5. CAPITAL STRUCTURE

NO. OF PROBLEMS IN 40E OF CA INTER: CLASSROOM - 20, ASSIGNMENT - 25

NO. OF PROBLEMS IN 41E OF CA INTER: CLASSROOM - 19, ASSIGNMENT - 25

SIGNIFICANCE OF EACH PROBLEM COVERED IN THIS CHAPTER

Problem No. in this material	Problem No. in NEW SM	Problem No. in OLD SM	Problem No. in OLD PM	RTP	MTP	Previous Exams	Remarks
CR 1	ILL-8	ILL-19	-	-	-	-	
CR 2	ILL-9	ILL-20	-	-	N18 (N)	N18 (N) - 5M	
CR 3	-	-	-	-	-	-	
CR 4	-	-	-	-	-	-	
CR 5	-	-	-	-	-	-	
CR 6	-	-	4	-	-	-	
CR 7	-	-	-	-	M18 (N) - 10M	-	
CR 8	PQ-3	ILL-23	-	-	-	-	
CR 9	-	-	-	-	-	-	
CR 10	-	-	-	-	-	-	
CR 11	-	-	-	M18	-	-	
CR 12	-	-	-	-	M18 (O) - 5M	-	
CR 13	-	-	-	-	-	-	
CR 14	-	-	-	-	-	-	
CR 15	ILL-4	ILL-28	-	-	-	-	
CR 16	-	-	3	-	-	-	
CR 17	-	-	6	-	-	-	
CR 18	-	-	-	-	-	-	
CR 19	-	-	-	-	-	-	
ASG 1	-	-	-	-	-	-	
ASG 2	-	-	-	-	-	-	
ASG 3	-	-	-	-	-	-	
ASG-4	-	-	-	-	-	-	
ASG 5	-	-	-	M17	-	-	
ASG 6	-	-	-	-	-	-	
ASG 7	-	-	10	-	-	-	
ASG 8	-	-	-	-	-	-	TN
ASG 9	ILL 1	ILL 25	-	-	-	-	
ASG 10	ILL 3	ILL 27	-	-	-	-	
ASG 11	-	-	-	-	-	-	RK
ASG 12	-	-	-	-	-	-	
ASG 13	-	-	-	-	-	-	
ASG 14	-	-	-	-	-	-	M.Y.K & P.K.J
ASG 15	-	-	-	-	-	-	
ASG 16	-	-	9	-	M18 (N) - 5M	-	
ASG 17	-	-	-	-	-	M18 (N) - 10M	
ASG 18	ILL 5	ILL 29	-	-	-	-	
ASG 19	-	-	-	-	-	-	

MEANING OF CAPITAL STRUCTURE:

➢ Capital Structure refers to <u>mix of sources</u>, from <u>where long term funds</u> required for a business have <u>to be raised</u>. In other words, the proportion of Debt, Preference capital and Equity capital to be employed for an Investment.

➢ Capital structure decision <u>is deciding about weightage of debt and equity</u> and ultimately <u>overall cost of capital</u> as well as <u>Value of a firm.</u> So, capital structure is relevant in maximizing value of the firm and minimizing overall cost of capital.

➢ Capital Structure decision refers to deciding <u>the forms of financing</u> (which sources to be tapped); their <u>actual requirements</u> (amount to be funded) and their <u>relative proportions</u> (mix) <u>in total capitalisation.</u>

➢ Whenever funds are to be raised to finance investments, capital structure decision is involved. A demand for raising funds generates a new capital structure since a decision has to be made as to the quantity and forms of financing.

PROBLEMS FOR CLASSROOM DISCUSSION

MODEL 1: EBIT-EPS ANALYSIS

➢ The basic objective of financial management is to design an appropriate capital structure which can provide the highest Earnings Per Share (EPS) over the company's expected range of Earnings Before Interest and Taxes (EBIT).

➢ Therefore, in search for an appropriate capital structure for a firm, the financial manager requires to analyze the effects of various alternative capital structures on the EPS.

➢ Eventually, he has to choose best capital structure at which EPS is maximum.

PROBLEM NO 1: (PRINTED SOLUTION AVAILABLE) Best of Luck Ltd., a profit making company, has a paid-up capital of Rs. 100 lakhs consisting of 10 lakhs ordinary shares of Rs.10 each. Currently, it is earning an annual pre-tax profit of Rs.60 lakhs. The company's shares are listed and are quoted in the range of Rs.50 to Rs.80. The management wants to diversify production and has approved a project which will cost Rs.50 lakhs and which is expected to yield a pre-tax income of Rs.40 lakhs per annum. To raise this additional capital, the following options are under consideration of the management.

a) To issue equity capital for the entire additional amount. It is expected that the new shares (face value of Rs.10) can be sold at a premium of Rs.15.

b) To issue 16% non-convertible debentures of Rs.100 each for the entire amount.

c) To issue equity capital for Rs.25 lakhs (face value of Rs.10) and 16% non-convertible debentures for the balance amount. In this case, the company can issue shares at a premium of Rs.40 each.

You are required to advise the management as to how the additional capital can be raised, 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%.   *(A) (NEW SM, OLD SM)*

(ANS.: EXISTING EPS IS RS.3 & EPS FOR OPTION - a) IS RS.4.16, OPTION - b) IS RS.4.6, OPTION - c) IS RS.4.57 & OPTION - b. I.E.,
ISSUE OF 16% DEBENTURES IS MOST SUITABLE TO MAXIMIZE THE EARNINGS PER SHARE)

(SOLVE PROBLEM NO. 1, 2 OF ASSIGNMENT PROBLEMS AS REWORK)

Note: _____

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PROBLEM NO 2: The Modern Chemicals Ltd. requires Rs.25,00,000 for a new plant. This plant is expected to field earnings before interest and taxes of Rs.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 Rs.2,50,000 or Rs.10,00,000 or Rs. 15,00,000 and the balance, in each case, by issuing equity shares. The company's share is currently selling at Rs.150, but is expected to decline to Rs.125 in case the funds are borrowed in excess of Rs.10,00,000. The funds can be borrowed at the rate of 10% up to Rs.2,50,000, at 15% over Rs.2,50,000 and up to Rs.10,00,000 and at 20% over Rs.10,00,000. The tax rate applicable to the company is 50%. Which form of financing should the company choose?   *(A) (NEW SM, OLD SM, SIMILAR: MTP N18, N18(N) - 5M)*

(ANS.: EPS FOR OPTION I IS RS. 15.83, OPTION II IS RS. 18.125, OPTION III IS RS.16.41)

(SOLVE PROBLEM NO. 3 OF ASSIGNMENT PROBLEMS AS REWORK)

PROBLEM NO 3: (PRINTED SOLUTION AVAILABLE) AB Limited provides you with the following information:

Particulars	Rs.
Profit	3,00,000
Less: Interest on debentures (0.12)	60,000

Earnings before taxes	2,40,000
Less: Taxes (0.35)	84,000
Earnings after taxes	1,56,000
Number of equity shares (Rs 10 each)	40,000
Earnings per share	3.9
Ruling market price	39
P/E ratio (Price / EPS) (times)	10

The company has undistributed reserves, Rs.6,00,000. It needs Rs.2,00,000 for expansion which will earn the same rate as funds already employed.

You are informed that a debt-equity ratio (debt / debt + equity) higher than 35 per cent will push the P/E ratio down to 8 and raise the interest rate on additional amount borrowed to 14%.

You are required to ascertain the probable price of the equity share:

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

ii) If the amount is raised by rising equity shares (at current market price).

(B) (ANS.: MARKET PRICE FOR OPTION-I IS RS. 32.76, OPTION-II IS RS.40.33, & SINCE MARKET PRICE IS HIGH IN OPTION II, IT IS BENEFICIAL TO RAISE THE FUNDS BY WAY OF FRESH EQUITY SHARES)

(SOLVE PROBLEM NO. 4 OF ASSIGNMENT PROBLEMS AS REWORK)

Note: _____

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<u>PROBLEM NO 4</u>: **(PRINTED SOLUTION AVAILABLE)** The existing capital structure of XYZ Ltd. is as under:

Particulars	Rs.
Equity shares of Rs. 100 each	40,00,000
Retained earnings	10,00,000
9% preference share of Rs. 100 each	25,00,000
7% debentures of Rs. 100 each	25,00,000

The existing rate of return on the company's capital is 12% and the income-tax rate is 50%. The company requires a sum of Rs. 25,00,000 to finance its expansion program for which it is considering the following alternatives: Issue of 20,000 equity shares at a premium of Rs. 25 per share Or Issue of 10% preference shares or Issue of 8% debentures. It is estimated that the PE ratio in the cases of Equity, Preference and Debenture financing would be 20, 17 and 16 respectively. Which of the above alternatives would you recommend? *(A)*

(ANS.: MARKET PRICE (EPS X PE RATIO) FOR OPTION-I IS RS.146, OPTION-II IS RS.80, OPTION-III IS RS.135 & SINCE MARKET PRICE IS HIGH IN OPTION I, IT IS BENEFICIAL TO RAISE THE FUNDS OF RS. 25,00,000 BY WAY OF FRESH EQUITY SHARES)

(SOLVE PROBLEM NO. 5 OF ASSIGNMENT PROBLEMS AS REWORK)

Note: _____

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MODEL 2: INDIFFERENCE POINT AND FINANCIAL BEP

EBIT - EPS Indifference Point:

➤ Alternative modes of financing have different impact on EPS. A <u>Firm is said to be indifferent between two modes of financing, if the EPS under both the options is the same</u>. This level of EBIT that results in equal EPS for two different financing options, is called <u>EPS Equivalency Point or Indifference Point.</u>

➤ Indifference Point is computed by solving the following equation for EBIT.

<u>Alternative 1, say, with Debt</u>   <u>EPS of 2 options</u>   <u>Alternative 2, say, No Debt</u>

$$\frac{(EBIT - Interest) \times (100 - Tax\,Rate)}{Number\,of\,Equity\,Shares} = Equal\,EPS\,under\,both\,options = \frac{(EBIT - Interest) \times (100 - Tax\,Rate)}{Number\,of\,Equity\,Shares}$$

➤ When both the alternatives <u>have the same EPS at a certain level of EBIT</u>, (to be computed by solving the equation), the <u>Company is said to be indifferent between the two alternatives</u>.

INTERPRETATION BASED ON EBIT-EPS INDIFFERENCE POINT

COMPANY'S EBIT LEVEL	PREFERABLE METHOD OF FINANCING	REASON
EBIT <u>below</u> the Indifference Point.	Option with <u>lower Debt</u> and lower Interest burden.	When ROCE and EBIT are low, a high DOL should be properly managed with low DFL, lower borrowings and interest burden.
EBIT <u>equal</u> to the Indifference Point.	<u>Any method</u> of financing can be chosen.	Same EPS under both alternatives.
EBIT <u>above</u> the Indifference Point	Option with <u>higher Debt</u> and higher Interest burden.	When ROCE and EBIT are high, use of Debt funds is justified and maximizes gain to Equity Shareholders by way of higher ROE and EPS (called Leverage Effect).

FINANCIAL BREAK EVEN POINT

➤ **MEANING:** It denotes the <u>level of earnings</u>, at which a Firm's EBIT is <u>just</u> <u>sufficient to cover</u> <u>Interest, Tax and Preference Dividend.</u> In other words, there is <u>no Residual Earnings</u> available <u>to</u> <u>Equity Shareholders</u>. In simple words, it is the EBIT at which EPS is zero.

➤ **FORMULA:** Financial Break Even Point is given by the formula:

$$EBIT = Interest\,Charges + \frac{Preference\,dividend}{(100\% - Tax\,Rate)}$$

➤ **SIGNIFICANCE:**

a) A Firm which is able to <u>generate EBIT above the Financial BEP</u> will be <u>able to meet</u> the <u>expectations of the Equity Shareholders</u> and <u>maximize the value / wealth</u>.

b) Financial BEP represents the <u>minimum amount that the Firm has to earn, in order to generate</u> <u>any surplus for Equity Shareholders</u>. Hence, the objective of the Firm must be to generate EBIT above the Financial BEP.

PROBLEM NO 5: (PRINTED SOLUTION AVAILABLE) ABC Ltd. is considering a capital structure of Rs.10,00,000 for which various mutually exclusive set of options are available. Calculate the indifference level of EBIT between the following alternative sets:

a) Equity share capital of Rs.10, 00,000 or 15% Debentures of Rs.5, 00,000 plus equity share capital of Rs. 5,00,000.

b) Equity share capital of Rs.10, 00,000, or 13% Pref. shares capital of Rs.5, 00,000 plus Equity share capital of Rs.5,00,000.

c) Equity share capital of Rs.8,00,000 plus 13% Pref. shares capital of Rs.2,00,000, or Equity share capital of Rs.4,00,000 plus 13% Pref. share capital of Rs. 2,00,000 plus 15% debentures of Rs.4,00,000.

The issue price of equity shares may be taken at par i.e., Rs. 100 each and the tax rate may be assumed at 50%. Find out indifference point of EBIT for different sets.

(A) (ANS.: A. RS.1,50,000, B. RS. 2 60,000, C. RS. 1,72,000) (SOLVE PROBLEM NO. 6 OF ASSIGNMENT PROBLEMS AS REWORK)

Note: _____

PROBLEM NO 6: X Ltd is considering the following two alternatives

Particulars	Plan I	Plan II
	Amount (Rs.)	Amount (Rs)

Equity Shares of Rs.10 /- each	4,00,000	4,00,000
12 % Debentures	2,00,000	-
Preference Shares of Rs.100/- each	-	2,00,000
	6,00,000	6,00,000

The indifference point between the plans is Rs.2, 40,000. Corporate Tax rate is 30% .Calculate the rate of Dividend of Preference Shares. *(B) (OLD PM) (ANS: 8.40%)*

(SOLVE PROBLEM NO. 7 OF ASSIGNMENT PROBLEMS AS REWORK)

Note: _____

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PROBLEM NO 7: (PRINTED SOLUTION AVAILABLE) Excel Limited is considering three financing plans. The key information is as follows:

a) Total investment to be raised: Rs.4,00,000.

b) Financing plans

Plans	Equity (%)	Debt (%)	Preference (%)
A	100	—	—
B	50	50	—
C	50	—	50

c) Cost of debt 8 per cent; cost of preference shares 8 per cent.

d) Tax rate is 50 per cent.

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

f) Expected EBIT Rs.1,60,000.

Determine for each plan:

i) Earnings per share (EPS) and financial break-even point.

ii) COMPUTE the EBIT range among the plans A and C for point of indifference. *(A) (MTP1 M18 (N) - 10M)*

(ANS.: I. EPS FOR PLAN A IS RS. 4, PLAN B IS RS. 6, PLAN C IS RS. 6.4 & FINANCIAL BREAK EVEN POINT FOR PLAN A IS RS. 0, PLAN B IS RS. 16,000, PLAN C IS RS. 16,000, II. POINT OF INDIFFERENCE BETWEEN A & C IS RS. 64,000)

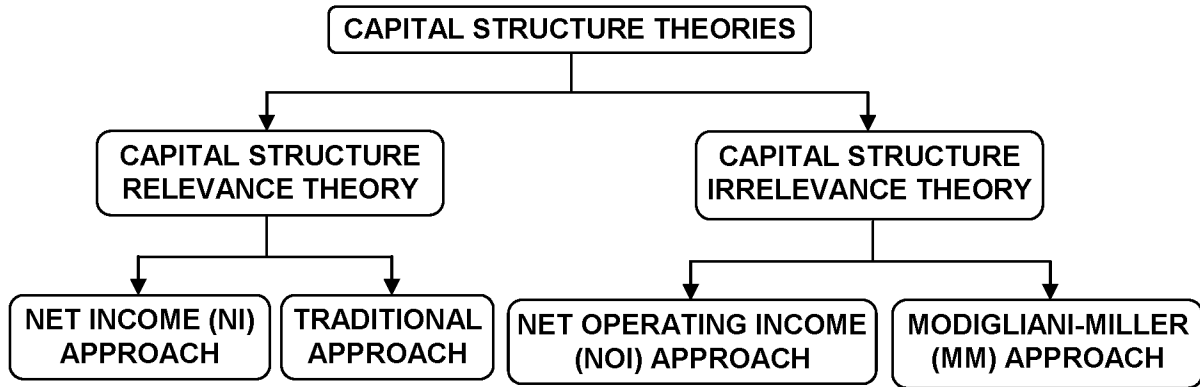*(SOLVE PROBLEM NO. 8 OF ASSIGNMENT PROBLEMS AS REWORK)*

Note: _____

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PROBLEM NO 8: (PRINTED SOLUTION AVAILABLE) Yoyo Limited presently has Rs. 36,00,000 in debt outstanding bearing an interest rate of 10 per cent. It wishes to finance a Rs. 40, 00,000 expansion programme and is considering three alternatives: additional debt at 12 per cent interest, preference shares with an 11 per cent dividend, and the issue of equity shares at Rs16 per share. The company presently has 8, 00,000 shares outstanding and is in a 40 per cent tax bracket.

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

b) Develop an indifference chart for these alternatives. What are the approximate indifference points? To check one of these points, what is the indifference point mathematically between debt and common?

c) Which alternative do you prefer? How much would EBIT need to increase before the next alternative would be best? *(A) (NEW SM, OLD SM) (ANS: (A) ALTERNATIVE III (B) RS. 2,376 (C) INCREASE BY RS. 876)*

(SOLVE PROBLEM NO. 9 OF ASSIGNMENT PROBLEMS AS REWORK)

MODEL 3: CAPITAL STRUCTURE THEORIES

The following approaches explain the relationship between cost of capital, capital structure and value of the firm:

CAPITAL STRUCTURE THEORIES

CAPITAL STRUCTURE
RELEVANCE THEORY

CAPITAL STRUCTURE
IRRELEVANCE THEORY

NET INCOME (NI)
APPROACH

TRADITIONAL
APPROACH

NET OPERATING INCOME
(NOI) APPROACH

MODIGLIANI-MILLER
(MM) APPROACH

However, the following assumptions are made to understand this relationship.

➢ There are only two kinds of funds used by a firm i.e. debt and equity.

➢ The total assets of the firm are given. The degree of Leverage can be changed by selling debt to purchase shares or selling shares to retire debt.

➢ Taxes are not considered.

➢ The payout ratio is 100%.

➢ The firm's total financing remains constant.

➢ Business risk is constant over time.

➢ The firm has perpetual life.

MODEL 3.1: NET INCOME APPROACH (NI-APPROACH)

NET INCOME APPROACH IS BASED ON THE FOLLOWING THREE ASSUMPTIONS:

a) There are no corporate taxes.

b) The cost of debt is less than cost of equity or equity capitalisation rate.

c) The use of debt content does not change the risk perception of Equity investors as a result both the k_d (debt capitalisation rate) and k_e (equity - capitalisation rate) remains constant.

IMPLICATION OR CONCLUSION:

➢ The Firm can increase its value and lower its Ko (WACC) by increasing the proportion of debt in the capital structure.

➢ Thus, Net Income Approach suggests the use of maximum possible debt financing, for minimizing the cost of capital.

➢ Value of the Firm will be maximum at a point where WACC is minimum, i.e. point of maximum debt.
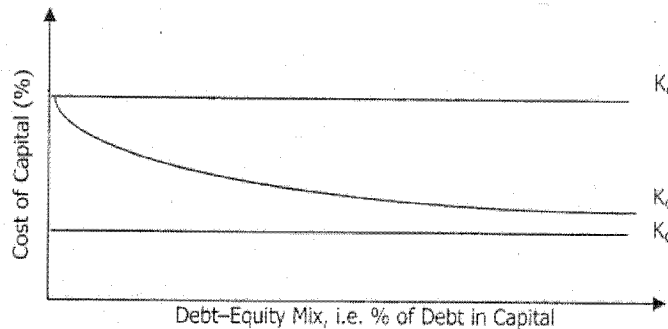
STEPS: The application of Net Income Approach for determining WACC involves the following Steps:

STEPS	PROCEDURE
1	Determine EBIT (Net Operating Income) and EBT (Net Income). EBT = EBIT **less** Interest

	on Debt Funds.
2	Compute Market Value of Equity (E) = EBT / Cost of Equity = EBT / K_e
3	Compute Market Value of Debt (D) = Interest / Cost of Debt = Interest / K_d
4	Compute Market Value of Firm (V) = E + D = Market Value of Equity + Market Value of Debt.
5	Compute Overall Cost of Capital (K_o) = EBIT / Value of Firm

PROBLEM NO 9: A company's expected net operating income (EBIT) is Rs.50,000. The company has Rs.2,00,000, 10% debentures. The equity capitalisation rate (Ke) of the company is 12.5 %. Find out value of firm and overall cost of capital. Also find out effect on value of firm and overall cost of capital under the following alternatives.

a) The firm has decided to raise the amount of debenture by Rs.1,00,000 and use the proceeds to retire the equity shares - State the implications?

b) The amount of debt has been reduced by Rs. 1,00,000 and a fresh issue of equity shares is made to retire the Debentures State the implications?

(A) (ANS.: A. AS THE PROPORTION OF DEBT INCREASE HAS DECREASED FROM 11.36% TO 10.87% & AS A RESULT OF M.V OF THE FIRM HAS INCREASED FROM RS.4,40,000 TO RS.4,60,000, B. AS THE PROPORTION OF DEBT DECREASE HAS INCREASED FROM 11.36% TO 11.90% & AS A RESULT OF M.V OF THE FIRM HAS INCREASED FROM RS.4,40,000 TO RS.4,20,000)

*(SOLVE PROBLEM NO. 10, 11 OF ASSIGNMENT PROBLEMS AS REWORK)*

Note: _____

MODEL 3.2: NET OPERATING INCOME (NOI) APPROACH

THE NET OPERATING INCOME APPROACH IS BASED ON THE FOLLOWING ASSUMPTIONS:

a) The <u>overall cost of capital remains constant</u> for all degree of debt equity mix.

b) The <u>market capitalizes the value of firm as a whole</u>. Thus the split between debt and equity is not important.

c) <u>The cost of debt is constant</u>.

IMPLICATION OR CONCLUSION:

➤ According to this approach, the <u>use of less costly debt</u> funds <u>increases</u> the <u>risk of shareholders</u>. This <u>causes</u> the <u>equity capitalisation rate to increase</u>.

➤ Thus, the advantage of debt is set off exactly by increase in equity capitalisation rate.

➤ Due to set-off of low K_d advantage vs. increasing K_e disadvantage, the Overall Cost of Capital (K_o) remains constant for all degrees of Debt-Equity mix.

➤ Since WACC is constant at all levels, every debt-equity mix is as good as any other mix. There is no optimum capital structure. Every capital structure is optimal one.
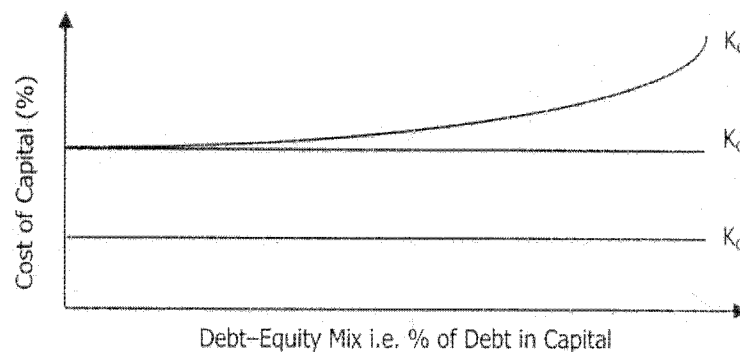
STEPS	PROCEDURE
1	Determine EBIT (Net Operating Income) and EBT (Net Income).

	EBT = EBIT **less** Interest on Debt Funds.
2	Compute Market Value of Firm (V) = EBIT / WACC = EBIT / K_o
3	Compute Market Value of Debt: (D) = Interest / Cost of Debt = Interest / K_d
4	Compute Market Value of Equity (E) = V - D = Market Value of Firm (**Less**) Market Value of Debt.
5	Compute Cost of Equity Capital (K_e) = EBT / Value of Equity = EBT / E

Note: Under Net Income Theory, the approach is V = F + D, in order to compute K_o However, under Net Operating Income Theory, the approach is E = V - D, in order to compute K_e

PROBLEM NO 10: (PRINTED SOLUTION AVAILABLE) Operating income of Rs.50,000, Cost of debt 10% and outstanding debt Rs.2,00,000. If the overall capitalisation rate (overall cost of capital) is 12.5%. Find out value of firm and overall cost of capital. Also find out effect on value of firm and overall cost of capital under the following alternatives

a) The firm increases the amount of debt from Rs.2,00,000 to Rs.3,00,000 and uses the proceeds of the debt to repurchase equity shares - State the implications?

b) The firm retires debt by Rs.1,00,000 by issuing fresh equity shares of the same amount - State the implications.

(A) (ANS.: A. RS. 4,00,000 & 15%, B. COST OF EQUITY SHARE CAPITAL HAS INCREASED FROM 15% TO 20% & M.V OF EQUITY HAS DECREASED FROM 2,00,000 TO 1,00,000.) (SOLVE PROBLEM NO. 12, 13 OF ASSIGNMENT PROBLEMS AS REWORK)

Note: _____

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PROBLEM NO 11: Company P and Q are identical in all respects including risk factors except for debt/equity, company P having issued 10% debentures of Rs. 18 lakhs while company Q is unlevered. Both the companies earn 20% before interest and taxes on their total assets of Rs. 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.   *(A) (RTP M18 (N&O))*

(ANS.: (i) TOTAL VALUE OF COMPANY P: 32,00,000 Q: 20,00,000, (ii) TOTAL VALUE OF COMPANY P: 29,00,000 Q: 20,00,000)

(SOLVE PROBLEM NO. 14 OF ASSIGNMENT PROBLEMS AS REWORK)

Note: _____

MODEL 3.3: TRADITIONAL APPROACH

DIFFERENT PHASES OF TRADITIONAL THEORY

PHASE	I	II	III
K_d	Constant	Constant	Increases gradually.
K_e	Constant	Increases	Increases faster than K_d
K_o	Declines	Declines and may remain constant	Increases
Reason for K_o movement	Low Cost K_d pulls down K_o	Advantage of Low Cost K_d is set-off by increase in K_e	K_d and K_e both increase, causing K_o to increase.

IMPLICATION OR CONCLUSION:

➢ Debt is a cheaper source of finance than equity due to tax saving effect and investor's risk expectations. Use of cheaper debt funds in total capital structure will reduce K_o initially. This is because benefit of cheaper debt is larger than increase in cost of Equity.   (STAGE - 1)

➢ If more debt is employed, the risk perceptions of Equity Investors and K_e may increase. However, K_d may still remain constant; causing WACC to remain constant due to set-off effect, i.e. advantage of low-cost debt is set-off exactly by the disadvantage of increasing cost of equity.   **(STAGE - 2)**

➢ As debt content further increases, the Firm's financial risk increases, causing increase in the expectations of Equity Investors and therefore a rise in the Cost of Equity Capital (K_e). Moreover additional loans can be taken only at a higher rate of interest. So Cost of Debt K_d also rises beyond a certain level of debt content.   **(STAGE - 3)**

➢ The Firm should strive to reach the optimal capital structure and maximize its total value through a judicious use of both debt and equity in the capital structure. At the optimal capital structure, the overall cost of capital will be minimum and the value of the Firm is maximum.
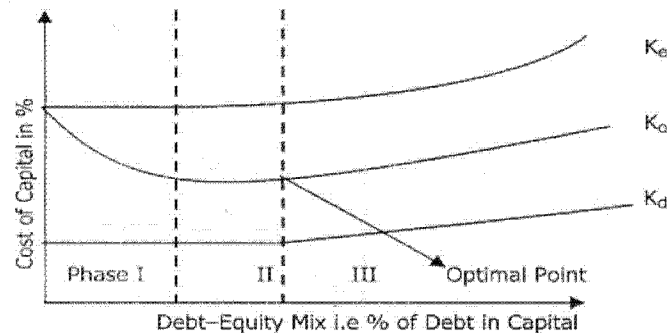
PROBLEM NO 12: M/s. Navya Corporation has a capital structure of 40% debt and 60% equity. The company is presently considering several alternative investment proposals costing less than Rs.20 lakhs. The corporation always raises the required funds without disturbing its present debt equity ratio.

The cost of raising the debt and equity are as under:

Project cost	Cost of debt	Cost of equity
Upto Rs.2 lakhs	10%	12%
Above Rs.2 lakhs & upto to Rs.5 lakhs	11%	13%
Above Rs. 5 lakhs & upto Rs.10 lakhs	12%	14%
Above Rs.10 lakhs & upto Rs.20 lakhs	13%	14.5%

Assuming the tax rate at 50%, CALCULATE:

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

ii) If a project is expected to give after tax return of 10%, Determine under what conditions it would be acceptable?   *(A) (SIMILAR: RTP N18(N))*

(ANS.: (I) 10.8%, 11.3%(II) IT WOULD BE ACCEPTABLE PROVIDED ITS PROJECT COST DOES NOT EXCEED RS. 5 LAKHS)

(SOLVE PROBLEM NO. 15 OF ASSIGNMENT PROBLEMS AS REWORK)

Note: _____

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PROBLEM NO 13:

a) A firm has EBIT of Rs. 40,000. The firm has 10% debentures of Rs. 1,00,000 and its current equity capitalisation rate is 16%. Find out the value of the firm and its overall cost of capital under traditional approach?

b) The firm is considering increasing its leverage by issuing additional Rs. 50,000 debentures and using the proceeds to retire that amount of equity. If however, as the firm increases the proportion of debt, K_d would rise to 11% and Ke to 17%. State the implications.

c) The firm issues additional Rs. 1,00,000 debentures instead of Rs. 50,000 (that is having Rs.2,00,000 debentures) and uses the proceeds to retire that amount of equity. Due to increased financial risk, K_d would rise to 12.5% and Ke to 20%. State the implications.

(A) (ANS.: A. RS. 1,87,500 & 13.913%, B. RS.2,88,235 & 13.88%, C. RS.2,75,000 & 14.54%)

(SOLVE PROBLEM NO. 16 OF ASSIGNMENT PROBLEMS AS REWORK)

MODEL 3.4: MODIGLIANI AND MILLER APPROACH-WITHOUT CORPORATE TAXES

IT IS BASED ON THE FOLLOWING ASSUMPTIONS:

a) The <u>overall cost of capital remains constant</u> for all degree of debt equity mix.

b) <u>The market capitalizes the value of firm as a whole</u>. Thus the split between debt and equity is not important.

c) <u>The cost of debt is constant</u>.

This Approach is a refinement of Net Operating Income Approach. The basic theory is essentially same, but some additional propositions are made.

PROPOSITIONS: Modigliani and Miller make the following propositions -

➢ The Total Market Value of a Firm and its Cost of Capital are independent of its Capital structure.

➢ The Total Market Value of the Firm is given by capitalising the expected stream of operating earnings (i.e. Net Operating Income) at a discount rate considered appropriate for its risk class.

➢ The Cost of Equity (K_e) is equal to Capitalisation Rate of Pure Equity Stream plus a premium for Financial Risk.

➢ The Financial Risk increases with more debt content in the capital structure. As a result, Ke increases in such a manner as to off-set exactly the use of less expensive source of debt funds.

Cost of Equity = WACC + Risk Premium. So, $K_e = K_o + \dfrac{Debt}{Equity}(K_o - K_d)$

➢ The cut off rate for investment purposes is completely independent of the mode of financing. Hence every investment proposal can be evaluated at the rate applicable for such type of Firms. Debt-Equity Mix is not relevant for Capital Budgeting decisions.

MODIGLIANI AND MILLER APPROACH
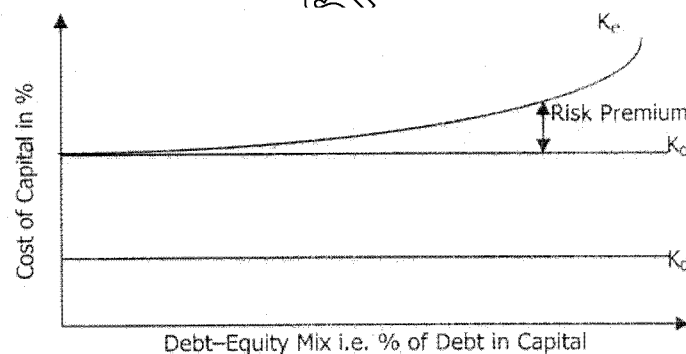
PROBLEM NO 14:
The following information is available regarding the Mid-Air Enterprises:

1. Mid-Air currently has no debt, it is an all-equity company;

2. Expected EBIT = Rs.24 lakhs. EBIT is not expected to increase overnight, so Mid-Air is in a no-growth situation;

3. Mid-Air pays out all of its income as dividends;

4. If Mid-Air begins to use debt, it can borrow at the rate k_d = 8 percent. This borrowing rate is constant and it is independent of the amount of debt used. Any money raised by selling debt would be used to retire common stock, so Mid-Air assets would remain constant;

5. The risk of Mid-Air's assets, and thus its EBIT, is such that its shareholders require a rate of return K_e = 12%, if no debt is used.

Using MM Model without corporate taxes and assuming a debt of Rs.1 crore, you are required to: (a) Determine the firm's total market value; (b) Determine the firm's value of equity; (c) Determine the firm's leverage cost of equity. *(A) (SIMILAR: NOV 18(N)) (ANS: (A) RS. 2 CR, (B) RS. 1 CR, (C) 16%))*

(SOLVE PROBLEM NO. 17 OF ASSIGNMENT PROBLEMS AS REWORK)

PROBLEM NO 15: (PRINTED SOLUTION AVAILABLE) Alpha Limited and Beta Limited are identical except for capital structures. Alpha has 50 percent debt and 50 percent equity, whereas Beta has 20 percent debt and 80 percent equity. (All percentages are in market-value terms). The borrowing rate for both companies is 8 percent in a no-tax world, and capital markets are assumed to be perfect.

a) If your own 2 percent of the stock of Alpha, what is your return if the company has net operating income of Rs.3,60,000 and the overall capitalisation rate of the company, K_0 is 18 percent? (ii) What is the implied required rate of return on equity?

b) Beta has the same net operating income as Alpha. (i) What is the implied required equity return of Beta? (ii) Why does it differ from that of Alpha?

(A) (NEW SM, OLD SM, SIMILAR: MTP 2 N18(O)) (ANS.: A. (I) RS. 5,600 (II) 28% B. 20.5% IMPLIED REQUIRED RATE OF RETURN ON EQUITY IS LESS IN THE CASE OF BETA BECAUSE IT USED LESS DEBT IN THE CAPITAL STRUCTURE)

(SOLVE PROBLEM NO. 18, 19 OF ASSIGNMENT PROBLEMS AS REWORK)

Note: _____

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MODEL 3.5: MODIGLIANI AND MILLER APPROACH-WITH CORPORATE TAXES

PROBLEM NO 16: There are two firm's P and Q which are identical except P does not use any debt in its capital structure while Q has Rs.8,00,000, 9% debentures in its capital structure. Both the firms have Earning Before Interest and Tax of Rs.2,60,000 p.a. and the capitalization rate is 10%. Assuming the corporate tax rate of 30%, calculate the value of these firms according to MM Hypothesis. *(A) (OLD PM, SIMILAR: NOV 18 (N)) (ANS.: P IS Rs.18,20,000 & Q IS Rs.20,60,000)*

(SOLVE PROBLEM NO. 20, 21 OF ASSIGNMENT PROBLEMS AS REWORK)

Note: _____

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PROBLEM NO 17: (PRINTED SOLUTION AVAILABLE) RES Ltd. is an all equity financed company with a market value of Rs.25,00,000 and cost of equity Ke = 21%. The company wants to buyback equity shares worth Rs.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 calculate:

i) Market value of RES Ltd.

ii) Cost of Equity (K_e).

iii) Weighted Average cost of Capital and comment on it.

(A) (OLD PM, RTP N18 (N&O)) (ANS.: (I) 26,50,000, (II) 22%, (III) 19.80%)

(SOLVE PROBLEM NO. 22 OF ASSIGNMENT PROBLEMS AS REWORK)

Note: _____

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MODEL 4: ARBITRAGE

➤ According to Modigliani and Miller, Two companies operating in the same industry must have identical or equal market values, if they differ; investor enters into arbitrage process to create equilibrium position.

➤ Arbitrage is a simultaneous process involves the selling of all securities of overvalued firm and purchasing securities of undervalued firm equal to the percentage of equity holding in the overvalued firm.

➤ An investor will gain by investing in undervalued firm since the same amount of present income can be earned by investing an amount, which is less than the present investment.

➤ The prices of the equity shares of the overvalued firm whose shares are being sold by investor will decrease.

➤ According to Modigliani and Miller, this arbitrage process will come to an end when the values of both companies become identical.

MODEL 4.1: IF LEVERED FIRM IS OVERVALUED

PROBLEM NO 18: The following is the data regarding two companies X and Y belonging to the same risk class:

Particulars	Company X	Company Y
Number of ordinary shares	90,000	1,50,000
Market price per share (Rs.)	1.20	1.00
6% Debentures (Rs.)	60,000	---
Profit before interest (Rs.)	18,000	18,000

All profits after debenture interest are distributed as dividends. Explain how under Modigliani & Miller approach, an investor holding 10% of shares in Company X will be better off in switching his holding to Company Y.

(A) (ANS.: SINCE THERE IS AN INCREASE IN EARNINGS OF RS. 108, THE INVESTOR CAN SWITCH HIS HOLDINGS FROM CO. X TO CO. Y) (SOLVE PROBLEM NO. 23, 24 OF ASSIGNMENT PROBLEMS AS REWORK)

Note: _____

MODEL 4.2: IF UNLEVERAGED FIRM IS OVERVALUED

PROBLEM NO 19: There are two firms U and L having same NO of Rs. 20,000 except that the firm L is a levered firm having a debt of Rs. 1,00,000 @ 7% and cost of equity of U & L are 10% and 18% respectively. Show how arbitrage process will work.   *(A) (NEW SM, OLD SM)*

(ANS.: TOTAL VALUE OF THE FIRM RS. 1,72,222 & ASSUME YOU HAVE 10% SHARES OF UNLEVERED FIRM I.E. INVESTMENT OF 10% OF RS. 2,00,000 = RS.20,000 AND RETURN @ 10% ON RS. 20,000)

(SOLVE PROBLEM NO. 25 OF ASSIGNMENT PROBLEMS AS REWORK)

Note: _____

ASSIGNMENT PROBLEMS

MODEL 1: EBIT - EPS ANALYSIS

PROBLEM NO 1: M/s Punjab Scooters Ltd. has currently an ordinary share capital of Rs. 40 lakhs, consisting of 40,000 shares of Rs. 100 each. The management is planning to raise another Rs. 40 lakhs to finance a major programme of expression through one of the four possible financing plans. The options are:

a) Further issue of 40,000 equity shares of Rs. 100 each.

b) Issue of 20,000 equity shares of Rs. 100 each (Rs. 20 lakhs) and the balance Rs. 20 lakhs through long term borrowings at 9% rate of interest per annum.

c) Issue of 10,000 equity shares of Rs. 100 each (Rs. 10 lakhs) and the balance Rs.30 lakhs through long term borrowings at 10% rate of interest per annum.

d) Issue of 20,000 equity shares of Rs. 100 each (Rs. 20 lakhs) and 20,000 preference shares of Rs.100 each with 7.5% dividend (Rs.20 lakhs).

You are required to advise the management of the company about the best alternative with earnings per share (EPS) in each alternative. The company's EBIT will be Rs. 15 lakhs and the corporate tax rate is 50%.   *(B) (ANS.: EPS FOR OPTION A IS RS. 9.375, OPTION B IS RS. 11, OPTION C IS RS. 12, AND OPTION D IS RS.10)*

PROBLEM NO 2: A Ltd. has a share capital of Rs.1,00,000 divided into shares of Rs.10 each. It has a major expansion program requiring an investment of another Rs. 50,000. The management is considering the following alternatives for raising this amount:

a) Issue of 5,000 equity shares of Rs. 10 each.

b) Issue of 5,000, 12% preference shares of Rs.10 each.

c) Issue of 10% debentures of Rs. 50,000.

The company's present Earnings before Interest and Tax (EBIT) is Rs. 40,000 per annum subject to tax @ 50%. You are required to calculate the effect of each of the above financial plan on the Earnings per Share presuming:

i)   EBIT continues to be the same even after expansion.

ii) EBIT increases by Rs. 10,000.

(A) (ANS.: (I) EPS FOR ALTERNATIVE-1 RS.1.33, ALTERNATIVE-2 RS.1.4, ALTERNATIVE-3 RS.1.75, (II) EPS ALTERNATIVE-1 RS.1.67, ALTERNATIVE-2 RS.1.9, ALTERNATIVE-3 RS.2.25)

PROBLEM NO 3: Paramount Products Ltd. wants to raise Rs.100 lakhs for a diversification project. Current estimate of earnings before interest and taxes (EBIT) from the new projects is Rs. 22 lakhs per annum. Cost of debt will 15% for amounts up to and including Rs. 40 lakhs, 16% for additional amounts up to and including Rs. 50 lakhs and 18% for additional amounts above Rs. 50 lakhs. The equity shares (face value Rs.10) of the company have a current market value of Rs. 40. This is expected to fall to Rs. 32 if debts exceeding Rs.50 lakhs are raised. The following options are under consideration of the Company:

Option	Equity	Debt
I	50%	50%
II	60%	40%
III	40%	60%

Determine the earning per share (E.P.S.) for each option and state which option the company should exercise. Tax rate applicable to the company is 50%.

(A) (ANS.: EPS FOR OPTION-I IS RS.5.76, OPTION-II IS RS.5.33, OPTION-III IS RS.5.04 & OPTION-I IS MOST SUITABLE TO MAXIMIZE THE EARNINGS PER SHARE)

PROBLEM NO 4: The Hardware Company Ltd has to make a choice between debt issue and equity issue for its expansion program. Its current position is as follows:

Particulars	Amount (Rs.)
5% Debt	20,000
Equity capital (Rs.10 per share)	50,000
Surpluses	30,000
Total capitalization	1,00,000
Sales	3,00,000
Total costs	2,69,000
Income Before Interest and Taxes	31,000
Interest	1,000
Earnings Before Taxes	30,000
Income tax	10,500
Income After Taxes	19,500

The expansion program is estimated to cost Rs.50,000. If this is financed through debt, the rate of interest on new debt will be 7 per cent and the price-earnings ratio will be 6. If the expansion program is financed through equity, new shares can be sold netting Rs.25 per share; and the price-earnings ratio will be 7. The expansion will generate additional sales of Rs.1,50,000 with a return of 10 per cent on sales before interest and taxes. If the company is to follow a policy of maximizing the market value of its shares, which form of financing should it choose?   *(A) (ANS.: MP FOR DEBT IS RS. 32.37 & EQUITY IS RS. 29.25)*

PROBLEM NO 5: The existing capital structure of XYZ Ltd. is as under:

Particulars	Rs.
Equity shares of Rs. 100 each	40,00,000
Retained earnings	10,00,000
9% preference share of Rs. 100 each	25,00,000
7% debentures of Rs. 100 each	25,00,000

The existing rate of return on the company's capital is 15% and the income-tax rate is 40%. The company requires a sum of Rs.50,00,000 to finance its expansion program for which it is considering

the following alternatives: Issue of 25,000 equity shares at a premium of Rs.100 per share Or Issue of 12% preference shares or Issue of 10% debentures. It is estimated that the PE ratio in the cases of Equity, Preference and Debenture financing would be 25, 20 and 15 respectively. Which of the above alternatives would you recommend? *(A)*

(ANS.: MARKET PRICE (EPS X PE RATIO) FOR OPTION-I IS RS.392.25, OPTION-II IS RS.210, OPTION-III IS RS.270 & SINCE MARKET PRICE IS HIGH IN OPTION I, IT IS BENEFICIAL TO RAISE THE FUNDS OF RS. 50,00,000 BY WAY OF FRESH EQUITY SHARES)

MODEL 2: INDIFFERENCE POINT / EPS EQUIVALENCY POINT

PROBLEM NO 6: A Company needs Rs. 31,25,000 for the construction of a new plant. The following three plans are feasible:

a) The company may issue 3,12,500 equity shares at Rs.10 per share.

b) The Company may issue 1,56,250 equity shares at Rs.10 per share and 15,625 debentures of Rs.100 denomination bearing an 8% rate of interest.

c) The Company may issue 1,56,250 equity shares at Rs.10 per share and 15,625 preference shares at Rs.100 per share bearing an 8% rate of dividend.

  i) If the Company's earnings before interest and taxes are Rs.62,500, Rs.1,25,000, Rs.2,50,000, Rs.3,75,000 and Rs.6,25,000, what are the earnings per share under each of three financial plans? Assume a Corporate Income tax rate of 40%

  ii) Which alternative would you recommend and why?

  iii) Determine the EBIT - EPS indifference points by formulae between Financing Plan I and Plan II and Plan I and Plan III.

(A) (RTP M17) (ANS.: (I) EPS IS RESPECTIVELY (II) BUSINESS CONDITIONS ARE FAVOURABLE & BUSINESS CONDITIONS ARE UNFAVORABLE (III) PLAN I & II = 2,50,000 PLAN I & III = 4,16,666.67 PLAN II &III = NIL)

PROBLEM NO 7: Y Ltd. is considering the following two alternative financing plans:

Particulars	Plan I	Plan II
	Amount (Rs.)	Amount (Rs)
Equity Shares of Rs.100 /- each	8,00,000	6,00,000
Debentures	2,00,000	-
10% Preference Shares of Rs.100/- each	-	4,00,000
	10,00,000	10,00,000

The indifference point between the plans is Rs.2,72,000. Corporate Tax rate is 50% .Calculate the rate of Interest for Debentures. *(B) (ANS: 8%)*

PROBLEM NO 8: The management of Z Company 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:

Proposals	% of Equity	% of Debts	% of Preference shares
P	100	-	-
Q	50	50	-
R	50	-	50

i) Cost of debt - 10%, Cost of preference shares - 10%

ii) Tax rate - 50%

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

iv) Total investment to be raised Rs. 40,00,000.

v) Expected earnings before interest and tax Rs. 18,00,000.

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

a) Earnings per share

b) Financial break-even-point

c) Compute the EBIT range among the plans for indifference. Also indicate if any of the plans dominate.

(A) (OLD PM) (ANS.: EPS FOR P IS RS. 4.5, Q IS RS. 8, R IS RS. 7 & FINANCIAL BREAK-EVEN POINT RS. 4,00,000)

PROBLEM NO 9: RTP Ltd. is in the process of raising Rs. 10,00,000 as additional capital. For this purpose two mutually exclusive alternative financial plans, have been identified. The current level of EBIT is Rs. 34,00,000 which is likely to remain unchanged. The relevant information is as follows:

Present capital structure : 6,00,000 Equity shares of Rs. 10 each, and 10% Bonds of Rs. 40,00,000

Tax rate : 50%

Current EBIT : Rs. 34,00,000

Current EPS : Rs. 2.50

Current market price : Rs. 50 per share

Financial plan I : 40,000 equity shares @ Rs. 25 per share

Financial plan II : 12% debentures of Rs. 10,00,000

Required: What is the indifference level of EBIT? Identify the financial break-even levels and plot the EBIT - EPS lines on the graph paper. Which alternative financial plan is better?

(TN) (ANS.: A) INDIFFERENCE LEVEL: RS. 23,20,000; B) FINANCIAL BEP: PLAN I: RS. 4,00,000, PLAN II: RS. 5,20,000; D) EPS (PLAN I): RS. 2.34 PER SHARE, (PLAN II): RS. 2.40 PER SHARE, HENCE PLAN II IS ADVISABLE)

MODEL 3.1: NET INCOME APPROACH (NI-APPROACH)

PROBLEM NO 10: Rupa Company's EBIT is Rs. 5,00,000. The company has 10%, 20 lakh debentures. The equity capitalization rate i.e. K_e is 16%.

You are required to calculate under NI Approach:

a) Market value of equity and value of firm   b) Overall cost of capital

(B) (NEW SM, OLD SM) (ANS.: A. RS. 38,75,000 & 12.9%)

PROBLEM NO 11: Glamour Ltd. earned a profit of Rs.20 lakhs before providing for interest and tax. The company's capital structure is as follows:

i) 4,00,000 Equity shares of Rs.10 each and its markets capitalisation rate is 16%.

ii) 25,000 14% secured redeemable debentures of Rs.150 each.

You are required to calculate the value of the firm under Net Income approach. Also calculate the overall cost of capital of the Firm.   *(B) (ANS.: RS. 1,29,68,750 & 15.42%)*

MODEL 3.2: NET OPERATING INCOME (NOI) APPROACH

PROBLEM NO 12: Anitha Ltd's operating income is Rs.5,00,000. The firm's cost of debt is 10% and currently the firm employs Rs.15, 00,000 of debt. The overall cost of capital of the firm is 15%.

You are required to determine using NOI approach:

a) Total value of the firm   b) Cost of equity

(B) (NEW SM, OLD SM) (ANS.: A. RS. 33,33,333 & B. 19.09%)

PROBLEM NO 13: XYZ Ltd. intends to set up a project with capital cost of Rs.50,00,000. It is considering following:

     Alternative 1 = 100% Equity financing

     Alternative 2 = Debt- Equity 1:1

     Alternative 3 = Debt- Equity 3:1

The estimated annual net cash inflow is @ 24% i.e. Rs.12, 00,000 on the project. The rate of interest on debt is 15%. Calculate the weighted average cost of capital for three different alternatives and analyse the capital structure decision.

(B) (ANS.: WACC FOR ALTERNATIVE 1 IS 24%, ALTERNATIVE 2 IS 24%, ALTERNATIVE 3 IS 24% & EVERY CAPITAL STRUCTURE IS AN OPTIMUM CAPITAL STRUCTURE)

PROBLEM NO 14: Company X and company Y are in the same risk class and identical in all respects except that company X uses debts while company Y does not. Levered company has Rs. 9 lakh debenture, carrying 10% rate of interest. Both companies earn 20% before interest and taxes on their total assets of Rs. 15 lakh. Assume perfect capital markets, Tax rate of 50% and capitalization rate of 15% for an all equity company.

i)   Compute the value of both the companies using Net Income (NI) approach.

ii) Compute the value of both the companies using Net Operating Income approach, and

iii) Using Net Operating Income approach, calculate the overall cost of capital for both the companies.

(RK) (ANS.: I) COMPANY X: RS. 16,00,000, COMPANY Y: RS. 10,00,000; II) COMPANY X: RS. 14,50,000; COMPANY Y: RS. 10,00,000; III) $K_o = 10.3\%$, $K_o = 15\%$)

MODEL 3.3: TRADITIONAL APPROACH

PROBLEM NO 15: M/s Mini & Fine Ltd. are analysing the most desirable capital structure. Following are the estimates of the cost of debt and equity capital (after tax) at various levels of debt equity mix.

Debt as a percentage of total Capital employed	Cost of debt (%)	Cost of equity (%)
0	6.0	11.5
10	6.0	12.0
20	6.0	12.0
30	6.5	13.0
40	7.0	15.0
50	7.5	17.0
60	8.0	20.0

You are required to determine the optimal debt equity mix for the company by calculating composite cost of capital.   *(A) (ANS.: THE WACC IS MINIMUM 20% OF DEBT AND 80% EQUITY REPRESENTS OPTIMUM CAPITAL STRUCTURE)*

PROBLEM NO 16: XYZ Limited is expecting an EBIT of Rs.3, 00,000. The company presently raised its entire fund requirement of Rs.20 lakhs by 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 upto 30% the rate of interest will be 10% and equity capitalization rate is expected to increases to 17%. However, if firm opts for 50% debt then interest rate will be 12% and equity capitalization rate will be 20%.You are required to compute value of firm and its overall cost of capital under different options.

(B) (ANS: FOR 0%, 30% & 50% DEBT - VALUE: 18,75,000; 20,11,176; 19,00,000 AND COC: 16%; 14.91%; 15.78%)

MODEL 3.4: MODIGLIANI AND MILLER APPROACH - WITHOUT CORPORATE TAXES

PROBLEM NO 17: Companies U and L are identical in every respect except that the former does not use debit in its capital structure, while the latter employs Rs. 6 lakhs of 15 per cent debt. Assuming that, (a) all the MM assumptions are met, (b) the corporate tax rate is 35 per cent, (c) the EBIT is Rs.2,00,000, and (d) the equity capitalisation of the unlevered company is 20 per cent, what will be the value of the firms, U and L ? Also, determine the weighted average cost of capital for both the firms.

(M.Y.K & P.K.J) (ANS.: VALUE OF UNLEVERED FIRM: RS. 6,50,000; VALUE OF LEVERED FIRM: RS. 8,60,000; $K_o = 15.11\%$)

PROBLEM NO 18: Gamma Limited and Delta Limited are identical except for capital structures. Gamma has no debt, whereas Beta has 40 percent debt and 60 percent equity. (All percentages are in market-value terms). The borrowing rate for both companies is 10 percent in a no-tax world, and capital markets are assumed to be perfect.

a)   If your own 3 percent of the stock of Gamma, what is your return if the company has net operating income of Rs.6,00,000 and the overall capitalisation rate of the company, K_0 is 20 percent? (ii) What is the implied required rate of return on equity?

b) Delta has the same net operating income as Gamma. (i) What is the implied required equity return of Delta? (ii) Why does it differ from that of Gamma?

(ANS.: A. (I) RS. 18,000 (II) 20% B. 20.5% IMPLIED REQUIRED RATE OF RETURN ON EQUITY IS LESS IN THE CASE OF DELTA BECAUSE IT USED LESS DEBT IN THE CAPITAL STRUCTURE)

PROBLEM NO 19: One-third of the total market value of Sanghmani Limited consists of loan stock, which has a cost of 10 per cent. 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? **(A) (NEW SM, OLD SM) (ANS: K_O =16%, K_E = 19%)**

MODEL 3.5: MODIGLIANI AND MILLER APPROACH-WITH CORPORATE TAXES

PROBLEM NO 20: A Ltd. and B Ltd. are identical in every respect except capital structure. A Ltd. does not employ debts in its capital structure whereas B Ltd. employs 12% Debentures amounting to Rs.10 lakhs.

Assuming that:

i)   All assumptions of MM model are met;

ii) Income-tax rate is 30%;

iii) EBIT is Rs.2,50,000 and

iv) The Equity capitalization rate of 'A' Ltd. is 20%.

Calculate the value of both the companies and also find out the Weighted Average Cost of Capital for both the companies. **(A) (OLD PM, MTP1 M18 (N) - 5M) (ANS: (I) 11,75,000 (II) WACC = 14.90%)**

PROBLEM NO 21: There are two firms Company A and B having net operating income of Rs.15,00,000 each. Company B is a levered company whereas Company A is all equity company. Debt employed by Company B is of Rs.7,00,000 @ 11%. The tax rate applicable to both the companies is 25%. Calculate earnings available for equity and debt for both the firms. **(A)**

(ANS.: TOTAL EARNINGS AVAILABLE TO EQUITY HOLDERS + DEBT HOLDERS COMPANY A RS. 11,25,000 & COMPANY B RS. 11,44,250)

PROBLEM NO 22: Stopgo Ltd, an all equity financed company, is considering the repurchase of Rs. 200 lakhs equity and to replace it with 15% debentures of the same amount. Current market Value of the company is Rs. 1140 lakhs and it's cost of 0capital is 20%. It's Earnings before Interest and Taxes (EBIT) are expected to remain constant in future. It's entire earnings are distributed as dividend. Applicable tax rate is 30 per cent.

You are required to calculate the impact on the following on account of the change in the capital structure as per Modigliani and Miller (MM) Hypothesis:

i)   The market value of the company

ii) It's cost of capital, and

iii) It's cost of equity **(M18 (N) - 10M) (ANS.: I) MV: RS. 1,200 LAKHS; II) COST OF CAPITAL: 19%, III) COST OF EQUITY: 20.7%)**

MODEL 4: ARBITRAGE

MODEL 4.1: IF LEVERED FIRM IS OVERVALUED

PROBLEM NO 23: Two companies, X and Y belong to the equivalent risk group. The two companies are identical in every respect except that company Y is levered, while X is unlevered. The outstanding amount of debt of the levered company is Rs. 6,00,000 in 10% Debenture. The other information for the two companies is as follows:

Particulars	X	Y
Net Operating income (EBIT)	Rs.1,50,000	Rs.1,50,000
- Interest	---	60,000
Earnings to equity holders	1,50,000	90,000

Equity capitalization rate, K_e	0.15	0.20
Market value of equity	10,00,000	4,50,000
Market value of debt	---	6,00,000
Total value of firm, V_1	10,00,000	10,50,000
Overall capitalization rate, $K_o = EBIT/V$	15.0%	14.3%
Debt equity ration	0	1.33

An investor owns 5% equity shares of company Y. Show the process and the amount by which he could reduce his outlay through use of the arbitrage process, Is there any limit to the 'process'?

(A) (ANS.: THROUGH THE PROCESS OF ARBITRAGE THE INVESTOR CAN REDUCE HIS INVESTMENT TO THE EXTENT OF RS.2,500)

PROBLEM NO 24: There are two firms N and M, having same earnings before interest and taxes i.e. EBIT of Rs. 20,000. Firm M is levered company having a debt of Rs. 1,00,000 @ 7% rate of interest. The cost of equity of N Company is 10% and of M Company is 11.50%.

Find out how arbitrage process will be carried on?　　　　　*(A) (NEW SM, OLD SM)*

(ANS.: 'M' COMPANY, BUT STILL YOU HAVE Rs.1,304.3 EXCESS MONEY AVAILABLE WITH YOU. HENCE, YOU ARE BETTER OFF BY DOING ARBITRAGE)

MODEL 4.2: IF UNLEVERAGED FIRM IS OVERVALUED

PROBLEM NO 25: Companies A and B belong to the same Business-risk class. Average net operating income before interest of each company is Rs. 100 lakhs. Other related information is given below:

Particulars	Company A	Company B
Market value of equity	400	120
Market value of debentures	—	200
Total market value	400	320

Rate of interest on debentures is 15% p.a. and the same is considered to be certain by all the investors.

a) In case the total market values of the two companies are not in equilibrium, explain the process by which equilibrium is restored to according to Modigliani and Miller theory.

b) If the cost of equity is 27.78% for Company A in equilibrium, what will it be for Company B?

(A) (ANS.: B. 43.75%)

PRINTED SOLUTIONS TO SOME SELECTIVE PROBLEMS

PROBLEM NUMBERS TO WHICH SOLUTIONS ARE PROVIDED: 1, 3, 4, 5, 7, 8, 10, 15, 17

PROBLEM NO. 1

Step 1: Calculation of EAESH　　　　　(Rs. In Lakhs)

Particulars	Existing	Option-I (Equity shares)	Option-II (Debt)	Option-III (Equity + Debt)
Estimated EBIT	60	100	100	100
Less: Interest	-	-	(8)	(4)
EBT	60	100	92	96
Less: Tax @ 50%	30	50	46	48
PAT / EAESH	30	50	46	48

Step 2: Finding out number of Equity shares

No. of equity shares (lakhs of shares) - Existing - New issued	10 -	10 2	10 -	10 0.50

| Total Shares | 10 | 12 | 10 | 10.5 |

Step 3: Calculation of EPS

| $EPS = \dfrac{PAT}{No.\,of\,equity\,shares}$ | Rs.3 | Rs.4.16 | Rs.4.6 | Rs.4.57 |

Decision: Option-II. i.e., issue of 16% debentures is most suitable to maximize the Earnings Per Share.

PROBLEM NO.3

Evaluation of the given two modes of financing the additional funds:

Particulars	Option 1	Option 2
EBIT (17,00,000 X 20%) (W.N.-1 & 2)	3,40,000	3,40,000
Less: Interest		
- Existing	60,000	60,000
- New	28,000	---
	(2,00,000 × 14%)	
EBT	2,52,000	2,80,000
Less: Tax @ 35%	88,200	98,000
EAT/EAESH (A)	1,63,800	1,82,000
No. of equity shares - Existing	40,000	40,000
- New	-	5,128
		(2,00,000 / 39)
Total number of equity shares (B)	40,000	45,128
EPS (A/B)	4.095	4.033
PE ratio (W.N.-3)	8	10
Market price	32.76	40.33

Conclusion: The objective of Financial Management is to maximize the benefits of equity shareholders. Since market price is high in option II, it is beneficial to raise the funds of Rs.25,00,000 by way of fresh equity shares.

W.N-1: Calculation of existing capital employed

Equity share capital (40,000 shares X Rs.10)	4,00,000
Retained earnings	6,00,000
12% debentures $\left(\dfrac{60000}{12\%}\right)$	5,00,000
Total capital employed (existing)	15,00,000

Total capital employed after expansion = Rs.15,00,000 + Rs.2,00,000

W.N-2: Existing Return on investment (ROI) = $\dfrac{EBIT}{Cap.employed} \times 100$ = $\dfrac{3L}{15L} \times 100 = 20\%$

Given that the additional investment of Rs.2,00,000/- will also yield the same rate of return.

W.N-3: Calculation of Debt Equity ratios & P/E ratio in different situations

Debt equity ratio under existing capital structure = $\dfrac{Debt}{Debt+Equity}$ = $\dfrac{5L}{15L} \times 100$ = 33.33%

Debt equity ratio when required funds are raised through debt = $\dfrac{7L\,(5+2)}{17L} \times 100$ = 41.2%

In this case, since the debt equity ratio is greater than 35%, PE ratio will fall down to 8 & cost of debt will increase to 14%.

Debt equity ratio when required funds are raised through equity = $\dfrac{5L}{17L} \times 100$ = 29.4%

In this case, since the debt equity ratio is less than 35%, PE ratio will remain to be same 10 & cost of debt will increase to 14%.

PROBLEM NO: 4

Calculation of EPS & Market price in each of the given options   **(Rs. In Lakhs)**

Particulars	Existing	Option I	Option II	Option III
EBIT (W.N-1) Less: Interest	12.00 (100 x 12%) 1.75 (25 x 7%)	15 (125 x 12%) 1.75	15 (125 x 12%) 1.75	15 (125 x 12%) 3.75 (1.75 + 25 x 8%)
EBT Less: Tax @ 50%	10.25 5.125	13.25 6.625	13.25 6.625	11.25 5.625
EAT Less: Preference dividend	5.125 2.25 (25 x 9%)	6.625 2.25	6.625 4.75 (2.25 + 25 x 10%)	5.625 2.25
EAESH (A)	2.875	4.375	1.875	3.375
No. of equity shares (Lakhs) Existing New	 0.40 -	 0.40 0.20	 0.40 -	 0.40 -
Number of Equity shares (B)	0.40	0.60	0.40	0.40
EPS (Rs.) (A/B) PE ratio Market price (EPS X PE ratio)	7.19 - -	7.2920 146 -	4.69 17 80	8.44 16 135

W.N-1: Calculation of EBIT

EBIT = 12% of capital employed

Capital employed (Before expansion):   Equity share capital   Rs. 40,00,000

                                   Debt   Rs. 25,00,000

                                   Preference share capital   Rs. 25,00,000

                                   Reserves and surplus   Rs. 10,00,000

                                                                        Rs.1,00,00,000

Capital employed (After expansion) = 1,00,00,000 + Additional Debt of Rs.25,00,000 = Rs. 1,25,00,000

EBIT, before expansion   = 1,00,00,000 x 12% = Rs. 12,00,000

EBIT, after expansion   = 1,25,00,000 x 12% = Rs. 15,00,000

Conclusion: The objective of Financial Management is to maximize the benefits of equity shareholders. Since market price is high in option I, it is beneficial to raise the funds of Rs.25,00,000 by way of fresh equity shares.

Assumption: The return on existing capital is given as 12%. It is assumed that the same rate of return will be maintained on additional investment also.

PROBLEM NO: 5

Given information:

      Capital Employed   = 10,00,000

      Issue Price   = 100

      Tax Rate   = 50%

Part A: a) 100% Equity

            b) 50% Equity + 50% Debt

Indifference Point $= \dfrac{(x - interest)(1- tax)- PD}{No. \, of \, Equity \, Shares} = \dfrac{(x - interest)(1- tax)- PD}{No. \, of \, Equity \, Shares}$

                = (x-0) (1 - 0.5) - 0 / 10,000   = (x - 75,000) (1 - 0.5) - 0 / 5,000

                            x   = 1,50,000

                        EBIT   = 1,50,000

Part B: a) 100% Equity

            b) 50% Equity + 50% Preference Shares

Indifference Point $= \dfrac{(x-\text{interest})(1-\text{tax})-PD}{\text{No. of Equity Shares}} = \dfrac{(x-\text{interest})(1-\text{tax})-PD}{\text{No. of Equity Shares}}$

$= (x-0)\ (1-0.5) - 0\ /\ 10,000 \qquad = (x-0)\ (1-0.5) - 65,000\ /\ 5,000$

$\qquad\qquad\qquad x\ (0.5) \qquad = 1,30,000$

$\qquad\qquad\qquad EBIT \qquad = 2,60,000$

Part C: a) 80% Equity + 13% Preference Shares

b) 40% Equity + 13% Preference Shares + 15% Debt

Indifference Point $= \dfrac{(x-\text{interest})(1-\text{tax})-PD}{\text{No. of Equity Shares}} = \dfrac{(x-\text{interest})(1-\text{tax})-PD}{\text{No. of Equity Shares}}$

$= (x-0)\ (1-0.5) - 26,000\ /\ 8,000 \qquad = (x-60,000)\ (1-0.5) - 26,000\ /\ 4,000$

$\qquad\qquad x\ (0.5) - 26,000 \qquad = 2\ (0.5x - 56,000)$

$\qquad\qquad\qquad 0.5x \qquad = x - 86,000$

$\qquad\qquad\qquad EBIT \qquad = 1,72,000$

PROBLEM NO.7

i) **Calculation of EPS in each of the financial plans and calculation of financial breakeven point.**

Particulars	Plan A	Plan B	Plan C
EBIT	1,60,000	1,60,000	1,60,000
Less: Interest on debt @ 8%	-	(16,000)	-
EBT	1,60,000	1,44,000	1,60,000
Less: Tax @ 50%	(80,000)	(72,000)	(80,000)
EAT/EASH	80,000	72,000	80,000
Less: Preference dividend	-	-	16,000
EAESH (A)	80,000	72,000	64,000
No. of equity shares (B)	20,000 (4,00,000 / 20)	10,000 (2,00,000 / 20)	10,000 (2,00,000 / 20)
EPS (A/B)	Rs.4.00	Rs.7.20	Rs.6.40

ii) **Financial Break-even Point for Each Plan**

Plan A : There is no fixed financial charge, hence the financial break-even point for Plan A is zero.

Plan B : Fixed interest charges is Rs.16,000, hence the financial break-even point for Plan B is Rs.16,000

Plan C : Fixed charge for preference dividend is Rs.16,000, hence, the financial break-even point for Plan C is Rs.16,000

iii) **Indifference point between Plan A and C:**

$$\dfrac{(X-0)(1-0.5)-0}{20,000} = \dfrac{(X-0)(1-0.5)-16,000}{10,000}$$

$$\dfrac{0.5X}{20,000} = \dfrac{0.5X-16,000}{10,000}$$

0.5X = 2 (0.5X − 16,000)

X − 0.5X = 32,000

X = Rs. 64,000

Thus point of indifference between plan A and C is Rs. 64,000.

PROBLEM NO: 8

a)

Particulars	Alternatives		
	Alternative-I : Take additional Debt	Alternative-II : Issue 11% Preference Shares	Alternative-III : Issue further Equity Shares
	(Rs.)	(Rs.)	(Rs.)
EBIT	15,00,000	15,00,000	15,00,000

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
Taxes @ 40%	(2,64,000)	(4,56,000)	(4,56,000)
Profit after taxes	3,96,000	6,84,000	6,84,000
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
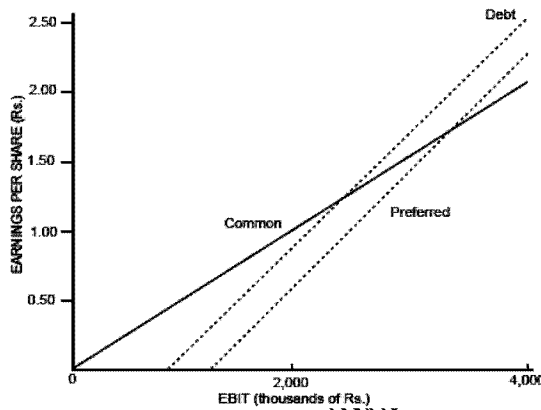
b) Approximate indifference points: Debt and equity shares, Rs 24 lakhs, preference and equity shares, Rs 33 lakhs in EBIT; Debt dominates preferred by the same margin throughout, there is no difference point. Mathematically, the indifference point between debt and equity shares is (in thousands):

$$\frac{EBIT^* - Rs\ 840}{800} = \frac{EBIT^* - Rs\ 360}{1,050}$$

EBIT* (1,050) - Rs.840(1,050) = EBIT* (800) - Rs.360 (800)

250 EBIT* = Rs.5,94,000

EBIT* = Rs.2,376

Note that for the debt alternative, the total before-tax interest is Rs.840, and this is the intercept on the horizontal axis. For the preferred stock alternative, we divide Rs.440 by (1−0.40) to get Rs733. When this is added to Rs 360 in interest on existing debt, the intercept becomes Rs.1,093.

c) For the present EBIT level, equity shares is clearly preferable. EBIT would need to increase by Rs.2,376 − Rs.1,500 = Rs.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 probability 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.

PROBLEM NO: 10

a) **Profit Statement:**

Particulars	Amount
EBIT	50,000
Less: Interest (2,00,000 x 10%)	20,000
EAESH	**30,000**

M.V. of firm $= \dfrac{EBIT}{K_o} = \dfrac{50,000}{0.125} = 4,00,000/-$

M.V of Equity   = M.V of Firm - M.V of Debt = 4,00,000 - 2,00,000 = 2,00,000

Cost of Equity (K_e) $= \dfrac{EAESH}{M.V \text{ of Equity}} = \dfrac{30,000}{2,00,000} = 0.15 = 15\%$

b) **Profit Statement:**

Particulars	Amount
EBIT	50,000
Less: Interest (3,00,000 x 10%)	30,000
EAESH	**20,000**

M.V of Debt   =   3,00,000

M.V of Equity =   1,00,000

M.V of Firm   =   4,00,000

Cost of Equity (K_e) $= \dfrac{EAESH}{M.V.\text{of Equity}} = \dfrac{20,000}{1,00,000} = 20\%$

Overall Cost of Capital (K_o) $= 20\% \times \dfrac{1,00,000}{4,00,000} + 10\% \times \dfrac{3,00,000}{4,00,000} = 12.5\%$

Implications:

1. Cost of Equity share capital has increased from 15% to 20%.

2. M.V of Equity has decreased from 2,00,000 to 1,00,000.

PROBLEM NO.15

PART A

Step 1: Calculation of Return to the equity shareholder who holds 2% of stock of Alpha Company

Particulars	Amount (Rs.)
Net Operating Income (EBIT)	3,60,000
Overall capitalization rate	0.18
Total value of the firm = (EBIT / 0.18)	20,00,000
Market value of debt (50%)	10,00,000
Market value of Equity	10,00,000
Net operating income	3,60,000
Less: Interest on debt (10,00,000 x 8%)	80,000
Earnings Available To Equity Share Holders (EAESH)	2,80,000
Earnings on 2% stock (2,80,000 x 2%)	5,600

Step 2: Implied required rate of return on equity

$$= \dfrac{\text{Earnings available to equity shareholders}}{\text{Market value of equity}} = \dfrac{2,80,000}{10,00,000} = 28\%$$

Therefore, Implied required return on equity = 28%

PART - B

Calculation of implied required equity return of Beta Company:

Particulars	Amount (Rs.)
Total value of the firm (same as Alpha)	20,00,000
Market value of debt (20%)	4,00,000
Market value of equity (80%)	16,00,000
Net operating income (EBIT)	3,60,000
Less: Interest on debt (8%)	32,000
EAESH (EBIT less Interest)	3,28,000

Implied required equity return $= \dfrac{\text{Earnings available to equity shareholders}}{\text{Market value of equity}} = \dfrac{3,28,000}{16,00,000} = 20.5\%$

Implied required rate of return on equity is less in the case of Beta. Because it used less debt in the capital structure. In short time 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 will offset exactly the disadvantage of not employing more amount of debt funds which are cheaper as compared to equity.

PROBLEM NO. 17

Computation of market value, cost of Equity and WACC of RES Ltd:

Market value of Equity = 25,00,000

K_e = 21%

$$\frac{\text{Net income(NI) for equityholders}}{K_e} = \text{Market value of equity}$$

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

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
Tax (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 = 5,00,000 x 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

$$K_e = \frac{4,72,500}{21,50,000} = 0.219 = 22\%$$

iii) WACC

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	Weighted COC
Equity	21,50,000	0.22	0.81	0.178
Debt	5,00,000	0.105	0.19	0.020
	26,50,000			1.198

WACC = 19.8%

Comment: At present company is all equity financed. So, K_e = K_o i.e. 21%. However after restructuring, the K_o would be reduced to 19.81% and K_e would increase from 21%. To 21.98%, Reduction in K_o and increase in K_e is good for health of the company.

THE END