Q.1 Company P and Q are identical in all respects including risk factors except for debt/equity, company P having issued 10% debentures of ₹ 18 lakhs while company Q is unlevered. Both the companies earn 20% before interest and taxes on their total assets of ₹ 30 lakhs.

Assuming a tax rate of 50% and capitalization rate of 15% from an all-equity company.

Required:

CALCULATE the value of companies' P and Q using (i) Net Income Approach and (ii) Net Operating Income Approach.

Ans:

(i) Valuation under Net Income Approach

Particulars	P Amount (₹)	Q Amount (₹)
Earnings before Interest & Tax (EBIT) (20% of ₹ 30,00,000)	6,00,000	6,00,000
Less: Interest (10% of ₹ 18,00,000)	1,80,000	
Earnings before Tax (EBT)	4,20,000	6,00,000
Less: Tax @ 50%	2,10,000	3,00,000
Earnings after Tax (EAT) (available to equity holders)	2,10,000	3,00,000
Value of equity (capitalized @ 15%)	14,00,000 (2,10,000 × 100/15)	20,00,000 (3,00,000 × 100/15)
Add: Total Value of debt	18,00,000	Nil
Total Value of Company	32,00,000	20,00,000

(ii) Valuation of Companies under Net Operating Income Approach

Particulars	P Amount (₹)	Q Amount (₹)
Capitalisation of earnings at 15% $\left(\frac{₹\ 6,00,000(1-0.5)}{0.15}\right)$	20,00,000	20,00,000
Less: Value of debt {18,00,000 (1 – 0.5)}	9,00,000	Nil
Value of equity	11,00,000	20,00,000
Add: Total Value of debt	18,00,000	Nil
Total Value of Company	29,00,000	20,00,000

Q.2 Rounak Ltd. is an all equity financed company with a market value of ₹ 25,00,000 and cost of equity (K_e) 21%. The company wants to buyback equity shares worth ₹ 5,00,000 by issuing and raising 15% perpetual debt of the same amount. Rate of tax may be taken as 30%. After the capital restructuring and applying MM Model (with taxes), you are required to COMPUTE:

(i) Market value of J Ltd.

(ii) Cost of Equity (K_e)

(iii) Weighted average cost of capital (using market weights) and comment on it.

Ans:

Value of a company (V) = Value of equity (S) + Value of debt (D)

₹ 25,00,000 $= \frac{\text{Net Income (NI)}}{K_e}$ + ₹ 5,00,000

Or, Net Income (NI) = 0.21 (₹ 25,00,000 – ₹ 5,00,000)

Market Value of Equity = ₹ 25,00,000

K_e =21%

$\frac{\text{Net income (NI) for equity holders}}{K_e}$ = Market Value of Equity

$\frac{\text{Net income (NI) for equity holders}}{0.21}$ = ₹ 25,00,000

Net income for equity holders = ₹ 5,25,000

EBIT = 5,25,000/0.7 = ₹ 7,50,000

	All Equity	Debt and Equity
	₹	₹
EBIT	7,50,000	7,50,000
Interest to debt-holders	-	(75,000)
EBT	7,50,000	6,75,000
Taxes (30%)	(2,25,000)	(2,02,500)
Income available to equity shareholders	5,25,000	4,72,500
Income to debt holders plus income available to shareholders	5,25,000	5,47,500

Present value of tax-shield benefits = ₹ 5,00,000 × 0.30 = ₹ 1,50,000

(i) Value of Restructured firm

= ₹ 25,00,000 + ₹ 1,50,000 = ₹ 26,50,000

(ii) Cost of Equity (K_e)

Total Value = ₹26,50,000

Less: Value of Debt = ₹5,00,000

Value of Equity = ₹21,50,000

$K_e = \frac{4,72,500}{21,50,000}$ =0.219 = 21.98%

(iii) WACC (on market value weight)

Cost of Debt (after tax) = 15% (1- 0.3) = 0.15 (0.70) = 0.105 = 10.5%

Components of Costs	Amount (₹)	Cost of Capital (%)	Weight	WACC (%)
Equity	21,50,000	21.98	0.81	17.80
Debt	5,00,000	10.50	0.19	2.00
	26,50,000			19.80

Comment: At present the company is all equity financed. So, $K_e = K_o$ i.e. 21%. However, after restructuring, the K_o would be reduced to 19.80% and K_e would increase from 21% to 21.98%.

Capital Structure

Q.3 Akash Limited provides you the following information:

	(₹)
Profit (EBIT)	2,80,000
Less: Interest on Debenture @ 10%	(40,000)
EBT	2,40,000
Less Income Tax @ 50%	(1,20,000)
	1,20,000
No. of Equity Shares (₹ 10 each)	30,000
Earnings per share (EPS)	4
Price /EPS (PE) Ratio	10

The company has reserves and surplus of ₹ 7,00,000 and required ₹ 4,00,000 further for modernisation. Return on Capital Employed (ROCE) is constant. Debt (Debt/ Debt + Equity) Ratio higher than 40% will bring the P/E Ratio down to 8 and increase the interest rate on additional debts to 12%. You are required to ASCERTAIN the probable price of the share.

(i) If the additional capital are raised as debt; and

(ii) If the amount is raised by issuing equity shares at ruling market price.

Ans:

3. Ascertainment of probable price of shares of Akash limited

Particulars	Plan-I	Plan-II
	If ₹ 4,00,000 is raised as debt (₹)	If ₹ 4,00,000 is raised by issuing equity shares (₹)
Earnings Before Interest and Tax (EBIT) {20% of new capital i.e. 20% of (₹14,00,000 + ₹4,00,000)} (Refer working note1)	3,60,000	3,60,000
Less: Interest on old debentures (10% of ₹4,00,000)	(40,000)	(40,000)

Less: Interest on new debt (12% of ₹4,00,000)	(48,000)	--
Earnings Before Tax (EBT)	2,72,000	3,20,000
Less: Tax @ 50%	(1,36,000)	(1,60,000)
Earnings for equity shareholders (EAT)	1,36,000	1,60,000
No. of Equity Shares (refer working note 2)	30,000	40,000
Earnings per Share (EPS)	₹ 4.53	₹ 4.00
Price/ Earnings (P/E) Ratio (refer working note 3)	8	10
Probable Price Per Share (PE Ratio × EPS)	₹ 36.24	₹ 40

Working Notes:

1. Calculation of existing Return of Capital Employed (ROCE):

	(₹)
Equity Share capital (30,000 shares × ₹10)	3,00,000
10% Debentures $\left(₹40,000 \times \frac{100}{10}\right.$	4,00,000
Reserves and Surplus	7,00,000
Total Capital Employed	14,00,000
Earnings before interest and tax (EBIT) (given)	2,80,000
ROCE = $\frac{₹2,80,000}{₹14,00,000} \times 100$	20%

2. Number of Equity Shares to be issued in Plan-II:

$= \frac{₹4,00,000}{₹40} = 10,000$ shares

Thus, after the issue total number of shares = 30,000+ 10,000 = 40,000 shares

3. Debt/Equity Ratio if ₹ 4,00,000 is raised as debt:

$= \frac{₹8,00,000}{₹18,00,000} \times 100 = 44.44\%$

As the debt equity ratio is more than 40% the P/E ratio will be brought down to 8 in Plan-I

Q.4 The management of RT Ltd. wants to raise its funds from market to meet out the financial demands of its long-term projects. The company has various combinations of proposals to raise its funds. You are given the following proposals of the company:

Proposal	Equity shares (%)	Debts (%)	Preference shares (%)
P	100	-	-
Q	50	50	-
R	50	-	50

(i) Cost of debt and preference shares is 12% each.

(ii) Tax rate –40%

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

(iv) Total investment to be raised ₹8,00,00,000.

(v) Expected earnings before interest and tax ₹3,60,00,000.

From the above proposals the management wants to take advice from you for appropriate plan after computing the following:

- Earnings per share
- Financial break-even-point

COMPUTE the EBIT range among the plans for indifference.

Ans:

(i) Computation of Earnings per Share (EPS)

Plans	P (₹)	Q (₹)	R (₹)
Earnings before interest & tax (EBIT)	3,60,00,000	3,60,00,000	3,60,00,000
Less: Interest charges	--	(48,00,000)	--
Earnings before tax (EBT)	3,60,00,000	3,12,00,000	3,60,00,000
Less : Tax @ 40%	(1,44,00,000)	(1,24,80,000)	(1,44,00,000)
Earnings after tax (EAT)	2,16,00,000	1,87,20,000	2,16,00,000
Less : Preference share dividend	--	--	(48,00,000)
Earnings available for equity shareholders	2,16,00,000	1,87,20,000	1,68,00,000
No. of equity shares	40,00,000	20,00,000	20,00,000
E.P.S	5.40	9.36	8.40

(ii) Computation of Financial Break-even Points

Proposal 'P' = 0

Proposal 'Q' = ₹48,00,000 (Interest charges)

Proposal 'R' = Earnings required for payment of preference share dividend

i.e. ₹48,00,000 ÷ 0.6 = ₹80,00,000

(iii) Computation of Indifference Point between the Proposals

Combination of Proposals

(a) Indifference point where EBIT of proposal "P" and proposal 'Q' is equal

$$\frac{EBIT(1-0.4)}{40,00,000\ shares} = \frac{(EBIT-₹48,00,000)(1-0.4)}{20,00,000\ shares}$$

0.6 EBIT = 1.2 EBIT – ₹57,60,000

EBIT = ₹96,00,000

(b) Indifference point where EBIT of proposal 'P' and proposal 'R' is equal:

$$\frac{EBIT(1-0.40)}{40,00,000\ shares} = \frac{EBIT(1-0.40)-₹48,00,000}{20,00,000\ shares}$$

$$\frac{0.6EBIT}{40,00,000\ shares} = \frac{0.6EBIT-₹48,00,000}{20,00,000\ shares}$$

$$0.30\ EBIT = 0.6\ EBIT - ₹48,00,000$$

$$EBIT = \frac{₹48,00,000}{0.30} = ₹1,60,00,000$$

(c) Indifference point where EBIT of proposal 'Q' and proposal 'R' are equal

$$\frac{(EBIT-₹48,00,000)(1-0.4)}{20,00,000\ shares} = \frac{EBIT(1-0.4)-₹48,00,000}{20,00,000\ shares}$$

There is no indifference point between proposal 'Q' and proposal 'R'

Q.5 CALCULATE the level of earnings before interest and tax (EBIT) at which the EPS indifference point between the following financing alternatives will occur.

(i) Equity share capital of ₹60,00,000 and 12% debentures of ₹40,00,000.

Or

(ii) Equity share capital of ₹40,00,000, 14% preference share capital of ₹20,00,000 and 12% debentures of ₹40,00,000.

Assume the corporate tax rate is 35% and par value of equity share is ₹100 in each case.

Ans:

Computation of level of earnings before interest and tax (EBIT)

In case, alternative (i) is accepted, then the EPS of the firm would be:

$$EPS_{Alternative\ (i)} = \frac{(EBIT - Interest)\ (1 - tax\ rate)}{No.\ of\ equity\ shares}$$

$$= \frac{(EBIT - 0.12 \times ₹40,00,000)\ (1-0.35)}{60,000\ shares}$$

In case, alternative (ii) is accepted, then the EPS of the firm would be:

$$EPS_{Alternative\ (ii)} = \frac{(EBIT - 0.12 \times ₹40,00,000)\ (1-0.35) - (0.14 \times ₹20,00,000)}{40,000\ shares}$$

In order to determine the indifference level of EBIT, the EPS under the two alternative plans should be equated as follows:

$$\frac{(EBIT - 0.12 \times ₹40,00,000)\ (1-0.35)}{60,000\ shares} = \frac{(EBIT - 0.12 \times ₹40,00,000)\ (1-0.35) - (0.14 \times\ 20,00,000)}{40,000\ shares}$$

$$\text{Or}\quad \frac{0.65\ EBIT - 3,12,000}{3} = \frac{0.65\ EBIT - 5,92,000}{2}$$

$$\text{Or}\quad 1.30\ EBIT - ₹6,24,000 = 1.95\ EBIT - ₹17,76,000$$

$$\text{Or}\quad (1.95 - 1.30)\ EBIT = ₹17,76,000 - ₹6,24,000 = ₹11,52,000$$

$$\text{Or}\quad EBIT = \frac{₹11,52,000}{0.65}$$

$$\text{Or}\quad EBIT = ₹17,72,308$$

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

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

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

Ans:

Computation of Rate of Preference Dividend

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

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

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

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

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

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

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

Q.6 Zordon Ltd. has net operating income of ₹ 5,00,000 and total capitalization of ₹ 50,00,000 during the current year. The company is contemplating to introduce debt financing in capital structure and has various options for the same. The following information is available at different levels of debt value:

Debt value (₹)	Interest rate (%)	Equity capitalization rate (%)
0	-	10.00
5,00,000	6.0	10.50
10,00,000	6.0	11.00
15,00,000	6.2	11.30
20,00,000	7.0	12.40
25,00,000	7.5	13.50
30,00,000	8.0	16.00

Assuming no tax and that the firm always maintains books at book values, you are REQUIRED to calculate:

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

(ii) Equity capitalization rate, if MM approach is followed.

Ans:

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

Calculation of Equity, W_d and W_e

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

Statement of Weighted Average Cost of Capital (WACC)

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

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

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

$$\text{Value of a firm} = \frac{\text{Net Operating Income (NOI)}}{K_0}$$

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

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

Statement of Equity Capitalization rate (k_e) under MM approach

Debt (₹)	Equity (₹)	Debt/Equity	K_o	K_d	$K_o - K_d$	$K_e = K_o + (K_o - K_d) \frac{Debt}{Equity}$
(1)	(2)	(3) = (1)/(2)	(4)	(5)	(6) = (4) -(5)	(7) = (4) + (6) x (3)
0	50,00,000	0	0.10	-	0.100	0.100
5,00,000	45,00,000	0.11	0.10	0.060	0.040	0.104
10,00,000	40,00,000	0.25	0.10	0.060	0.040	0.110
15,00,000	35,00,000	0.43	0.10	0.062	0.038	0.116
20,00,000	30,00,000	0.67	0.10	0.070	0.030	0.120
25,00,000	25,00,000	1.00	0.10	0.075	0.025	0.125
30,00,000	20,00,000	1.50	0.10	0.080	0.020	0.130

Q.8 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

Ans:

Workings:

Market Value of Equity $= \frac{\text{Net income (NI) for equity holders}}{K_e}$

₹ 1,750 lakhs $= \frac{\text{Net income (NI) for equity holders}}{0.20}$

Net Income to equity holders/EAT = ₹ 350 lakhs

Therefore, EBIT $= \frac{EAT}{(1-t)} = \frac{₹\,350 \text{ lakhs}}{(1-0.3)}$ = ₹ 500 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 + Tax Advantage

= ₹ 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 - Equity repurchased

= ₹ 1,832.50 lakhs – ₹ 275 lakhs = ₹ 1,557.50 lakhs

Cost of Equity (K_e) = (Net Income to equity holders / Market value of equity) × 100

= (₹ 321.12 lakhs / ₹ 1,557.50 lakhs) × 100 = 20.62%

Cost of debt (K_d) = I (1 - t) = 15 (1 - 0.3) = 10.50%

Components	Amount (₹ In lakhs)	Cost of Capital %	Weight	WACC (K_o) %
Equity	1,557.50	20.62	0.85	17.53
Debt	275.00	10.50	0.15	1.58
	1,832.50		1	19.11

The impact is that the Overall Cost of Capital or K_o has fallen by 0.89% (20% - 19.11%) due to the benefit of tax relief on debt interest payment.

(iii) Cost of Equity

The impact is that cost of equity has risen by 0.62% (20.62% - 20%) due to the presence of financial risk i.e. introduction of debt in capital structure.

Note: Cost of Capital and Cost of equity can also be calculated with the help of following formulas, though there will be no change in the final answers.

Cost of Capital (K_o) = K_{eu} [1 – (t x L)]

Where,

K_{eu} = Cost of equity in an unlevered company

t = Tax rate

$$L = \frac{\text{Debt}}{\text{Debt} + \text{Equity}}$$

$$\text{So, } K_o = 0.20\left[1 - 0.3\right] \times \frac{₹\ 275\ \text{lakhs}}{₹\ 1{,}832.5\ \text{lakhs}} = 0.191 \text{ or } 19.10\% \text{ (approx.)}$$

$$\text{Cost of Equity } (K_e) = K_{eu} + (K_{eu} - K_d)\ \frac{\text{Debt}(1-t)}{\text{Equity}}$$

Where,

K_{eu} = Cost of equity in an unlevered company

K_d = Cost of debt

t = Tax rate

$$\text{So, } K_e = 0.20 + \left((0.20 - 0.15) \times \frac{₹\ 275\ \text{lakhs}\ (1-0.3)}{₹\ 1{,}557.5\ \text{lakhs}}\right) = 0.2062 \text{ or } 20.62\%$$

Q.9 The following data relates to two companies belonging to the same risk class:

Particulars	**Bee Ltd.**	**Cee Ltd.**
12% Debt	₹ 27,00,000	-
Equity Capitalization Rate	-	18
Expected Net Operating Income	₹ 9,00,000	₹ 9,00,000

You are required to:

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

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

Ans:

3. (a) Assuming no tax as per MM Approach.

Calculation of Value of Firms 'Bee Ltd.' and 'Cee Ltd' according to MM Hypothesis

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

Total Value of Unlevered Firm (V_u) = [NOI/k_e] = 9,00,000/0.18 = ₹ 50,00,000

K_e of Unlevered Firm (given) = 0.18

K_o of Unlevered Firm (Same as above = k_e as there is no debt) = 0.18

Market Value of 'Bee Ltd' [Levered Firm (l)]

Total Value of Levered Firm (V_L) = V_u + (Debt× Nil)

= ₹ 50,00,000 + (27,00,000 × nil)

= ₹ 50,00,000

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

Particulars	Bee Ltd.
Net Operating Income (NOI)	9,00,000
Less: Interest on Debt (I)	3,24,000
Earnings of Equity Shareholders (NI)	5,76,000
Overall Capitalization Rate (k_o)	0.18
Total Value of Firm ($V = NOI/k_o$)	50,00,000
Less: Market Value of Debt	27,00,000
Market Value of Equity (S)	23,00,000
Equity Capitalization Rate [k_e = NI /S]	0.2504
Weighted Average Cost of Capital (k_o)* $k_o = (k_e \times S/V) + (k_d \times D/V)$	0.18

*Computation of WACC Bee Ltd

Component of Capital	Amount	Weight	Cost of Capital	WACC
Equity	23,00,000	0.46	0.2504	0.1152
Debt	27,00,000	0.54	0.12*	0.0648
Total	50,00,000			0.18

*K_d = 12% (since there is no tax)

WACC = 18%

(b) Assuming 40% taxes as per MM Approach

Calculation of Value of Firms 'Bee Ltd.' and 'Cee Ltd' according to MM Hypothesis

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

Total Value of unlevered Firm (V_u) = [NOI (1 - t)/ke] = 9,00,000 (1 – 0.40)] / 0.18

= ₹ 30,00,000

K_e of unlevered Firm (given) = 0.18

K_o of unlevered Firm (Same as above = k_e as there is no debt) = 0.18

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

Total Value of Levered Firm (V_L) = V_u + (Debt× Tax)

= ₹ 30,00,000 + (27,00,000 × 0.4)

= ₹ 40,80,000

Computation of Weighted Average Cost of Capital (WACC) of 'Cee Ltd.'

= 18% (i.e. $K_e = K_o$)

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

Particulars	Bee Ltd. (₹)
Net Operating Income (NOI)	9,00,000
Less: Interest on Debt (I)	3,24,000
Earnings Before Tax (EBT)	5,76,000
Less: Tax @ 40%	2,30,400
Earnings for equity shareholders (NI)	3,45,600
Total Value of Firm (V) as calculated above	40,80,000
Less: Market Value of Debt	27,00,000
Market Value of Equity (S)	13,80,000
Equity Capitalization Rate [k_e = NI/S]	0.2504
Weighted Average Cost of Capital (k_o)* $k_o = (k_e \times S/V) + (k_d \times D/V)$	13.23

*Computation of WACC Bee Ltd.

Component of Capital	Amount	Weight	Cost of Capital	WACC
Equity	13,80,000	0.338	0.2504	0.0846
Debt	27,00,000	0.662	0.072*	0.0477
Total	40,80,000			0.1323

*K_d= 12% (1- 0.4) = 12% × 0.6 = 7.2%

WACC = 13.23%

Q.10 ABC Limited provides you the following information:

	(₹)
Profit (EBIT)	2,80,000
Less: Intt. on Debt @10%	40,000
EBT	2,40,000
Less: Income Tax @ 50%	1,20,000
	1,20,000
No. of Equity Shares (₹ 10 each)	30,000
Earnings per share (EPS)	4
Price / EPS (P/E) Ratio	10
Ruling Market price per share	40

The company has undistributed reserves of ₹ 7,00,000 and needs ₹ 4,00,000 further for expansion. This investment is expected to earn the same rate as funds already invested. You are informed that a debt equity (debt/ debt +equity) ratio higher than 32% will push the P/E ratio down to 8 and raise the interest rate on additional borrowings (debentures) to 12%. You are required to ASCERTAIN the probable price of the share.

(i) If the additional funds are raised as debt; and

(ii) If the amount is raised by issuing equity shares at ruling market price of ₹ 40 per share.

Ans: Ascertainment of probable price of shares

Particulars	Plan (i) (If ₹ 4,00,000 is raised as debt) (₹)	Plan (ii) (If ₹ 4,00,000 is raised by issuing equity shares) (₹)
Earnings Before Interest (EBIT)	3,60,000	3,60,000
20% on (14,00,000 + 4,00,000)		
Less: Interest on old debentures @ 10% on 4,00,000	40,000	40,000
	3,20,000	3,20,000
Less: Interest on New debt @ 12% on ₹ 4,00,000	48,000	-
Earnings Before Tax (After interest)	2,72,000	3,20,000
Less: Tax @ 50%	1,36,000	1,60,000
Earnings for equity shareholders (EAIT)	1,36,000	1,60,000
Number of Equity Shares (in numbers)	30,000	40,000
Earnings per Share (EPS)	4.53	4.00
Price/ Earnings Ratio	8	10
Probable Price Per Share	36.24 (8 x 4.53)	40 (10 x 4)

Working Notes:

		(₹)
1.	Calculation of Present Rate of Earnings	
	Equity Share capital (30,000 x ₹ 10)	3,00,000
	10% Debentures $\left(40{,}000 \times \frac{100}{10}\right)$	4,00,000
	Reserves (given)	7,00,000
		14,00,000
	Earnings before interest and tax (EBIT) given	2,80,000
	Rate of Present Earnings = $\left(\frac{2{,}80{,}000}{14{,}00{,}000} \times 100\right)$	20%
2.	Number of Equity Shares to be issued in Plan $\left(\frac{4{,}00{,}000}{40}\right)$	10,000
	Thus, after the issue total number of shares	30,000 + 10,000 = 40,000
3.	Debt/Equity Ratio if ₹ 4,00,000 is raised as debt:	$\left(\frac{8{,}00{,}000}{18{,}00{,}000} \times 100\right)$ = 44.44%

As the debt equity ratio is more than 32% the P/E ratio shall be 8 in plan (i)

Q.11 Current Capital Structure of XYZ Ltd is as follows:

Equity Share Capital of 7 lakh shares of face value ₹ 20 each

Reserves of ₹ 10,00,000

9% bonds of ₹ 3,00,00,000

11% preference capital: 3,00,000 shares of face value ₹ 50 each

Additional Funds required for XYZ Ltd are ₹ 5,00,00,000.

XYZ Ltd is evaluating the following alternatives:

I. Proposed alternative I: Raise the funds via 25% equity capital and 75% debt at 10%. PE ratio in such scenario would be 12.

II. Proposed alternative II: Raise the funds via 50% equity capital and rest from 12% Preference capital .PE ratio in such scenario would be 11.

Any new equity capital would be issued at a face value of ₹ 20 each. Any new preferential capital would be issued at a face value of ₹ 20 each. Tax rate is 34%

DETERMINE the indifference point under both the alternatives.

Ans:

Current Capital Structure		
Equity Share Capital	₹ 20 x 7 lakhs	₹ 1,40,00,000
Reserves		₹ 10,00,000
9% Bonds		₹ 3,00,00,000
11% Preference Share Capital	₹ 50 x 3 lakhs	₹ 1,50,00,000
Total Capital Employed		**₹ 6,00,00,000**

Proposed Capital Structure

Capital	Working	Proposal I	Proposal II
Capital to be raised		**₹5,00,00,000**	**₹5,00,00,000**
Equity	50000000 x 25%	₹ 1,25,00,000	-
	50000000 x 50%	-	₹ 2,50,00,000
Debt @ 10%	50000000 x 75%	₹ 3,75,00,000	-
Preference Shares @ 12%	50000000 x 50%	-	₹ 2,50,00,000
Combined Capital		**Amount (proposal 1)**	**Amount (proposal 2)**
Equity		₹ 2,65,00,000	₹ 3,90,00,000
Reserves		₹ 10,00,000	₹ 10,00,000
9% Bond		₹ 3,00,00,000	₹ 3,00,00,000
10% Debt		₹ 3,75,00,000	-
11% Preference Shares		₹ 1,50,00,000	₹ 1,50,00,000
12% Preference Shares		-	₹ 2,50,00,000
		₹ 11,00,00,000	**₹ 11,00,00,000**

Interest for Proposal I = ₹ 3,00,00,000 x 9% + ₹ 3,75,00,000 x 10%

= ₹ 27,00,000 + ₹ 37,50,000

= ₹ 64,50,000

Preference Dividend for Proposal I = ₹ 1,50,00,000 x 11% = ₹ 16,50,000

Interest for Proposal II = ₹ 3,00,00,000 x 9% = ₹ 27,00,000

Preference Dividend for Proposal II = ₹ 1,50,00,000 x 11% + ₹ 2,50,00,000 x 12%

= ₹ 16,50,000 + ₹ 30,00,000 = ₹ 46,50,000

Let the indifference point be ₹ X

For Proposal I,

$$EPS = \frac{(X - ₹\ 64,50,000) \times 0.66 - ₹\ 16,50,000}{13,25,000} \quad (1)$$

For Proposal II,

$$EPS = \frac{(X - ₹\ 27,00,000) \times 0.66 - ₹\ 46,50,000}{19,50,000} \quad (2)$$

Equating (1) and (2),

$$EPS = \frac{(X - ₹\ 64,50,000) \times 0.66 - ₹\ 16,50,000}{13,25,000} = \frac{(X - ₹\ 27,00,000) \times 0.66 - ₹\ 46,50,000}{19,50,000}$$

$$\frac{0.66\,X\ ₹\ 42,57,000 - ₹\ 16,50,000}{1,325} = \frac{0.66X - ₹\ 17,82,000 - ₹\ 46,50,000}{1,950}$$

$$\frac{0.66X - ₹\ 59,07,000}{53} \ldots\ldots\ldots = \frac{0.66X - ₹\ 64,32,000}{78}$$

$51.48X – ₹\ 46,07,46,000 = 37.98X - ₹34,08,96,000$

$16.5X = ₹\ 11,98,50,000$

Indifference Point = X = ₹ 72,63,636.36

Q.12 Prakash Limited provides you the following information:

	(₹)
Profit (EBIT)	3,00,000
Less: Interest on Debenture @ 10%	(50,000)
EBT	2,50,000
Less Income Tax @ 50%	(1,25,000)
	1,25,000
No. of Equity Shares (₹ 10 each)	25,000
Earnings per share (EPS)	5
Price /EPS (PE) Ratio	10

The company has reserves and surplus of ₹ 7,50,000 and required ₹ 5,00,000 further for modernisation. Return on Capital Employed (ROCE) is constant. Debt (Debt/ Debt + Equity) Ratio higher than 40% will bring the P/E Ratio down to 8 and increase the interest rate on additional debts to 12%. You are required to ASCERTAIN the probable price of the share.

(i) If the additional capital is raised as debt; and

(ii) If the amount is raised by issuing equity shares at ruling market price

Ans:

Ascertainment of probable price of shares of Prakash limited

Particulars	Plan-I If ₹ 5,00,000 is raised as debt (₹)	Plan-II If ₹ 5,00,000 is raised by issuing equity shares (₹)
Earnings Before Interest and Tax (EBIT) {20% of new capital i.e., 20% of (₹15,00,000 + ₹ 5,00,000)} (Refer working note1)	4,00,000	4,00,000
Less: Interest on old debentures (10% of ₹5,00,000)	(50,000)	(50,000)
Less: Interest on new debt (12% of ₹5,00,000)	(60,000)	--
Earnings Before Tax (EBT)	2,90,000	3,50,000
Less: Tax @ 50%	(1,45,000)	(1,75,000)
Earnings for equity shareholders (EAT)	1,45,000	1,75,000
No. of Equity Shares (refer working note 2)	25,000	35,000
Earnings per Share (EPS)	₹ 5.80	₹ 5.00
Price/ Earnings (P/E) Ratio (refer working note 3)	8	10
Probable Price Per Share (PE Ratio × EPS)	₹ 46.40	₹ 50

Working Notes:

1. Calculation of existing Return of Capital Employed (ROCE):

	(₹)
Equity Share capital (25,000 shares × ₹10)	2,50,000
10% Debentures $\left(₹\,50,000 \times \frac{100}{10}\right)$	5,00,000
Reserves and Surplus	7,50,000
Total Capital Employed	15,00,000
Earnings before interest and tax (EBIT) (given)	3,00,000
ROCE = $\frac{₹\,3,00,000}{₹\,15,00,000} \times 100$	20%

2. Number of Equity Shares to be issued in Plan-II:

$= \frac{₹\,5,00,000}{₹\,50} = 10,000$ Shares

Thus, after the issue total number of shares = 25,000+ 10,000 = 35,000 shares

3. Debt/Equity Ratio if ₹ 5,00,000 is raised as debt:

$= \frac{₹10,00,000}{₹20,00,000} \times 100 = 50\%$

As the debt equity ratio is more than 40% the P/E ratio will be brought down to 8 in Plan-I

Q.13 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.

Ans:

Computation of Market Value of Equity of Company ABC

Total market value of Company ABC

$V_{ABC} = V_{XYZ} + Bt$.....(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

V_{ABC} = ₹ 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

$WACC_{ABC} = WACC_{XYZ}[1- Bt/V_{ABC}]$

$$= 20\% \left[1 - \frac{4,00,00,000}{11,00,00,000} \times 0.25\right]$$

$$= 18.18\%$$

Where,

$WACC_{ABC}$ is the weighted average cost of capital of the levered company ABC

$WACC_{XYZ}$ is the weighted average cost of capital of the unlevered company XYZ.

Cost of Equity of company ABC

$R_{Eabc} = R_{Exyz} + [(1 - t)B/E(R_{Exyz} - R_B)]$

20%+[(1-.25)4,00,00,000/7,00,00,000(.20-.10)]

24.28% approx.

Where,

R_{EABC} is the cost of equity in the levered Company ABC.

R_{Exyz} is the cost of equity in the unlevered Company XYZ.

E is the market value of equity.

B is the market value of debt.

R_B is the cost of debt

Q.14 The following data relate to two companies belonging to the same risk class:

Particulars	A Ltd.	B Ltd.
Expected Net Operating Income	₹ 18,00,000	₹ 18,00,000
12% Debt	₹ 54,00,000	-
Equity Capitalization Rate	-	18

Required:

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

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

Ans: **(a)** **Assuming no tax as per MM Approach.**

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

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

Total Value of Unlevered Firm (V_u) = [NOI/k_e] = 18,00,000/.18 = ₹ 1,00,00,000

K_e of Unlevered Firm (given) = 0.18

K_o of Unlevered Firm (Same as above = k_e as there is no debt) = 0.18

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

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

= ₹ 1,00,00,000

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

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

Assuming 40% taxes as per MM Approach

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

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

Total Value of unlevered Firm (V_u) = [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 (V_L) = V_u + (Debt× Tax)
= ₹ 60,00,000 + (54,00,000 × 0.40)
= ₹ 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]	.2504
Weighted Average Cost of Capital (k_o)*	13.23

*Computation of WACC A Ltd

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

*K_d= 12% (1- 0.4) = 12% × 0.6 = 7.2%

WACC = 13.23%

Q.15 Ritu Limited in the expansion stage and it provides you the following information:

	(₹)
Profit (EBIT)	5,00,000
Less: Interest on Debenture @ 10%	(1,00,000)
EBT	4,00,000
Less Income Tax @ 30%	(1,20,000)
	2,80,000
No. of Equity Shares (₹ 10 each)	50,000
Earnings per share (EPS)	5.6
Price /EPS (PE) Ratio	10

The company has reserves and surplus of ₹ 10,00,000 and required ₹ 5,00,000 further for modernisation. Return on Capital Employed (ROCE) is constant. Debt (Debt/ Equity) Ratio lesser than 2 will raise the P/E Ratio to 12. Interest rate on additional debts is 12%. You are required to ASCERTAIN the probable price of the share.

(i) If the additional capital are raised as debt; and

(ii) If the amount is raised by issuing equity shares at ruling market price.

Ans:

6. Ascertainment of probable price of shares of Akash limited

Particulars	Plan-I	Plan-II
	If ₹ 5,00,000 is raised as debt (₹)	**If ₹ 5,00,000 is raised by issuing equity shares (₹)**
Earnings Before Interest and Tax (EBIT) {20% of new capital i.e. 20% of (₹ 25,00,000 + ₹ 5,00,000)} (Refer working note1)	6,00,000	6,00,000
Less: Interest on old debentures (10% of ₹ 10,00,000)	(1,00,000)	(1,00,000)
Less: Interest on new debt (12% of ₹ 5,00,000)	(60,000)	--
Earnings Before Tax (EBT)	4,40,000	5,00,000
Less: Tax @ 30%	(1,32,000)	(1,50,000)
Earnings for equity shareholders (EAT)	3,08,000	3,50,000
No. of Equity Shares (refer working note 2)	50,000	58,929

Earnings per Share (EPS)	₹ 6.16	₹ 5.94
Price/ Earnings (P/E) Ratio (refer working note 3)	12	10
Probable Price Per Share (PE Ratio × EPS)	₹ 73.92	₹ 59.40

Working Notes:

1. Calculation of existing Return of Capital Employed (ROCE):

	(₹)
Equity Share capital (50,000 shares × ₹ 10)	5,00,000
10% Debentures $\left(₹1,00,000 \times \frac{100}{10}\right)$	10,00,000
Reserves and Surplus	10,00,000
Total Capital Employed	25,00,000
Earnings before interest and tax (EBIT) (given)	5,00,000
ROCE = $\frac{₹5,000,000}{₹25,00,000} \times 100$	20%

2. Number of Equity Shares to be issued in Plan-II:

$= \frac{₹5,00,000}{₹56} = 8,929 \text{shares}$

Thus, after the issue totalnumber of shares = 50,000+ 8,929 = 58,929 shares

3. Debt/Equity Ratio if ₹ 5,00,000 is raised as debt:

$= \frac{₹15,00,000}{₹15,00,000} = 1$

As the debt equity ratio is less than 2 the P/E ratio will be increase to 12 in Plan-I

Q.17 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

Ans:

(A) Calculation of NPV

WN 1 : Calculation of Present Value of Cash Outflow (PV CO)

(i) Initial Investment = ₹ 850 lakhs

(ii) Working capital outlay = ₹ 150 lakhs

Therefore, total PV CO = ₹ 1000 lakhs

WN 2 : Calculation of Present Value of Cash Inflows (PV CI)

Cash flows before tax are given i.e. nothing but NPBDT

Amount (₹ in lakhs)

Year	1	2	3	4	5
NPBDT	290.00	320.00	360.00	390.00	270.00
(-) Dep	170.00	136.00	108.80	87.04	69.63
NPBT	120.00	184.00	251.20	302.96	200.37
(-) Tax	24.00	36.80	50.24	60.59	40.07
NPAT	96.00	147.20	200.96	242.37	160.29
(+) Dep	170.00	136.00	108.80	87.04	69.63
CFAT	266.00	283.20	309.76	329.41	229.93
(+) Working Capital Release					150.00
(+) Scrap					140.00
PV Factor @ 14%	0.88	0.77	0.67	0.59	0.52
PV CI	**234.08**	**218.06**	**207.54**	**194.35**	**270.36**

(i) Total PV CI = ₹ 1124.40 Lakhs

WN 3 : Calculation of Present Value of tax savings on short term Capital loss

	₹ in Lakhs
WDV at end of 5th year	278.53
(-) Sale value	140.00
Loss on sale	138.53
Tax savings on above @ 15%	20.78

PV of tax savings on short term capital loss (STCL) = Tax saving x PV factor (14%, 5th year)

= 20.78 x 0.52

= ₹ 10.81 lakhs

NPV = PV CI + PV of tax savings on STCL - PV CO

= 1124.40 + 10.81 - 1000

NPV = ₹ 135.20 lakhs

Advise: Since the NPV of the project is positive, project should be accepted

(B) Calculation of IRR

IRR is that discounting rate where NPV = 0 (point where PV of all CI = PV Co)

We know that @ 14%, NPV ₹ is 135.20, so by trial-and-error method we need to calculate that rate where NPV equals 0.

When Discounting rate is 16%

	1	2	3	4	5
CFAT	266.00	283.20	309.76	329.41	229.93
(+) Working Capital Release					150.00
(+) Scrap					140.00
PV Factor @ 14%	0.86	0.74	0.64	0.55	0.48
PV CI	**228.76**	**209.57**	**198.25**	**181.17**	**249.56**

PV CI = 1067.31

(+) PV of tax savings on STCL = 9.97 {20.78 x 0.48}

(-) PV CO = (1000)

NPV = ₹ 77.29

Since NPV is positive at 16% as well, we need to go for Trial II at 20%

When Discounting rate is 20%

	1	2	3	4	5
CFAT	266.00	283.20	309.76	329.41	229.93
(+) Working Capital Release					150.00
(+) Scrap					140.00
PV Factor @ 14%	0.83	0.69	0.58	0.48	0.4
PV CI	220.78	195.41	179.66	158.12	207.97

PV CI = 961.94

(+) PV of tax savings on STCL = 8.31 {20.78 x 0.40}

(-) PV CO = (1000)

NPV = ₹ (29.75)

Since NPV is negative at 20%, IRR lies somewhere between 16% and 20%

IRR = $LR + \frac{\text{NPV at LR}}{\text{NPV at LR - NPV at HR}} \times (HR - LR)$

LR = Lower Rate (16% here) HR = Higher Rate (20% here)

IRR = $16 + \frac{77.29}{77.29 - (-29.75)} \times (20 - 16)$

IRR = 18.89%

(C) Calculation of Desirability Factory (Profitability Index)

PI = TOTAL PV CI / PV CO

PI = 1135.21 / 1000

PI = 1.13521