 0.5}{0.16 - (0.5 \times 0.2)} = \frac{₹\ 3.5}{0.16 - 0.10} = ₹\ 58.33$$

(iii) When dividend pay-out is 100%

$$P_0 = \frac{₹\ 7 \times 1}{0.16 - (0 \times 0.2)} = \frac{₹\ 1.75}{0.16} = ₹\ 43.75$$

PROBLEM – 5

With the help of following figures CALCULATE the market price of a share of a company by using:

1. Walter's formula

2. Dividend growth model (Gordon's formula)

Earnings per share (EPS)	₹ 10
Dividend per share (DPS)	₹ 6
Cost of capital (Ke)	20%
Internal rate of return on investment	25%
Retention Ratio	40%

SOLUTION:

Market Price per share by

(i) Walter's model

$$P = \frac{D}{K_e} + \frac{r\,(E - D)}{K_e^{\,2}}$$

$$P = \frac{6}{20\%} + \frac{0.25\ (₹\ 10 - ₹\ 6\ )}{(20\%)^2}$$

$$P = \frac{6}{20\%} + \frac{25\%\ (\ 10 - 6)}{(20\%)^2}$$

$$P = ₹\ 55$$

(ii) Gordon's model

$$\text{Present market price per share } (P_0) = \frac{E(1 - b)}{k - br}$$

$$P_0 = \frac{₹\ 10\ (1 - 0.40)}{0.20 - (0.4 \times 0.25)}$$

$$= \frac{₹\ 6}{0.1} = ₹\ 60$$

PROBLEM – 5A

The following information is given below in case of Aditya Ltd.:

Earnings per share = ₹ 60

Capitalisation rate = 15%

Return on investment = 25%

Dividend payout ratio = 30%

1. COMPUTE price per share using Walter's Model.

2. WHAT would be optimum dividend payout ratio per share under Gordon's Model.

SOLUTION:

(i) As per Walter's Model, Price per share is computed by using the following formula:

Where,

P = Market Price of the share.

E = Earnings per share.

D = Dividend per share.

K_e = Cost of equity/ rate of capitalization/ discount rate.

r = Internal rate of return/ return on investment

Applying the above formula, price per share

$$P = \frac{D}{K_e} + \frac{r\,(E - D)}{(K_e)^2}$$

$$P = \frac{18}{15\%} + \frac{0.25\ (₹\ 60 - ₹\ 18\ )}{(15)^2}$$

$$P = \frac{18}{15\%} + \frac{10.5}{(15\%)^2} \Rightarrow P = ₹\ 586.67$$

(ii) As per Gordon's model, when r > Ke, optimum dividend payout ratio is 'Zero'.

PROBLEM – 5B **(MTP 2 JAN 25 4M)**

Return on Equity (ROE) is Satva Limited is 15% and the capitalization rate applicable to the company is at 20%. Satva Limited's Book Value per share (BVPS) is Rs 125. Calculate the intrinsic value of the share today using Gordon's model and Walter's model if the company's policy is to retain 65% of the earning.

SOLUTION:

EPS = ROE x BVPS (WN 1)

EPS = 0.15 x 125 = ₹ 18.75

Growth = ROE x Retention Ratio

= 0.15 x 0.65

= 9.75%

D1 = Do (1 + g)

= (₹18.75 x 35%) x (1 + 0.0975)

= ₹ 7.20

Intrinsic Value of share today - Gordon's Formula

$$P_0 = \frac{D_1}{K_e - g}$$

$$= \frac{₹\ 7.20}{0.20 - 0.0975}$$

P_0 = ₹ 70.24

Intrinsic Value of share today - Walter's Model

Here D = Do assuming it would remain constant through infinity

$$P = \frac{D}{K_e} + \frac{r(E - D)}{K_e^2}$$

$$P = \frac{6.5625}{0.20} + \frac{0.15\ (₹\ 18.75 - ₹\ 6.5625)}{(0.20)^2}$$

P = ₹ 78.51

WN 1 - Relationship between ROE-EPS-BVPS

ROE = Earnings for Equity Shareholders / Equity shareholders funds

If we divide the numerator and denominator with "**No of equity shares**"

$$ROE = \frac{\text{Earnings for Equity Shareholders / No of equity shares}}{\text{Equity shareholders funds / No of equity shares}}$$

Therefore, ROE = EPS / BVPS

PROBLEM – 6

X Ltd. is a no growth company, pays a dividend of ₹ 5 per share. If the cost of capital is 10%, COMPUTE the current market price of the share?

SOLUTION:

$$P_0 = \frac{D}{K_e} = \frac{₹\ 5}{0.10} = ₹\ 50$$

PROBLEM – 7

In the month of May of the current Financial Year, shares of RT Ltd. were 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.

1. **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?**
2. **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 orrequired return on equity is computed as follows:

$$K_e = \frac{D_1}{P_0} + g$$

$$K_e = \frac{₹\ 20\ (1 + 0.075)}{₹\ 1,460} + 7.5\% = 8.97\%$$

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

$g = br = 0.10 \times 0.60 = 6\%$

Accordingly, dividend will also get changed and to calculate this, first we shall calculate previous retention ratio (b1) and then EPS assuming that rate of return on retained earnings (r) is same.

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

$0.075 = b1 \times 0.10$

$b1 = 0.75$ and payout ratio = 0.25

With 0.25 payout ratio the EPS will be as follows:

$$\frac{₹\ 20}{0.25} = ₹\ 80$$

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

$D_1 = ₹\ 80 \times 0.40 = ₹\ 32$

Accordingly, new Ke will be

$$K_e = \frac{₹\ 32}{₹\ 1,460} + 6.0\%$$

or, Ke = 8.19%

PROBLEM – 8

A&R Ltd. is a large-cap multinational company listed in BSE in India with a face value of ₹ 100 per share. The company is expected to grow @ 15% p.a. for next four years then 5% for an indefinite period. The shareholders expect 20% return on their share investments. Company paid ₹ 120 as dividend per share for the current Financial Year. The shares of the company traded at an average price of ₹ 3,122 on last day. FIND out the intrinsic value per share and state whether shares are overpriced or underpriced.

SOLUTION:

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

$$P = \frac{D_1}{(1+K_e)^1} + \frac{D_2}{(1+K_e)^2} + \frac{D_3}{(1+K_e)^3} + \frac{D_4}{(1+K_e)^4} + \frac{D_5}{(K_e - g)} \times \frac{1}{(1+K_e)^4}$$

Where,

P = Price per share

K_e = Required rate of return on equity

g = Growth rate

$$P = \frac{₹\,120 \times 1.15}{(1+0.2)^1} + \frac{₹\,120 \times (1.15)2}{(1+0.2)^2} + \frac{₹\,120 \times (1.15)3}{(1+0.2)^3} + \frac{₹\,120 \times (1.15)4}{(1+0.2)^4} + \frac{₹\,120 \times (1.15)5}{(0.2 - 0.05)} \times \frac{1}{(1+0.2)^4}$$

P= 115 + 110.2 + 105.6 + 101.2 + 775.9 = ₹1,207.92

Intrinsic value of share is ₹ 1,022.42 as compared to latest market price of ₹ 3,122.

Market price of a share is overpriced by ₹1914.1

PROBLEM – 8A **(PEP MAY 24 3M)**

Vista Limited's retained earnings per share for the year ending 31.03.2023 being 40% is ₹ 3.60 per share. Company is foreseeing a growth rate of 10% per annum in the next two years. After that the growth rate is expected to stabilize at 8% per annum. Company will maintain its existing pay-out ratio. If the investor's required rate of return is 15%, Calculate the intrinsic value per share as of date using Dividend Discount model.

SOLUTION:

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

Retained earnings per share = ₹ 3.60

Dividend per share, $D_0 = \frac{₹\,3.60}{40\%} \times 60\% = ₹\,5.40$

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

Where,

P = Price per share

K_e = Required rate of return on equity g = Growth rate

$$P = \frac{5.4 \times 1.1}{(1+0.15)^1} + \frac{5.94 \times 1.1}{(1+0.15)^2} + \frac{6.534 \times 1.08}{(0.15 - 0.08)} \times \frac{1}{(1+0.15)^2}$$

P = 5.17 + 4.94 + 76.23 = ₹ 86.34

Intrinsic value of share is ₹ 86.34

PROBLEM – 8B **(MTP 1 JAN 25 4M)**

Paras TMT Ltd. is a TMT manufacturing company with a face value of ₹ 10 per share. The following information is given about the company:

- **The company is expected to grow @ 10% p.a. for next four years then 5% for an indefinite period.**
- **Rate of return expected by the shareholders on their share investments is 15%.**
- **Company paid ₹ 4 as dividend per share for the current Financial Year.**

FIND out the intrinsic value per share

SOLUTION:

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

$$P = \frac{D_1}{(1+K_e)^1} + \frac{D_2}{(1+K_e)^2} + \frac{D_3}{(1+K_e)^3} + \frac{D_4}{(1+K_e)^4} + \frac{D_5}{(K_e - g)} \times \frac{1}{(1+K_e)^4}$$

Where,

P = Price per share

K_e = Required rate of return on equity

g = Growth rate

Calculation PV of Dividends

Year	Dividend per share ₹	PVF @ 15%	PV
1	4.4	0.870	3.828
2	4.84	0.756	3.660
3	5.324	0.658	3.503
4	5.856	0.572	3.350
Total			**14.341**

$$\text{PV of Terminal Value} = \frac{₹\ 5.856 \times 1.05}{(0.15 - 0.05)^1} \times \frac{1}{(1 + 0.15)^4} = ₹61.488 \times 0.572 = ₹35.171$$

Intrinsic value of share = PV of Dividends + PV of terminal value

= ₹ 14.341 + ₹ 35.171 = ₹ 49.512

PROBLEM – 9

AB Engineering Ltd. belongs to a risk class for which the capitalization rate is 10%. It currently has outstanding 10,000 shares selling at ₹ 100 each. The firm is contemplating the declaration of a dividend of ₹ 5 share at the end of the current financial year. It expects to have a net income of ₹ 1,00,000 and has a proposal for making new investments of ₹ 2,00,000. CALCULATE the value of the firm when dividends (i) are not paid (ii) are paid.

SOLUTION:

Part 1: Value of the firm when dividends are not paid.

Step 1: Calculate price at the end of the period

K_e = 10%, P_0 = ₹ 100, D_1 = 0

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

$$₹\ 100 = \frac{P_1 + 0}{1 + 0.10}$$

$₹\ 100\ (1 + 0.10) = P_1 + 0$

P_1 = ₹ 110

Step 2: Calculation of funds required for investment:

Earning	₹ 1,00,000
Dividend distributed	Nil
Fund available for investment	**₹ 1,00,000**
Total Investment	₹ 2,00,000
Balance Funds required	**₹ 2,00,000 - ₹ 1,00,000 = ₹ 1,00,000**

Step 3: Calculation of No. of shares required to be issued for balance funds

$$\text{No of shares} = \frac{\text{Funds required}}{\text{Price at end}(P_1)}$$

$$\Delta_n = \frac{₹\ 1,00,000}{110}$$

Step 4: Calculation of value of firm

$$nP_o = \frac{(n + \Delta n)\,P_1 - I + E}{1 + K_e}$$

$$nP_o = \frac{\left(10,000 + \frac{₹\ 1,00,000}{₹\ 110}\right) \times ₹\ 110 - ₹\ 2,00,000 + ₹\ 1,00,000}{(1 + 0.10)} = ₹\ 10,00,000$$

CASE 2: Value of the firm when dividends are paid.

Step 1: Calculate price at the end of the period

K_e = 10%, P_0 = ₹ 100, D_1 = 5

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

$$₹\ 100 = P_o = \frac{P_1 + 5}{1 + 0.10} \quad P_1 = ₹\ 105$$

Step 2: Calculation of funds required for investment

Earning	₹ 1,00,000
Dividend distributed	₹ 50,000
Fund available for investment	**₹ 50,000**

Total Investment	₹ 2,00,000
Balance Funds required	**₹ 2,00,000 - ₹ 50,000 = ₹ 1,50,000**

Step 3: Calculation of No. of shares required to be issued for balance fund

$$\text{No of shares} = \frac{\text{Funds required}}{\text{Price at end } (P_1)}$$

$$\Delta_n = \frac{₹\ 1,50,000}{₹\ 105}$$

Step 4: Calculation of value of firm

$$nP_o = \frac{(n + \Delta n)\,P_1 - I + E}{1 + K_e}$$

$$nP_o = \frac{\left(10,000 + \frac{₹\ 1,50,000}{₹\ 105}\right) \times ₹\ 105 - ₹\ 2,00,000 + ₹\ 1,00,000}{(1 + 0.10)} = ₹\ 10,00,000$$

Thus it can be seen that the value of firm remains the same in both the cases, under MM approach.

PROBLEM – 9A

RST Ltd. has a capital of ₹ 10,00,000 in equity shares of ₹ 100 each. The shares are currently quoted at par. The company proposes to declare a dividend of ₹ 10 per share at the end of the current financial year. The capitalization rate for the risk class of which the company belongs is 12%. COMPUTE market price of the share at the end of the year, if

i. dividend is not declared

ii. dividend is declared

Assuming that the company pays the dividend and has net profits of ₹ 5,00,000 and makes new investments of ₹ 10,00,000 during the period, CALCULATE number of new shares to be issued? Use the MM model.

SOLUTION:

Given,

Cost of Equity (Ke)	12%
Number of shares in the beginning (n)	10,000
Current Market Price (P0)	₹ 100
Net Profit (E)	₹ 5,00,000
Expected Dividend (D1)	₹ 10 per share
Investment (I)	₹ 10,00,000

Computation of market price per share, when:

i) No dividend is declared:

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

$$₹\ 100 = \frac{P_1 + 0}{1 + 0.12}$$

$$P_1 = ₹\ 112 - 0 = ₹\ 112$$

ii) Dividend is declared:

$$₹\ 100 = \frac{P_1 + 10}{1 + 0.12}$$

P_1 = ₹ 112 - ₹ 10 = ₹ 102

Calculation of number of shares required for investment

	(₹)
Earning	5,00,000
Dividend distributed	1,00,000
Fund available for investment	**4,00,000**
Total Investment	10,00,000
Balance Funds required	**10,00,000 - 4,00,000 = ₹ 6,00,000**

$$\text{No of shares} = \frac{\text{Funds required}}{\text{Price at end}(P_1)}$$

$$\Delta n = \frac{₹\ 6,00,000}{₹\ 102} = 5,882.35 \text{ or } 5,883 \text{shares}$$

PROBLEM – 9B

M Ltd. belongs to a risk class for which the capitalization rate is 10%. It has 25,000 outstanding shares and the current market price is ₹100. It expects a net profit of ₹2,50,000 for the year and the Board is considering dividend of ₹5 per share.

M Ltd. requires to raise ₹ 5,00,000 for an approved investment expenditure.

ILLUSTRATE, how the MM approach affects the value of M Ltd. if dividends are paid or not paid.

SOLUTION:

Given,

Cost of Equity (Ke)	10%
Number of shares in the beginning (n)	25,000
Current Market Price (P0)	₹ 100
Net Profit (E)	₹ 2,50,000
Expected Dividend (D1)	₹ 5 per share
Investment (I)	₹ 5,00,000

Case 1 - When dividends are paid	**Case 2 - When dividends are not paid**
Step 1 $P_0 = \frac{P_1 + D_1}{1 + K_e}$ $₹\ 100 = \frac{P_1 + ₹\ 5}{1 + 0.10}$ P_1 = ₹ 110 - ₹ 5 = ₹ 105	**Step 1** $P_0 = \frac{P_1 + D_1}{1 + K_e}$ $₹\ 100 = \frac{P_1 + 0}{1 + 0.10}$ P_1 = ₹ 110 - ₹ 0 = ₹ 110
Step 2 Calculation of funds required	**Step 2** Calculation of funds required

= [Total Investment – (Net profit – Dividend)] = ₹ 5,00,000 - (₹ 2,50,000 - ₹ 1,25,000) = ₹ 3,75,000	= [Total Investment – (Net profit – Dividend)] = ₹ 5,00,000 - (₹ 2,50,000 - ₹ 0) = ₹ 2,50,000
Step 3 No. of shares required to be issued for balance fund No. of shares = $\frac{\text{Funds required}}{\text{Price at end}(P_1)}$ $\Delta_n = \frac{₹\ 3,75,000}{₹\ 105}$ = ₹ 3,571.4285	**Step 3** No. of shares required to be issued for balance fund No. of shares = $\frac{\text{Funds required}}{\text{Price at end}(P_1)}$ $\Delta_n = \frac{₹\ 2,50,000}{₹\ 110}$ = ₹ 2,272.73
Step 4 Calculation of value of firm $V_f = \frac{(n + \Delta n)P_1 - I + E}{(1 + K_e)}$ $V_f = \frac{\left(₹\ 25,000 + \frac{₹\ 3,75,000}{₹\ 105}\right) \times ₹\ 105 - ₹\ 5,00,000 + ₹\ 2,50,000}{(1 + 0.10)}$ ₹25,00,000	**Step 4** Calculation of value of firm $V_f = \frac{(n + \Delta n)P_1 - I + E}{(1 + K_e)}$ $V_f = \frac{\left(₹25,000 + \frac{₹250000}{₹\ 110}\right) \times ₹\ 110 - ₹\ 5,00,000 + ₹2,50,000}{(1 + 0.10)}$ ₹25,00,000

PROBLEM – 9C

Aakash Ltd. has 10 lakh equity shares outstanding at the start of the accounting year. The existing market price per share is ₹ 150. Expected dividend is ₹ 8 per share. The rate of capitalization appropriate to the risk class to which the company belongs is 10%.

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

ii. **CALCULATE number of shares to be issued by the company at the end of the accounting year on the assumption that the net income for the year is ₹ 3 crore, investment budget is ₹ 6 crores, when (a) Dividends are declared, and (b) Dividends are not declared.**

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

SOLUTION:

(i) Calculation of market price per share

According to Miller – Modigliani (MM) Approach:

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

Where,

Existing market price (P_0) = ₹ 150

Expected dividend per share (D_1) = ₹ 8

Capitalization rate (k_e) = 0.10

Market price at year end (P_1) = to be determined

(a) If expected dividends are declared, then

$$₹\ 150 = \frac{P_1 + ₹\ 8}{1 + 0.10}$$

$₹\ 150\ (1 + 0.10) = P_1 + ₹\ 8$

$₹\ 150 + ₹\ 15 = P_1 + ₹\ 8$

$\therefore P_1 = ₹\ 157$

(b) If expected dividends are not declared, then

$$₹\ 150 = \frac{P_1 + 0}{1 + 0.10}$$

$₹\ 150\ (1 + 0.10) = P_1 + 0$

$₹\ 150 + ₹\ 15 = P_1 + 0$

$\therefore P_1 = ₹\ 165$

(ii) Calculation of number of shares to be issued

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

(iii)Calculation of market value of the shares

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

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

PROBLEM – 10

Mr H is currently holding 1,00,000 shares of HM ltd, and currently the share of HM ltd is trading on Bombay Stock Exchange at ₹ 50 per share. Mr A have a policy to re-invest

the amount of any dividend received into the shared back again of HM ltd. If HM ltd has declared a dividend of ₹ 10 per share, please determine the no of shares that Mr A would hold after he re-invests dividend in shares of HM ltd.

SOLUTION:

Ex-dividend price is ₹ 40 (50-10).
The total amount of dividend received is ₹ 10,00,000 which is re-invested atthe rate of ₹ 40 per share.
Hence additional shares purchased would be 25,000. (₹ 10,00,000 ÷ ₹ 40)
Total holding would be 1,25,000 shares (1,00,000 + 25,000)

PROBLEM – 11
Following information is given pertaining to DG ltd

No of shares outstanding	**1 lakh shares**
Earnings Per share	**₹ 25 per share**
P/E Ratio	**20**
Book Value per share	**₹ 400 per share**

If company decides to repurchase 25,000 shares, at the prevailing market price, what is the resulting book value per share after repurchasing.

SOLUTION:

Current Market price = 20 Times x ₹ 25 = ₹ 500 per share
Book value of the company before repurchase = ₹ 4 crores (₹400 x 1 lakh shares)
Amount paid for repurchase = ₹ 1.25 crores (25,000 shares x ₹ 500 per share)
Book Value of company after repurchase = ₹ 2.75 crores (4 crores – 1.25 crores)
No of shares after repurchase = 75,000 shares
Book value per share = ₹ 2.75 ÷ 75000 shares = ₹ 367 per share.

Multiple Choice Questions

1. **Which one of the following is the assumption of Gordon's Model:**
   a. $K_e > g$
   b. Retention ratio, (b), once decide upon, is constant
   c. Firm is an all equity firm
   d. All of the above

2. **What should be the optimum Dividend pay-out ratio, when r = 15% & Ke = 12%:**
   a. 100%
   b. 50%
   c. Zero
   d. None of the above

3. **Which of the following is the irrelevance theory?**
   a. Walter model
   b. Gordon model
   c. M.M. hypothesis
   d. Linter's model

4. **If the company's D/P ratio is 60% & ROI is 16%, what should be the growth rate?**
   a. 5%
   b. 7%
   c. 6.4%
   d. 9.6%

5. **If the shareholders prefer regular income, how does this affect the dividend decision:**
   a. It will lead to payment of dividend
   b. It is the indicator to retain more earnings
   c. It has no impact on dividend decision
   d. Can't say

6. **Mature companies having few investment opportunities will show high payout ratios, this statement is:**
   a. False
   b. True
   c. Partial true
   d. None of these

7. **Which of the following is the limitation of Linter's model?**
   a. This model does not offer a market price for the shares.
   b. The adjustment factor is an arbitrary number and not based on anyscientific criterion or methods.
   c. Both (a) & (b)
   d. None of the above.

8. **What are the different options other than cash used for distributing profits to shareholders?**
   a. Bonus shares
   b. Stock split
   c. Both (a) and (b)
   d. None of the above

9. **Which of the following statement is correct with respect to Gordon's model?**
   a. When IRR is greater than cost of capital, the price per share increases and dividend pay-out decreases.
   b. When IRR is greater than cost of capital, the price per share decreases and dividend pay-out increases.
   c. When IRR is equal to cost of capital, the price per share increases and dividend pay-out decreases.
   d. When IRR is lower than cost of capital, the price per share increases and dividend pay-out decreases.

10. **Compute EPS according to Graham & Dodd approach from the given information:**

Market price	**Rs. 56**
Dividend pay-out ratio	**60%**
Multiplier	**2**

a. Rs. 30

b. Rs. 56

c. Rs. 28

d. Rs. 84

11. Which among the following is not an assumption of Walter's Model?

a. Rate of return and cost of capital are constant

b. Information is freely available to all

c. There is discrimination in taxes

d. The firm has perpetual life

Answers to the MCQs

1.	(d)	2.	(c)	3.	(c)	4.	(c)	5. (a)	6.	(b)
7.	(c)	8.	(a)	9.	(a)	10.	(a)	11. (c)		

Case Scenarios

KGF Chemicals Ltd., a prominent player in the chemical industry, faces the challenge of determining its growth trajectory and dividend policy to maximize shareholder value. With expectations of significant growth in the near term and stabilization in the long run, the company must strategically manage its resources to align with investor expectations.

KGF Chemicals Ltd. is a leading manufacturer and supplier of specialty chemicals catering to diverse industries such as pharmaceuticals, agriculture, and manufacturing. Established with a commitment to innovation and quality, the company has garnered a strong market presence over the years.

The company is projected to experience robust growth at a rate of 14% per annum for the next four years. Subsequently, the growth rate is expected to stabilize at the national economy's rate of 7% indefinitely. This forecast reflects both the company's expansion plans and the broader economic landscape.

KGF Chemicals Ltd. paid a dividend of ₹ 2 per share last year (Do = 2). The management faces the crucial decision of balancing dividend payouts with reinvestment opportunities to sustain growth and meet shareholders' expectations. The dividend policy must strike a delicate balance between rewarding shareholders and retaining earnings for future investments.

The required rate of return on equity shares is 12%, indicating investors' expected return given the company's risk profile and market conditions.

Management must carefully assess investment opportunities to ensure they meet or exceed this threshold, thereby generating value for shareholders over the long term.
In navigating the dynamic landscape of the chemical industry, KGF Chemicals Ltd. must adopt a proactive approach to managing growth and dividend policy.

By aligning strategic decisions with investor expectations and market dynamics, the company can position itself for sustainable success while maximizing shareholder value. Continual evaluation and adaptation will be essential to capitalize on growth opportunities and maintain competitiveness in the evolving marketplace.

You are required to answer the following on the basis of above information:

1. What is the expected dividend at the end of 4th Year?
   a. ₹ 2.1097
   b. ₹ 2.1483
   c. ₹ 2.9631

d. ₹ 3.3779

2. **What is the present value of Expected Dividends to be received in next four years?**
   a. ₹ 11.2202
   b. ₹ 8.3655
   c. ₹ 9.8423
   d. ₹ 6.2176

3. **Determine the Market Price of shares at the end of 4th Year?**
   a. ₹ 72.28
   b. ₹ 67.55
   c. ₹ 50.67
   d. ₹ 77.34

4. **Determine the Present Value of Market Price of shares at the end of 4th Year?**
   a. ₹ 49.18
   b. ₹ 32.22
   c. ₹ 45.79
   d. ₹ 42.96

5. **Calculate today's market price of the share.**
   a. ₹ 59.03
   b. ₹ 54.33
   c. ₹ 57.01
   d. ₹ 57.54

Answers to the Case Scenarios

i.	(d)	ii.	(b)	iii.	(a)	iv.	(c)	v.	(b)

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

P = Sum of PV of Expected Dividends + PV of Share Price at the end of the period

$$P = \frac{D_1}{(1+K_e)^1} + \frac{D_2}{(1+K_e)^2} + \frac{D_3}{(1+K_e)^3} + \frac{D_4}{(1+K_e)^4} + \frac{D_5}{(K_e - g)} \times \frac{1}{(1+K_e)^4}$$

Where,

P = Price per share

K_e = Required rate of return on equity

g = Growth rate

Year	$D_1 = D_0(1+g)$	PV Discount Factor @ 12%	PV in ₹
1	2(1+14%) =2.28	0.893	2.0364
2	2.28(1+14%) =2.5992	0.797	2.0715
3	2.5992(1+14%) =2.9631	0.712	2.1097
4	2.9631(1+14%) =**3.3779**	0.636	2.1483
Total PV of Expected Dividend			₹ **8.3655**

$$P_4 = \frac{D_5}{K_e - g} = \frac{D_4(1+g)}{K_e - g} = \frac{3.3779(1+7\%)}{12\% - 7\%} = ₹\ 72.28$$

PV of share at the end of 4th Year = ₹ 72.28 x 0.636 = ₹ **45.97**

Market Price of shares = ₹ 8.3655 + ₹ 45.97 = ₹ **54.33**

CHAPTER 07: RATIO ANALYSIS

PROBLEM 1:

In a meeting held at Solan towards the end of 20x1-20x2, the Directors of HPCL Ltd. have taken a decision to diversify. At present HPCL Ltd. sells all finished goods from its own warehouse. The company issued debentures on 01.04.20x2 and purchased fixed assets on the same day. The purchase prices have remained stable during the concerned period. Following information is provided to you:

INCOME STATEMENT

Particulars	20x1-20x2 (₹)		20x2-20x3 (₹)	
Cash Sales	30,000		32,000	
Credit Sales	2,70,000	3,00,000	3,42,000	3,74,000
Less: Cost of goods sold		2,36,000		2,98,000
Gross profit		64,000		76,000
Less: Operating Expenses:				
Warehousing	13,000		14,000	
Transport	6,000		10,000	
Administrative	19,000		19,000	
Selling	11,000	49,000	14,000	57,000
Net Profit		15,000		19,000

BALANCE SHEET

Assets & Liabilities	20x1-20x2 (₹)		20x2-20x3 (₹)	
Fixed Assets (Net Block)	-	30,000	-	40,000
Receivables	50,000		82,000	
Cash at Bank	10,000		7,000	
Stock	60,000		94,000	
Total Current Assets (CA)	1,20,000		1,83,000	
Payables	50,000		76,000	
Total Current Liabilities (CL) Working Capital (CA - CL)	50,000		76,000	
Net Assets		70,000		1,07,000
		1,00,000		1,47,000
Represented by:				
Share Capital		75,000		75,000
Reserve and Surplus		25,000		42,000
Debentures		-		30,000
		1,00,000		1,47,000

You are required to CALCULATE the following ratios for the years 20x1-20x2 and 20x2-20x3:

1. Gross Profit Ratio

2. Operating Expenses to Sales Ratio
3. Operating Profit Ratio
4. Capital Turnover Ratio
5. Stock Turnover Ratio
6. Net Profit to Net Worth Ratio
7. Receivables Collection Period

Ratio relating to capital employed should be based on the capital at the end of the year. Give the reasons for change in the ratios for 2 years. Assume opening stock of ₹ 40,000 for the year 20x1-20x2. Ignore Taxation.

SOLUTION:

Computation of Ratios		
Ratio	**2021-22 (₹)**	**2022-23 (₹)**
1. Gross profit ratio (Gross profit ÷ sales)	$\frac{₹\,64,000 \times 100}{₹\,3,00,000}$ = 21.3%	$\frac{₹\,76,000 \times 100}{₹\,3,74,000}$ = 20.3%
2. Operating expense to sales ratio (Operating expenses ÷ Total sales)	$\frac{₹\,49,000 \times 100}{₹\,3,00,000}$ = 16.3%	$\frac{₹\,57,000 \times 100}{₹\,3,74,000}$ = 15.2%
2. Operating profit ratio (Operating profit ÷ Total sales)	$\frac{₹\,15,000 \times 100}{₹\,3,00,000}$ = 5%	$\frac{₹\,19,000 \times 100}{₹\,3,74,000}$ = 5.08%
3. Capital turnover ratio (Sales ÷ capital employed)	$\frac{₹\,3,00,000}{₹\,1,00,000}$ = 3	$\frac{₹\,3,74,000}{₹\,1,47,000}$ = 2.54
4. Stock turnover ratio (COGS ÷ Average stock) (Refer to W.N.1)	$\frac{₹\,2,36,000}{₹\,50,000}$ = 4.72	$\frac{₹\,2,98,000}{₹\,77,000}$ = 3.87
5. Net Profit to Net worth ratio (Net profit ÷ Net worth)	$\frac{₹\,15,000 \times 100}{₹\,1,00,000}$ = 15%	$\frac{₹\,19,000 \times 100}{₹\,1,17,000}$ =16.24%
6. Receivables collection period (Average receivables ÷ Average daily credit sales) (Refer to W.N. 2)	$\frac{₹\,50,000}{739.73}$ = 67.6 days	$\frac{₹\,82,000}{936.99}$ = 87.5 days
Working notes (W.N.):		
1. Average Stock = (opening stock + closing stock) ÷ 2	(₹ 40,000 + ₹ 60,000) ÷ 2 = ₹ 50,000	(₹ 60,000 + ₹ 94,000) ÷ 2 = ₹ 77,000
2. Average daily sales = Credit sales ÷ 365 Days	$\frac{₹\,2,70,000}{365\ Days}$ = 739.73	$\frac{₹\,3,42,000}{365\ Days}$ = 936.99

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

Similarly, there is a decline in the ratio of operating expenses to sales. Further analysis reveals that in comparison to increase in sales, there has a lesser proportionate increase in operating expenses. As a result, even the operating profit ratio has remained the same approximately in spite of a decline in the Gross profit ratio.

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

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

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

PROBLEM 2:

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

Particulars	20x0-20x1	20x1-20x2	20x2-20x3
	₹	₹	₹
Cash	30,000	20,000	5,000
Accounts receivable	2,00,000	2,60,000	2,90,000
Inventory	4,00,000	4,80,000	6,00,000
	6,30,000	7,60,000	8,95,000
Net fixed assets	8,00,000	8,00,000	8,00,000
	14,30,000	15,60,000	16,95,000
	₹	₹	₹
Accounts payable	2,30,000	3,00,000	3,80,000
Accruals	2,00,000	2,10,000	2,25,000
Bank loan (short-term)	1,00,000	1,00,000	1,40,000
	5,30,000	6,10,000	7,45,000
Long-term debt	3,00,000	3,00,000	3,00,000
Common stock	1,00,000	1,00,000	1,00,000
Retained earnings	5,00,000	5,50,000	5,50,000
	14,30,000	15,60,000	16,95,000
	₹	₹	₹
Sales	40,00,000	43,00,000	38,00,000
Cost of goods sold	32,00,000	36,00,000	33,00,000
Net profit	3,00,000	2,00,000	1,00,000

Considering opening balance of Accounts Receivable and Inventory as 2,00,000 and 4,00,000 respectively as on 01.04.20x0, ANALYSE the company's financial condition and performance over the last 3 years Are there any problems?

SOLUTION:

Ratios	2020-21	2021-22	2022-23
Current ratio (Current Assets ÷ Current Liabilities)	1.19 (₹ 6,30,000 / ₹ 5,30,000)	1.25 (₹ 7,60,000 / ₹ 6,10,000)	1.20 (₹ 8,95,000 / ₹ 7,45,000)
Acid-test ratio (Quick Assets ÷ Current Liabilities)	0.43 (₹ 2,30,000 / ₹ 5,30,000)	0.46 (₹ 2,80,000 / ₹ 6,10,000)	0.40 (₹ 2,95,000 / ₹ 7,45,000)
Receivables turnover ratio (Sales ÷ Average Receivables) (Refer Working Notes)	20 (₹ 40,00,000 / ₹ 2,00,000	18.70 (₹ 43,00,000 / ₹ 2,30,000	13.82 (₹ 38,00,000 / ₹ 2,75,000
Average collection period (365 Days ÷ Receivables turnover ratio)	18.25 (365 Days ÷ 20)	19.52 (365 Days ÷ 18.70)	26.41 (365 Days ÷ 13.82)
Inventory turnover ratio (COGS ÷ Average Inventory) (Refer Working Notes)	8 (₹ 32,00,000 / ₹ 4,00,000	8.18 (₹ 36,00,000 / ₹ 4,40,000	6.11 (₹ 33,00,000 / ₹ 5,40,000
Total debt to net worth (Short term + Long term Debt) ÷ (Common stock + Retained earnings)	1.38 (₹ 8,30,000 / ₹ 6,00,000)	1.40 (₹ 9,10,000 / ₹ 6,50,000)	1.61 (₹ 10,45,000 / ₹ 6,50,000
Long-term debt to total capitalization	0.33 (₹ 3,00,000 / ₹ 9,00,000)	0.32 (₹ 3,00,000 / ₹ 9,50,000)	0.32 (₹ 3,00,000 / ₹ 9,50,000)
Gross profit margin (Gross Profit ÷ Sales) {Gross profit = Sales - Cost of Goods sold}	0.20 (₹ 8,00,000 / ₹ 40,00,000)	0.16 (₹ 7,00,000 / ₹ 43,00,000)	0.13 (₹ 5,00,000 / ₹ 38,00,000)
Net profit margin (Net Profit ÷ Sales)	0.075 (₹ 3,00,000 / ₹ 40,00,000)	0.047 (₹ 2,00,000 / ₹ 43,00,000)	0.026 (₹ 1,00,000 / ₹ 38,00,000)
Total Asset turnover (Sales ÷ Total Assets)	2.80 (₹ 40,00,000 / ₹ 14,30,000)	2.76 (₹ 43,00,000 / ₹ 15,60,000)	2.24 (₹ 38,00,000 / ₹ 16,95,000)
Return on assets (Net profit÷ Total Assets)	0.21 (₹ 3,00,000 / ₹ 14,30,000)	0.13 (₹ 2,00,000 / ₹ 15,60,000)	0.06 (₹ 1,00,000 / ₹ 16,95,000)
Working Notes			
Average receivables	(₹ 2,00,000 + ₹	(₹ 2,00,000 + ₹	(₹ 2,60,000 + ₹

{(Opening + closing) ÷ 2}	2,00,000) ÷ 2 = ₹ 2,00,000	2,60,000) ÷ 2 = ₹ 2,30,000	2,90,000) ÷ 2 = ₹ 2,75,000
Average Inventory {(Opening + closing) ÷ 2}	(₹ 4,00,000 + ₹ 4,00,000) ÷ 2 = ₹ 4,00,000	(₹ 4,00,000 + ₹ 4,80,000) ÷ 2 = ₹ 4,40,000	(₹ 4,80,000 + ₹ 6,00,000) ÷ 2 = ₹ 5,40,000

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

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

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

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

PROBLEM 2A:

Following information are available for Navya Ltd. along with various ratios relevant to the particular industry it belongs to. APPRAISE your comments on strength and weakness of Navya Ltd. comparing its ratios with the given industry norms.

Navya Ltd.

Balance Sheet as at 31.3.20x3

Liabilities	(₹)	Assets	(₹)
Equity Share Capital	48,00,000	Fixed Assets	24,20,000
10% Debentures	9,20,000	Cash	8,80,000
Sundry Creditors	6,60,000	Sundry debtors	11,00,000
Bills Payable	8,80,000	Stock	33,00,000
Other current Liabilities	4,40,000		-
Total	77,00,000	Total	77,00,000

Statement of Profitability For the year ending 31.3.20x3

Particulars	(₹)	(₹)
Sales		1,10,00,000
Less: Cost of goods sold:		
Material	41,80,000	

Wages	26,40,000	
Factory Overhead	12,98,000	81,18,000
Gross Profit		28,82,000
Less: Selling and Distribution Cost	11,00,000	
Administrative Cost	12,28,000	23,28,000
Earnings before Interest and Taxes		5,54,000
Less: Interest Charges		92,000
Earnings before Tax		4,62,000
Less: Taxes @ 50%		2,31,000
Net Profit (PAT)		2,31,000

Industry Norms

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

SOLUTION:

Ratios	Navya Ltd.	Industry Norms
1. Current Ratio = $\frac{\text{Current Assets}}{\text{Current Liabilities}}$	$\frac{₹\,52,80,000}{₹\,19,80,000}$ = 2.67	2.50
2. Receivable Turnover Ratio = $\frac{\text{Sales}}{\text{Debtors}}$	$\frac{₹\,1,10,00,000}{₹\,11,00,000}$ = 10.0	8.00
3. Inventory turnover ratio = $\frac{\text{Sales}}{\text{Stock}}$	$\frac{₹\,1,10,00,000}{₹\,33,00,000}$ = 3.33	9.00
4. Total Asset Turnover ratio = $\frac{\text{Sales}}{\text{Total Assets}}$	$\frac{₹\,1,10,00,000}{₹\,77,00,000}$ =1.43	2.00
5. Net Profit Ratio = $\frac{\text{Net Profit}}{\text{Sales}}$	$\frac{₹\,2,31,000}{₹\,1,10,00,000}$ = 2.10%	3.50%
6. Return on Total Asset = $\frac{\text{EBIT}}{\text{Total Assets}}$	$\frac{₹\,5,54,000}{₹\,77,00,000}$ = 7.19%	7%
7. Return on Net worth = $\frac{\text{Net Profit}}{\text{Net Worth}}$	$\frac{₹\,2,31,000}{₹\,48,00,000}$ = 4.81%	10.5%
8. $\frac{\text{Total Debt}}{\text{Total Assets}}$	$\frac{₹\,29,00,000}{₹\,77,00,000}$ = 37.66%	60%

Comments:

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

and Receivables Turnover Ratio.

2. However, the Inventory turnover ratio and Total Asset Turnover ratio is poor comparing to industry norm indicating that company is inefficient to utilize its inventory and assets.
3. The firm also has its net profit ratio and return on net worth ratio much lower than the industry norm.
4. Total debt to total assets ratio is lower that the industry standard which suggests that the firm is less levered by debt and more by equity resulting in less risky company.

PROBLEM 3:

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

You are required to CALCULATE:

(i) Operating profit margin (before tax)

(ii) Net profit margin (after tax)

(iii) Return on assets (on operating profit after tax)

(iv) Asset turnover and

(v) Return on owners' equity.

SOLUTION:

The net profit is calculated as follows:

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

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

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

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

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

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

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

PROBLEM 4:

The total sales (all credit) of a firm are ₹ 6,40,000. It has a gross profit margin of 15 per cent and a current ratio of 2.5. The firm's current liabilities are ₹ 96,000; inventories ₹ 48,000 and cash ₹ 16,000.

a. DETERMINE the average inventory to be carried by the firm, if an inventory turnover of 5 times is expected? (Assume 360 days a year).

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

SOLUTION:

(a)

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

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

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

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

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

(b)

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

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

Closing balance of receivables is found as follows:

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

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

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

PROBLEM 5:

The capital structure of Beta Limited is as follows:

Equity share capital of ₹ 10 each	**8,00,000**
9% preference share capital of ₹ 10 each	**3,00,000**
	11,00,000

Additional information: Profit (after tax at 35 per cent) ₹ 2,70,000; Depreciation ₹ 60,000; Equity dividend paid 20 per cent; Market price of equity shares ₹ 40.

You are required to COMPUTE the following, showing the necessary workings:

a) Dividend yield on the equity shares

b) Cover for the preference and equity dividends

c) Earnings per shares

d) Price-earnings ratio

SOLUTION:

(a) Dividend yield on the equity shares

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

(b) Dividend coverage ratio

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

$$= \frac{₹\,2,70,000}{₹\,27,000\ (0.09 \times ₹\,3,00,000)} = 10\text{times}$$

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

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

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

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

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

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

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

PROBLEM 6:

Following information relates to Temer Ltd.:

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

Closing stock of the period is ₹ 10,000 above the opening stock. DETERMINE:

i. **Sales and cost of goods sold**
ii. **Sundry Debtors**
iii. **Sundry Creditors**
iv. **Closing Stock**
v. **Fixed Assets**

SOLUTION:

i) Determination of Sales and Cost of goods sold:

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

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

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

Cost of Goods Sold = Sales – Gross Profit
= ₹ 16,00,000 - ₹ 4,00,000
= ₹ 12,00,000

ii) Determination of Sundry Debtors:

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

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

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

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

Or, Sundry Debtors + Bills receivable = ₹ 4,00,000
Sundry Debtors = ₹ 4,00,000 – ₹ 25,000 = ₹ 3,75,000

iii) Determination of Sundry Creditors:

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

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

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

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

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

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

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

iv) Determination of Closing Stock

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

So, Average Stock = ₹ 8,00,000

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

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

Or, Opening Stock = ₹ 7,95,000

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

v) Determination of Fixed Assets

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

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

Or, Fixed Asset = ₹ 3,00,000

Workings:

***Calculation of Credit purchases:**

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

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

₹ 12,00,000 + ₹ 10,000 = Purchases

₹ 12,10,000 = Purchases (credit)

Assumption:

(i) All sales are credit sales

(ii) All purchases are credit purchase

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

PROBLEM 6A: **(MTP 1 SEPT 24 5 M)**

You are required to CALCULATE the Total Current Assets of Ananya Limited from the given information:

Stock Turnover	**= 5 times**
Sales (All credit)	**= ₹ 7,20,000**
Gross Profit Ratio	**= 25%**
Current Liabilities	**= 2,40,000**
Liquidity Ratio	**= 1.25**

Stock at the end is ₹ 30,000 more than stock in the beginning.

SOLUTION:

Cost of Goods Sold = Sales – Gross Profit

= ₹ 7,20,000 – 25% x ₹ 7,20,000 = ₹ 5,40,000

Stock Turnover = Cost of Goods Sold ÷ Average Stock

= ₹ 5,40,000 ÷ Average Stock = 5 times.

Average Stock = ₹ 5,40,000 ÷ 5 = ₹ 1,08,000

Let Opening Stock be x.

Closing Stock is ₹ 30,000 more than Opening Stock.

Closing Stock = (x + ₹ 30,000)

Average Stock = (x + x + ₹ 30,000) ÷ 2 = ₹ 1,08,000.

2x = ₹ 2,16,000 – ₹ 30,000

x = ₹ 1,86,000 ÷ 2 = ₹ 93,000 = Opening Stock.

Closing Stock = x + ₹ 30,000

= ₹ 93,000 + ₹ 30,000 = ₹ 1,23,000

Liquid Ratio = Liquid Assets ÷ Current Liabilities = Liquid Assets ÷ ₹ 2,40,000 = 1.25

Liquid Assets = ₹ 3,00,000

Current Assets = Liquid Assets + Closing Stock

= ₹ 3,00,000 + ₹ 1,23,000 = ₹ 4,23,000

PROBLEM 7:

Manan Pvt Ltd. gives you the following information relating to the year ending 31st March20x3:

1. Current Ratio	**2.5: 1**
2. Debt-Equity Ratio	**1: 1.5**
3. Return on Total Assets (After Tax)	**15%**
4. Total Assets Turnover Ratio	**2**
5. Gross Profit Ratio	**20%**
6. Stock Turnover Ratio	**7**
7. Net Working Capital	**₹ 13,50,000**

8. Fixed Assets	₹ 30,00,000
9. 1,80,000 Equity Shares of	₹ 10 each
10. 60,000, 9% Preference Shares of	₹ 10 each
11. Opening Stock	₹ 11,40,000

You are required to CALCULATE:

a) Quick Ratio

b) Fixed Assets Turnover Ratio

c) Proprietary Ratio

d) Earnings per Share

SOLUTION:

Workings Notes:

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

Net Working Capital = Current Assets – Current Liabilities

= 2.5 – 1 = 1.5

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

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

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

Total Assets = Current Assets + Fixed Assets

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

(ii) Computation of Sales & Cost of Goods Sold

Sales = Total Assets Turnover × Total Assets

= 2 x (Fixed Assets + Current Assets)

= 2 × (₹ 30,00,000 + ₹ 22,50,000)

= ₹ 1,05,00,000

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

= 80% × ₹ 1,05,00,000 = ₹ 84,00,000

(iii)Computation of Stock & Quick Assets

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

= ₹ 12,00,000

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

= (₹ 12,00,000 × 2) – ₹ 11,40,000

= ₹ 12,60,000

Quick Assets = Current Assets – Closing Stock

= ₹ 22,50,000 – ₹ 12,60,000

= ₹ 9,90,000

(iv) Computation of Proprietary Fund

$$\text{Debt-Equity Ratio} = \frac{\text{Debt}}{\text{Equity}} = \frac{1}{5}$$

Or, Equity = 1.5 Debt

Total Assets = Equity + Preference capital + Debt + CL

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

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

Equity = ₹ 15,00,000 × 1.5

= ₹ 22,50,000

So, Proprietary Fund = Equity + Preference Capital

= ₹ 22,50,000 + ₹ 6,00,000

= ₹ 28,50,000

(v) Computation of Profit after tax (PAT)

= Total Assets × Return on Total Assets

= ₹ 52,50,000 × 15%

= ₹ 7,87,500

(a) Quick Ratio

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

(b) Fixed Assets Turnover Ratio

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

(c) Proprietary Ratio

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

(d) Earnings per Equity Share (EPS)

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

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

= ₹ 4.075 per share

PROBLEM 7A: **(PEP MAY 24 5M)**

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 × 12.5% = ₹ 5,62,500

Debt to Equity = 1.5:1

$$= \frac{\text{Total Debt}}{\text{Shareholders' Equity}}$$

Equity = ₹ 30,00,000

$$\text{Return of Shareholders' Funds} = 54\% = \frac{\text{Net Profit after Taxes}}{\text{EquityShareholders' Fund}} \times 100$$

Profit after Tax (PAT) = 54% × Equity = ₹ 16,20,000

Profit before Tax (PBT) = Profit after Tax

= ₹ 16,20,000 ÷ 75% = ₹ 21,60,000

Earnings 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%

$$0.15 = \frac{\text{Operating Profit}}{\text{Sales}} \times 100$$

Sales = EBIT or Operating Profit ÷ 0.15

= ₹ 27,22,500 ÷ 0.15 = ₹ 1,81,50,000

$$\text{Operating Ratio} = \frac{\text{Operating Expenses}}{\text{Cost of Goods Sold (COGS)}} = 2:6 = 1:3$$

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

₹ 1,54,27,500 = COGS + (1 ÷ 3) COGS

COGS = ₹ 1,15,70,625

Gross Profit = Sales - COGS

= ₹ 1,81,50,000 - ₹ 1,15,70,625

= ₹ 65,79,375

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

= ₹ 65,79,375 ÷ ₹ 1,81,50,000

= 0.3625 or 36.25%

Gross profit and sales can be calculated in an alternative way also. However, there will be no change in GP ratio, i.e., 36.25%.

iii. $$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

= 1.8

Current Assets = 1.8 × Current Liabilities

Total Balance Sheet Liability = Equity + Debt + Current Liabilities

= ₹ 30,00,000 + ₹ 45,00,000 + CL .....(2)

Total Balance Sheet Asset = Fixed Assets + Current Assets

= ₹ 39,00,000 + CA = ₹ 39,00,000 + 1.8 × CL .....(3)

Equating (2) and (3):

₹ 75,00,000 + CL = ₹ 39,00,000 + 1.8 × CL

0.8 × CL = ₹ 36,00,000

CL = ₹ 45,00,000

Current Assets = 1.8 × CL = 1.8 × ₹ 45,00,000 = ₹ 81,00,000

PROBLEM 7B: (RTP JAN 25)

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

Particulars	Amount (₹)
Current Ratio	3:1
Loan funds to Owned Funds Ratio	1:3
Gross Profit Ratio	25%
Stock Turnover Ratio	10
Net Working Capital	₹ 5,00,000
Return on Total Assets (pre-tax)	15%
MPS	₹ 20
Total Assets Turnover Ratio	2.5
Opening stock	₹ 6,50,500
Fixed Assets	₹ 15,00,000
75,000 equity shares of	₹ 10 each

25,000, 12% Pref. Shares of	₹ 10 each
Depreciation	₹ 50,000
Interest on Debt	9%
Future Instalments	₹ 2,00,000

SOLUTION:

WN 1: Calculation of Current Assets & Current Liabilities

Current Ratio = CA ÷ CL = 3:1

Therefore, CA = 3 CL

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 Lakhs + ₹ 7.5 Lakhs = 22.50 lakhs

Total Assets Turnover Ratio = Sales ÷ Total Assets = 2.5 (given)

Therefore Sales = ₹ 22.5 lakhs X 2.5

Sales = ₹ 56,25,000

GP Margin = 25%, therefore COGS = 75% of Sales

COGS = ₹ 56.25 Lakhs x 75% = ₹ 42,18,750

Stock Turnover Ratio = COGS ÷ Average Stock = 10 (Given)

Average Stock = ₹ 42,18,750 ÷ 10 Times = ₹ 4,21,875

Average Stock = (Opening Stock + Closing Stock) ÷ 2

₹ 4,21,875 = (₹ 6,50,500 + Closing Stock) ÷ 2

Closing 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 Interest & Tax = EBIT + Depreciation

= ₹ 337500 + ₹ 50000

Cash Profit before Interest & 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 Liabilities = 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 Equity Share holders

Particulars	**Amount (₹)**
EBIT	3,37,500
(-) Interest (5 lakhs x 9%)	(45,000)
EBT	**2,92,500**
(-) Tax @ 0.25	(73,125)
EAT	**2,19,375**
(-) Preference Dividend (₹ 250000 x 12%)	(30,000)
Earnings For Equity Shareholders Holders	**1,89,375**

1. Quick Ratio = (Current Asset - Closing Stock) ÷ Current Liabilities
   = (₹ 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 Interest & Tax) ÷ (Interest + Instalments)
   = ₹ 3,87,500 ÷ (₹ 45,000 + ₹ 2,00,000)
   Debt Service Coverage Ratio = 1.58 times.

4. EPS = Earnings for Equity Shareholders ÷ No of Equity 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

PROBLEM 8:

From the following information and ratios, PREPARE the Balance sheet as at 31st March, 20x3 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

   $$CL = \frac{₹\,10,00,000}{2}$$

   CL = ₹ 5,00,000

   CA = 3 x ₹ 5,00,000

   CA = ₹ 15,00,000

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

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

   ₹ 15,00,000 – stock = ₹ 5,00,000

   Stock = ₹ 10,00,000

3. Stock Turnover ratio (on sales) = 5

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

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

   Sales = ₹ 50,00,000

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

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

5. PBIT ÷ PBT = 2.2

   PBIT = 2.2 x ₹ 5,00,000

   PBIT= ₹ 11,00,000

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

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

6. Average collection period = 30 days

Receivables = $\frac{30\ Days}{360\ Days}$ x ₹ 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**

PROBLEM 8A:

From the following ratios and information given below, PREPARE Trading Account, Profit and Loss Account and Balance Sheet of Aebece Company:

Fixed Assets	**₹ 40,00,000**
Closing Stock	**₹ 4,00,000**
Stock turnover ratio	**10**
Gross profit ratio	**25 percent**
Net profit ratio	**20 percent**
Net profit to capital	**1/5**
Capital to total liabilities	**1/2**
Fixed assets to capital	**5/4**
Fixed assets/Total current assets	**5/7**

SOLUTION:

Workings:

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

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

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

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

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

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

*It is assumed that Total Liabilities do not include Capital.

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

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

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

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

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

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

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

Or, Average Stock = ₹ 2,40,000

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

Or, Opening Stock = ₹ 80,000

Trading Account

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

Profit and Loss Account

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

Balance Sheet

Capital and Liabilities	(₹)	Assets	(₹)
Capital	32,00,000	Fixed Assets	40,00,000
Liabilities	64,00,000	Current Assets:	
		Closing Stock	4,00,000
		Other Current Assets	52,00,000
		(Balancing Figure)	
	96,00,000		**96,00,000**

PROBLEM 8B:

Ganpati Limited has furnished the following ratios and information relating to the year ended 31st March, 20x3:

Sales	**₹ 60,00,000**
Return on net worth	**25%**
Rate of income tax	**50%**
Share capital to reserves	**7:3**
Current ratio	**2**
Net profit to sales	**6.25%**
Inventory turnover (based on cost of goods sold)	**12**
Cost of goods sold	**₹ 18,00,000**
Interest on debentures	**₹ 60,000**
Receivables	**₹ 2,00,000**
Payables	**₹ 2,00,000**

You are required to:

a) CALCULATE the operating expenses for the year ended 31st March, 20x3.

b) PREPARE a Balance Sheet as on 31st March, 20x3 in the following format:

Balance Sheet as on 31st March, 2023

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

SOLUTION:

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

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

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

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

Working Notes:

(i) Share Capital and Reserves and Surplus

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

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

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

The ratio of share capital to reserves is 7:3

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

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

(ii) Debentures

Interest on Debentures @ 15% = ₹ 60,000

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

(iii) Current Assets

Current Ratio = 2

Payables = ₹ 2,00,000

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

(iv) Fixed Assets

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

(v) Composition of Current Asset

Inventory Turnover = 12

$$\frac{\text{Cost of Goods Sold}}{\text{Closing Stock}} = 12$$

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

Composition	₹
Stock	1,50,000
Receivables	2,00,000
Cash (Balancing Figure)	**50,000**
Total Current Assets	4,00,000

PROBLEM 8C:

Using the following information, PREPARE the balance sheet:

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

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

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

SOLUTION:

Working Notes:

(i) Long term Debt

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

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

(ii) Total assets

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

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

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

(iii)Sales and Cost of Goods sold

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

$\therefore$ Sales = ₹ 10,00,000

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

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

(iv)Current Assets

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

$\therefore$ Inventory = ₹ 1,00,000

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

$\therefore$ Accounts receivables = ₹ 50,000

Sales ₹ 10,00,000

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

$\therefore$ Cash = ₹ 50,000

(v) Plant and equipment Note and Payables ₹ 1,00,000

= Total Assets - Current Assets

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

Balance Sheet

	₹		₹
Cash	50,000	Notes and payables	1,00,000
Accounts receivable	50,000	Long-term debt	1,00,000
Inventory	1,00,000	Common stock	1,00,000
Plant and equipment	2,00,000	Retained earnings	1,00,000
Total Assets	**4,00,000**	**Total Liabilities and Equity**	**4,00,000**

PROBLEM 8D: **Sep 2025 (5 Marks)**

Following information relates to MNP Limited for the year ended on 31st March, 2024:

Inventory turnover ratio (based on cost of goods sold)	7.5 times
Total assets turnover ratio	2.5 times
Long term debt to Shareholders' fund	0.6:1
Debtors' collection period	30 days
Gross profit ratio	25% on sales
Current Ratio	2.9:1

Balance Sheet as on 31st March,2024

Liabilities	₹	Assets	₹
Equity share capital	6,00,000	Fixed Assets	?
Reserves & Surplus	3,00,000	Inventories	?
Long term debt	?	Debtors	?
Creditors	3,00,000	Cash	?
Total		Total	

You are required to complete the Balance Sheet of MNP Limited as on 31st March,2024. Assume a 360 days year and all sales are credit sales.

SOLUTION:

Working Notes:

Long term debt to Shareholder's fund = 0.6:1

Long term debt = 0.6 x ₹ 9,00,000 = ₹ 5,40,000

Total Assets = ₹ 17,40,000

$$\text{Total Asset turnover ratio} = \frac{\text{Sales}}{\text{Total Assets}} = 2.5 \text{ Times}$$

Sales = 2.5 x ₹ 17,40,000 = ₹ 43,50,000

$$\text{Current ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}} = 2.9:1$$

Current Assets = 2.9 x ₹ 3,00,000 = ₹ 8,70,000

Fixed Assets = Total Assets - Current Assets

= ₹ 17,40,000 – ₹ 8,70,000 = ₹ 8,70,000

Gross profit ratio = 25% on sales

Gross Profit (GP) = ₹ 43,50,000 x 0.25 = ₹ 10,87,500

Cost of Goods Sold (COGS) = Sales – GP

= ₹ 43,50,000 - ₹ 10,87,500

= ₹ 32,62,500

$$\text{Inventory Turnover Ratio} = \frac{\text{Cost Of Goods Sold}}{\text{Averge Inventory}} = 7.5 \text{ times}$$

Inventory = ₹ 32,62,500 ÷ 7.5 = ₹ 4,35,000

Debtor Collection Period = $\frac{\text{Average Accounts Receivables}}{\text{Averge Daily Credit Sales}}$ = 30 Days

Average Daily Credit Sales

Receivables = (30 days x ₹ 43,50,000) ÷ 360 days

= ₹ 3,62,500

Balance Sheet as on 31st March 2024

Liabilities	(₹)	Assets	(₹)
Share Capital	6,00,000	Fixed Assets	8,70,000
Reserve and Surplus	3,00,000	Inventories	4,35,000
Long-term loan	5,40,000	Debtors	3,62,500
Creditors	3,00,000	Cash (Balancing Figure)	72,500
	17,40,000		**17,40,000**

PROBLEM – 8E

Gig Ltd. has furnished the following information relating to the year ended 31st March, 20x2 and 31st March, 20x3:

	31st March, 20x2 (₹)	31st March, 20x3 (₹)
Share Capital	40,00,000	40,00,000
Reserve and Surplus	20,00,000	25,00,000
Long term loan	30,00,000	30,00,000

- **Net profit ratio: 8%**
- **Gross profit ratio: 20%**
- **Long-term loan has been used to finance 40% of the fixed assets.**
- **Stock turnover with respect to cost of goods sold is 4.**
- **Debtors represent 90 days sales.**
- **The company holds cash equivalent to 1½ months cost of goods sold.**
- **Ignore taxation and assume 360 days in a year.**

You are required to PREPARE Balance Sheet as on 31st March, 20x3 in the following format:

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

SOLUTION:

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

So, Net profit = ₹ 5,00,000

Net Profit Ratio = 8%

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

(ii) Cost of Goods sold

= Sales – Gross profit Margin

= ₹ 62,50,000 – 20% of ₹ 62,50,000

= ₹ 50,00,000

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

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

v) Debtors = $\frac{₹\,62,50,000}{360\text{ Days}}$ × 90 Days = ₹ 15,62,500

vi) Cash Equivalent = $\frac{₹\,50,00,000}{12\text{ months}}$ × 1.5 months = ₹ 6,25,000

Balance Sheet as on 31st March 2023

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

PROBLEM – 8F

Following information has been provided from the books of Laxmi Pvt Ltd. for the year ending on 31st March, 20x3:

Net Working Capital	**₹ 4,80,000**
Bank overdraft	**₹ 80,000**
Fixed Assets to Proprietary ratio	**0.75**
Reserves and Surplus	**₹ 3,20,000**
Current ratio	**2.5**
Liquid ratio (Quick Ratio)	**1.5**

You are required to PREPARE a summarised Balance Sheet as at 31 st March, 20x3 assuming that there is no long-term debt.

SOLUTION:

Working notes:

(i) Computation of Current Assets and Current Liabilities

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

Current assets = 2.5 Current liabilities

Now, Working capital = Current assets - Current liabilities

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

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

∴ Current Liabilities = ₹ 3,20,000

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

(ii) Computation of Inventories

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

$$1.5 = \frac{\text{Current assets - Inventories}}{\text{Rs3,20,000}}$$

1.5 x ₹ 3,20,000 = ₹ 8,00,000 - Inventories

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

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

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

∴ Fixed Assets = 0.75 Proprietary fund

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

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

∴ Proprietary fund = ₹ 19,20,000

and Fixed Assets = 0.75 proprietary fund

= 0.75 x ₹ 19,20,000 = ₹ 14,40,000

Capital = Proprietary fund - Reserves & Surplus

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

Sundry Creditors = Current liabilities - Bank overdraft

= ₹ 3,20,000 - ₹ 80,000 = ₹ 2,40,000

Balance Sheet as on 31st March, 2023

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

PROBLEM 8G:

The following accounting information and financial ratios of PQR Ltd. relates to the year ended 31st March, 20x3:

I	**Accounting Information:**	
	Gross Profit Net profit	**15% of Sales**

	Raw materials consumed	8% of sales
	Direct wages	20% of works cost
	Stock of raw materials	10% of works cost
	Stock of finished goods	3 months' usage
	Debt collection period	6% of works cost
	(All sales are on credit)	60 days
II	Financial Ratios:	
	Fixed assets to sales	1 : 3
	Fixed assets to Current assets	13 : 11
	Current ratio	2 : 1
	Long-term loans to Current liabilities	2 : 1
	Share Capital to Reserves and Surplus	1 : 4

If value of Fixed Assets as on 31st March, 20x2 amounted to ₹ 26 lakhs, PREPARE a summarised Profit and Loss Account of the company for the year ended 31st March, 20x3 and also the Balance Sheet as on 31st March, 20x3.

SOLUTION:

Working Notes:

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

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

ii) Calculation of Current Assets

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

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

iii) Calculation of Raw Material Consumption and Direct Wages

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

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

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

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

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

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

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

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

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

viii) Calculation of Long-term Loan

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

$$\frac{\text{Long Term Loan}}{₹\ 11,00,000} = \frac{2}{1} \Rightarrow \text{Long Term Loan} = ₹\ 22,00,000$$

ix) Calculation of Cash Balance

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

x) Calculation of Net worth

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

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

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

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

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

Profit and Loss Account of PQR Ltd.
for the year ended 31st March, 2023

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

PROBLEM 8H: **(MTP 1 MAY 24 5M)**

ANVY Ltd. has furnished the following ratios and information for the year end 31st March, 2023:

Equity share capital	**₹ 2,00,000**
The relevant ratios of the company are as follows:	
Current debt to total debt	**0.50**
Total debt to Equity shares capital	**0.60**
Fixed assets to Equity share capital	**0.70**
Total assets turnover	**2.5 Times**
Inventory turnover	**10 Times**

You are required to PREPARE the Balance Sheet of ANVY Ltd. as on 31st March, 2023.

SOLUTION:

ANVY Ltd
Balance Sheet as on 31st March, 2023

Liabilities	₹	Assets	₹
Equity share capital	2,00,000	Fixed assets	1,40,000
Current debt	60,000	Cash (balancing figure)	1,00,000

Long term debt	60,000	Inventory	80,000
	3,20,000		**3,20,000**

Working Notes

1. Total debt = 0.60 x Equity share capital
   = 0.60 x ₹ 2,00,000
   = ₹ 1,20,000
   Further, Current debt to total debt = 0.50.
   So, current debt = 0.50 x ₹ 1,20,000 = ₹ 60,000,
   Long term debt = ₹ 1,20,000 - ₹ 60,000 = ₹ 60,000
2. Fixed assets = 0.70 × Equity share Capital
   = 0.70 × ₹ 2,00,000 = ₹ 1,40,000
3. Total assets to turnover = 2.5 Times: Inventory turnover = 10 Times
   Hence, Inventory ÷ Total assets = 2.5 ÷ 10 = 1 ÷ 4, Total assets = ₹ 3,20,000
   Therefore Inventory = ₹ 3,20,000 ÷ 4 = ₹ 80,000

PROBLEM 8I: **(MTP 1 JAN 25 6M)**

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	**730,000**
Working Capital	**120,000**
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 x 2.5 = ₹ 2,00,000

2. **Closing Stock**

Given,

Quick Ratio = 1.3

Current Assets - Closing Stock ÷ Current Liabilities - Bank Overdraft =1.3

₹ 2,00,000 - Closing Stock ÷ (₹ 80,000 - ₹ 15,000) = 1.3

or Closing Stock = ₹ 2,00,000 - ₹ 84,500 = ₹ 1,15,500

Opening Stock = 1,15,000 x (100 ÷ 110) = ₹ 1,05,000

3. **Debtors**

Given

Debtors Velocity = 40 Days

(Debtors ÷ Sales) x 365 Days = 40 Days

Debtors = (₹ 7,30,000 x 40 Days) ÷ 365 Days = ₹ 80,000

4. **Gross Profit** = ₹ 7,30,000 x 10 ÷ 100 = ₹ 73,000

5. **Proprietary Fund:**

Proprietary Ratio = 0.6

Fixed Assets ÷ Proprietary Fund = 0.6

Working Capital ÷ Proprietary Fund = 0.4

Proprietary Fund = ₹ 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

M/s Anya Co Ltd.

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		By Gross Profit	73,000
Expenses (Balancing Figure)	43,000		
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**

PROBLEM 8J: **(MTP 2 JAN 25 5M)**

The financial statement and operating results of Alpha Limited revealed the following position as on 31st March, 2023:

- **Equity shares capital (₹ 10 fully paid share)** **₹ 20,00,000**
- **Working capital** **₹ 6,00,000**
- **Bank overdraft** **₹ 1,00,000**
- **Current ratio** **2.5 : 1**
- **Liquidity ratio** **1.5 : 1**
- **Proprietary ratio (Net fixed assets/Proprietary fund)** **0.75 : 1**
- **Cost of sales** **₹ 14,40,000**
- **Debtors velocity** **2 months**
- **Stock turnover based on cost of sales** **4 times**
- **Gross profit ratio** **20% of sales**
- **Net profit ratio** **15% of sales**

Closing stock was 25% higher than the opening stock. There were also free reserves brought forward from earlier yea₹ Current assets include stock, debtors and cash only. The current liabilities expect bank overdraft treated as creditors.

Expenses include depreciation of ₹ 90,000.

The following information was collected from the records for the year ended 31st March, 2024:

- **Total sales for the year were 20% higher as compared to previous year.**
- **Balances as on 31st March, 2024 were: Stock ₹ 5,20,000, Creditors ₹ 4,15,000, Debtors ₹ 4,95,000 and Cash balance ₹ 3,10,000.**
- **Percentage of Gross profit on turnover has gone up from 20% to 25% and ratio of net profit to sales from 15% to 16%.**
- **A portion of Fixed assets was very old (book values ₹ 1,80,000) disposed for ₹ 90,000. (No depreciations to be provided on this item).**
- **Long-term investments were purchased for ₹ 2,96,600.**
- **Bank overdraft fully discharged.**
- **Percentage of depreciation to Fixed assets to be provided at the rate in the previous**

year.

PREPARE Balance Sheet as on 31st March, 2023 and 31st March, 2024.

SOLUTION:

Balance Sheets of Alpha Limited

Liabilities	31 March 2023	31 March 2024	Assets	31 March 2023	31 March 2024
Equity share capital	₹ 20,00,000	₹ 20,00,000	Fixed Assets	₹ 18,00,000	₹ 15,39,000
(₹ 10 each fully paid)			(₹ 18,90,000 - ₹ 90,000)		
Reserve and Surplus	₹ 1,30,000	₹ 1,30,000	Long-term investment	-	₹ 2,96,600
Profit & Loss A/c (15% sales)	₹ 2,70,000	₹ 6,15,600	Current Assets (₹10,00,000)		
Current Liabilities			Stock	₹ 4,00,000	₹ 5,20,000
Bank Overdraft	₹ 1,00,000	-	Sundry Debtors	₹ 3,00,000	₹ 4,95,000
Creditors	₹ 3,00,000	₹ 4,15,000	Cash at Bank (Balancing)	₹ 3,00,000	₹ 3,10,000
Total	**28,00,000**	**31,60,000**	**Total**	**28,00,000**	**31,60,000**

Calculation for 31st March, 2023

(i) Calculation of Current Liabilities

Suppose that Current Liabilities = x, then current assets will be 2.5 x

Working capital = Current Assets – Current Liabilities

₹ 6,00,000 = 2.5x – x

x = ₹ 6,00,000 ÷ 1.5 = ₹ 4,00,000 (Current Liabilities)

Other Current Liabilities = Current Liabilities – Bank Overdraft

(Creditors) = ₹ 4,00,000 – ₹ 1,00,000 = ₹ 3,00,000

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

(ii) Liquid Ratio = Liquid Assets ÷ Current Liabilities

1.5 = Liquid Assets ÷ ₹ 4,00,000

Liquid assets = ₹ 6,00,000

Liquid assets = Current Assets – Stock

₹ 6,00,000 = ₹ 10,00,000 – Stock

So, Stock = ₹ 4,00,000

(iii) Calculation of fixed assets: Fixed assets to proprietary fund is 0.75,

working capital is therefore 0.25 of proprietary fund.

So, Fixed Assets = ₹ 6,00,000 ÷ (0.25 x 0.75) = ₹ 18,00,000

(iv) Sales = (₹ 14,40,000 ÷ 80) × 100 = ₹ 18,00,000

(v) Debtors = (2 months ÷ 12 months) x Sales

= (2 months ÷ 12 months) × ₹ 18,00,000 = ₹ 3,00,000

(vi) Net profit = 15% of ₹ 18,00,000 = ₹ 2,70,000

Calculation for the year 31st March, 2024

(vii) Sales = ₹ 18,00,000 + (₹ 18,00,000 × 0.2) = ₹ 21,60,000

(viii) Calculation of fixed assets

Particulars	₹	Particulars	₹
To Opening balance	18,00,000	By Banks (Sale)	90,000
		By Loss on sales of Fixed asset	90,000
		By P & L (Dep.) (5% as in previous year)	81,000
		By Balance b/d	15,39,000
Total	**18,00,000**		**18,00,000**

(ix) Net profit for the year 2011, 16% × ₹ 21,60,000 = ₹ 3,45,600

Total Profit = ₹ 2,70,000 + ₹ 3,45,600 = ₹ 6,15,600

PROBLEM – 8K **(RTP MAY 24)**

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

Gross Profit	**₹ 1,20,000**
Shareholders' Funds	**₹ 5,00,000**
Gross Profit margin	**40%**
Net Profit Margin	**10%**
PBIT to PBT	**2:1**
Credit sales to Total sales	**80%**
Total Assets turnover	**0.4 times**
Inventory turnover (Use sales as turnover)	**5 times**
Average collection period (a 360 days year)	**30 days**
Current ratio	**2**
Operating expenses (excluding interest)	**₹ 60,000**
Long-term Debt to Equity	**40%**
Tax	**Nil**

SOLUTION:

Gross Profit = ₹ 1,20,000

Gross Profit Margin = 40%

∴ Sales = Gross Profit ÷ Gross Profit Margin = ₹ 1,20,000 ÷ 0.40 = ₹ 3,00,000

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

PBIT ÷ PBT = 2

PBIT = 2 x ₹ 30,000

PBIT = ₹ 60,000

Interest = ₹ 60,000 – ₹ 30,000 = ₹ 30,000

Credit Sales to Total Sales = 80%

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

Total Assets Turnover = 0.4 times

∴ Total Assets = Sales ÷ Total Assets Turnover

= ₹ 3,00,000 ÷ 0.4 = ₹ 7,50,000

Inventory turnover = 5 times

Inventory = Sales ÷ Inventory turnover = ₹ 3,00,000 ÷ 5 Times = ₹ 60,000

Average Collection Period = 30 days

∴ Debtors' turnover = 360 Days ÷ Average Collection Period = 360 Days ÷ 30 Days

= 12 Times.

∴ Debtors = Credit Sales ÷ Debtors turnover = ₹ 2,40,000 ÷ 12 Times = ₹ 20,000

Current ratio = 2

2 = Debtors + Inventory + Cash (Current Assets) ÷ Creditors (Current Liabilities)

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

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

Long-term Debt to Equity = 40%

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

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

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

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

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

Income Statement

	(₹)
Sales	3,00,000
Less: Cost of Goods Sold	1,80,000
Gross Profit	**1,20,000**
Less: Operating Expenses	60,000
PBIT	**60,000**
Less: Interest	30,000
Net Profit	**30,000**

Balance Sheet

Liabilities	₹	Assets	₹
Equity share capital	5,00,000	Fixed asset (bal. fig.)	6,50,000
Long term debt	2,00,000	Current assets:	
Current liability	50,000	Stock	60,000
		Receivables	20,000
		Cash	20000
	7,50,000		**7,50,000**

PROBLEM – 8L **(RTP SEPT 24)**

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

Debt to Total assets ratio: 0.40

Long-term debts to equity ratio: 30%

Gross profit margin on sales: 20%

Accounts receivables period: 36 days

Quick ratio: 0.9

Inventory holding period: 60 days

Cost of goods sold: ₹ 64,00,000

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

Required:

COMPLETE the Balance Sheet of LP enterprises as on 31st March, 2024.

All calculations should be in nearest Rupee. Assume 360 days in a year.

SOLUTION:

Working Notes:

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

Debt to Total Asset Ratio = 0.40

Debt ÷ Total Assets = 0.40

Debt ÷ ₹ 50,00,000 = 0.40

So, Debt = ₹ 20,00,000

(2) Total Liabilities = ₹ 50,00,000

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

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

So, Reserves & Surplus = ₹ 10,00,000

(3)

Long term Debt ÷ Equity Shareholders' Fund = 30%

Long term Debt ÷ (₹ 20,00,000 + ₹ 10,00,000) = 30%

Long Term Debt = ₹ 9,00,000

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

Accounts Payable = ₹ 11,00,000

(5) Gross Profit to sales = 20%

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

Sales = (100 ÷ 80) × ₹ 64,00,000 = ₹ 80,00,000

(6) Inventory Turnover = 360 Days ÷ 60 Days

COGS ÷ Closing inventory = 360 Days ÷ 60 Days

₹ 64,00,000 ÷ Closing inventory = 360 Days ÷ 60 Days.

Closing inventory = ₹ 10,66,667

(7) Accounts Receivable period = 36 days

Accounts Receivable ÷ (Credit sales ×360 Days) = 36 Days

Accounts Receivable = (36 Days ÷ 360 Days) × credit sales

= (36 Days ÷ 360 Days) × ₹ 80,00,000 (assumed all sales are on credit)

Accounts Receivable = ₹ 8,00,000

(8) Quick Ratio = 0.9

Quick Assets ÷ Current liabilities = 0.9

(Cash + Debtors) ÷ ₹ 11,00,000 = 0.9

Cash + ₹ 8,00,000 = ₹ 9,90,000

Cash = ₹ 1,90,000

(9) Fixed Assets = Total Assets - Current Assets

= ₹ 50,00,000 – (₹ 10,66,667 + ₹ 8,00,000 + ₹ 1,90,000) = ₹ 29,43,333

Balance Sheet of LP enterprises as on 31st March 2024

Liabilities	(₹)	Assets	(₹)
Share Capital	20,00,000	Fixed Assets	29,43,333
Reserved surplus	10,00,000	Current Assets:	
Long Term Debt	9,00,000	Inventory	10,66,667
Accounts Payable	11,00,000	Accounts Receivables	8,00,000
		Cash	1,90,000
Total	**50,00,000**	**Total**	**50,00,000**

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

PROBLEM 9:

From the following information, you are required to PREPARE a summarised Balance Sheet for Rudra Ltd. for the year ended 31st March, 20x3:

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

Gross Profit 20% of Cost

COGS to Creditor 10:1

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

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	2,00,000		
Current Liability (Other			
STCL)			
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 Reserves		Fixed Assets	x/4
Net Worth	x/4	Current Assets:	
Long Term Loan @ 10%	x/4	Stock in Trade	x/6
		Debtors	x/6
Current liabilities:		Cash	5,00,000
Creditors	x/12		
Other Short-term Current			

Liability			
Outstanding Interest			
Total Current Liabilities	x/9+5,00,000/3		
Total		**Total**	

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

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

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

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

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

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

4. Debt: Equity = 1: 1

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

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

5. Gross Profit to Cost = 20%

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

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

   GP = 0.2 x – 0.2 GP

   1.2 GP = 0.2 x

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

   G P = x/6

   Cost of Goods Sold = x – x/6 = 5/6 x

6. COGS to creditors = 10:1

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

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

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

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

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

8. Current Ratio = 3: 1

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

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

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

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

9. $CA = 3CL$

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

$$CA = \frac{x}{3} + ₹\,5,00,000$$

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

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

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

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

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

$x = ₹\,1,20,00,000$

11. Now, from above calculations, we get,

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

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

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

Net Worth = x / 4 = ₹ 30,00,000

Now, Capital to Reserve is 1: 2

Capital = ₹ 10,00,000

and, Reserve = ₹ 20,00,000

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

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

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

Current Liabilities = Creditors + Other STCL + Outstanding Interest

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

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

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

Other STCL = ₹ 2,00,000

PROBLEM 9A:

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 31 st March, 20x3:

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.

- **Land and Buildings remained unchanged. Additional plant and machinery have been bought and a further ₹ 5,000 depreciation was written off.**
- **(The total fixed assets then constituted 60% of total fixed and current assets.)**
- **Working capital ratio was 8: 5.**
- **Quick assets ratio was 1: 1.**
- **The receivables (four-fifth of the quick assets) to sales ratio revealed a credit period of 2 months. There were no cash sales.**
- **Return on net worth was 10%.**
- **Gross profit was at the rate of 15% of selling price.**

- **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 x 60 ÷ 100 = ₹ 1,20,000

Current Assets = Total Assets – Fixed Assets

= ₹ 2,00,000 – ₹ 1,20,000 = ₹ 80,000

Calculation of additions to Plant & Machinery

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

Calculation of stock

$$\text{Quick ratio: } = \frac{\text{Current Assets - Stock}}{\text{Current Liabilities}} = 1$$

$$= \frac{₹\,80000 - \text{Stock}}{₹\,50000} = 1$$

₹ 50,000 = ₹ 80,000 – Stock

Stock = ₹ 80,000 - ₹ 50,000

= ₹ 30,000

Receivables = 4 ÷ 5th of quick assets

= (₹ 80,000 – ₹ 30,000) x (4 ÷ 5)

= ₹ 40,000

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

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

2 x credit sales = ₹ 4,80,000

Credit sales = ₹ 4,80,000 ÷ 2

= ₹ 2,40,000

= Total Sales (As there were no cash sales)

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

Return on net worth (net profit)

Net worth = ₹ 1,00,000 + ₹ 30,000

= ₹ 1,30,000

Net profit = ₹ 1,30,000 x 10 ÷100

= ₹ 13,000

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

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

Particulars	₹	Particulars	₹
To cost of goods sold	2,04,000	By sales	2,40,000
To gross profit	36,000		
	2,40,000		**2,40,000**
To debenture interest	1,000	By gross profit	36,000
To administration 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**

PROBLEM 9B: (MTP 2 MAY 24 8M)

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

Statement of Profit and Loss	₹	₹
Sales		1,25,00,000
Cost of goods sold		(76,40,000)
Gross Profit		48,60,000
Less: Operating Expenses		
Administrative Expenses	13,20,000	
Selling and Distribution Expenses	15,90,000	(29,10,000)
Operating Profit		19,50,000
Add: Non-Operating Income		3,28,000
Less: Non-Operating Expenses		(1,27,000)
Profit before Interest and taxes		21,51,000
Less: Interest		(4,39,000)
Profit before tax		17,12,000
Less: Taxes		(4,28,000)
Profit after Tax		12,84,000

Balance Sheet

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

ST loans	13,80,000	(39,47,000)
Total Funds Employed		62,30,000

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

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

Equity SC to Reserves	1	
Net Profit Ratio	15%	
Gross Profit Ratio	50%	
Long Term Debt to Equity	0.5	
Debtor Turnover	100	Days
Creditor Turnover (based on COGS)	100	Days
Inventory	70%	of Opening inventory

Cash Balance is assumed to remain same for next year

You are required to -

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

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

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

SOLUTION:

$$\text{Inventory Turnover} = \frac{\text{Inventory}}{\text{COGS}} \times 365 \text{ Days} = \frac{₹\,38,60,000 \times 365}{₹\,76,40,000} = 184.41 \text{ days}$$

= 185 days (apx)

$$\text{Receivables turnover} = \frac{\text{Receivables}}{\text{Sales}} \times 365 \text{ Days} = \frac{₹\,39,97,000 \times 365}{₹\,1,25,00,000} = 116.71$$

= 117 days (apx)

Equity to Reserves = 1

Reserves = 1 x ₹ 30,00,000 = ₹ 30,00,000

Projected profit = ₹ 30,00,000 - ₹ 18,00,000 = ₹ 12,00,000

Net Profit Margin = 15%

₹ 12,00,000 ÷ Sales = 0.15

Sales = ₹ 80,00,000

Gross Profit = ₹ 80,00,000 x 50% = ₹ 40,00,000

COGS = ₹ 80,00,000 - ₹ 40,00,000 = ₹ 40,00,000

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

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

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

Projected Closing Inventory = 70% of opening inventory

= 70% of ₹ 38,60,000 = ₹ 27,02,000

Projected Creditor Turnover = 100 days = Closing Creditors ÷ (COGS x 365 Days)

Closing Creditors = COGS ÷ 365 Days x100

Closing Creditor = ₹ 40,00,000 ÷ 365 Days x 100 = ₹ 10,95,890

Equity Share Capital + Reserves = ₹ 30,00,000 + ₹ 30,00,000 = ₹ 60,00,000

Long Term Debt to Equity = 0.5

LTD ÷ ₹ 60,00,000 = 0.5

Long Term Debt = 0.5 x ₹ 60,00,000

Long Term Debt = ₹ 30,00,000

Multiple Choice Questions

1. **Ratio of Net sales to Net working capital is a:**
   a. Profitability ratio
   b. Liquidity ratio
   c. Current ratio
   d. Working capital turnover ratio

2. **Long-term solvency is indicated by:**
   a. Debt/equity ratio
   b. Current Ratio
   c. Operating ratio
   d. Net profit ratio

3. **Ratio of net profit before interest and tax to sales is:**
   a. Gross profit ratio
   b. Net profit ratio
   c. Operating profit ratio
   d. Interest coverage ratio.

4. **Observing changes in the financial variables across the years is:**
   a. Vertical analysis
   b. Horizontal Analysis
   c. Peer-firm Analysis
   d. Industry Analysis.

5. **The Receivable-Turnover ratio helps management to:**
   a. Managing resources
   b. Managing inventory
   c. Managing customer relationship
   d. Managing working capital

6. **Which of the following is a liquidity ratio?**
   a. Equity ratio
   b. Proprietary ratio
   c. Net Working Capital

d. Capital Gearing ratio

7. Which of the following is not a part of Quick Assets?

a. Disposable investments

b. Receivables

c. Cash and Cash equivalents

d. Prepaid expenses

8. Capital Gearing ratio is the fraction of:

a. Preference Share Capital and Debentures to Equity Share Capital and Reserve & Surplus.

b. Equity Share Capital and Reserve & Surplus to Preference Share Capital and Debentures.

c. Equity Share Capital to Total Assets.

d. Total Assets to Equity Share Capital.

9. From the following information, calculate P/E ratio: Equity share capital of Rs.10 each Rs.8,00,000 9% Preference share capital of Rs.10 each Rs.3,00,000 Profit (after 35% tax) Rs.2,67,000, Depreciation Rs.67,000
Market price of equity share Rs.48

a. 15 times

b. 16 times

c. 17 times

d. 18 times

10. Equity multiplier allows the investor to see:

a. What portion of interest on debt can be covered from earnings available to equity shareholders?

b. How many times preference share interest be paid from earnings available to equity shareholders?

c. What portion of return on equity is the result of debt?

d. How many times equity is multiplied to get the value of debt?

11. A company has average accounts receivable of Rs.10,00,000 and annual credit sales of Rs.60,00,000. Its average collection period would be:

a. 60.83 days

b. 6.00 days

c. 1.67 days

d. 0.67 days

12. A company has net profit margin of 5%, total assets of Rs.90,00,000 and return on assets of 9%. Its total asset turnover ratio would be:

a. 1.6

b. 1.7

c. 1.8

d. 1.9

13. What does Q ratio measures?

a. Relationship between market value and book value per equity share.

b. Proportion of profit available per equity share.

c. Overall earnings on average total assets.

d. Market value of equity as well as debt in comparison to all assets at their replacement cost.

14. Calculate operating expenses from the information given below:

Sales	**Rs.75,00,000**
Rate of income tax	**50%**
Net profit to sales	**5%**
Cost of goods sold	**Rs.32,90,000**
Interest on debentures	**Rs.60,000**

a. Rs.41,00,000

b. Rs.8,10,000

c. Rs.34,00,000

d. Rs.33,90,000

15. Which of the following is not a profitability ratio?

a. P/E ratio

b. Return on capital employed (ROCE)

c. Q Ratio

d. Preference Dividend Coverage Ratio

Answers to the MCQs

1.	(d)	2.	(a)	3.	(c)	4.	(b)	5.	(d)	6.	(c)
7.	(d)	8.	(a)	9.	(b)	10.	(c)	11.	(a)	12.	(c)
13.	(d)	14.	(c)	15.	(d)						

Case Scenarios

RNOC Ltd is a listed company and has been facing a cash crunch situation since a while. The CFO is of the opinion that excess stock maintained as per the instructions of management of the company is the reason for cash crunch.

However, the management states that its product line requires larger amount of inventory due to greater variety of product line and customer may ask for any type of product. To maintain competitive advantage, the company should be able to cater to customer needs as and when required. The management is highly critical of the collection team as the management feels that they are not collecting the receivables within time as per industry standards.

You have been hired by the company as a financial consultant. Management has provided you the latest audited financial statements and also relevant industry statistics. You are required to advice the company to improve its liquidity position.

Statement of Profit and Loss	(₹)	(₹)
Sales		1,25,00,000
Cost of goods sold		
Opening Stock	23,00,000	
Add: Purchases	80,00,000	
Add: Direct expenses	12,00,000	
Less: Closing Stock	(38,60,000)	(76,40,000)
Gross Profit		48,60,000
Less: Operating Expenses		
Administrative Expenses	13,20,000	
Selling and Distribution Expenses	15,90,000	(29,10,000)
Operating Profit		19,50,000
Add: Non-Operating Income		3,28,000
Less: Non-Operating Expenses		(1,27,000)
Profit before Interest and taxes		21,51,000
Less: Interest		(4,39,000)
Profit before tax		17,12,000
Less: Taxes		(4,28,000)
Profit after Tax		12,84,000

Balance Sheet

Sources of Funds	₹	₹

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

Industry Standards

Receivables Turnover	=	90 Days
Inventory Turnover	=	100 Days
Payables turnover	=	90 Days
Net Asset Turnover	=	4 Times

The company has set certain standards for the upcoming year financial status. All the ratios are based on closing figures in financial statements.

Equity SC to Reserves	=	1
Net Profit Ratio	=	15%
Gross Profit Ratio	=	50%
loan Term Debt to Equity	=	0.5

Debtor Turnover	=	100 Days
Creditor Turnover (based on COGS)	=	100 Days
Inventory	=	70% of Opening inventory

Cash Balance is assumed to remain same for next year.

1. What is the inventory turnover ratio in days and whether assertion of CFO is correct?
   a. 120 days; Assertion of CFO is correct.
   b. 100 days; Assertion of CFO is incorrect.
   c. 185 days; Assertion of CFO is correct.
   d. 150 days; Assertion of CFO is incorrect.

2. What is the receivables turnover and whether assertion of management is correct?
   a. 117 days; Assertion of management is correct.
   b. 100 days; Assertion of management is correct.
   c. 85 days; Assertion of management is correct.
   d. 85 days; Assertion of management is not correct.

3. What is the expense company needs to incur for earning ₹ 1 of revenue in the last year?
   a. 0.844
   b. 0.754
   c. 0.962
   d. 0.824

4. What is the projected net working capital of the company?
   a. ₹ 42,87,891
   b. ₹ 40,27,891
   c. ₹ 48,27,891
   d. ₹ 48,28,891

5. What is the projected Long-Term Debt of the company for the next year?
   a. ₹ 60,00,000
   b. ₹ 30,00,000
   c. ₹ 14,30,000
   d. ₹ 28,60,000

Answers to the Case Scenarios

1.	(c)	**2.**	(a)	**3.**	(a)	**4.**	(b)	**5.**	(b)

i. **(c)**

$$\text{Inventory Turnover} = \frac{\text{Inventory}}{COGS} \times 365 = \frac{38,60,000}{76,40,000} \times 365$$

= 184.41 days = 185 days (apx)

76,40,000

Inventory holding period of 185 days is significantly higher as compared to industry standard of 100 days. This means a significant amount of working capital is tied in inventory, which may be leading to liquidity crunch.

ii. **(a)**

$$\text{Receivables Turnover} = \frac{\text{Receivables}}{\text{Sales}} \times 365 = \frac{39,79,000}{1,25,00,000} \times 365$$

= 116.71 = 117 days (apx)

Receivables turnover of 117 days as compared to industry standard of 90 days is a further delay of 27 days. This will lead to good amount of money being tied up in debtors.

iii. **(a)**

Operating Ratio is the number which indicates cost incurred by company for earning each rupee of revenue

$$\text{Operating Ratio} = \frac{COGS+\text{Operating Expenses}}{\text{Sales}} \times 100$$

$$= \frac{76,40,000 + 29,10,000}{1,25,00,000} \times 100 = 0.844$$

iv. **(b)**

Equity to Reserves	=	1
Reserves	=	1x30,00,000 = ₹ 30,00,000
Projected profit	=	30,00,000 -18,00,000 = ₹ 12,00,000
Net Profit Margin	=	15%
12,00,000/ Sales	=	0.15
Sales	=	₹ 80,00,000
Gross Profit	=	80,00,000 x 50% = ₹ 40,00,000
COGS	=	80,00,000 - 40,00,000 = ₹ 40,00,000
Projected Debtors Turnover	=	100 days = closing Receivables/Sales x 365
100	=	Closing Receivables/ 80,00,000 x365
Closing Receivables	=	80,00,000 x 100/365 = ₹ 21,91,781
Projected Closing Inventory	=	70% of opening inventory
	=	70% of 38,60,000 = ₹ 27,02,000

Projected Creditor Turnover = 100 days

= closing creditors/COGSx365

Closing Creditors = COGS x 100/365

Closing Creditors = 40,00,000 x 100/365 = ₹ 10,95,890

Net Working Capital = Cash + Debtors + Inventory - Creditors

= 2,30,000 + 21,91,781 + 27,02,000 - 10,95,890

Net Working Capital = ₹ 40,27,891

v. **(b)**

Equity Share Capital + Reserves = 30,00,000 + 30,00,000

= ₹ 60,00,000

Long Term Debt to Equity = 0.5

LTD/60,00,000 = 0.5

Long Term Debt = 0.5 x 60,00,000

Long Term Debt = ₹ 30,00,000

CHAPTER 08: WORKING CAPITAL MANAGEMENT

PROBLEM – 1

A firm has the following data for the year ending 31st March, 20x2:

	(₹)
Sales (1,00,000 @ ₹ 20)	20,00,000
Earnings before Interest and Taxes	2,00,000
Fixed Assets	5,00,000

The three possible current assets holdings of the firm are ₹ 5,00,000, ₹ 4,00,000 and ₹ 3,00,000. It is assumed that fixed assets level is constant, and profits do not vary with current assets levels. ANALYSE the effect of the three alternative current assets policies.

SOLUTION:

Effect of Alternative Current Assets Policies

	Conservative (₹)	Moderate (₹)	Aggressive (₹)
Sales (Given)	20,00,000	20,00,000	20,00,000
Earnings before Interest and Taxes (Given)	2,00,000	2,00,000	2,00,000
Current Assets	5,00,000	4,00,000	3,00,000
Fixed Assets (Given)	5,00,000	5,00,000	5,00,000
Total Assets (Current asset + Fixed asset)	**10,00,000**	**9,00,000**	**8,00,000**
Return on Total Assets (EBIT ÷ Total Assets)	20%	22.22%	25%
Current Assets ÷ Fixed Assets	1.00	0.80	0.60

Observations:

1. Under Conservative Policy where there is a High Liquidity and Low Profitability.
2. Under Aggressive Policy where there is a Low Liquidity and High Profitability.
3. Moderate Policy Generates Higher Return than Conservative Policy but Lower than Aggressive Policy.
4. In Determining the Optimum Level of Current Asset, the firm Should Balance Profitability and Liquidity Parameters.

PROBLEM – 2

From the following information of XYZ Ltd., you are required to CALCULATE:

a. Net operating cycle period.

b. Number of operating cycles in a year.

Raw material inventory consumed during the year	₹ 600000
Average stock of raw material	₹ 50000

	Cost of Production for the year	₹ 500000
	Average work-in-progress inventory	₹ 30000
	Cost of goods sold during the year	₹ 800000
	Average finished goods stock held	40000
	Average collection period from debtors	45 days
	Average credit period availed	30 days
	No. of days in a year	360 days

SOLUTION:

Step 1: Raw Material Storage Period (R)

$$\text{Raw Material storage period (R)} = \frac{\text{Average stock of raw material}}{\text{Average Cost of Raw Material Consumption per day}}$$

$$= \frac{₹\,50{,}000}{₹\ 6{,}00{,}000 \div 360\ \text{days}} = \frac{₹\ 50{,}000}{1{,}667} = 30\text{days}$$

Work-in-progress inventory holding period (W)

$$= \frac{\text{Average Work - in - progress inventory}}{\text{Average Cost of Production per day}}$$

$$= \frac{₹\ 30{,}000}{₹\ 5{,}00{,}000 \div 360\text{days}} = \frac{₹\ 30{,}000}{1{,}389} = 22\text{days}$$

Finished Goods storage period (F)

$$= \frac{\text{Average stock of finished goods}}{\text{Average Cost of Goods Sold per day}}$$

$$= \frac{₹\ 40{,}000}{₹\ 8{,}00{,}000 \div 360\text{days}} = \frac{₹\ 40{,}000}{2{,}222} = 18\text{days}$$

Receivables (Debtors) collection period (D) = 45 days

Credit Period allowed by creditors (C) = 30 days

Net Operating Cycle = R + W + F+ D – C = 30 + 22 + 18 + 45 – 30 = 85 days

$$\text{Number of Operating Cycles in a year} = \frac{\text{No of days in a year}}{\text{Operating Cycle period}}$$

$$= \frac{360\ \text{days}}{85\ \text{days}} = 4.23\text{times}$$

PROBLEM – 3

PREPARE a working capital estimate to finance an activity level of 52,000 units a year (52 weeks) based on the following data:

Raw Materials	**₹400 per unit**
Direct Wages	**₹150 per unit**
Overheads (Manufacturing)	**₹200 per unit**
Overheads (Selling & Distribution)	**₹100 per unit**

Selling Price - ₹1,000 per unit, Raw materials & Finished Goods remain in stock for 4

weeks, Work in process takes 4 weeks. Debtors are allowed 8 weeks for payment whereas creditors allow us 4 weeks.
Minimum cash balance expected is ₹50,000. Receivables are valued at Selling Price.

SOLUTION:

Step 1: Cost structure (Cost Sheet for 52,000 units)

Cost Sheet	
Particulars	**Amount (₹)**
Raw Material @ ₹400 Per Unit (Given)	2,08,00,000
Direct Wages @ ₹150 Per Unit (Given)	78,00,000
Manufacturing Overheads @ ₹200 Per Unit (Given)	1,04,00,000
Selling and Distribution OH @ ₹100 Per Unit (Given)	52,00,000
Cost of Sales	4,42,00,000
Add: Profit (Balancing Figure)	**78,00,000**
Sales @ ₹1,000 Per Unit (Given)	5,20,00,000

Particulars	**Calculation**	**Amount (₹)**
A. Current Assets:		
Raw Material Stock	$₹\ 2,08,00,000 \times \frac{4\ Weeks}{52\ Weeks}$	16,00,000
Work in Progress (WIP) Stock *	$₹\ 2,08,00,000 + \frac{(₹\ 78,00,000 + ₹\ 1,04,00,000)}{2} \times \frac{4\ Weeks}{52\ Weeks}$	23,00,000
Finished Goods Stock	$₹\ 4,42,00,000 \times \frac{4\ Weeks}{52 Weeks}$	34,00,000
Receivables	$₹\ 5,20,00,000 \times \frac{8\ Weeks}{52\ Weeks}$	80,00,000
Cash		50,000
	Total Current Assets	**1,53,50,000**
B.Current Liabilities:		
Creditors	$₹\ 2,08,00,000 \times \frac{4\ Weeks}{52\ Weeks}$	16,00,000
C.Working Capital Estimates (A-B)		**1,37,50,000**

Note:

* It is assumed that Labour and Overheads are Incurred Evenly Throughout the Year.

PROBLEM – 3A

On 1st January, the Managing Director of Naureen Ltd. wishes to know the amount of working capital that will be required during the year. From the following information, PREPARE the working capital requirements forecast.
Production during the previous year was 60,000 units. It is planned that this level of

activity would be maintained during the present year.
The expected ratios of the cost to selling prices are Raw materials 60%, Direct wages 10% and Overheads 20%.
Raw materials are expected to remain in store for an average of 2 months before issue to production.
Each unit is expected to be in process for one month, the raw materials being fed into the pipeline immediately and the labour and overhead costs accruing evenly during the month.
Finished goods will stay in the warehouse awaiting dispatch to customers for approximately 3 months.
Credit allowed by creditors is 2 months from the date of delivery of raw material. Credit allowed to debtors is 3 months from the date of dispatch.
Selling price is ₹ 5 per unit.
There is a regular production and sales cycle.
Wages and overheads are paid on the 1st of each month for the previous month. The company normally keeps cash in hand to the extent of ₹ 20,000.

SOLUTION:

Working Notes:

1. **Raw material inventory:** The cost of materials for the whole year is 60% of the Sales value.

   Hence it is 60,000 units × ₹ 5 × $\frac{60}{100}$ = ₹1,80,000.

   The monthly consumption of raw material would be ₹ 15,000. Raw material requirements would be for two months; Hence raw materials in stock would be ₹ 30,000

2. **Work-in-process:** Components of WIP Stock:

		(₹)
(a)	Raw materials in work-in-process (₹ 180000 ÷ 12 months) x 1 month x 100%	15,000
(b)	Labor costs in work-in-process $\left(\frac{10\% \times (₹\ 60{,}000 \times ₹\ 5)}{12 \text{ months}} \times 1 \text{ month} \times 50\%\right)$	1,250
(c)	Overheads (For ½ month as explained above) $\left(\frac{20\% \times (₹\ 60{,}000 \times ₹\ 5)}{12 \text{months}} \times 1 \text{ month} \times 50\%\right)$	2,500
	Total work-in-process	**18,750**

3. **Finished goods inventory:** (3 month's cost of production)

Raw Materials $\left(\frac{60\% \times (₹\ 60{,}000 \times ₹\ 5)}{12 \text{ months}} \times 3 \text{ months}\right)$	₹ 45,000
Labor $\left(\frac{10\% \times (₹\ 60{,}000 \times ₹\ 5)}{12 \text{ months}} \times 3 \text{ months}\right)$	₹ 7,500

Overheads $\left(\frac{20\% \times (₹\ 60{,}000 \times ₹\ 5)}{12\ \text{months}} \times 3\ \text{months}\right)$	₹ 15,000
Total finished goods inventory	**₹ 67,500**

4. **Debtors:** The total cost of sales = ₹ 2,70,000. (60000 units x ₹ 5 x 90%)

   Therefore, debtors = ₹ 2,70,000 × $\frac{3\ \text{Months}}{12\ \text{Months}}$ = ₹ 67,500

   Where, Total Cost of Sales = RM + Wages + Overheads + Opening Finished goods inventory – Closing finished goods inventory.

   = ₹ 1,80,000 + ₹ 30,000 + ₹ 60,000 + ₹ 67,500 – ₹ 67,500 = ₹ 2,70,000.

5. **Creditors:** Suppliers allow a two months' credit period. Hence, the average amount of creditors would be two months consumption of raw materials i.e.

   $\left(\frac{60\% \times (60{,}000 \times ₹\ 5)}{12\text{months}} \times 2\text{months}\right)$ = ₹ 30,000

6. **Direct Wages payable:** $\left(\frac{10\% \times (₹\ 60{,}000 \times ₹\ 5)}{12\text{months}} \times 1\text{month}\right)$ = ₹ 2,500

7. **Overheads Payable:** $\left(\frac{20\% \times (₹\ 60{,}000 \times ₹\ 5)}{12\text{months}} \times 1\text{month}\right)$ = ₹ 5,000

Here it has been assumed that inventory level is uniform throughout the year, therefore opening inventory equals closing inventory.

Statement of Working Capital Required

	(₹)	(₹)
Current Assets or Gross Working Capital:		
Raw materials inventory (Refer to working note 1)	30,000	
Working-in-process (Refer to working note 2)	18,750	
Finished goods inventory (Refer to working note 3)	67,500	
Debtors (Refer to working note 4)	67,500	
Cash	20,000	2,03,750
Current Liabilities:		
Creditors (Refer to working note 5)	30,000	
Direct wages payable (Refer to working note 6)	2,500	
Overheads payable (Refer to working note 7)	5,000	(37,500)
Estimated working capital requirements		**1,66,250**

PROBLEM – 3B

Following information is forecasted by R Limited for the year ending 31st March, 20x2:

	Balance as at 31st March, 20x2 (₹in lakh)	Balance as at 31st March, 20x1 (₹in lakh)
Raw Material	**65**	**45**
Work-in-progress	**51**	**35**

Finished goods	70	60
Receivables	135	112
Payables	71	68
Annual purchases of raw material (all credit)	400	
Annual cost of production	450	
Annual cost of goods sold	525	
Annual operating cost	325	
Annual sales (all credit)	585	

You may take one year as equal to 365 days.

You are required to CALCULATE:

1. Net operating cycle period.
2. Number of operating cycles in the year.
3. Amount of working capital requirement.

SOLUTION:

Working Notes:

1. **Raw Material Storage Period (R)**

$$= \frac{\text{Average Stock of Raw Material}}{\text{Annual Consumption of Raw Material}} \times 365 \text{ Days}$$

$$= \frac{\frac{₹\,45 + ₹\,65}{2}}{₹\,380} \times 365 = 52.83 \text{ or } 53 \text{days}$$

Annual Consumption of Raw Material = Opening Stock + Purchases - Closing Stock

= ₹ 45 + ₹ 400 – ₹ 65 = ₹ 380 lakh

2. **Work – in - Progress (WIP) Conversion Period (W)**

$$= \frac{\text{Average Stock of WIP}}{\text{Annual Cost of Production}} \times 365 \text{ Days}$$

$$= \frac{\frac{₹\,35 + ₹\,51}{2}}{₹\,450} \times 365 = 34.87 \text{ or } 35 \text{days}$$

3. **Finished Stock Storage Period (F)**

$$= \frac{\text{Average Stock of Finishedgoods}}{\text{Cost of Goods sold}} \times 365 \text{ Days}$$

$$= \frac{\frac{₹\,60 + ₹\,70}{2}}{₹\,525} \times 365 = 45.19 \text{ or } 45 \text{ Days}$$

4. **Receivables (Debtors) Collection Period (D)**

$$= \frac{\text{Average receivables}}{\text{Annual credit sales}} \times 365 \text{ Days}$$

$$= \frac{\frac{₹\,112 + ₹\,135}{2}}{₹\,585} \times 365 = 77.05 \text{ or } 77 \text{days}$$

5. **Payables (Creditors) Payment Period (C)**

$$= \frac{\text{Average payables for materials}}{\text{Annual Credit purchases}} \times 365 \text{ Days}$$

$$= \frac{\frac{₹\,68 + ₹\,71}{2}}{₹\,400} \times 365 = 63.41 \text{ or } 64 \text{ days}$$

(i) Net Operating Cycle Period

= R + W + F + D - C

= 53 + 35 + 45 + 77 – 64 = 146 days

(ii) Number of Operating Cycles in the Year

$$= \frac{365 \text{ Days}}{\text{Operating Cycle Period}} = \frac{365 \text{ Days}}{146} = 2.5 \text{times}$$

(iii) Amount of Working Capital Required

$$= \frac{\text{Annual Operating Cost}}{\text{Number of Operating Cycles}} = \frac{₹\,325}{2.50} = ₹\,130 \text{lakh}$$

PROBLEM – 3C **(RTP SEPT 24)**

TMT Limited is commencing a new project for manufacture of electric toys. The following cost information has been ascertained for annual production of 60,000 units at full capacity:

		Amount per unit (₹)
Raw materials		20
Direct labour		15
Manufacturing overheads:		
	₹	
Variable	15	
Fixed	10	25
Selling and Distribution overheads:		
	₹	
Variable	3	
Fixed	1	4
Total cost		64
Profit		16
Selling price		80

In the first year of operations expected production and sales are 40,000 units and 35,000 units respectively. To assess the need of working capital, the following additional information is available:

i. **Stock of Raw materials 3 months consumption.**

ii. **Credit allowable for debtors 1½ months.**

iii. **Credit allowable by creditors 4 months.**

iv. **Lag in payment of wages 1 month.**

v. Lag in payment of overheads ½ month.
vi. Cash in hand and Bank is expected to be ₹60,000.
vii. Provision for contingencies is required @ 10% of working capital requirement including that provision.

You are required to PREPARE a projected statement of working capital requirement for the first year of operations. Debtors are taken at cost.

SOLUTION:

Statement Showing Cost and Sales for the First Year

Annual Production Capacity	60,000 units
Production	40,000 units
Sales	35,000 units

Particulars	₹
Sales Revenue (₹ 80 × 35,000)	28,00,000
Cost of Production:	
Materials @ ₹ 20 per unit	8,00,000
Direct Labour @ ₹ 15 per unit	6,00,000
Manufacturing Overheads	
Variable @ ₹ 15 per unit	6,00,000
Fixed (based on production capacity 60,000 units × ₹ 10)	6,00,000
Cost of Production	**26,00,000**
Less: Closing Stock (40,000 – 35,000 = 5,000 units)	
$\left(\frac{₹\ 26,00,000}{40,000\ \text{units}} \times 5,000\ \text{units}\right)$	3,25,000
Cost of Goods Sold	**22,75,000**
Add: Selling & Distribution Overheads	
Variable @ ₹ 3 × 35,000 units = ₹ 1,05,000	
Fixed (₹ 1 × 60,000 units) = ₹ 60,000	1,65,000
Cost of Sales	24,40,000
Profit	**3,60,000**

Statement Showing Working Capital Requirement

A.	**Current Assets**	**₹**
	Stock of Raw Materials (₹ 8,00,000 × 3 ÷ 12)	2,00,000
	Stock of Finished Goods	3,25,000
	Debtors at Cost (₹ 24,40,000 × 3 ÷ 24)	3,05,000
	Cash and Bank	60,000
	Total (A)	**8,90,000**
B.	**Current Liabilities**	
	Creditors for Materials (₹ 10,00,000 × 4 ÷ 12)	3,33,333
	Creditors for Expenses (₹ 13,65,000 × 1 ÷ 24)	56,875

	Outstanding Wages (₹ 6,00,000 × 1 ÷ 12)	50,000
	Total (B)	**4,40,208**
	Working Capital Requirement before Contingencies **(A – B)**	4,49,792
	Add: Provision for Contingencies (₹ 4,49,792 × 1 ÷ 9)	49,977
	Estimated Working Capital Requirement	**4,99,769**

Workings Notes:

Purchase of Raw Material during the first year	**₹**
Raw Material consumed during the year	₹ 8,00,000
Add: Closing Stock of Raw Materials (3 months consumption)	₹ 2,00,000
	₹ 10,00,000
Less: Opening Stock of Raw Material	Nil
Purchases during the year	**₹ 10,00,000**

PROBLEM – 4

The following annual figures relate to XYZ Co.:

	(₹)
Sales (at two months' credit)	**36,00,000**
Materials consumed (suppliers extend two months' credit)	**9,00,000**
Wages paid (1 month lag in payment)	**7,20,000**
Cash manufacturing expenses (expenses are paid one month in arrear)	**9,60,000**
Administrative expenses (1 month lag in payment)	**2,40,000**
Sales promotion expenses (paid quarterly in advance)	**1,20,000**

The company sells its products on gross profit of 25%. Depreciation is considered as a part of the cost of production. It keeps one month's stock each of raw materials and finished goods, and a cash balance of ₹ 1,00,000.

Assuming a 20% safety margin, COMPUTE the working capital requirements of the company on cash cost basis. Ignore work-in-process.

SOLUTION:

Step 1: Computation of Annual Cash Cost of Production and Annual Cash Cost of Sales:

(i) Computation of Annual Cash Cost of Production	**(₹)**
Material consumed (Given)	9,00,000
Wages (Given)	7,20,000
Manufacturing expenses (Given)	9,60,000
Total cash cost of production	**25,80,000**
(ii) Computation of Annual Cash Cost of Sales:	**(₹)**
Total Cash cost of production as in (i) above	25,80,000
Administrative Expenses (Given)	2,40,000
Sales promotion expenses (Given)	1,20,000
Total cash cost of sales	**29,40,000**

Step 2: Statement if Working Capital Requirement (Cash Cost Basis)

	(₹)	(₹)
A. Current Assets		
Inventory:		
-Raw materials $\left(\frac{₹\ 9,00,000}{12\ \text{months}} \times 1\ \text{month}\right)$	75,000	
-Finished Goods $\left(\frac{₹\ 25,80,000}{12\ \text{months}} \times 1\ \text{month}\right)$	2,15,000	
Receivables (Debtors) $\left(\frac{₹\ 29,40,000}{12\ \text{months}} \times 2\ \text{months}\right)$	4,90,000	
Sales Promotion expenses paid in advance $\left(\frac{₹\ 1,20,000}{12\ \text{months}} \times 3\ \text{months}\right)$	30,000	
Cash balance	1,00,000	
Gross Working Capital		**9,10,000**
B. Current Liabilities:		
Payables:		
-Creditors for materials $\left(\frac{₹\ 9,00,000}{12\ \text{months}} \times 2\ \text{months}\right)$	1,50,000	
Wages outstanding $\left(\frac{₹\ 7,20,000}{12\ \text{months}} \times 1\ \text{month}\right)$	60,000	
Manufacturing expenses outstanding $\left(\frac{₹\ 9,60,000}{12\ \text{months}} \times 1\ \text{month}\right)$	80,000	
Administrative expenses outstanding $\left(\frac{₹\ 2,40,000}{12\ \text{months}} \times 1\ \text{month}\right)$	20,000	3,10,000
Net working capital (A - B)		**6,00,000**
Add: Safety margin @ 20%		1,20,000
Total Working Capital requirements		**7,20,000**

PROBLEM – 4A

Aneja Limited, a newly formed company, has applied to a commercial bank for the first time for financing its working capital requirements. The following information is available about the projections for the current year:

Estimated level of activity: 1,04,000 completed units of production plus 4,000 units of work-in-progress.

Based on the above activity, estimated cost per unit is:

Raw material	**₹ 80 per unit**
Direct wages	**₹ 30 per unit**
Overheads (exclusive of depreciation)	**₹ 60 per unit**
Total cost	**₹170 per unit**
Selling price	**₹200 per unit**

Raw materials in stock: Average 4 weeks consumption, work-in-progress (assume 50%

completion stage in respect of conversion cost) (materials issued at the start of the processing).

Finished goods in stock	8,000 units
Credit allowed by suppliers	Average 4 weeks
Credit allowed to debtors/receivables	Average 8 weeks
Lag in payment of wages	Average 1.5 weeks

Cash at banks (for smooth operation) is expected to be ₹ 25,000.

Assume that production is carried on evenly throughout the year (52 weeks) and wages and overheads accrue similarly. All sales are on credit basis only.

You are required to CALCULATE the net working capital required.

SOLUTION:

Step 1: Annual Cash Cost of Production and Cost of Sales:

	(₹)
Raw material requirements (1,04,000 units × ₹ 80) + (4000 units x ₹ 80)	86,40,000
Direct wages {(1,04,000 units × ₹30) + (4000 units x ₹ 30 x 50%)	31,80,000
Overheads (exclusive of depreciation) {(1,04,000 × ₹60) + (4000 units x ₹ 60 x 50%)	63,60,000
Gross Factory Cost	**1,81,80,000**
Add: Opening WIP	0
Less: Closing W.I. P (4000 units x ₹ 80) (4000 units x ₹ 30 x 50%) (4000 units x ₹ 60 x 50%)	(5,00,000)
Cost of Goods Produced	**1,76,80,000**
Add: Opening Stock of Finished Goods	**0**
Less: Closing Stock of Finished Goods (₹ 1,76,80,000 × 8,000 units ÷ 1,04,000 units)	(13,60,000)
Total Cash Cost of Sales	**1,63,20,000**

Step 2: Calculation of Net Working Capital requirement:

	(₹)	(₹)
A. Current Assets:		
Inventories:		
- Raw material stock (Refer to Working note 2)	6,64,615	
- Work in progress stock (Refer to Working note 1)	5,00,000	
- Finished goods stock (Refer to Working note 3)	13,60,000	
Receivables (Debtors) (Refer to Working note 4)	25,10,769	
Cash and Bank balance	25,000	
Gross Working Capital		**50,60,384**

B. Current Liabilities:		
Creditors for raw materials(Refer to Working note 5)	7,15,740	
Creditors for wages (Refer to Working note 6)	91,731	
		8,07,471
Net Working Capital (A - B)		**42,52,913**

Working Notes:

1. Work in progress stock

	(₹)
Raw material requirements (4,000 units × ₹ 80)	3,20,000
Direct wages (50% × 4,000 units × ₹30)	60,000
Overheads (50% × 4,000 units × ₹60)	1,20,000
	5,00,000

2. Raw material stock

The raw material consumption for the year (52 weeks) is as follows:

	(₹)
For Finished goods (1,04,000 × ₹ 80)	83,20,000
For Work in progress (4,000 × ₹80)	3,20,000
	86,40,000

Raw material stock $\frac{₹\ 86,40,000}{52\ \text{weeks}} \times 4\ \text{weeks} = ₹\ 6,64,615$

3. Finished goods stock: 8,000 units @ ₹170 per unit = ₹13,60,000

4. Debtors for sale: ₹ 1,63,20,000 × $\frac{8\ \text{Weeks}}{52\ \text{Weeks}}$ = ₹ 25,10,769

5. Creditors for raw material:

Material Consumed (₹83,20,000 + ₹3,20,000)	₹86,40,000
Add: Closing stock of raw material	₹ 6,64,615
Purchases of Raw Material	₹93,04,615

Credit allowed by suppliers = $\frac{₹\ 93,04,615}{52\ \text{weeks}} \times 4\ \text{weeks} = ₹\ 7,15,740$

6. Creditors for wages

Outstanding wage payment = $\frac{₹\ 31,80,000}{52\ \text{weeks}} \times 1.5\ \text{weeks} = ₹\ 91,731$

PROBLEM – 4B

PQ Ltd., a company newly commencing business in 2021-22 has the following projected Profit and Loss Account:

	(₹)	(₹)
Sales		**2,10,000**
Cost of goods sold		**1,53,000**
Gross Profit		**57,000**

Administrative Expenses	14,000	
Selling Expenses	13,000	27,000
Profit before tax		30,000
Provision for taxation		10,000
Profit after tax		20,000
The cost of goods sold has been arrived at as under:		
Materials used	84,000	
Wages and manufacturing Expenses	62,500	
Depreciation	23,500	
	1,70,000	
Less: Stock of Finished goods		
(10% of goods produced not yet sold)	17,000	
	1,53,000	

The figure given above relate only to finished goods and not to work-in- progress. Goods equal to 15% of the year's production (in terms of physical units) will be in process on the average requiring full materials but only 40% of the other expenses. The company believes in keeping materials equal to two months' consumption in stock.

All expenses will be paid one month in advance. Suppliers of materials will extend 1-1/2 months credit. Sales will be 20% for cash and the rest at two months' credit. 70% of the Income tax will be paid in advance in quarterly instalments. The company wishes to keep ₹ 8,000 in cash. 10% has to be added to the estimated figure for unforeseen contingencies.

PREPARE an estimate of working capital.

Note: All workings should form part of the answer.

SOLUTION:

Statement showing the requirements of Working Capital

Particulars	(₹)	(₹)
A. Current Assets:		
Inventory:		
Stock of Raw material (₹96,600 × 2 ÷ 12)	16,100	
Stock of Work-in-progress (As per Working Note)	16,350	
Stock of Finished goods (₹1,46,500 × 10 ÷ 100)	14,650	
Receivables (Debtors) (₹1,27,080 × 2 ÷ 12)	21,180	
Cash in Hand	8,000	
Prepaid Expenses:		
Wages & Manufacturing Expenses (₹66,250 × 1 ÷ 12)	5,521	
Administrative expenses (₹14,000 × 1 ÷ 12)	1,167	
Selling & Distribution Expenses (₹13,000 × 1 ÷ 12)	1,083	
Advance taxes paid {(70% of ₹10,000) × 3 ÷ 12}	1,750	
Gross Working Capital	**85,801**	**85,801**

B. Current Liabilities:		
Payables for Raw materials (₹1,12,700 × 1.5 ÷ 12)	14,088	
Provision for Taxation (Net of Advance Tax)(₹10,000 × 30 ÷ 100)	3,000	
Total Current Liabilities	17,088	17,088
C. Excess of CA over CL		68,713
Add: 10% for unforeseen contingencies		6,871
Net Working Capital requirements		**75,584**

Working Notes:

i) Calculation of Stock of Work-in-progress

Particulars	**(₹)**
Raw Material (₹84,000 × 15%)	12,600
Wages & Manufacturing Expenses (₹62,500 × 15% × 40%)	3,750
Total	**16,350**

ii) Calculation of Stock of Finished Goods and Cost of Sales

Particulars	**(₹)**
Direct material Cost [₹84,000 + ₹12,600]	96,600
Wages & Manufacturing Expenses [₹62,500 + ₹3,750]	66,250
Depreciation	0
Gross Factory Cost	**1,62,850**
Add: Opening W.I. P	0
Less: Closing W.I. P (WN 1)	(16,350)
Cost of goods produced	**1,46,500**
Less: Closing stock (10% on COGS)	(14,650)
Cost of Goods Sold	**1,31,850**
Add: Selling and Distribution Expenses	13,000
Add: Admin Overheads	14000
Total Cash Cost of Sales	**1,58,850**
Debtors (80% of cash cost of sales)	1,27,080

iii) Calculation of Credit Purchase

Particulars	**(₹)**
Raw material consumed	96,600
Add: Closing Stock (₹ 96600 ÷ 12 months) x 2 months	16,100
Less: Opening Stock	-
Purchases	**1,12,700**

PROBLEM – 4C

The following data relating to an auto component manufacturing company is available for the year 20x1-20x2:

Raw material held in storage **20 days**

Receivables' collection period	**30 days**
Conversion process period	**10 days**
(raw material – 100%, other costs – 50% complete)	
Finished goods storage period	**45 days**
Credit period from suppliers	**60 days**
Advance payment to suppliers	**5 days**
Total cash operating expenses per annum	**₹ 800 lakhs**

75% of the total cash operating expenses are for raw material. 360 days are assumed in a year.

You are required to CALCULATE:

i. **Each item of current assets and current liabilities,**

ii. **The working capital requirement, if the company wants to maintain a cash balance of ₹ 10 lakhs at all times.**

SOLUTION:

Since WIP is 100% complete in terms of material and 50% complete in terms of other cost, the same has been considered for number of days for WIP inventory i.e. 10 days for material and 5 days for other costs respectively.

Particulars	For Raw Material	For Other Costs	Total ₹
Cash Operating expenses	$\frac{75}{100}$ × ₹ 800 = ₹ 600 Lakhs	$\frac{25}{100}$ × ₹ 800 =₹ 200 Lakhs	800.00
Raw Material Stock Holding	$\frac{20\ Days}{360\ Days}$ × ₹ 600 = 33.33 Lakhs	-	33.33
WIP Conversion	$\frac{10\ Days}{360\ Days}$ × ₹ 600 = 16.67 Lakhs	$\frac{10\ Days}{360\ Days}$ × ₹ 200 x 50% = 2.78 Lakhs	19.45
Finished Goods Stock Holding	$\frac{45\ Days}{360\ Days}$ × ₹ 600 = 75 Lakhs	$\frac{45\ Days}{360\ Days}$ × ₹ 200 = 25 Lakhs	100.00
Receivable Collection Period	$\frac{30\ Days}{360\ Days}$ × ₹ 600 = 50 Lakhs	$\frac{30\ Days}{360\ Days}$ × ₹ 200 = 16.67 Lakhs	66.67
Advance to suppliers	$\frac{5\ Days}{360\ Days}$ × ₹ 600 = 8.33 Lakhs	-	8.33
Credit Period from suppliers	$\frac{60\ Days}{360\ Days}$ × ₹ 600 = 100 lakhs	-	100.00

Computation of working capital

	(₹) in lakhs
Raw Material Stock	33.33
WIP	19.45
Finished Goods stock	100.00

Receivables	66.67
Advance to Suppliers	8.33
Cash	10.00
Gross Working Capital	**237.78**
Less: Payables (Creditors)	100.00
Net Working capital	**137.78**

PROBLEM – 5

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 labor 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 expense 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
Opening Stock of FG	0	1000
Add: Production (Units)	6,000	9,000
Less: Sales (Units)	5,000	8,500
Closing FG (Opening + Production – Closing)	1000	1500
	(₹)	**(₹)**
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 labor 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 (Given) (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) (6,00,000 ÷ 6000) x 1000	(1,32,000) (880000 ÷ 10000) x 1500
Cost of Goods Sold	**5,00,000**	**7,48,000**
Add: Selling expenses – Variable (Sales unit × ₹4)	20,000	34,000
Add: Selling Expense - Fixed (12,000 units × ₹1)	12,000	12,000
Cost of Sales: (B)	5,32,000	7,94,000
Profit (+) / Loss (-): (A - B)	**(-) 52,000**	**(+) 22,000**

Working Notes:

1. **Calculation of creditors for supply of materials:**

	Year 1 (₹)	Year 2 (₹)
Materials consumed during the year	2,40,000	3,60,000

Add: Closing stock (2.25 month'saverage consumption) (RM Consumed ÷ 12 months) x 2.25 months	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 permonth (Creditors) (Purchases ÷ 12 months) x 1 month	**23,750**	**31,875**

2. Creditors for expenses:

	Year 1 (₹)	Year 2 (₹)
Direct labor 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
Annual Expenses	2,72,000	3,46,000
Average per month	**22,667 (272000 ÷ 12 months) x 1 month**	**28,833 (346000 ÷ 12 months) x 1 month**

(ii) Projected Statement of Working Capital requirements (Total Basis)

	Year 1 (₹)	Year 2 (₹)
Current Assets:		
Inventories:		
- Stock of materials (2.25 month's average consumption) (Annual RM ÷ 12 month) x 2.25 month	45,000	67,500
- Finished goods (Step -1)	1,00,000	1,32,000
Debtors (1 month's average sales) (sales ÷ 12 month) x 1 month	40,000	68,000
Cash (Given)	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 x ₹40 x 2.25 ÷ 12); (9,000 units x ₹40 x 2.25 ÷ 12)	45,000	67,500
- Finished Goods (Refer working note 1)	80,000	1,11,000
Receivables (Debtors) (Refer working note 2)	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	23,750	31,875
Creditors for Expenses	22,667	28,833
Total Current Liabilities	46,417	60,708
Net Working Capital (A – B)	**1,24,583**	**1,84,042**

Working Note:

1. 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 Average Cost $\left(\frac{₹\ 4,80,000 \times 1,000}{6,000}\right); \left(\frac{₹\ 7,40,000 \times 1,500}{10,000}\right)$	(80,000)	(1,11,000)
Cash Cost of Goods Sold	**4,00,000**	**6,29,000**

2. **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 (Cash Cost of Debtors ÷ 12 months) x 1 month	**36,000**	**56,250**

PROBLEM – 5A **(MTP 2 Jan 25 6M)**

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	₹ 40 per unit
Direct Wages Cost	₹ 25 per Unit
Overhead	₹ 40 per Unit (Incl Rs 10 of Depreciation)
Selling Price	₹ 150 per unit
GP Ratio (Cash Cost)	30%
Net Profit Ratio	25% (On Total 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:

Problem mentions that the company has applied to the Private Bank for financing its working capital needs. Ideally, banks would not finance for Depreciation cost being a non-cash cost and it would also not finance the profit for you. So, problem needs to be solved using Cash Cost Basis.

Estimation of working capital required (cash cost basis)

Particulars		Amount (₹)
A) Current Assets		
A1) Stock of RM	(₹ 15,84,960 x 30 Days) ÷ 360 Days	1,32,080.00
A2) Stock of WIP	(From Cost Statement)	4,77,360.00
A3) Stock of FG	(From Cost Statement)	2,37,500.00
A4) Debtors	(₹32,74,686 x 45 Days) ÷ 360 Days	4,09,335.75
A5) Cash & Cash Equivalents	(Given)	1,25,000.00
Gross Working Capital		**13,81,275.75**

Less: **B) Current Liabilities**

B1) Creditors	(₹17,17,040 x 30 Days) ÷ 360 Days	1,43,086.67
B2) Lag in Wages Payment	(₹9,20,400 x 15 Days) ÷ 360 Days	38,350.00
Excess of Current Assets Over Current Liabilities (A) - (B)		**11,99,839.08**
Safety Margin @ 15%		
Add: Of Net Working Capital		2,11,736.31
Net Working Capital		**14,11,575.39**

Working Note -1: Calculation of Profit

Profit = 25% of total cost

= 20% of sales price

= {(₹ 31,200 - ₹ 2,500) x 150} x 20% = ₹ 8,61,000

Working Note – 2: Gross Factory Cost

	Completed Units	**WIP Units**
	31,200	**9,360**
Raw Material Consumed	12,48,000	3,36,960
Direct Wages	7,80,000	1,40,400
Overheads	9,36,000	1,68,480
	29,64,000	6,45,840
Gross Factory Cost	**36,09,840**	

Add: Opening WIP	-
Less: Closing WIP **(At Prime Cost)**	4,77,360
Cost of Production	**31,32,480**
Add: Opening FG Stock	-
Less: Closing FG Stock	2,37,500
Cash Cost of Goods Sold	**28,94,980**
Add: Selling & Distribution Expenses (Balance Figure)	3,79,706
Cost Of Sales	**32,74,686**
Profit*	8,61,000
Sales	**41,35,686**

*It is assumed that profit is unchanged

Working Note 3 - Calculation of WIP stock (units) and WIP stock amount

WIP UNITS = 30% of FG produced units i.e. 30% of 31,200 units

= 9,360 units

WIP amount (at prime cost)

Raw materials = 9,360 x 40 x 90% = ₹ 3,36,960

Direct wages = 9,360 x 25 x 60% = ₹ 1,40,400

Working Note 4 - Calculation of purchases from suppliers

Raw Materials Consumed = Opening RM Stock + Purchases - Closing RM Stock

₹ 15,84,960 = 0 + Purchases – ₹ 1,32,080

Purchases = ₹ 17,17,040

Working Note 5 – Calculation of safety margin

Safety Margin = 15% Of Net Working Capital Needs

Excess Of Current Asset – Current Liability = ₹ 11,99,839.08

Safety Margin ₹ 2,11,736.31

Net Working Capital ₹ 14,11,575.388

PROBLEM – 6

The management of Trux Company Ltd. is planning to expand its business and consults you to prepare an estimated working capital statement. The records of the company reveal the following annual information:

	(₹)
Sales – Domestic at one month's credit	18,00,000
Export at three month's credit (sales price 10% below domestic price)	8,10,000
Materials used (suppliers extend two months credit)	6,75,000
Lag in payment of wages – ½ month	5,40,000
Lag in payment of manufacturing expenses (cash) – 1 month	7,65,000
Lag in payment of Administration Expenses – 1 month	1,80,000
Selling expenses payable quarterly in advance	1,12,500
Income tax payable in four installments, of which one falls in the next financial year	1,68,000

Rate of gross profit is 20%. Ignore work-in-progress and depreciation.

The company keeps one month's stock of raw materials and finished goods (each) and believes in keeping ₹ 2,50,000 available to it including the overdraft limit of ₹ 75,000 not yet utilized by the company.

The management is also of the opinion to make 10% margin for contingencies on computed figure.

You are required to PREPARE the estimated working capital statement for the next year.

SOLUTION:

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

	(₹)	(₹)
A. Current Assets		
(i) Inventories:		
Material (1 month) $\left(\frac{₹\ 6,75,000}{12\ \text{months}} \times 1\ \text{month}\right)$	56,250	

Finished goods (1 month) $\left(\frac{₹\ 21,60,000}{12\ \text{months}} \times 1\ \text{month}\right)$	1,80,000	2,36,250
(ii) Receivables (Debtors)		
For Domestic Sales $\left(\frac{₹\ 15,17,586}{12\ \text{months}} \times 1\ \text{month}\right)$	1,26,466	
For Export Sales $\left(\frac{₹\ 7,54,914}{12\ \text{months}} \times 3\ \text{months}\right)$	1,88,729	3,15,195
(iii) Prepayment of Selling expenses $\left(\frac{₹\ 1,12,500}{12\ \text{months}} \times 3\ \text{months}\right)$		28,125
(iv) Cash in hand & at bank (net of overdraft)		1,75,000
Total Current Assets		**7,54,570**
B. Current Liabilities:		
(i) Payables (Creditors) for materials (2 months) $\left(\frac{₹\ 6,75,000}{12\ \text{months}} \times 2\ \text{months}\right)$		1,12,500
(ii) Outstanding wages (0.5 months) $\left(\frac{₹\ 5,40,000}{12\ \text{months}} \times 0.5\ \text{month}\right)$		22,500
(iii) Outstanding manufacturing expenses $\left(\frac{₹\ 7,65,000}{12\ \text{months}} \times 1\ \text{month}\right)$		63,750
(iv) Outstanding administrative expenses $\left(\frac{₹\ 1,80,000}{12\ \text{months}} \times 1\ \text{month}\right)$		15,000
(v) Income tax payable (₹ 168000 ÷ 4 Installments) x 1 Installment		42,000
Total Current Liabilities		**2,55,750**
Net Working Capital (A – B)		4,98,820
Add: 10% contingency margin		49,882
Total Working Capital required		**5,48,702**

Working Notes:

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

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

2. **Calculation of gross profit on Export Sales**

Let domestic selling price is ₹ 100.

Gross profit is ₹ 20

Costper unit is ₹ 80

Export price is 10% less than the domestic price i.e. ₹ 100 – (1 - 0.1) = ₹ 90

Now, gross profit will be = ₹ 90 - ₹ 80 = ₹ 10

So, Gross profit ratio at export price will be = $\frac{₹\ 10}{₹\ 90} \times 100 = 11.11\%$

Gross Profit amount on export = ₹ 810000 x 11.11% = ₹ 90000

3. **Apportionment of Selling expenses between Domestic and Exports sales:**

Apportionment on the basis of sales value:

Domestic Sales = $\frac{₹\ 1,12,500}{₹\ 26,10,000} \times ₹\ 18,00,000 = ₹\ 77,586$

Exports Sales= $\frac{₹\ 1,12,500}{₹\ 26,10,000} \times ₹\ 8,10,000 = ₹\ 34,914$

4. **Assumptions**

i. It is assumed that administrative expenses is related to productionactivities.

ii. Value of opening and closing stocks are equal.

PROBLEM – 7

The following figures and ratios are related to a company:

i. Sales for the year (all credit)	**₹90,00,000**
ii. Gross Profit ratio	**35 percent**
iii. Fixed assets turnover (based on cost of goods sold)	**1.5**
iv. Stock turnover (based on cost of goods sold)	**6**
v. Liquid ratio	**1.5:1**
vi. Current ratio	**2.5:1**
vii. Receivables (Debtors) collection period	**1 month**
viii. Reserves and surplus to Share capital	**1:1.5**
ix. Capital gearing ratio	**0.7875**
x. Fixed assets to net worth	**1.3: 1**

You are required to PREPARE:

a. Balance Sheet of the company on the basis of above details.

b. The statement showing working capital requirement, if the company wants to make a provision for contingencies @15 percent of net working capital.

SOLUTION:

Working Notes:

(i) Cost of Goods Sold = Sales – Gross Profit (35% of Sales)
= ₹90,00,000 – ₹31,50,000

= ₹58,50,000

(ii) Closing Stock = Cost of Goods Sold ÷ Stock Turnover
= ₹58,50,000 ÷ 6 = ₹9,75,000

(iii) Fixed Assets = Cost of Goods Sold ÷ Fixed Assets Turnover
= ₹58,50,000 ÷ 1.5 = ₹39,00,000

(iv) Current Assets and Current Liabilities
Current Ratio = 2.5 and Liquid Ratio = 1.5
Current Asset ÷ Current Liability = 2.5 … (i)
(Current Asset – Inventories) ÷ CL = 1.5 … (ii)

Equation 1 ÷ 2
Rewrite as = (2.5 ÷ 1.5) = CA ÷ (CA - ₹ 975000)
2.5 CA - ₹ 2437500 = 1.5 CA
CA = ₹ 2437500
2.5 = (₹ 2437500 ÷ Current Liability)
Current Liability = ₹ 975000

(v) Receivables (Debtors) = (Sales × Debtors Collection period) ÷ 12 months
= ₹90,00,000 × 1 ÷ 12
= ₹7,50,000

(vi) Cash
Current Asset = ₹ 2437500
Less: Stock = ₹ 975000
Less: Debtors = ₹ 750000
Cash = ₹ 712500

(vii) Net worth = Fixed Assets ÷ 1.3
= ₹39,00,000 ÷ 1.3 = ₹30,00,000

(viii) Reserves and Surplus
Reserves and Surplus ÷ Share Capital = 1 ÷ 1.5
Share Capital= 1.5 Reserves and Surplus … (i)
Now, Reserves and Surplus + Share Capital = Net worth … (ii)
From (i) and (ii), we get,
2.5 Reserves and Surplus = Net worth
Reserves and Surplus = ₹30,00,000 ÷ 2.5 = ₹12,00,000

(ix) Share Capital= Net worth – Reserves and Surplus
= ₹30,00,000 – ₹12,00,000
= ₹18,00,000

(x) Long-term Debts
Capital Gearing Ratio = Long-term Debts ÷ Equity Shareholders' FundLong-term Debts
= ₹30,00,000 × 0.7875 = ₹23,62,500

(a) Balance Sheet of the Company

Particulars	Figures as the end of 31-03-2021 (₹)	Figures as the end of 31-03-2020 (₹)
I. EQUITY AND LIABILITIES		
Shareholders' funds		
(a) Share capital (WN 9)	18,00,000	-
(b) Reserves and surplus (WN 8)	12,00,000	-
Non-current liabilities		
(a) Long-term borrowings (WN 10)	23,62,500	-
Current liabilities (WN 4)	9,75,000	-
TOTAL	**63,37,500**	**-**
II. ASSETS		
Non-current assets		
Fixed assets (WN 3)	39,00,000	-
Current assets		
Inventories (WN 4)	9,75,000	-
Trade receivables (WN 5)	7,50,000	-
Cash and cash equivalents (WN 6)	7,12,500	-
TOTAL	**63,37,500**	**-**

(b) Statement Showing Working Capital Requirement

	(₹)
A. Current Assets	
(i) Inventories (Stocks)	9,75,000
(ii) Receivables (Debtors)	7,50,000
(iii) Cash in hand & at bank	7,12,500
Gross Working Capital	**24,37,500**
B. Current Liabilities:	
Total Current Liabilities	9,75,000
Net Working Capital (A – B)	**14,62,500**
Add: Provision for contingencies (15% of Net Working Capital)	2,19,375
Working capital requirement	**16,81,875**

PROBLEM – 8

Samreen Enterprises has been operating its manufacturing facilities till 31.3.20x2 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:

This question can be solved using two approaches:

(i) To assess the impact of double shift for long term as a matter of production policy.

(ii) To assess the impact of double shift to mitigate the immediate demand for next year only.

The first approach is more appropriate and fulfilling the requirement of the question.

i) Assessment of impact of double shift for long term as a matter of production policy:

Comparative Statement of Working Capital Requirement

	Single Shift (24,000)			Double Shift (48,000)		
	Unit	Rate (₹)	Amount (₹)	Unit	Rate (₹)	Amount (₹)
Current Assets						
Inventories:						
Raw Materials	6,000	6.00	36,000	12,000	5.40	64,800
Work-in-Progress	2,000	11.00	22,000	2,000	9.40	18,800
Finished Goods	4,500	16.00	72,000	9,000	12.40	1,11,600
Sundry Debtors	6,000	16.00	96,000	12,000	12.40	1,48,800
Total Current Assets: (A)			**2,26,000**			**3,44,000**
Current Liabilities						
Creditors for Materials	4,000	6.00	24,000	8,000	5.40	43,200

Creditors for Wages	1,000	5.00	5,000	2,000	4.00	8,000
Creditors for Expenses	1,000	5.00	5,000	2,000	3.00	6,000
Total Current Liabilities: (B)			34,000			57,200
Working Capital: (A) – (B)			**1,92,000**			**2,86,800**

Additional Working Capital requirement = ₹ 2,86,800 – ₹ 1,92,000 = ₹ 94,800

Workings:

1. Statement of cost at single shift and double shift working

	24,000 units		**48,000 Units**	
	Per unit (₹)	**Total (₹)**	**Per unit (₹)**	**Total (₹)**
Raw materials	6.00	1,44,000	5.40	2,59,200
1. Wages - Variable	3.00	72,000	3.00	1,44,000
Fixed	2.00	48,000	1.00	48,000
Overheads - Variable	1.00	24,000	1.00	48,000
Fixed	4.00	96,000	2.00	96,000
Total cost	16.00	3,84,000	12.40	5,95,200
Profit	2.00	48,000	5.60	2,68,800
	18.00	**4,32,000**	**18.00**	**8,64,000**

2. Sales in units 2020-21 = $\frac{\text{Sales}}{\text{Unit selling price}} = \frac{₹\ 4,32,000}{₹\ 18}$ = 24,000 units

3. Stock of Raw Materials in units on 31.3.2021

$$= \frac{\text{Value of Stock}}{\text{Cost per unit}} = \frac{₹\ 36,000}{₹\ 6} = 6,000 \text{ units}$$

4. Stock of work-in-progress in units on 31.3.2021

$$= \frac{\text{Value of work-in-progress}}{\text{Prime Cost per unit}} = \frac{₹\ 22,000}{(₹\ 6 + ₹\ 5)} = 2,000 \text{ units}$$

5. Stock of finished goods in units 2020-21

$$= \frac{\text{Value of Stock}}{\text{Total Cost per unit}} = \frac{₹\ 72,000}{₹\ 16} = 4,500 \text{ units}$$

ii) Assessment of the impact of double shift to mitigate the immediate demand for next year only & not as part of policy implementation.

In this approach, working capital shall be computed as if we are calculating the same for the next / second year with double production. Whereas, in the first approach to implement double-shift as part of policy implementation, we calculated comparative analysis of working capital requirement for single & double shift within the same year.

Workings:

(1) Calculation of no. of units to be sold:

No. of units to be Produced	48,000
Add: Opening stock of finished goods	4,500

Less: Closing stock of finished goods	(9,000)
No. of units to be Sold	**43,500**

(2) Calculation of Material to be consumed and materials to be purchased in units:

No. of units Produced	48,000
Add: Closing stock of WIP	2,000
Less: Opening stock of WIP	(2,000)
Raw Materials to be consumed in units	48,000
Add: Closing stock of Raw material	12,000
Less: Opening stock of Raw material	(6,000)
Raw Materials to be purchased (in units)	**54,000**

(3) Credit allowed by suppliers:

$$= \frac{\text{No of units to purchased} \times \text{Cost per unit}}{12 \text{ months}} \times 2 \text{ months}$$

$$= \frac{54{,}000 \text{ units} \times ₹\ 5.40}{12 \text{ months}} \times 2 \text{ months} = ₹\ 48{,}600$$

Comparative Statement of Working Capital Requirement

	Single Shift (Current Year – 24,000 units)			Double Shift (Next Year – 48,000 units)		
	Unit	**Rate (₹)**	**Amount (₹)**	**Unit**	**Rate (₹)**	**Amount (₹)**
Current Assets						
Inventories:						
Raw Materials	6,000	6.00	36,000	12,000	5.40	64,800
Work-in-Progress	2,000	11.00	22,000	2,000	9.40	18,800
Finished Goods	4,500	16.00	72,000	9,000	12.40	1,11,600
Sundry Debtors	6,000	16.00	96,000	12,000	12.40	1,48,800
Total Current Assets: (A)			**2,26,000**			**3,44,000**
Current Liabilities						
Creditors for Materials	4,000	6.00	24,000	9,000	5.40	48,600
Creditors for Wages	1,000	5.00	5,000	2,000	4.00	8,000
Creditors for Expenses	1,000	5.00	5,000	2,000	3.00	6,000
Total Current Liabilities: (B)			34,000			62,600
Working Capital: (A) – (B)			**1,92,000**			**2,81,400**

Additional Working Capital requirement = ₹ 2,81,400 – ₹ 1,92,000 = ₹ 89,400

Notes:

a. 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.

b. 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.

c. 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.

d. It is assumed that all purchases are on credit.

e. The valuation of work-in-progress based on prime cost (i.e. material & labour) 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**

PROBLEM – 9

PREPARE monthly cash budget for six months beginning from April 2022 on the basis of the following information:

i. Estimated monthly sales are as follows:

	(₹)		(₹)
January	1,00,000	June	80,000
February	1,20,000	July	1,00,000
March	1,40,000	August	80,000
April	80,000	September	60,000
May	60,000	October	1,00,000

ii. Wages and salaries are estimated to be payable as follows: -

	(₹)		(₹)
April	9,000	July	10,000
May	8,000	August	9,000
June	10,000	September	9,000

iii. Of the sales, 80% is on credit and 20% for cash. 75% of the credit sales are collected within one month after sale and the balance in two months after sale. There are no bad debt losses.

iv. Purchases amount to 80% of sales and are made on credit and paid for in the month preceding the sales.

v. The firm has 10% debentures of ₹ 1,20,000. Interest on these has to be paid quarterly in January, April and so on.

vi. The firm is to make an advance payment of tax of ₹ 5,000 in July, 2022.

vii. The firm had a cash balance of ₹ 20,000 on April 1, 2022, which is the minimum

desired level of cash balance. Any cash surplus/deficit above/below this level is made up by temporary investments/liquidation of temporary investments or temporary borrowings at the end of each month (interest on these to be ignored).

SOLUTION:

Workings:

Collection from debtors:

(Amount in ₹)

	February	March	April	May	June	July	August	September
Total sales	1,20,000	1,40,000	80,000	60,000	80,000	1,00,000	80,000	60,000
Credit sales (80% of total sales)	96,000	1,12,000	64,000	48,000	64,000	80,000	64,000	48,000
Collections:								
One month		72,000	84,000	48,000	36,000	48,000	60,000	48,000
Two months			24,000	28,000	16,000	12,000	16,000	20,000
Total collections			1,08,000	76,000	52,000	60,000	76,000	68,000

Monthly Cash Budget for Six months, April to September, 2022

(Amount in ₹)

	April	May	June	July	August	September
Receipts:						
Opening balance	20,000	20,000	20,000	20,000	20,000	20,000
Cash sales	16,000	12,000	16,000	20,000	16,000	12,000
Collection from debtors	1,08,000	76,000	52,000	60,000	76,000	68,000
Total cash available (A)	**1,44,000**	**1,08,000**	**88,000**	**1,00,000**	**1,12,000**	**1,00,000**
Payments:						
Purchases	48,000	64,000	80,000	64,000	48,000	80,000
Wages & salaries	9,000	8,000	10,000	10,000	9,000	9,000
Interest on debentures	3,000	---	---	3,000	---	---
Tax payment	---	---	---	5,000	---	---
Total payments (B)	**60,000**	**72,000**	**90,000**	**82,000**	**57,000**	**89,000**
Minimum cash balance desired	20,000	20,000	20,000	20,000	20,000	20,000
Total cash needed (C)	**80,000**	**92,000**	**1,10,000**	**1,02,000**	**77,000**	**1,09,000**
Surplus - deficit (A-C)	64,000	16,000	(22,000)	(2,000)	35,000	(9,000)
Investment / financing Temporary Investments	(64,000)	(16,000)	----		(35,000)	-----
Liquidation of temporary investments or temporary borrowings	----	----	22,000	2,000	----	9,000
Total effect of investment / financing (D)	(64,000)	(16,000)	22,000	2,000	(35,000)	9,000

Closing cash balance (A + D - B)	20,000	20,000	20,000	20,000	20,000	20,000

PROBLEM – 9A

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 20x1, of ₹ 1,500.

You are required to PREPARE a cash budget for the six months from January to June, 20x2.

SOLUTION:

Workings:

1. Sale receipts

Month	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Forecastsales (S) (Given)	1,000	1,000	1,000	1,250	1,500	2,000	1,900	2,200
	(₹)	(₹)	(₹)	(₹)	(₹)	(₹)	(₹)	(₹)
Sales × ₹15	15,000	15,000	15,000	18,750	22,500	30,000	28,500	33,000
Debtors pay:								
1month 40% (Sales x 40%)		6,000	6,000	6,000	7,500	9,000	12,000	11,400
2month 60% (Sales x 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 monthlater		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 (working Note 1)	15,000	15,000	16,500	20,250	25,500	29,400
Freehold property (Given)	-	-	-	-	25,000	-
	15,000	**15,000**	**16,500**	**20,250**	**50,500**	**29,400**
Payments:						
Materials (Working Note 2)	5,000	6,250	7,500	10,000	9,500	11,000
Variable overheads (Working Note 3)	2,500	3,000	4,000	3,800	5,500	5,500
Wages (Working Note 4)	5,750	7,500	8,412	9,563	9,900	10,237
Printing press (Given)	-	-	-	-	10,000	-
Corporation tax (Given)	-	-	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 Figure	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**

PROBLEM – 9B

From the information and the assumption that the cash balance in hand on 1st January 20x2 is ₹72,500, PREPARE a cash budget.

Assume that 50 per cent of total sales are cash sales. Assets are to be acquired in the months of February and April. Therefore, provisions should be made for the payment of ₹8,000 and ₹25,000 for the same. An application has been made to the bank for the grant of a loan of ₹30,000 and it is hoped that the loan amount will be received in the month of May.

It is anticipated that a dividend of ₹35,000 will be paid in June. Debtors are allowed one month's credit. Creditors for materials purchased and overheads grant one month's credit. Sales commission at 3 per cent on sales is paid to the salesman each month.

Month	Sales (₹)	Materials Purchases (₹)	Salaries & Wages (₹)	Production Overheads (₹)	Office and Selling Overheads (₹)
January	72,000	25,000	10,000	6,000	5,500
February	97,000	31,000	12,100	6,300	6,700
March	86,000	25,500	10,600	6,000	7,500
April	88,600	30,600	25,000	6,500	8,900
May	1,02,500	37,000	22,000	8,000	11,000
June	1,08,700	38,800	23,000	8,200	11,500

SOLUTION:

Cash Budget

	Jan (₹)	Feb (₹)	Mar (₹)	Apr (₹)	May (₹)	June (₹)	Total (₹)
Receipts							
Cash sales (50% of Total Sales)	36,000	48,500	43,000	44,300	51,250	54,350	2,77,400
Collections from debtors	-	36,000	48,500	43,000	44,300	51,250	2,23,050
Bank loan (Given)	-	-	-	-	30,000	-	30,000
Total	**36,000**	**84,500**	**91,500**	**87,300**	**1,25,550**	**1,05,600**	**5,30,450**
Payments							
Materials (Given)	-	25,000	31,000	25,500	30,600	37,000	1,49,100
Salaries and wages (Given)	10,000	12,100	10,600	25,000	22,000	23,000	1,02,700
Production overheads (Given)	-	6,000	6,300	6,000	6,500	8,000	32,800
Office & selling overheads (Given)	-	5,500	6,700	7,500	8,900	11,000	39,600
Sales commission (3% on Sales)	2,160	2,910	2,580	2,658	3,075	3,261	16,644
Capital expenditure (Given)	-	8,000	-	25,000	-	-	33,000
Dividend (Given)	-	-	-	-	-	35,000	35,000
Total	**12,160**	**59,510**	**57,180**	**91,658**	**71,075**	**1,17,261**	**4,08,844**
Net cash flow	23,840	24,990	34,320	(4,358)	54,475	(11,661)	1,21,606
Balance, beginning of month	72,500	96,340	1,21,330	1,55,650	1,51,292	2,05,767	72,500
Balance, end ofmonth	96,340	1,21,330	1,55,650	1,51,292	2,05,767	1,94,106	1,94,196

PROBLEM – 9C

Consider the balance sheet of Maya Limited as on 31 December, 20x2. The company has received a large order and anticipates the need to go to its bank to increase its borrowings. As a result, it has to forecast its cash requirements for January, February and March, 20x3. Typically, the company collects 20 per cent of its sales in the month of sale, 70 per cent in the subsequent month, and 10 per cent in the second month after the sale. All sales are credit sales.

Equity & liabilities	Amount (₹ in '000)	Assets	Amount (₹ in '000)
Equity shares capital	100	Net fixed assets	1,836
Retained earnings	1,439	Inventories	545
Long-term borrowings	450	Accounts receivables	530

Accounts payables	360	Cash and bank	50
Loan from banks	400		
Other liabilities	212		
	2,961		2,961

Purchases of raw materials are made in the month prior to the sale and amounts to 60 per cent of sales. Payments for these purchases occur in the month after the purchase. Labour costs, including overtime, are expected to be ₹ 1,50,000 in January, ₹ 2,00,000 in February, and ₹ 1,60,000 in March. Selling, administrative, taxes, and other cash expenses are expected to be ₹ 1,00,000 per month for January through March. Actual sales in November and December and projected sales for January through April are as follows (in thousands):

Month	(₹)	Month	(₹)	Month	(₹)
November	500	January	600	March	650
December	600	February	1,000	April	750

On the basis of this information:

a. PREPARE a cash budget and DETERMINE the amount of additional bank borrowings necessary to maintain a cash balance of ₹50,000 at all times for the months of January, February, and March.

b. PREPARE a pro forma balance sheet for March 31.

SOLUTION:

(a) Cash Budget (in thousands)

	Nov.	Dec.	Jan.	Feb.	Mar.
	(₹)	(₹)	(₹)	(₹)	(₹)
Opening Balance **(A)**			**50**	**50**	**50**
Sales	500	600	600	1,000	650
Receipts:					
Collections, current month's sales			120	200	130
Collections, previous month's sales			420	420	700
Collections, previous 2 month's sales			50	60	60
Total **(B)**			**590**	**680**	**890**
Purchases		360	600	390	450
Payments:					
Payment for purchases			360	600	390
Labor costs			150	200	160
Other expenses			100	100	100
Total **(C)**			**610**	**900**	**650**
Surplus/Deficit **(D) = (A + B – C)**			30	(170)	290
Minimum cash balance **(E)**			50	50	50
Additional borrowings **(F) = (E – D)**			20	220	(240)

	Jan.	Feb.	Mar.
	(₹)	(₹)	(₹)
Additional borrowings	20	220	(240)
Cumulative borrowings (Opening balance of 400)	420	640	400

The amount of financing peaks in February owing to the need to pay for purchases made the previous month and higher labor costs. In March, substantial collections are made on the prior month's billings, causing large net cash inflow sufficient to pay off the additional borrowings.

(b) Pro forma Balance Sheet, 31st March, 2023

Equity & liabilities	Amount (₹ in '000)	Assets	Amount (₹ in '000)
Equity shares capital	100	Net fixed assets	1,836
Retained earnings	1,529	Inventories	635
Long-term borrowings	450	Accounts receivables	620
Accounts payables	450	Cash and bank	50
Loan from banks	400		
Other liabilities	212		
	3,141		**3,141**

Accounts receivable = Sales in March x 0.8 + Sales in February x 0.1

= (₹650 x 0.8) + (₹1,000 x 0.1) = ₹620

Inventories = ₹ 545 + Total purchases from January to March - Total sales from January to March x 0.6

= ₹545 + (₹600 + ₹390 + ₹450) - (₹600 ₹1000 + ₹650) x 0.6 = ₹635

Accounts payable = Purchases in March = ₹450

Retained earnings = ₹ 1,439 + Sales – Payment for purchases – Labor costs and – Other expenses, all forJanuary to March

= ₹1,439 + (₹600 + ₹1000 + ₹650) – (₹360 + ₹600 + ₹390) – (₹150 + ₹200 + ₹160) – (₹100 + ₹100 + ₹100) = ₹1,529

PROBLEM – 10

From the following information relating to a departmental store, you are required to PREPARE for the three months ending 31st March, 20x2:

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, 20x2 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 month	(₹) 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 Note:

		(₹) in '000		
		Jan.	Feb.	March
(1)	Payments to creditors:			
	Cost of goods sold	1,635	1,405	1,330
	Add: Closing Stocks	1,200	1,100	1,000
		2,835	2,505	2,330
	Less: Opening Stocks	1,300	1,200	1,100
	Purchases	**1,535**	**1,305**	**1,230**
	Add: Trade Creditors, Opening balance	2,110	2,000	1,950
		3,645	3,305	3,180

	Less: Trade Creditors, closing balance	2,000	1,950	1,900
	Payment	**1,645**	**1,355**	**1,280**
(2)	Receipts from debtors:			
	Debtors, Opening balances	2,570	2,600	2,500
	Add: Sales	2,100	1,800	1,700
		4,670	4,400	4,200
	Less: Debtors, closing balance	2,600	2,500	2,350
	Receipt	**2,070**	**1,900**	**1,850**

CASH BUDGET

(a) 3 months ending 31st March, 2022

			(₹ in 000)
	January, 2022	**February, 2022**	**March, 2022**
Opening cash balances	545	315	65
Add: Receipts:			
From Debtors	2,070	1,900	1,850
Sale of Investments	---	700	----
Sale of Plant	---	---	50
Total (A)	**2,615**	**2,915**	**1,965**
Deduct: Payments			
Creditors	1,645	1,355	1,280
Expenses	255	210	195
Capital Expenditure	---	800	---
Payment of dividend	---	485	---
Purchase of investments	400	---	200
Total payments (B)	**2,300**	**2,850**	**1,675**
Closing cash balance (A-B)	315	65	290

(b) Statement of Sources and uses of Funds for the three-month period ending 31st March, 2022

	(₹' 000)	(₹' 000)
Sources:		
Funds from operation:		
Net profit (150 + 125 + 115)	390	
Add: Depreciation (60 × 3)	180	570
Sale of plant		50
		620
Decrease in Working Capital (Refer Statement of changes in working capital)		665
Total		**1,285**

Uses:		
Purchase of plant		800
Payment by dividends		485
Total		**1,285**

Statement of Changes in Working Capital

	January,22	March,22	Increase	Decrease
	(₹' 000)	(₹' 000)	(₹' 000)	(₹' 000)
Current Assets				
Cash in hand and at Bank	545	290		255
Short term Investments	300	200		100
Debtors	2,570	2,350		220
Stock	1,300	1,000		300
	4,715	**3,840**		
Current Liabilities				
Trade Creditors	2,110	1,900	210	---
Other Creditors	200	200	---	---
Tax Due	320	320	---	---
Total	**2,630**	**2,420**		
Working Capital	**2,085**	**1,420**		
Decrease	-	665	665	
	2,085	**2,085**	**875**	**875**

PROBLEM – 11

You are given below the Profit & Loss Accounts for two years for a company:

Profit and Loss Account

	Year 1	Year 2		Year 1	Year 2
	(₹)	(₹)		(₹)	(₹)
To Opening stock	80,00,000	1,00,00,000	By Sales	8,00,00,000	10,00,00,000
To Raw materials	3,00,00,000	4,00,00,000	By Closing stock	1,00,00,000	1,50,00,000
To Stores	1,00,00,000	1,20,00,000	By Misc. Income	10,00,000	10,00,000
To Manufacturing Expenses	1,00,00,000	1,60,00,000			
To Other Expenses	1,00,00,000	1,00,00,000			
To Depreciation	1,00,00,000	1,00,00,000			
To Net Profit	1,30,00,000	1,80,00,000		-	-
	9,10,00,000	11,60,00,000		9,10,00,000	11,60,00,000

Sales are expected to be ₹ 12,00,00,000 in year 3.

As a result, other expenses will increase by ₹ 50,00,000 besides other charges. Only raw materials are in stock. Assume sales and purchases are in cash terms and the closing

stock is expected to go up by the same amount as between year 1 and 2. You may assume that no dividend is being paid. The Company can use 75% of the cash generated to service a loan.
COMPUTE how much cash from operations will be available in year 3 for the purpose? Ignore income tax.

SOLUTION:

Projected Profit and Loss Account for the year 3

	Year 2 Actual (₹ in lakhs)	Year 3 Projected (₹ in lakhs)		Year 2 Actual (₹ in lakhs)	Year 3 Projected (₹ in lakhs)
To Materials consumed (WN 1)	350	420	By Sales	1,000	1,200
To Stores (WN 2)	120	144	By Misc. Income	10	10
To Manufacturing Expenses (WN 3)	160	192			
To Other expenses	100	150			
To Depreciation	100	100			
To Net profit (Balancing Figure)	180	204			
	1,010	**1,210**		**1,010**	**1,210**

Cash Flow:

	(₹ in lakhs)
Profit	204
Add: Depreciation	100
	304
Less: Cash required for increase in stock	50
Net cash inflow	**254**

Available for servicing the loan: 75% of ₹ 2,54,00,000 or ₹ 1,90,50,000

Working Notes:

(i) Material consumed in year 2: 35% of sales.

RM Consumed in year 2 = ₹ 100

Add: Purchases = ₹ 400

Less: Closing Stock = ₹ 150

RM Consumed = ₹ 350

RM Consumed as a % : $100 \times \frac{₹\ 350}{₹\ 1000} = 35\%$

RM Consumption in Year 3 = ₹ 1200 x 35% = ₹ 420

(ii) Stores as a% = (₹ 120 ÷ ₹ 1000) = 12%

Likely Stores in Year -3 = ₹ 1200 x 12% = ₹ 144

(iii) Manufacturing expenses ₹ 160 ÷ ₹ 1000 = 16% on sales.

Likely Manufacturing expenses = ₹ 1200 x 16% = ₹ 192.

Note: The above also shows how a projected profit and loss account is prepared.

PROBLEM – 12

Prachi Ltd is a manufacturing company producing and selling a range of cleaning products to wholesale customers It has three suppliers and two customers Prachi Ltd relies on its cleared funds forecast to manage its cash.

You are an accounting technician for the company and have been asked to prepare a cleared funds forecast for the period Saturday 9 August to Wednesday 13 August 20X2 inclusive. You have been provided with the following information:

1. Receipts from customers

	Credit terms	Payment method	9 Aug 20X2 sales	9 Jul 20X2 sales
W Ltd	1 calendar month	BACS	₹ 150,000	₹ 130,000
X Ltd	None	Cheque	₹ 180,000	₹ 160,000

a. Receipt of money by BACS (Bankers' Automated Clearing Services) is instantaneous.

b. X Ltd's cheque will be paid into Prachi Ltd's bank account on the same day as the sale is made and will clear on the third day following this (excluding day of payment).

2. Payments to suppliers

Supplier name	Credit terms	Payment method	9 Aug 20X2 purchases	9 Jul 20X2 purchases	9 Jun 20X2 purchases
A Ltd	1 calendar month	Standing order	₹ 65,000	₹ 55,000	₹ 45,000
B Ltd	2 calendar months	Cheque	₹ 85,000	₹ 80,000	₹ 75,000
C Ltd	None	Cheque	₹ 95,000	₹ 90,000	₹ 85,000

a. Prachi Ltd has set up a standing order for ₹ 45,000 a month to pay for supplies from A Ltd. This will leave Prachi's bank account on 9 August.

Every few months, an adjustment is made to reflect the actual cost of supplies purchased (you do NOT need to make this adjustment).

b. Prachi Ltd will send out, by post, cheques to B Ltd and C Ltd on 9 August. The amounts will leave its bank account on the second day following this (excluding the day of posting).

3. Wages and salaries

	July 20X2	August 20X2
Weekly wages	₹ 12,000	₹ 13,000
Monthly salaries	₹ 56,000	₹ 59,000

a. Factory workers are paid cash wages (weekly). They will be paid one week's wages, on 13 August, for the last week's work done in July (i.e. they work a week in hand).

b. All the office workers are paid salaries (monthly) by BACS. Salaries for July will be paid on 9 August.

4. Other miscellaneous payments

a. Every Saturday morning, the petty cashier withdraws ₹ 200 from the company bank account for the petty cash. The money leaves Prachi's bank account straight away.

b. The room cleaner is paid ₹ 30 from petty cash every Monday morning.

c. Office stationery will be ordered by telephone on Sunday 10 August to the value of ₹ 300. This is paid for by company debit card. Such payments are generally seen to leave the company account on the next working day.

d. Five new soft wares 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 (Saturday)	10 Aug (Sunday)	11 Aug (Monday)	12 Aug (Tuesday)	13Aug (Wednesday)
Receipts	(₹)	(₹)	(₹)	(₹)	(₹)
W Ltd	1,30,000	0	0	0	0
X Ltd	0	0	0	1,80,000	0
(a) Receipts	**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 Opening Balance	2,00,000	2,28,800	2,28,800	58,500	2,38,500
Cleared Closing Balance	**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)	(6,500)	(6,500)
(d)	**10,000**	**9,700**	**180,000**	**(6,500)**	**(6,500)**
Total book balance c/f	**2,38,800**	**2,38,500**	**2,38,500**	**2,32,000**	**2,20,000**
(c)+ (d)					

PROBLEM – 13

A firm maintains a separate account for cash disbursement. Total disbursement are ₹ 1,05,000 per month or ₹ 12,60,000 per year. Administrative and transaction cost of transferring cash to disbursement account is ₹ 20 per transfer. Marketable securities yield is 8% per annum.

DETERMINE the optimum cash balance according to William J. Baumol model.

SOLUTION:

The optimum cash balance $C = \sqrt{\frac{2 \times ₹\ 12,60,000 \times ₹\ 20}{0.08}} = ₹\ 25,100$

PROBLEM – 14

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 cycle cash.

(b) Minimum operating cash = Total operating annual outlay ÷ Cash Turnover

₹ 120 lakhs ÷ 4 cycle = ₹ 30 lakhs.

(c) Revised Cash cycle = 45 days + 45 days – 30 days = 60 days (2 months).
Revised Cash turnover = 12 months (360 days) ÷ 2 months (60 days) = 6 cycle.
Minimum operating cash = ₹ 120 lakhs ÷ 6 cycle = ₹ 20 lakhs.
Reduction in investments = ₹ 30 lakhs – ₹ 20 lakhs = ₹ 10 lakhs.
Savings = 0.10 × 10 lakhs = ₹ 1 lakh.

PROBLEM – 15

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 (Working Note)	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) –	1,44,000	1,50,550	1,53,040	1,54,750	1,52,400

	(c)]					
B.	Opportunity Cost of Investments in Receivables (WN)	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

Calculation of Opportunity Cost of Average Investments

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

$$\text{Present Policy} = ₹\ 4,50,000 \times \frac{30\ \text{Days}}{360\ \text{Days}} \times \frac{20}{100} = ₹\ 7,500$$

$$\text{Policy A} = ₹\ 4,70,000 \times \frac{40\ \text{Days}}{360\ \text{Days}} \times \frac{20}{100} = ₹\ 10,444$$

$$\text{Policy B} = ₹\ 4,82,000 \times \frac{50\ \text{Days}}{360\ \text{Days}} \times \frac{20}{100} = ₹\ 13,389$$

$$\text{Policy C} = ₹\ 5,00,000 \times \frac{60\ \text{Days}}{360\ \text{Days}} \times \frac{20}{100} = ₹\ 16,667$$

$$\text{Policy D} = ₹\ 5,10,000 \times \frac{75\ \text{Days}}{360\ \text{Days}} \times \frac{20}{100} = ₹\ 21,250$$

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

Particulars		Present Policy 30 days	Proposed Policy A 40 days	Proposed Policy B 50 days	Proposed Policy C 60 days	Proposed Policy D 75 days
		(₹)	(₹)	(₹)	(₹)	(₹)
A.	**Incremental Expected Profit:**					
	(a) Incremental Credit Sales	---	30,000	48,000	75,000	90,000
	(b) Incremental Costs					
	(i) Variable Costs	---	20,000	32,000	50,000	60,000
	(ii) Fixed Costs	---	-	-	-	-
	(c) Incremental Bad Debt Losses	---	3,450	6,960	14,250	21,600
	(d) **Incremental Expected Profit (a – b –c)]**		**6,550**	**9,040**	**10,750**	**8,400**

B.	**Required Return on**					
	Incremental Investments:					
	(a) Cost of Credit Sales	4,50,000	4,70,000	4,82,000	5,00,000	5,10,000
	(b) Collection period	30 Days	40 Days	50 Days	60 Days	75 Days
	(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.**

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

$$\text{For Policy A} = \frac{₹\ 6,550}{₹\ 14,722} \times 100 = 44.49\%$$

$$\text{For Policy B} = \frac{₹\ 9,040}{₹\ 2\ 9,444} \times 100 = 30.70\%$$

$$\text{For Policy C} = \frac{₹\ 10,750}{₹\ 45,833} \times 100 = 23.45\%$$

$$\text{For Policy D} = \frac{₹\ 8,400}{₹\ 68,750} \times 100 = 12.22\%$$

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.

PROBLEM – 15A

XYZ Corporation is considering relaxing its present credit policy and is in the process of evaluating two proposed policies. Currently, the firm has annual credit sales of ₹ 50 lakhs and accounts receivable turnover ratio of 4 times a year. The current level of loss due to bad debts is ₹ 1,50,000. The firm is required to give a return of 25% on the investment in new accounts receivables. The company's variable costs are 70% of the selling price. Given the following information, IDENTIFY which is the better option?

(Amount in ₹)

	Present Policy	Policy Option I	Policy Option II
Annual credit sales	**50,00,000**	**60,00,000**	**67,50,000**

Accounts receivable turnover ratio	4 times	3 times	2.4 times
Bad debt losses	1,50,000	3,00,000	4,50,000

SOLUTION:

Statement showing the Evaluation of Debtors Policies

Particulars	Present Policy	Proposed Policy I	Proposed Policy II
	(₹)	(₹)	(₹)
A Expected Profit:			
(a) Credit Sales	50,00,000	60,00,000	67,50,000
(b) Total Cost other than Bad Debts:			
(i) Variable Costs 70%	35,00,000	42,00,000	47,25,000
(c) Bad Debts	1,50,000	3,00,000	4,50,000
(d) Expected Profit [(a) – (b) – (c)]	**13,50,000**	**15,00,000**	**15,75,000**
B Opportunity Cost of Investments in Receivables (WN)	2,18,750	3,50,000	4,92,188
C Net Benefits (A – B)	**11,31,250**	**11,50,000**	**10,82,812**

Recommendation: The Proposed Policy I should be adopted since the net benefits under this policy are higher as compared to other policies.

Working Note: Calculation of Opportunity Cost of Average Investments

$$\text{Opportunity Cost} = \text{Total cost} \times \frac{\text{Collection period}}{12} \times \frac{\text{Rate of Return}}{100}$$

Collection Period in months = 12 ÷ Accounts Receivable Turnover Ratio

Present Policy = 12 months ÷ 4 Times = 3 months

Proposed Policy I = 12 months ÷ 3 Times = 4 months

Proposed Policy II = 12 months ÷ 2.4 Times = 5 months

Opporutnity Cost

Present Policy	=	(₹ 35,00,000 × 3 months) ÷ 12months × 25%	=	₹ 2,18,750
Proposed Policy I	=	(₹ 42,00,000 × 4 months) ÷ 12months × 25%	=	₹ 3,50,000
Proposed Policy II	=	(₹ 47,25,000 × 5 months) ÷ 12months × 25%	=	₹ 4,92,188

PROBLEM – 15B

Mosaic Limited has current sales of ₹ 15 lakhs per year. Cost of sales is 75 per cent of sales and bad debts are one per cent of sales. Cost of sales comprises 80 per cent variable costs and 20 per cent fixed costs, while the company's required rate of return is 12 per cent. Mosaic Limited currently allows customers 30 days' credit, but is considering increasing this to 60 days' credit in order to increase sales.

It has been estimated that this change in policy will increase sales by 15 per cent, while bad debts will increase from one per cent to four per cent. It is not expected that the policy change will result in an increase in fixed costs and creditors and stock will be

unchanged.

Should Mosaic Limited introduce the proposed policy? ANALYSE (Assume a 360 days year)

SOLUTION:

New level of sales will be ₹ 15,00,000 x 1.15 = ₹ 17,25,000

Variable costs are 80% x 75% = 60% of sales

Contribution from sales is therefore 40% of sales

Fixed Cost are 20% × 75% = 15% of sales

Particulars	(₹)	(₹)
Proposed investment in debtors = Variable Cost + Fixed Cost* = (₹ 17,25,000 × 60%) + (₹ 15,00,000 × 15%)		
$= (₹\ 10,35,000 + ₹\ 2,25,000) \times \frac{60\ Days}{360\ Days}$		2,10,000
Current investment in debtors = [(₹ 15,00,000 x 60%)		93,750
$+ (₹\ 15,00,000 \times 15\%)] \times \frac{30\ Days}{360\ Days}$		**1,16,250**
Increase in investment in debtors		90,000
Increase in contribution = 15% x ₹ 15,00,000 x 40%		
New level of bad debts = (₹ 17,25,000 x 4%)		
Current level of bad debts (₹ 15,00,000 × 1%)	69,000	
Increase in bad debts	(15,000)	(54,000)
Additional financing costs = ₹ 1,16,250 x 12% =		(13,950)
Savings by introducing change in policy		**22,050**

* Fixed Cost is taken at existing level in case of proposed investment as well

Advise: Mosaic Limited should introduce the proposed policy.

PROBLEM – 15C

PQR Ltd. having an annual sale of ₹30 lakhs, is re-considering its present collection policy. At present, the average collection period is 50 days and the bad debt losses are 5% of sales. The company is incurring an expenditure of ₹30,000 on account of collection of receivables. Cost of funds is 10 percent.

The alternative policies are as under:

	Alternative I	Alternative II
Average Collection Period	40 days	30 days
Bad Debt Losses	4% of sales	3% of sales
Collection Expenses	₹60,000	₹95,000

DETERMINE the alternatives on the basis of incremental approach and state which alternative is more beneficial.

SOLUTION:

Evaluation of Alternative Collection Programmes

	Present Policy	Alternative I	Alternative II
	(₹)	(₹)	(₹)
Sales Revenues	30,00,000	30,00,000	30,00,000
Average Collection Period (ACP)(days)	50	40	30
Receivables (₹) $\left(\text{Sales} \times \frac{\text{ACP}}{360 \text{ Days}}\right)$	4,16,667	3,33,333	2,50,000
Reduction in Receivables from Present Level (₹)	-	83,334	1,66,667
Savings in Interest @ 10% p.a. **(A)**	-	₹ 8,333	₹ 16,667
% of Bad Debt Loss	5%	4%	3%
Amount (₹)	1,50,000	1,20,000	90,000
Reduction in Bad Debts from Present Level **(B)**	-	30,000	60,000
Incremental Benefits from PresentLevel **(C) = (A) + (B)**	-	38,333	76,667
Collection Expenses (₹)	30,000	60,000	95,000
Incremental Collection Expenses from Present Level **(D)**	-	30,000	65,000
Incremental Net Benefit (C – D)	**-**	**₹ 8,333**	**₹ 11,667**

Conclusion: From the analysis it is apparent that Alternative I has a benefit of ₹ 8,333 and Alternative II has a benefit of ₹ 11,667 over present level. Alternative II has a benefit of ₹ 3,334 more than Alternative I. Hence Alternative II is more viable.

(**Note:** In absence of Cost of Sales, sales has been taken for purpose of calculating investment in receivables. 1 year = 360 days.)

PROBLEM – 16

A company is presently having credit sales of ₹ 12 lakh. The existing credit terms are 1/10, net 45 days and average collection period is 30 days. The current bad debts loss is 1.5%. In order to accelerate the collection process further as also to increase sales, the company is contemplating liberalization of its existing credit terms to 2/10, net 45 days. It is expected that sales are likely to increase by 1/3 of existing sales, bad debts increase to 2% of sales and average collection period to decline to 20 days. The contribution to sales ratio of the company is 22% and opportunity cost of investment in receivables is 15 percent (pre-tax). 50 per cent and 80 percent of customers in terms of sales revenue are expected to avail cash discount under existing and liberalization scheme respectively. The tax rate is 30%.

ADVISE, should the company change its credit terms? (Assume 360 days in a year).

SOLUTION:

Working Notes:

(i) Calculation of Cash Discount

Cash Discount = Total credit sales × % of customers who take up discount × Discount Rate

$$\text{Present Policy} = \frac{₹\ 12,00,000 \times 50\% \times 0.01}{100} = ₹\ 6,000$$

Proposed Policy = ₹ 16,00,000 × 0.80 × 0.02 = ₹ 25,600

(ii) Opportunity Cost of Investment in Receivables

Present Policy = ₹ 9,36,000 x (30 Days ÷ 360 Days) x (70% of 15) ÷ 100
= ₹ 78,000 x 10.5 ÷ 100 = ₹ 8,190

Proposed Policy = ₹ 12,48,000 x (20 Days ÷ 360 Days) x 10.50 ÷ 100 = ₹ 7,280

Statement showing Evaluation of Credit Policies

Particulars	Present Policy	Proposed Policy
Credit Sales	12,00,000	16,00,000
Variable Cost @ 78%* of sales	9,36,000	12,48,000
Bad Debts @ 1.5% and 2%	18,000	32,000
Cash Discount (WN)	6,000	25,600
Profit before tax	**2,40,000**	**2,94,400**
Tax @ 30%	72,000	88,320
Profit after Tax	**1,68,000**	**2,06,080**
Opportunity Cost of Investment in Receivables (WN)	8,190	7,280
Net Profit	**1,59,810**	**1,98,800**

*Only relevant or variable costs are considered for calculating the opportunity costs on the funds blocked in receivables. Since 22% is contribution, hence the relevant costs are taken to be 78% of the respective sales.

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

PROBLEM – 17

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% on ₹ 100000	(10,000)
Profit before Tax	**10,000**
Less: Tax @ 50%	(5,000)
Profit after Tax	**5,000**
B. Opportunity Cost of Investment in Receivables (Working Notes)	(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 ×

$$\frac{\text{Collection period}}{12} \times \frac{\text{Required Rate of Return}}{100} = ₹\ 80{,}000 \times \frac{1.5\ \text{Months}}{12\ \text{Months}} \times \frac{25}{100} = ₹\ 2{,}500$$

Statement showing the Acceptable Degree of Risk of Non-payment

Particulars	Required Rate of Return		
	30%	**40%**	**60%**
Sales	1,00,000	1,00,000	1,00,000
Less: Production and Sales Expenses	80,000	80,000	80,000
Profit before providing for Bad Debts	**20,000**	**20,000**	**20,000**
Less: Bad Debts (assume X)	X	X	X
Profit before tax	**20,000 – X**	**20,000 – X**	**20,000 – X**
Less: Tax @ 50%	(20,000 – X) 0.5	(20,000 – X) 0.5	(20,000 – X) 0.5
Profit after Tax	**10,000 –0.5X**	**10,000 –0.5X**	**10,000 –0.5X**
Required Return (given)	30% of 10,000*	40% of 10,000*	60% of 10,000*
	= ₹3,000	= ₹4,000	= ₹6,000

*Average Debtors = Total Cost of Credit Sales × $\frac{\text{Collection period}}{12}$

= ₹ 80,000 × $\frac{1.5\ \text{Months}}{12\ \text{Months}}$ = ₹ 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 (₹ 10000 – ₹ 3000)

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 (₹ 10000 - ₹ 4000)

X = ₹ 6,000 ÷ 0.5 = ₹12,000

Bad Debts as % of sales = ₹12,000 ÷ ₹1,00,000 = 12%

Case III

10,000 – 0.5x = ₹ 6,000

0.5x = ₹ 4,000 (₹ 10000 - ₹ 6000)

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.

PROBLEM – 18

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 20x1-20x2, 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 (Given)	15,00,000
(b) Total Cost	
(i) Variable Costs (₹ 15,00,000 ÷ ₹ 150) x ₹ 145	14,50,000
(ii) Recurring Costs (Given)	5,000
	14,55,000
(c) Bad Debts (1% x ₹ 15,00,000)	15,000
(d) Expected Profit [(a) – (b) – (c)]	30,000
B. Opportunity Cost of Investments in Receivables (Working Note)	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 Days ÷ 365 Days	60 Days ÷ 365 Days	90 Days ÷ 365 Days	100 Days ÷ 365 Days	
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**

PROBLEM – 19

A Factoring firm has credit sales of ₹ 360 lakhs and its average collection period is 30 days. The financial controller estimates, bad debt losses are around 2% of credit sales. The firm spends ₹ 1,40,000 annually on debtor's administration. This cost comprises of telephonic and fax bills along with salaries of staff members These are the avoidable costs. A Factoring firm has offered to buy the firm's receivables. The factor will charge 1% commission and will pay an advance against receivables on an interest @15% p.a. after withholding 10% as reserve. ANALYSE what should the firm do?
Assume 360 days in a year.

SOLUTION:

Working notes:

$$\text{Average level of receivables} = ₹\ 360 \text{ lakhs} \times \frac{30}{360} = ₹\ 30 \text{ lakhs}$$

Factoring Commission = 1% of ₹ 30,00,000	₹ 30,000
Reserve = 10% of ₹ 30,00,000	₹ 3,00,000
Total (i)	**₹ 3,30,000**
Thus, the amount available for advance is	
Average level of receivables	₹ 30,00,000
Less: Total (i) from above	₹ 3,30,000
(ii)	₹ 26,70,000
Less: Interest @ (15% x ₹ 2670000 x 30 days ÷ 360 Days)	₹ 33,375
Net Amount of Advance available.	**₹ 26,36,625**

Evaluation of Factoring Proposal

	Particulars	**(₹)**	**(₹)**
A.	**Savings (Benefit) to the firm**		
	Cost of Credit administration	₹ 1,40,000	₹ 1,40,000
	Cost of bad-debt losses	(0.02 × 360 lakhs)	₹ 7,20,000
	Total		**₹ 8,60,000**
B.	**Cost to the Firm:**		
	Factoring Commission [Annual credit Sales × % of Commission (or calculated annually)]	$₹\ 30,000 \times \frac{360\ Days}{30\ Days}$	₹ 3,60,000
	Interest Charges	$₹\ 33,375 \times \frac{360\ Days}{30\ Days}$	₹ 4,00,500
	Total		**₹ 7,60,500**
C.	**Net Benefits to the Firm: (A-B)**		**₹ 99,500**

Advice: Since the savings to the firm exceeds the cost to the firm on account of factoring, therefore, the proposal is acceptable.

PROBLEM – 19A **(PEP MAY 24 5M)**

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

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

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

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

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

Evaluation of Factoring Proposal

Credit Sales = ₹ 7.5 crores x 90% = ₹ 6,75,00,000

Average level of receivables = ₹ 6.75 crores x 70 Days ÷ 360 Days = ₹ 1,31,25,000

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

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

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

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

PROBLEM – 19B **(MTP 2 SEPT 24 7M)**

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	₹	₹
	(A) Savings (Benefit) to the firm		
	Administration Cost	45,000	45,000
	Bad Debts Cost (On Recourse basis)		

	In House – 75 lakhs x 1%	(75 lakhs X 0.5%)	37,500
	Factoring – 75 lakhs x 0.5%		
	Net Savings in bad debts cost		
	Cost of Carrying Debtors Cost	**(Working Note – 1)**	1,06,750
	TOTAL		**1,89,250**
(B)	**Cost to the Firm:**		
	Factor Commission [Annual credit Sales × % of Commission]	75 lakhs X 1.5%	1,12,500
	Interest Cost on Net advances	**(Working Note -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.

Working Note - 1: Calculation of Savings in Interest Cost of Carrying Debtors

(I) In house Management:

Interest Cost = Credit Sales X Average Collection Period ÷ 360 X Interest (%) P.a
= (₹ 75,00,000 x 60 Days) ÷ 360 Days x 10%
= ₹ **1,25,000**

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

Calculation of Net Advances to the firm - Debtors		= (₹ 75 lakhs x 30 Days) ÷ 360 Days
		= ₹ 6,25,000
(-) Factor Reserve	= 10% of above	= (₹ 62,500)
(-) Factor Commission	= 1.5% of Debtors	= (₹ 9,375)
Net Advance		= ₹ **5,53,125**

Advance from Factor = ₹ 5,53,125 x 80% = ₹ 4,42,500

Int cost on Advance from Factor = ₹ 4,42,500 x 12% = ₹ 53,100

Now, the amount that is not funded by the factor (₹ 6,25,000 - ₹ 4,42,500) needs to be funded by Sukrut Limited from overdraft facility at 10%

Therefore, Interest cost on Overdraft (Cost of carrying debtors)
= ₹ 1,82,500 x 10%
= ₹ 18,250

Net Savings in Interest Cost of Carrying Debtors = ₹ 1,25,000 (-) ₹ 18,250 = ₹ 1,06,750

PROBLEM – 19C **(MTP 1 JAN 25 10M)**

Zomo Ltd. currently has a turnover of ₹ 120 lakhs, 75% of which is on credit. The variable cost ratio is 80%, and the credit terms offered are 2/10, net 30. On the current sales volume, the bad debts are 1%, and the company spends ₹ 1,20,000 annually

on administering its credit sales, including staff salaries for credit checking and collection. These costs are avoidable.

In addition:

- 60% of customers avail of the 2% cash discount, and the remaining customers take 60 days on average to pay after the date of sale.
- The book debts are financed by a mix of bank borrowings and owned funds in a 1:1 ratio, with annual costs of 15% and 14%, respectively.

However, Zomo Ltd. is also considering dynamic discounting for its cash customers, which might incentivize more customers to pay earlier by increasing the discount rate. This could lead to a potential reduction in bad debts to 0.8% but may also increase the cost of the discount offered to 2.5%.

A factoring firm has proposed a deal with the following terms: (i) Factor reserve: 12% (ii) Guaranteed payment: 25 days (iii) Interest charges: 15% (iv) Commission: 4% of receivables.

In addition, the company also has the option to extend the credit period for its remaining customers (who do not avail of the discount) to 75 days, which might increase sales by 10% but could result in an increase in bad debts to 1.5%.

Given:

1. The cost of funds is expected to rise to 16% next year.
2. Zomo Ltd. plans to introduce late payment penalties (for customers who take more than 60 days) at 5% of outstanding receivables after 60 days.

Assume a 360-day year.

Required:

- SHOULD Zomo Ltd. opt for dynamic discounting or the factoring firm's offer?
- ANALYZE the impact of extending the credit period on the company's finances.

COMPARE all options and RECOMMEND whether to continue with in-house management, dynamic discounting, or accept the factoring firm's offer.

SOLUTION:

1. **In-House Management of Receivables (With Dynamic Discounting)**

   Particulars:

   Cash Discount Cost:

   - Revised discount rate: 2.5%
   - 60% of customers avail discount.
   - **Cost of Discount:** ₹90,00,000 × 60% × 2.5% = ₹1,35,000

2. **Bad Debts (Reduced to 0.8% due to dynamic discounting):**
   - ₹90,00,000 × 0.8% = ₹72,000

3. **Administration Cost:** ₹1,20,000

4. **Cost of Financing Receivables:**
   - **Working Note 1 (Average Collection Period):** (10 days × 60%) + (60 days × 40%) = 30 days

- **Working Note 2 (Average Receivables):** ₹90,00,000 × (30 Days ÷ 360 Days) = ₹7,50,000
- **Working Note 3 (Cost of Financing):**
  - Cost of Bank Funds: ₹7,50,000 × 1 ÷ 2 × 15% = ₹56,250
  - Cost of Owned Funds: ₹7,50,000 × 1 ÷ 2 × 14% = ₹52,500
  - **Total Cost of Financing Receivables:** ₹1,08,750

Total Cost with In-House Receivables Management and Dynamic Discounting:

Particulars	Amount (₹)
Cash Discount (₹ 90,00,000 × 60% × 2.5%)	1,35,000
Bad Debts (₹ 90,00,000 × 0.8%)	72,000
Admin Cost	1,20,000
Cost of Financing Receivables	1,08,750
Total Cost (In-House with Dynamic Discounting):	**4,35,750**

2. Factoring Firm's Offer:

Particulars:

1. **Factoring Commission:** ₹90,00,000 × 4% = ₹3,60,000
2. **Interest Charges on Receivables:** Factor Reserve: 12%, so financing on 88% of receivables. Interest for 25 days: (₹ 90,00,000 - ₹ 3,60,000) × 88% × 15% × (25 Days ÷ 360 Days) = ₹79,200
3. **Cost of Owned Funds (Receivables not factored):** ₹ 13,96,800 × 14% × (25 Days ÷ 360 Days) = ₹ 13580

Owned Funds: (₹ 90,00,000 - ₹ 3,60,000) × 12% + ₹ 3,60,000 = ₹13,96,800

Total Cost with Factoring Firm:

Particulars	Amount (₹)
Factoring Commission (₹90,00,000 × 4%)	3,60,000
Interest Charges on Receivables	79,200
Cost of Owned Funds	13,580
Total Cost with Factoring:	**4,52,780**

3. Impact of Extending Credit Period:

If Zomo Ltd. extends the credit period to 75 days:

- **Sales increase:** 10% of ₹ 120,00,000 = ₹ 12,00,000
  New total turnover = ₹ 120,00,000 + ₹ 12,00,000 = ₹ 1,32,00,000
  Credit Sales (75%) = ₹ 99,00,000
- **Increased Bad Debts (1.5%):** ₹99,00,000 × 1.5% = ₹ 1,48,500
- **Late Payment Penalty:** Customers delaying beyond 60 days (40%):
  ₹ 99,00,000 × 40% × 5% = ₹ 1,98,000

A. Cash Discount Cost:

- **Discount rate:** 2% (since there's no mention of dynamic discounting in this case)
- **Percentage of customers availing discount:** 60%

- **Calculation:** ₹ 99,00,000 × 60% × 2% = ₹ 1,18,800

B. Bad Debts (Increased to 1.5%):

- **Calculation:** ₹ 99,00,000 × 1.5% = ₹ 1,48,500

C. Administration Costs (Remains the same):

- The administration cost stays fixed at ₹ 1,20,000, as no change in admin structure is mentioned.

D. Cost of Financing Receivables (Based on the new extended credit period):

- **Working Note 1 (Average Collection Period):** Credit period has been extended to 75 days for customers who don't take the discount (40% of customers).
  - **Revised Average Collection Period:** (10 days × 60%) + (75 days × 40%) = 36 days
- **Working Note 2 (Average Receivables):** ₹99,00,000 × (36 Days ÷ 360 Days) = ₹ 9,90,000
- **Working Note 3 (Cost of Financing Receivables):**
  - **Cost of Bank Funds (15%):** ₹9,90,000 × 1 ÷ 2 × 15% = ₹74,250
  - **Cost of Owned Funds (14%):** ₹9,90,000 × 1 ÷ 2 × 14% = ₹69,300
  - **Total Cost of Financing Receivables:** ₹74,250 + ₹69,300 = ₹1,43,550

Revised Bad Debts after Penalty:

- **Bad debts before penalty:** ₹1,48,500
- **Penalty earned:** ₹1,98,000
- **Net effect on bad debts:** ₹1,48,500 - ₹1,98,000 = (- ₹ 49,500)

(Zomo Ltd. would effectively earn ₹49,500 from penalties, reducing bad debt cost.)

4. Total Cost Calculation:

Now, summing up all the components:

Particulars	Amount (₹)
Cash Discount (₹99,00,000 × 60% × 2%)	1,18,800
Net Bad Debts after Penalty (- ₹49,500)	-49,500
Administration Costs	1,20,000
Cost of Financing Receivables	1,43,550
Total Cost (In-House with Extended Credit Period)	**₹3,32,850**

5. Final Decision:

Option	Total Cost (₹)
In-House with Dynamic Discounting	4,35,750
Factoring Firm's Offer	4,52,780
In-House with Extended Credit Period	**3,32,850**

Recommendation: Zomo Ltd should **extend the credit period** and continue in-house management. This option will not only reduce costs (due to lower bad debts offset by penalties) but also increase sales by 10%. Factoring is the least beneficial due to its high commission charges, and dynamic discounting offers only marginal savings compared to the credit extension option.

PROBLEM – 20 **(RTP JAN 25)**

Nirmoh Limited wants to avail short-term loan from the bank. However, bank grants short term loan by keeping the collateral in the form of accounts receivable. A bank is analysing the receivables of Nirmoh Limited to identify acceptable collateral for a short-term loan.

The current policy of the company is 3/10 net 40. Bank will lend only to the extent of 90% of acceptable receivables at an interest rate of 12% only if both the conditions mentioned below are fulfilled. Bank will keep a reserve of 5% for cash discount & returns

(a) Customers are not currently overdue for more than 5 days to the net period

(b) Average aging (payment period) of the customer should not exceed 15 days past the net period.

If any of the above conditions are not fulfilled, the bank will lend 65% of the receivables subject to a reserve of 15% and the interest rate will be charged at 15% on such accounts. The corporate tax rate applicable is 25%.

On the scrutiny of all the receivables, following are the acceptable receivables considered for lending-

Accounts	Amount (₹)	Outstanding in Days since invoiced	Average Aging (payment period) in Days
DR 01	50,000	37	40
DR 02	25,000	25	48
DR 03	1,20,000	47	49
DR 04	72,000	10	56
DR 05	45,000	30	30
DR 06	1,75,000	39	50
DR 07	19,000	55	25
DR 08	54,000	44	54
DR 09	1,05,000	15	25
DR 10	37,000	22	75

You are required to CALCULATE:

(a) Total amount lends by the bank

(b) Effective Interest cost (%) to the company

SOLUTION:

Condition (a) says that accounts shouldn't be overdue for more than 5 days to the net period. In other words, it means those accounts who are overdue by 45 days (40 days + 5 additional days), will not fulfil condition a) and thus will not be eligible for 90% lending. Therefore, from the above, we can see that **Accounts DR 03 & DR 07** are overdue for more than 45 days and hence will not be eligible for 90% lending.

Condition (b) says that average receivables ageing (payment period) should not exceed 15 days to the net period i.e. it should not exceed 55 days (40 days + 15 days = 55 days). Therefore, from the above, we can see that **Accounts DR 04 & DR 10** has an ageing of more than 55

days. Hence, they would also not be eligible for 90% lending.

Amount of Bank Lending:

Accounts	Bank Lending at 90% (₹)	Bank Lending at 65% (₹)
DR 01	50,000	-
DR 02	25,000	-
DR 03	-	1,20,000
DR 04	-	72,000
DR 05	45,000	-
DR 06	1,75,000	-
DR 07	-	19,000
DR 08	54,000	-
DR 09	1,05,000	-
DR 10	-	37,000
Total	**4,54,000**	**2,48,000**
(-) Reserve	₹ 22,700 {₹ 4,54,000 x 5%}	₹ 37,200 {₹ 2,48,000 x 15%}
Net (₹)	**4,31,300**	**2,10,800**
Loan (₹)	**3,88,170**	**1,37,020**

Total short-term loan granted by the bank = ₹ 5,25,190

(B) Calculation of the Effective Interest Cost

Interest at 12% (On 90% lending) = ₹ 3,88,170 x 0.12 = ₹ 46,580.4

Interest at 15% (On 65% lending) = ₹ 1,37,020 x 0.15 = ₹ 20,553

Total Interest = ₹67,133.4

Effective Interest Cost (%) = Interest (1 - t) ÷ Total Short-term Loan

= 67,133.4 (1 - 0.25) ÷ 5,25,190

Effective Interest Cost (%) = 9.59%

PROBLEM – 21

Suppose ABC Ltd. has been offered credit terms from its major supplier of 2/10, net 45. Hence the company has the choice of paying ₹ 10 per ₹ 100 or to invest ₹ 98 for an additional 35 days and eventually pay the supplier ₹ 100 per ₹ 100. The decision as to whether the discount should be accepted depends on the opportunity cost of investing ₹ 98 for 35 days. ANALYSE what should the company do?

SOLUTION:

If the company does not avail the cash discount and pays the amount after 45 days, the implied cost of interest per annum would be approximately:

$$\left(\frac{100}{100-2}\right)^{\frac{365\ Days}{35\ Days}} - 1 = 23.5\%$$

Now let us assume that ABC Ltd. can invest the additional cash and can obtain an annual return

of 25% and if the amount of invoice is ₹10,000. The alternatives areas follows:

	Refuse discount	Accept discount
	(₹)	(₹)
Payment to supplier	10,000	9,800
Return from investing ₹ 9,800 between day 10 and day 45: $\frac{35\ Days}{365\ Days} \times ₹\ 9,800 \times 25\%$	(235)	
Net Cost	**9,765**	**9,800**

Advise: Thus, it is better for the company to refuse the discount, as return on cash retained is more than the saving on account of discount.

PROBLEM – 22

The Dolce Company purchases raw materials on terms of 2/10, net 30. A review of the company's records by the owner, Mr. Gautam, revealed that payments are usually made 15 days after purchases are made. When asked why the firm did not take advantage of its discounts, the accountant, Mr. Rohit, replied that it cost only 2 per cent for these funds, whereas a bank loan would cost the company 12 per cent.

a. ANALYSE what mistake is Rohit making?

b. If the firm could not borrow from the bank and was forced to resort to the use of trade credit funds, what suggestion might be made to Rohit that would reduce the annual interest cost? IDENTIFY.

SOLUTION:

(a) Rohit's argument of comparing 2% discount with 12% bank loan rate is not rational as 2% discount can be earned by making payment 5 days in advance i.e. within 10 days rather 15 days as payments are made presently. Whereas12% bank loan rate is for a year.

Assume that the purchase value is ₹100, the discount can be earned by making payment within 10 days is ₹2, therefore, net payment would be ₹98 only. Annualized benefit

$$= \frac{₹\ 2}{₹\ 98} \times \frac{365\ Days}{5\ Days} \times 100 = 149\%$$

This means cost of not taking cash discount is 149%.

(b) If the bank loan facility could not be available, then in this case the company should resort to utilise maximum credit period as possible.

Therefore, payment should be made in 30 days to reduce the interest cost.

Multiple Choice Questions

1. **The credit terms may be expressed as "3/15 net 60". This means that a 3% discount will be granted if the customer pays within 15 days, if he does not avail the offer, he must make payment within 60 days.**
   a. I agree with the statement
   b. I do not agree with the statement
   c. I cannot say.

2. **The term 'net 50' implies that the customer will make payment:**
   a. Exactly on 50th day
   b. Before 50th day
   c. Not later than 50th day
   d. None of the above.

3. **Trade credit is a source of:**
   a. Long-term finance
   b. Medium term finance
   c. Spontaneous source of finance
   d. None of the above.

4. **The term float is used in:**
   a. Inventory Management
   b. Receivable Management
   c. Cash Management
   d. Marketable securities.

5. **William J Baumol's model of Cash Management determines optimum cash level where the carrying cost and transaction cost are:**
   a. Maximum
   b. Minimum
   c. Medium
   d. None of the above.

6. **In Miller – ORR Model of Cash Management:**
   a. The lower, upper limit, and return point of Cash Balances are set out
   b. Only upper limit and return point are decided
   c. Only lower limit and return point are decided
   d. None of the above are decided.

7. **Working Capital is defined as:**
   a. Excess of current assets over current liabilities
   b. Excess of current liabilities over current assets
   c. Excess of Fixed Assets over long-term liabilities
   d. None of the above.

8. **Working Capital is also known as "Circulating Capital, fluctuating Capital and revolving capital". The aforesaid statement is;**
   a. Correct
   b. Incorrect
   c. Cannot say.

9. **The basic objectives of Working Capital Management are:**
   a. Optimum utilization of resources for profitability
   b. To meet day-to-day current obligations
   c. Ensuring marginal return on current assets is always more than cost of capital
   d. Select any one of the above statements.

10. **The term Gross Working Capital is known as:**
    a. The investment in current liabilities
    b. The investment in long-term liability
    c. The investment in current assets
    d. None of the above.

11. **The term net working capital refers to the difference between the current assets minus current liabilities.**
    a. The statement is correct
    b. The statement is incorrect
    c. I cannot say.

12. **The term "Core current assets' was coined by:**
    a. Chore Committee
    b. Tandon Committee
    c. Jilani Committee
    d. None of the above.

13. **The concept operating cycle refers to the average time which elapses between the acquisition of raw materials and the final cash realization. This statement is:**
    a. Correct
    b. Incorrect
    c. Partially True
    d. I cannot say.

14. **As a matter of self-imposed financial discipline can there be a situation of zero working capital now-a-days in some of the professionally managed organizations.**
    a. Yes
    b. No
    c. Impossible
    d. Cannot say.

15. **Over trading arises when a business expands beyond the level of funds available. The statement is:**
    a. Incorrect
    b. Correct
    c. Partially correct
    d. I cannot say.

16. **A Conservative Working Capital strategy calls for high levels of current assets in relation to sales.**
    a. I agree
    b. Do not agree
    c. I cannot say.

17. **The term Working Capital leverage refer to the impact of level of working capital on company's profitability. This measures the responsiveness of ROCE for changes in current assets.**
    a. I agree
    b. Do not agree
    c. The statement is partially true.

18. **The term spontaneous source of finance refers to the finance which naturally arise in the course of business operations. The statement is:**
    a. Correct
    b. Incorrect
    c. Partially Correct
    d. I cannot say.

19. **Under hedging approach to financing of working capital requirements of a firm, each asset in the balance sheet assets side would be offset with a financing instrument of the same approximate maturity. This statement is:**
    a. Incorrect
    b. Correct
    c. Partially correct
    d. I cannot say.

20. **Trade credit is a:**
    a. Negotiated source of finance
    b. Hybrid source of finance
    c. Spontaneous source of finance
    d. None of the above.

21. **Factoring is a method of financing whereby a firm sells its trade debts at a discount to a financial institution. The statement is:**
    a. Correct
    b. Incorrect
    c. Partially correct
    d. I cannot say.

22. **A factoring arrangement can be both with recourse as well as without recourse:**
    a. True
    b. False
    c. Partially correct
    d. Cannot say.

23. **The Bank financing of working capital will generally be in the following form. Cash Credit, Overdraft, bills discounting, bills acceptance, line of credit; Letter of credit and bank guarantee.**
    a. I agree
    b. I do not agree
    c. I cannot say.

24. **When the items of inventory are classified according to value of usage, the technique is known as:**
    a. XYZ Analysis
    b. ABC Analysis
    c. DEF Analysis
    d. None of the above.

25. **When a firm advises its customers to mail their payments to special Post Office collection centers, the system is known as.**
    a. Concentration banking
    b. Lock Box system
    c. Playing the float
    d. None of the above.

Answers to the MCQs

1.	(a)	2.	(c)	3.	(c)	4.	(c)	5.	(b)	6.	(a)
7.	(a)	8.	(a)	9.	(b)	10.	(c)	11.	(a)	12.	(b)
13.	(a)	14.	(a)	15.	(b)	16.	(a)	17.	(a)	18.	(a)
19.	(b)	20.	(c)	21.	(a)	22.	(a)	23.	(a)	24.	(b)
25.	(b)										

Case Scenarios

ArMore LLP is a newly established startup dealing in manufacture of a revolutionary product HDHMR which is a substitute to conventional wood and plywood. It is an economical substitute for manufacture of furniture and home furnishing. It has been asked by a venture capitalist for an estimated amount of funds required for setting up plant and also the amount of circulating capital required. A consultant hired by the entity has advised that the cost of setting up the plant would be ₹ 5 Crores and it will require 1 year to make the plant operational. The anticipated revenue and associated cost numbers are as follows:

Units to be sold = 3 lakh sq metres p.a.

Sale Price of each sq mtr	= ₹ 1000
Raw Material cost	= ₹ 200 per sq mtr
Labour cost	= ₹ 50 per hour
Labour hours per sq mtr	= 3 hours
Cash Manufacturing Overheads	= ₹ 75 per machine hour
Machine hours per sq mtr	= 2 hours
Selling and credit administration Overheads	= ₹ 250 per sq mtr

Being a new product in the industry, the firm will have to give a longer credit period of 3 months to its customers. It will maintain a stock of raw material equal to 15% of annual consumption. Based on negotiation with the creditors, the payment period has been agreed to be 1 month from the date of purchase.

The entity will hold finished goods equal to 2 months of units to be sold. All other expenses are to be paid one month in arrears. Cash and Bank balance to the tune of ₹ 25,00,000 is required to be maintained.

The entity is also considering reducing the working capital requirement by either of the two options: a) reducing the credit period to customers by a month which will lead to reduction in sales by 5%. b) Engaging with a factor for managing the receivables, who will charge a commission of 2% of invoice value and will also advance 65% of receivables @ 12% p.a. This will lead to savings in administration and bad debts cost to the extent of ₹ 20 lakhs and 16 lakhs respectively.

The entity is also considering funding a part of working capital by bank loan. For this purpose, bank has stipulated that it will grant 75% of net current assets as advance against working capital. The bank has quoted 16.5% rate of interest with a condition of

opening a current account with it, which will require 10% of loan amount to be minimum average balance.

You being an finance manager, has been asked the following questions:

1. The anticipated profit before tax per annum after the plant is operational is …….
   a. ₹ 750 Lakhs
   b. ₹ 570 Lakhs
   c. ₹ 370 Lakhs
   d. ₹ 525 Lakhs

2. The estimated current assets requirement in the first year of operation (debtors calculated at cost) is …….
   a. ₹ 9,42,50,000
   b. ₹ 2,17,08,333
   c. ₹ 7,25,41,667
   d. ₹ 67,08,333

3. The net working capital requirement for the first year of operation is …….
   a. ₹ 9,42,50,000
   b. ₹ 2,17,08,333
   c. ₹ 7,25,41,667
   d. ₹ 67,08,333

4. The annualised % cost of two options for reducing the working capital is …….
   a. 18.18% and 16.92%
   b. 18.33% and 16.92%
   c. 18.59% and 18.33%
   d. 16.92% and 19.05%

5. What will be the Maximum Permissible Bank Finance by the bank and annualised % cost of the same?
   a. ₹ 4,55,03,630 and 18.33%
   b. ₹ 5,44,06,250 and 18.33%
   c. ₹ 4,45,86,025 and 18.59%
   d. ₹ 3,45,89,020 and 19.85%

Answers to the Case Scenarios

1.	(a)	**2.**	(a)	**3.**	(c)	**4.**	(a)	**5.**	(b)

1.

i.

	Units	Per unit (₹)	Amount (₹)
Raw Material consumption	3,50,000	200	7,00,00,000
labour cost	3,50,000	150	5,25,00,000
Production Overheads	3,50,000	150	5,25,00,000
Cost of Production	**3,50,000**	**500**	**17,50,00,000**
Less: Stock of FG	50,000	500	2,50,00,000
COGS	**3,00,000**	**500**	**15,00,00,000**
Selling and admin exp	3,00,000	250	7,50,00,000
Cost of Sales	**3,00,000**	**750**	**22,50,00,000**
Sales	3,00,000	1000	30,00,00,000
Profit	**3,00,000**	**250**	**7,50,00,000**

Stock of FG (sq. mtr.) = 30,00,000 x 2/12 = 50,000

Units sold = 3,00,000

Raw material consumed (sq. mtr.) = 3,50,000

Raw Material Purchases = Consumption + RM stock (15%)

= 7,00,00,000 + 1,05,00,000

= ₹ 8,05,00,000

ii. Stock of Raw Material (15% of 7,00,00,000) = 1,05,00,000

Stock of finished goods = 2,50,00,000

Debtors (22,50,00,000 x 3/12) = 5,62,50,000

Cash = 25,00,000

Total Current Assets = 9,42,50,000

iii. **Working Capital Statement**

	Amount (₹)
Stock of Raw Material (15% of 7,00,00,000)	1,05,00,000
Stock of finished goods	2,50,00,000
Debtors (22,50,00,000 x 3/12)	5,62,50,000
Cash	25,00,000
Total Current Assets	**9,42,50,000**

Creditors (8,05,00,000 x 1/12)	67,08,333
O/s Exp (18,00,00,000 x 1/12)	1,50,00,000
Total Current Liabilities	**2,17,08,333**
Net Working Capital	**7,25,41,667**

iv. **Cost reducing debtors credit period**

Debtors credit period = 2 months

Debtors balance = 21,37,50,000(2,85,000 units) x 2/12 = ₹ 3,56,25,000

Debtors credit period = 3 months

Debtors balance = 22,50,00,000 x 3/12

= ₹ 5,62,50,000

Amount released from debtors = ₹ 2,06,25,000

reduction in profit (15,000 units x ₹ 250) = ₹ 37,50,000

% p.a. cost (37,50,000/2,06,25,000) = **18.18%**

Costs of factoring

Commission (2% of 30 crores) = 60,00,000

Interest = ₹ 58,50,000

(30cr x 65% x 12% x 3/12)

Savings = ₹ 36,00,000

Net cost of factoring $\frac{82,50,000}{65\% \text{ of } 30\text{cr. i.e. } 19,50,00,000} \times \frac{12}{3}$ = ₹ .82,50,000

% p.a. cost = **16.92%**

v. **5,44,06,250 and 18.33%**

Maximum Permissible Bank Finance = 75% of 7,25,41,667

= ₹ 5,44,06,250

Annualised cost of bank loan = 16.5/90% = 18.33%

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