

CAPITAL STRUCTURE AND COST OF CAPITAL

Question 1

X Ltd. a widely held company is considering a major expansion of its production facilities and the following alternatives are available:

	<i>Alternatives (Rs. in lakhs)</i>		
	<i>A</i>	<i>B</i>	<i>C</i>
<i>Share Capital</i>	50	20	10
<i>14% Debentures</i>	-	20	15
<i>Loan from a Financial Institution @ 18% p.a. Rate of Interest.</i>	-	10	25

Expected rate of return before tax is 25%. The rate of dividend of the company is not less than 20%. The company at present has low debt. Corporate taxation 50%

Which of the alternatives you would choose? (Final- Nov.1997) (8 marks)

Answer

	<i>(Rs. in lakhs)</i>		
	<i>A</i>	<i>B</i>	<i>C</i>
Return on Rs. 50 lakhs @ 25%	12.50	12.50	12.50
Less: Interest on Debentures	-	2.80	2.10
Interest on loan	-	<u>1.80</u>	<u>4.50</u>
Taxable profit	12.50	7.90	5.90
Income tax 50%	<u>6.25</u>	<u>3.95</u>	<u>2.95</u>
Profit after tax available to share holders	6.25	3.95	2.95
Rate of return on share capital	12.5%	19.75%	29.5%

From the shareholders point of view Alternative C (highest) is to be chosen.

Question 2

The following figures are made available to you:

	<i>Rs.</i>
<i>Net profits for the year</i>	18,00,000
<i>Less: Interest on secured debentures at 15% p.a.</i>	

6.2 Financial Management

(Debentures were issued 3 months after the commencement of the year)	<u>1,12,500</u>
	16,87,500
Less: Income –tax at 35% and dividend distribution tax	<u>8,43,750</u>
Profit after tax	<u>8,43,750</u>
Number of equity shares (Rs. 10 each)	1,00,000
Market quotation of equity share	Rs. 109.7

The company has accumulated revenue reserves of Rs. 12 lakhs. The company is examining a project calling for an investment obligation of Rs. 10 lakhs; this investment is expected to earn the same rate of return as funds already employed.

You are informed that a debt equity ratio (Debt divided by debt plus equity) higher than 60% will cause the price earning ratio to come down by 25% and the interest rate on additional borrowals will cost company 300 basic points more than on the current borrowal on secured debentures.

You are required to advise the company on the probable price of the equity share, if

- (a) the additional investment were to be raised by way of loans; or
- (b) the additional investment were to be raised by way of equity.

(Final-May 1998) (10 marks)

Answer

Working Note:

Present earning/share:

	Rs.
Profit before taxes	16,87,500
Less: Taxes at 35%	<u>5,90,625</u>
Profit after tax	<u>10,96,875</u>
No. of equity shares	1,00,000

$$\text{E.P.S.} = \frac{\text{Rs. } 10,96,875}{1,00,000}$$

$$\text{E.P.S.} = \text{Rs. } 10.97$$

$$\text{Market Price} = \text{Rs. } 109.70$$

$$\text{Hence, P/E} = \frac{\text{Rs. } 10,96,875}{1,00,000} = 10$$

(a) Probable Price/share, if the additional investment were to be raised by way of loans

Present capital employed:

	Rs.	
Equity	10,00,000	
Debenture (Long term)	10,00,000	
Revenue reserves	<u>12,00,000</u>	Rs. 32,00,000

Pre-interest and pre-tax profits given Rs. 18 lakhs

$$\text{Rate of return EBIT} = \frac{\text{Rs. 18 lakhs} \times 100}{\text{Rs. 32 lakhs}} = 56.25\%$$

Debt equity ratio, if Rs. 10 lacs (additional investment) were to be borrowed (Debt Rs. 20 lacs and equity Rs. 22 lacs), will be

$$\frac{\text{Rs. 20 lacs} \times 100}{\text{Rs. 42 lacs}}$$

Since, the debt equity ratio will not exceed 60% P/E will remain same.

If Rs. 10 lacs is to be borrowed, the earning will be as under:

	Rs.	Rs.
Return of 56.25% on Rs. 42 lacs		23,62,500
Less: Interest at 15% on existing Rs. 10 lacs debentures	1,50,000	
Interest on fresh borrowed amount of Rs. 10 lacs at 18%	<u>1,80,000</u>	<u>3,30,000</u>
Profit after interest before tax		20,32,500
Less: Tax at 35%		<u>7,11,375</u>
Profit after tax		<u>13,21,125</u>
No. of equity shares		1,00,000

$$\text{E.P.S.} = \frac{\text{Rs. 13,21,125}}{1,00,000} = 13.21$$

Probable price of equity share = Rs. 13.21 x 10

(Refer to working note)

$$= \text{Rs. 132.10}$$

(b) Probable Price/share, if additional investment were to be raised by way of equity.

If Rs. 10 lacs were to be raised by way of equity shares to be raised at market rates. The existing market price of Rs. 109.70 may come down a little and may possibly settle at Rs. 100. Hence, new equity shares to be raised will be :

$$\text{Rs. 10,00,000 / Rs. 100} = 10,000 \text{ shares}$$

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If Rs. 10 lacs is to be raised by way of equity shares, the earning will be as under:-

	Rs.
Profit before interest and tax	23,62,500
Less: Interest on debentures	<u>1,50,000</u>
Profit after interest before tax	22,12,500
Less: Tax @ 35%	<u>7,74,375</u>
Profit after tax	<u>14,38,125</u>
No. of equity shares	1,10,000
E.P.S. = $\frac{\text{Rs. } 14,38,125}{1,10,000}$	= Rs. 13.07

Probable price of equity share = Rs. 13.07 x 10

(Refer to working note)

= Rs. 130.70

The suggested solution will be to issue fresh debentures to finance expansion

Question 3

The Modern Chemicals Ltd. requires Rs. 25,00,000 for a new plant. This plant is expected to yield earnings before interest and taxes of Rs. 5,00,000. While deciding about the financial plan, the company considers the objective of maximising 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% upto Rs. 2,50,000, at 15% over Rs. 2,50,000 and upto 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? (Final- Nov. 1999) (7 marks)

Answer

Calculation of Earning per share for three alternatives to finance the project

Particulars	<u>Alternatives</u>		
	I To raise debt of Rs. 2,50,000 and equity of Rs. 22,50,000 Rs.	II To raise debt of Rs. 10,00,000 and equity of Rs. 15,00,000 Rs.	III To raise debt of Rs. 15,00,000 and equity of Rs. 10,00,000 Rs.
Earnings before interest and tax	5,00,000	5,00,000	5,00,000

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Less: Interest on debt	25,000	1,37,500	2,37,500
at the rate of	(10% on Rs. 2,50,000)	(10% on Rs. 2,50,000)	(10% on Rs. 2,50,000)
		(15% on Rs. 7,50,000)	(15% on Rs. 7,50,000)
			(20% on Rs. 5,00,000)
Earnings before tax	4,75,000	3,62,500	2,62,500
Less: Tax (@ 50%)	<u>2,37,500</u>	<u>1,81,250</u>	<u>1,31,250</u>
Earnings after tax: (A)	2,37,500	1,81,250	1,31,250
Number of shares : (B)	15,000	10,000	8,000
(Refer to working note)			
Earning per share :	15,833	18,125	16,406
(A)/(B)			

Decision: The earning per share is higher in alternative II i.e. if the company finance the project by raising debt of Rs. 10,00,000 and issue equity shares of Rs. 15,00,000. Therefore the company should choose this alternative to finance the project.

Working Note:

	<u>Alternatives</u>		
	<u>I</u>	<u>II</u>	<u>III</u>
Equity financing : (A)	Rs. 22,50,000	Rs. 15,00,000	Rs. 10,00,000
Market price per share: (B)	Rs. 150	Rs. 150	Rs. 125
Number of equity share: (A)/(B)	15,000	10,000	8,000

Question 4

The following is the capital structure of Simons Company Ltd. as on 31.12.1998:

	Rs.
Equity shares : 10,000 shares (of Rs. 100 each)	10,00,000
10% Preference Shares (of Rs. 100 each)	4,00,000
12% Debentures	<u>6,00,000</u>
	<u>20,00,000</u>

The market price of the company's share is Rs. 110 and it is expected that a dividend of Rs. 10 per share would be declared for the year 1998. The dividend growth rate is 6%:

- If the company is in the 50% tax bracket, compute the weighted average cost of capital.
- Assuming that in order to finance an expansion plan, the company intends to borrow a fund of Rs. 10 lakhs bearing 14% rate of interest, what will be the company's received weighted average cost of capital? This financing decision is expected to increase

6.6 Financial Management

dividend from Rs. 10 to Rs. 12 per share. However, The market price of equity share is expected to decline from Rs. 110 to Rs. 105 per share. (Final- Nov. 1999) (10 marks)

Answer

(i) Computation of the weighted average cost of capital

Source of finance	Proportion	After tax cost (%) (1-tax rate i.e. 50%)	Weighted average cost of capital (%)
(a)	(b)	(c)	(d)=(b)x(c)
Equity share	0.5	15.09	7.54
		(Refer to working note 1)	
10% Preference share	0.2	10.00	2.00
12% Debentures	0.3	6.00	<u>1.80</u>
Weighted average cost of capital			<u>11.34</u>

(ii) Computation of Revised Weighted Average Cost of Capital

Source of finance	Proportion	After tax cost (%) (1-tax rate i.e. 50%)	Weighted average cost of capital (%)
(a)	(b)	(c)	(d) = (b)×(c)
Equity shares	0.333	17.42	5.80
		(Refer to working note 2)	
10% Preference shares	0.133	10.00	1.33
12% Debentures	0.200	6.00	1.20
14% Loan	0.333	7.00	<u>2.33</u>
Revised weighted average cost of capital			<u>10.66</u>

Working Notes:

(1) Cost of equity shares (k_e)

$$\begin{aligned}
 k_e &= \frac{\text{Dividend per share}}{\text{Market price per share}} + \text{Growth rate} \\
 &= \frac{10}{100} + 0.06 \\
 &= 0.1509 \text{ or } 15.09\%
 \end{aligned}$$

(2) Revised cost of equity shares (k_e)

$$\begin{aligned}
 \text{Revised } k_e &= \frac{12}{105} + 0.06 \\
 &= 0.1742 \text{ or } 17.42\%
 \end{aligned}$$

Question 5

XYZ Ltd. has the following book value capital structure:

<i>Equity Capital (in shares of Rs. 10 each, fully paid up- at par)</i>	<i>Rs. 15 crores</i>
<i>11% Preference Capital (in shares of Rs. 100 each, fully paid up- at par)</i>	<i>Rs. 1 crore</i>
<i>Retained Earnings</i>	<i>Rs. 20 crores</i>
<i>13.5% Debentures (of Rs. 100 each)</i>	<i>Rs. 10 crores</i>
<i>15% Term Loans</i>	<i>Rs. 12.5 crores</i>

The next expected dividend on equity shares per share is Rs. 3.60; the dividend per share is expected to grow at the rate of 7%. The market price per share is Rs. 40.

Preference stock, redeemable after ten years, is currently selling at Rs. 75 per share.

Debentures, redeemable after six years, are selling at Rs. 80 per debenture.

The Income tax rate for the company is 40%.

(i) Required

Calculate the weighted average cost of capital using:

- (a) book value proportions; and*
- (b) market value proportions.*

(ii) Define the weighted marginal cost of capital schedule for the company, if it raises Rs. 10 crores next year, given the following information:

- (a) the amount will be raised by equity and debt in equal proportions;*
- (b) the company expects to retain Rs. 1.5 crores earnings next year;*
- (c) the additional issue of equity shares will result in the net price per share being fixed at Rs. 32;*
- (d) the debt capital raised by way of term loans will cost 15% for the first Rs. 2.5 crores and 16% for the next Rs. 2.5 crores.*

(Final- Nov. 2000) (12 marks)

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Answer

(i) (a) **Statement showing computation of weighted average cost of capital by using Bookvalue proportions**

Source of finance	Amount (Book value) (Rs. in crores)	Weight (Book value proportion)	Cost of capital	Weighted cost of capital
		(a)	(b)	(c)= (a)x(b)
Equity capital	15	0.256 (Refer to working note 1)	0.16	0.04096
11% Preference capital	1	0.017 (Refer to working note 2)	0.1543	0.00262
Retained earnings	20	0.342 (Refer to working note 1)	0.16	0.05472
13.5% Debentures	10	0.171 (Refer to working note 3)	0.127	0.02171
15% term loans	12.5	0.214 (Refer to working note 4)	0.09	0.01926
	<u>58.5</u>	<u>1.00</u>		
Weighted average cost of capital				<u>0.013927</u> or 13.93%

(b) **Statement showing computation of weighted average cost of capital by using market value proportions**

Source of finance	Amount (Rs. in crores)	Weight (Market value proportions)	Cost of capital	Weighted cost of capital
		(a)	(b)	(c)=(a)x(b)
Equity capital (Rs. 1.5 crores x Rs. 40)	60.00	0.739 (Refer to working note 1)	0.16	0.11824
11% Preference capital (Rs. 1 lakh x Rs. 75)	0.75	0.009 (Refer to working note 2)	0.1543	0.00138
13.5% Debentures (Rs. 10 lakhs x Rs. 80)	8.00	0.098 (Refer to working note 3)	0.127	0.01245
15% Term loans	12.50	0.154 (Refer to working note 4)	0.09	0.01386
	<u>81.25</u>	<u>1.00</u>		
Weighted average cost of capital				<u>0.14593</u> or 14.59%

Note: Since retained earnings are treated as equity capital for purposes of calculation of cost of specific source of finance, the market value of the ordinary shares may be taken to represent the combined market value of equity shares and

retained earnings. The separate market values of retained earnings and ordinary shares may also be worked out by allocating to each of these a percentage of total market value equal to their percentage share of the total based on book value.

- (ii) **Statement showing weighted marginal cost of capital schedule for the company, if it raises Rs. 10 crores next year, given the following information:**

Chunk	Source of finance	Amount (Rs. in crores)	Weight	Cost of capital	Weighted cost of capital
			(a)	(b)	(c)=(a)x(b)
1.	Retained earnings	1.5	0.5	0.16 (Refer to working note 1)	0.08
	Debt	1.5	0.5	0.09 (Refer to working note 6)	0.045
	Weighted average cost of capital			<u>0.125</u> or 12.5%	
2.	Equity shares	1	0.5	0.1825 (Refer to working note 5)	0.09125
	Debt	1	0.5	0.09 (Refer to working note 6)	0.045
	Weighted average cost of capital			<u>0.13625</u> or 13.625%	
3.	Equity shares	2.5	0.5	0.1825 (Refer to working note 5)	0.09125
	Debt	2.5	0.5	0.096 (Refer to working note 6)	0.048
	Weighted average cost of capital			<u>0.13925</u> or 13.925%	

Working Notes:

1. Cost of equity capital and retained earnings (K_e)

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

Where, K_e = Cost of equity capital

D_1 = Expected dividend at the end of year 1

P_0 = Current market price of equity share

g = Growth rate of dividend

Now, it is given that D_1 = Rs. 3.60, P_0 = Rs. 40 and g = 7%

$$\text{Therefore, } K_e = \frac{\text{Rs. 3.60}}{\text{Rs. 40}} + 0.07$$

$$\text{or } K_e = 16\%$$

6.10 Financial Management

2. Cost of preference capital (K_p)

$$K_p = \frac{D + \left[\frac{F - P}{n} \right]}{\left[\frac{F + P}{n} \right]}$$

Where, D = Preference dividend

F = Face value of preference shares

P = Current market price of preference shares

N = Redemption period of preference shares

Now, it is given that D= 11%, F=Rs. 100, P= Rs. 75 and n= 10 years

$$\begin{aligned} \text{Therefore } K_p &= \frac{11 + \left[\frac{\text{Rs. } 100 - \text{Rs. } 75}{10} \right]}{\left[\frac{\text{Rs. } 100 + \text{Rs. } 75}{n} \right]} \times 100 \\ &= 15.43 \% \end{aligned}$$

3. Cost of debentures (K_d)

$$K_d = \frac{r(1-t) \left[\frac{F - P}{n} \right]}{\left[\frac{F + P}{n} \right]}$$

Where, r = Rate of interest

t = Tax rate applicable to the company

F = Face value of debentures

P = Current market price of debentures

n = Redemption period of debentures

Now it is given that r= 13.5%, t=40%, F=Rs. 100, P=Rs. 80 and n=6 years

$$\begin{aligned} \text{Therefore, } K_d &= \frac{13.5(1 - 0.40) + \left[\frac{\text{Rs. } 100 - \text{Rs. } 80}{6} \right]}{\left[\frac{\text{Rs. } 100 + \text{Rs. } 80}{6} \right]} \times 100 \\ &= 12.70\% \end{aligned}$$

4. Cost of term loans(K_t)

$$K_t = r(1-t)$$

Where, r = Rate of interest on term loans

t = Tax rate applicable to the company

Now, r = 15% and t = 40%

Therefore, $K_t = 15\% (1-0.40)$
 $= 9\%$

5. Cost of fresh equity share (K_e)

$$K_e = \left[\frac{D_1}{P} \right] + g$$

Now, D_1 = Rs. 3.60, P = Rs. 32 and $g=0.07$

Therefore, $K_e = \left[\frac{\text{Rs. 3.60}}{\text{Rs. 32}} \right] + 0.07$
 $= 18.25\%$

6. Cost of debt (K_d)

$$K_d = r(1-t)$$

(For first Rs. 2.5 crores)

r = 15% and t = 40%

Therefore, $K_d = 15\% (1-40\%)$
 $= 9\%$

(For the next 2.5 crores)

r = 16% and t = 40%

Therefore, $K_d = 16\% (1-40\%)$
 $= 9.6\%$

Question 6

A Company earns a profit of Rs.3,00,000 per annum after meeting its Interest liability of Rs.1,20,000 on 12% debentures. The Tax rate is 50%. The number of Equity Shares of Rs.10 each are 80,000 and the retained earnings amount to Rs.12,00,000. The company proposes to take up an expansion scheme for which a sum of Rs.4,00,000 is required. It is anticipated that after expansion, the company will be able to achieve the same return on investment as at present. The funds required for expansion can be raised either through debt at the rate of 12% or by issuing Equity Shares at par.

6.12 Financial Management

Required:

- (i) Compute the Earnings Per Share (EPS), if:
- the additional funds were raised as debt
 - the additional funds were raised by issue of equity shares.
- (ii) Advise the company as to which source of finance is preferable.

(PE-II- Nov. 2002) (6 marks)

Answer

Working Notes:

1. Capital employed before expansion plan :

	Rs.
Equity shares	8,00,000
Debentures	10,00,000
(Rs.1,20,000/12) × 100	
Retained earnings	12,00,000
Total capital employed	30,00,000

2. Earnings before the payment of interest and tax (EBIT)

	Rs.
Profit	3,00,000
Interest	1,20,000
EBIT	4,20,000

3. Return on investment (ROI)

$$\text{ROI} = \frac{\text{EBIT}}{\text{Capital employed}} \times 100 = \frac{\text{Rs.4,20,000}}{\text{Rs.30,00,000}} \times 100 = 14\%$$

4. Earnings before the payment of interest and tax (EBIT) after expansion

After expansion, capital employed = Rs.34,00,000

Desired EBIT = 14% × Rs.34,00,000 = Rs.4,76,000

(i) **Statement showing Earning Per Share (EPS)**

(Under present and anticipated expansion scheme)

	Present situation	Expansion scheme	
		Additional funds raised as	
	Rs.	Debt Rs.	Equity Rs.
EBIT: (A)	4,20,000	4,76,000	476,000

Capital Structure and Cost of Capital 6.13

	<i>(Refer to Working note 2)</i>	<i>(Refer to Working note 4)</i>	
Interest – Old capital	1,20,000	1,20,000	1,20,000
– New capital	–	48,000	–
		<i>(Rs.4,00,000 × 12%)</i>	
Total interest : (B)	1,20,000	1,68,000	1,20,000
EBT: {(A) – (B)}	3,00,000	3,08,000	3,56,000
Less: Tax (50% of EBT)	1,50,000	1,54,000	1,78,000
PAT	1,50,000	1,54,000	1,78,000
EPS	1.875	1.925	1.48
	<i>(Rs.1,50,000/ 80,000)</i>	<i>(Rs.1,54,000/ 80,000)</i>	<i>(Rs.1,78,000/ 1,20,000)</i>

- (ii) **Advise to the Company:** Since EPS is greater in the case when company arranges additional funds as debt. Therefore, debt scheme is better.

Question 7

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 Rs.6,00,000 and 12% debentures of Rs.4,00,000

Or

- (ii) Equity share capital of Rs.4,00,000, 14% preference share capital of Rs.2,00,000 and 12% debentures of Rs.4,00,000.

Assume the corporate tax rate is 35% and par value of equity share is Rs.10 in each case

. (PE-II- May. 2003) (3 marks)

Answer

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

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

$$\begin{aligned} \text{EPS}_{\text{Alternative(i)}} &= \frac{(\text{EBIT} - \text{Interest})(1 - \text{tax rate})}{\text{No. of equity shares}} \\ &= \frac{(\text{EBIT} - 0.12 \times \text{Rs.4,00,000})(1 - 0.35)}{60,000} \end{aligned}$$

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

$$\text{EPS}_{\text{Alternative(ii)}} = \frac{(\text{EBIT} - 0.12 \times \text{Rs.4,00,000})(1 - 0.35) - (0.14 \times \text{Rs.2,00,000})}{40,000}$$

6.14 Financial Management

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

$$\frac{(\text{EBIT} - 0.12 \times \text{Rs.}4,00,000)(1 - 0.35)}{60,000} = \frac{(\text{EBIT} - 0.12 \times \text{Rs.}4,00,000)(1 - 0.35) - (0.14 \times \text{Rs.}2,00,000)}{40,000}$$

$$\text{Or } \frac{0.65 \text{ EBIT} - \text{Rs.}31,200}{3} = \frac{0.65 \text{ EBIT} - \text{Rs.}59,200}{2}$$

$$\text{Or } 1.30 \text{ EBIT} - \text{Rs.}62,400 = 1.95 \text{ EBIT} - \text{Rs.}1,77,600$$

$$\text{Or } (1.95 - 1.30) \text{ EBIT} = \text{Rs.}1,77,600 - \text{Rs.}62,400 = \text{Rs.}1,15,200$$

$$\text{Or } \text{EBIT} = \frac{\text{Rs.}1,15,200}{0.65}$$

$$\text{Or } \text{EBIT} = \text{Rs.}1,77,231$$

Question 8

JKL Ltd. has the following book-value capital structure as on March 31, 2003.

	Rs.
Equity share capital (2,00,000 shares)	40,00,000
11.5% preference shares	10,00,000
10% debentures	<u>30,00,000</u>
	<u>80,00,000</u>

The equity share of the company sells for Rs.20. It is expected that the company will pay next year a dividend of Rs.2 per equity share, which is expected to grow at 5% p.a. forever. Assume a 35% corporate tax rate.

Required:

- (i) Compute weighted average cost of capital (WACC) of the company based on the existing capital structure.
- (ii) Compute the new WACC, if the company raises an additional Rs.20 lakhs debt by issuing 12% debentures. This would result in increasing the expected equity dividend to Rs.2.40 and leave the growth rate unchanged, but the price of equity share will fall to Rs. 16 per share.
- (iii) Comment on the use of weights in the computation of weighted average cost of capital.

(PE-II- May. 2003) (8 marks)

Answer

(i) Weighted Average Cost of Capital of the Company

(Based on Existing Capital Structure)

	After tax cost	Weights (Refer to working note 4)	Weighted cost
	(a)	(b)	(a) × (b)
Equity share capital cost (Refer to working note 1)	0.15	0.50	0.075
Cost of preference share capital @11.5% (Refer to working note 2)	0.115	0.125	0.014375
Cost of debentures (Refer to working note 3)	0.065	0.375	0.02437
Weighted average cost of capital			<u>11.375%</u>

Working Notes:

1. Cost of equity capital:

$$K_e = \frac{\text{Dividend}}{\text{Current market price of share}} + g$$

$$= \frac{\text{Rs.2}}{\text{Rs.20}} + 5\% = 15\% \text{ or } 0.15$$

2. Cost of preference share capital:

$$= \frac{\text{Annual preference share dividend}}{\text{Net proceeds in the issue of preference share}}$$

$$= \frac{\text{Rs.1,15,000}}{\text{Rs.10,00,000}} = 0.115$$

3. Cost of Debentures:

$$= \frac{1}{\text{Net proceeds}} (\text{Interest} - \text{Tax})$$

$$= \frac{1}{\text{Rs.30,00,000}} (\text{Rs.3,00,000} - \text{Rs.1,05,000})$$

$$= 0.065$$

6.16 Financial Management

4. Weights of equity share capital, preference share capital and debentures in total investment of Rs.80,00,000:

$$\begin{aligned}\text{Weight of equity share capital} &= \frac{\text{Total equity share capital}}{\text{Total investments}} \\ &= \frac{\text{Rs.40,00,000}}{\text{Rs.80,00,000}} = 0.50\end{aligned}$$

$$\begin{aligned}\text{Weight of preference share capital} &= \frac{\text{Total preference share amount}}{\text{Total investments}} \\ &= \frac{\text{Rs.10,00,000}}{\text{Rs.80,00,000}} = 0.125\end{aligned}$$

$$\begin{aligned}\text{Weight of debentures} &= \frac{\text{Total debentures}}{\text{Total investments}} \\ &= \frac{\text{Rs.30,00,000}}{\text{Rs.80,00,000}} = 0.375\end{aligned}$$

(ii) New Weighted Average Cost of Capital of the Company

(Based on new capital structure)

	After tax cost	Weights (Refer to working note 4)	Weighted cost
	(a)	(b)	(a) × (b)
Cost of equity share capital (Refer to working note 2)	0.20	0.40	0.080
Cost of preference share	0.115	0.10	0.0115
Cost of debentures @ 10%	0.065	0.30	0.0195
Cost of debentures @12%	0.078	0.20	<u>0.0156</u>
Weighted average cost of capital			<u>12.66%</u>

Working Notes:

(1) Weights of equity share capital, preference share and debentures in total investment of Rs.100,00,000

$$\text{Weight of equity share capital} = \frac{\text{Rs.40,00,000}}{\text{Rs.1,00,00,000}} = 0.4$$

$$\text{Weight of preference share capital} = \frac{\text{Rs.10,00,000}}{\text{Rs.1,00,00,000}} = 0.1$$

$$\text{Weight of debentures @10\%} = \frac{\text{Rs.30,00,000}}{\text{Rs.1,00,00,000}} = 0.30$$

$$\text{Weight of debentures @12\%} = \frac{\text{Rs.20,00,000}}{\text{Rs.1,00,00,000}} = 0.20$$

2. **Cost of equity capital:**

$$K_e = \frac{\text{Dividend}}{\text{Current market price of share}} + g$$

$$= \frac{\text{Rs.2.40}}{\text{Rs.16}} + 5\% = 20\%$$

(iii) **Comment:** In the computation of weighted average cost of capital weights are preferred to book value. For example, weights representing the capital structure under a corporate financing situation, its cash flows are preferred to earnings and market. Balance sheet is preferred to book value balance sheet.

Question 9

ABC Limited has the following book value capital structure:

Equity Share Capital (150 million shares, Rs.10 par)	Rs.1,500 million
Reserves and Surplus	Rs.2,250 million
10.5% Preference Share Capital (1 million shares, Rs.100 par)	Rs.100 million
9.5% Debentures (1.5 million debentures, Rs.1000 par)	Rs.1,500 million
8.5% Term Loans from Financial Institutions	Rs.500 million

The debentures of ABC Limited are redeemable after three years and are quoting at Rs.981.05 per debenture. The applicable income tax rate for the company is 35%.

The current market price per equity share is Rs.60. The prevailing default-risk free interest rate on 10-year GOI Treasury Bonds is 5.5%. The average market risk premium is 8%. The beta of the company is 1.1875.

The preferred stock of the company is redeemable after 5 years is currently selling at Rs.98.15 per preference share.

Required:

- Calculate weighted average cost of capital of the company using market value weights.
- Define the marginal cost of capital schedule for the firm if it raises Rs.750 million for a new project. The firm plans to have a target debt to value ratio of 20%. The beta of new project is 1.4375. The debt capital will be raised through term loans. It will carry interest rate of 9.5% for the first 100 million and 10% for the next Rs.50 million.

(PE-II- May 2004) (9 marks)

6.18 Financial Management

Answer

Working Notes:

1) **Computation of cost of debentures (K_d) :**

$$981.05 = \frac{95}{(1 + ytm)^1} + \frac{95}{(1 + ytm)^2} + \frac{1095}{(1 + ytm)^3}$$

$$\text{Yield to maturity (ytm)} = 10\% \text{ (approximately)}$$

$$\begin{aligned} K_d &= ytm \times (1 - T_c) \\ &= 10\% \times (1 - 0.35) \\ &= 6.5\% \end{aligned}$$

2) **Computation of cost of term loans (K_T) :**

$$\begin{aligned} &= i \times (1 - T_c) \\ &= 8.5\% (1 - 0.35) \\ &= 5.525\% \end{aligned}$$

3) **Computation of cost of preference capital (K_P) :**

$$98.5 = \frac{10.5}{(1 + YTM)^1} + \frac{10.5}{(1 + YTM)^2} + \frac{10.5}{(1 + YTM)^3} + \frac{10.5}{(1 + YTM)^4} + \frac{10.5}{(1 + YTM)^5}$$

$$YTM = 11\% \text{ (approximately)}$$

$$K_p = 11\%$$

4) **Computation of cost of equity (K_E) :**

$$\begin{aligned} &= r_f + \text{Average market risk premium} \times \text{Beta} \\ &= 5.5\% + 8\% \times 1.1875 \\ &= 15\% \end{aligned}$$

5) **Computation of proportion of equity capital, preference share, debentures and term loans in the market value of capital structure:**

(Rs. in million)

	Market value of capital structure Rs.	<u>Proportion</u>
Equity share capital (150 million share $\times$ Rs.60)	9,000	81.3000
10.5% Preferential share capital (1 million shares $\times$ 98.15)	98.15	0.889

Capital Structure and Cost of Capital 6.19

9.5 % Debentures (1.5 million debentures × Rs.981.05)	1,471.575	13.294
8.5% Term loans	500	4.517
	11,069.725	100

(i) **Weighted Average cost of capital (WACC) :** (Using market value weights)

$$\begin{aligned}
 \text{WACC} &= K_d \times \frac{D}{V} + K_T \times \frac{T}{V} + K_P \times \frac{P}{V} + K_E \times \frac{E}{V} \\
 &= 6.5\% \times 0.1329 + 5.25\% \times 0.04517 + 11\% \times 0.0089 + 15\% \times 0.813 \\
 &= 0.008638 + 0.002495 + 0.00097 + 0.12195 \\
 &= 13.41\%
 \end{aligned}$$

* For the values of K_d , K_T , K_P and K_E and weights refer to working notes 1 to 5 respectively.

(ii) **Marginal cost of capital (MCC) schedule :**

$$\begin{aligned}
 K_E (\text{New Project}) &= 5.5\% + 8\% \times 1.4375 = 17\% \\
 K_d &= 9.5\% \times (1 - 0.35) = 6.175\% \\
 &= 10\% \times (1 - 0.35) = 6.5\% \\
 \text{MCC} &= 17\% \times 0.80 + 6.175\% \times \frac{100}{750} + 6.5\% \times \frac{50}{750} \\
 &= 14.86\% \text{ (Approximately)}
 \end{aligned}$$

Question 10

You are analysing the beta for ABC Computers Ltd. and have divided the company into four broad business groups, with market values and betas for each group.

Business group	Market value of equity	Unleveraged beta
Main frames	Rs. 100 billion	1.10
Personal Computers	Rs. 100 billion	1.50
Software	Rs. 50 billion	2.00
Printers	Rs. 150 billion	1.00

ABC Computers Ltd. had Rs. 50 billion in debt outstanding.

6.20 Financial Management

Required:

- (i) Estimate the beta for ABC Computers Ltd. as a Company. Is this beta going to be equal to the beta estimated by regressing past returns on ABC Computers stock against a market index. Why or why not ?
- (ii) If the treasury bond rate is 7.5%, estimate the cost of equity for ABC Computers Ltd. Estimate the cost of equity for each division. Which cost of equity would you use to value the printer division ? The average market risk premium is 8.5%.

(PE-II-Nov. 2004) (6 marks)

Answer

- (i) Beta of ABC Computers

$$\begin{aligned} &= 1.10 \times 2/8 + 1.50 \times 2/8 + 2 \times 1/8 + 1 \times 3/8 \\ &= 1.275 \end{aligned}$$

Beta coefficient is a measure of volatility of securities return relative to the returns of a broad based market portfolio. Hence beta measures volatility of ABC Computers stock return against broad based market portfolio. In this case we are considering four business groups in computer segment and not a broad based market portfolio, therefore beta calculations will not be the same.

- (ii) Cost of equity

$$\begin{aligned} &= r_f + \text{av mkt risk premium} \times \beta \\ &= 7.5\% + 1.275 \times 8.5\% = 18.34\% \end{aligned}$$

Main frame KE = $7.5\% + 1.10 \times 8.5\% = 16.85\%$

Personal KE = $7.5\% + 1.5 \times 8.5\% = 20.25\%$

Computers

Software KE = $7.5\% + 2 \times 8.5\% = 24.5\%$

Printers KE = $7.5\% + 1 \times 8.5\% = 16\%$

To value printer division, the use of 16% KE is recommended.

Question 11

D Ltd. is foreseeing a growth rate of 12% per annum in the next two years. The growth rate is likely to be 10% for the third and fourth year. After that the growth rate is expected to stabilise at 8% per annum. If the last dividend was Rs. 1.50 per share and the investor's required rate of return is 16%, determine the current value of equity share of the company.

The P.V. factors at 16%

Year	1	2	3	4
P.V. Factor	.862	.743	.641	.552

(PE-II-May 2005) (6 marks)

Answer

The current value of equity share of D Ltd. is sum of the following:

- (i) Presently value (PV) of dividends payments during 1-4 years; and
- (ii) Present value (PV) of expected market price at the end of the fourth year based on constant growth rate of 8 per cent.

PV of dividends – year 1-4

Year	Dividend	PV factor at 16%	Total PV (in Rs.)
1	$1.50(1 + 0.12)=1.68$	0.862	1.45
2	$1.68 (1+0.12)= 1.88$	0.743	1.40
3	$1.88 (1 + 0.10)=2.07$	0.641	1.33
4	$2.07 (1 + 0.10)= 2.28$	0.552	1.26
Total			5.44

Present value of the market price (P_4): end of the fourth year –

$$P_4 = D_5 / (K_e - g) = \text{Rs. } 2.28 (1.08) / (16\% - 8\%) = \text{Rs. } 30.78$$

$$\text{PV of Rs. } 30.78 = \text{Rs. } 30.78 \times 0.552 = \text{Rs. } 16.99$$

Hence,

$$\text{Value of equity shares Rs. } 5.44 + \text{Rs. } 16.99 = \text{Rs. } 22.43$$

Question 12

The R&G Company has following capital structure at 31st March 2004, which is considered to be optimum:

	Rs.
13% debenture	3,60,000
11% preference share capital	1,20,000
Equity share capital (2,00,000 shares)	19,20,000

The company's share has a current market price of Rs. 27.75 per share. The expected dividend per share in next year is 50 percent of the 2004 EPS. The EPS of last 10 years is as follows. The past trends are expected to continue:

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
EPS										
(Rs.)	1.00	1.120	1.254	1.405	1.574	1.762	1.974	2.211	2.476	2.773

6.22 Financial Management

The company can issue 14 percent new debenture. The company's debenture is currently selling at Rs. 98. The new preference issue can be sold at a net price of Rs. 9.80, paying a dividend of Rs. 1.20 per share. The company's marginal tax rate is 50%.

- (i) Calculate the after tax cost (a) of new debts and new preference share capital, (b) of ordinary equity, assuming new equity comes from retained earnings.
- (ii) Calculate the marginal cost of capital.
- (iii) How much can be spent for capital investment before new ordinary share must be sold? Assuming that retained earnings available for next year's investment are 50% of 2004 earnings.
- (iv) What will be marginal cost of capital (cost of fund raised in excess of the amount calculated in part (iii)) if the company can sell new ordinary shares to net Rs. 20 per share? The cost of debt and of preference capital is constant.

(PE-II-May 2005) (2+1+2+2=7 marks)

Answer

The existing capital structure is assumed to be optimum.

Existing Capital Structure Analysis

Type of capital	Amount (Rs)	Proportions
13% debentures	3,60,000	0.15
11% Preference	1,20,000	0.05
Equity	19,20,000	0.80
	24,00,000	1.00

(i) (a) After tax cost of debt = $K_d = \frac{14}{98} \times (1 - 0.5)$

$$= 0.07143$$

After tax cost of preference capital (new)

$$K_p = \frac{1.20}{9.80} = 0.122449$$

(b) After tax cost of retained earnings

$$K_e = \frac{1.3865}{27.75} + g$$

(here 'g' is the growth rate)

$$= 0.05 + 0.12 = 0.17$$

Capital Structure and Cost of Capital 6.23

(ii)

<i>Types of capital</i>	<i>Proportion</i>	<i>Specific cost</i>	<i>Product</i>
(1)	(2)	(3)	(2) × (3)
Debt	.15	.07143	.0107
Preference	.05	.122449	.0061
Equity	.80	.17	.1360
Marginal cost of capital at existing capital structure			.1528 or 15.28%

- (iii) The company can spend the following amount without increasing its MCC and without selling the new shares.

$$\text{Retained earnings} = 1.3865 \times 2,00,000 = 2,77,300$$

The ordinary equity (retained earnings in this case) is 80% of the total capital. Thus investment before issuing equity ($\frac{2,77,300}{80} \times 100$) = Rs 3,46,625

- (iv) if the company spends more than Rs3, 46,625 , it will have to issue new shares . The cost of new issue of ordinary share is :

$$K_e = \frac{1.3865}{20} + 0.12 = 0.1893$$

The marginal cost of capital of Rs 3,46,625

<i>Types of capital</i>	<i>Proportion</i>	<i>Specific cost</i>	<i>Product</i>
(1)	(2)	(3)	(2) × (3)
Debt	.15	.07143	.0107
Preference	.05	.122449	.0061
Equity(new)	.80	.1893	0.15144
Marginal cost of capital at existing capital structure			0.16824 or 16.82 %

Question 13

A Company needs Rs. 31,25,000 for the construction of new plant. The following three plans are feasible:

- I The Company may issue 3,12,500 equity shares at Rs. 10 per share.

6.24 Financial Management

- II The Company may issue 1,56,250 ordinary equity shares at Rs. 10 per share and 15,625 debentures of Rs., 100 denomination bearing a 8% rate of interest.
- III The Company may issue 1,56,250 equity shares at Rs. 10 per share and 15,625 preference shares at Rs. 100 epr share bearing a 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. (PE-II-Nov.2005) (6+1+3=10 marks)

Answer

(i) Computation of EPS under three-financial plans.

Plan I: Equity Financing

EBIT	Rs. 62,500	Rs. 1,25,000	Rs. 2,50,000	Rs. 3,75,000	Rs. 6,25,000
Interest	0	0	0	0	0
EBT	Rs. 62,500	Rs. 1,25,000	Rs. 2,50,000	Rs. 3,75,000	Rs. 6,25,000
Less: Taxes 40%	25,000	50,000	1,00,000	1,50,000	2,50,000
PAT	Rs. 37,500	Rs. 75,000	Rs. 1,50,000	Rs. 2,25,000	Rs. 3,75,000
No. of equity shares	3,12,500	3,12,500	3,12,500	3,12,500	3,12,500
EPS	Rs. 0.12	0.24	0.48	0.72	1.20

Plan II: Debt – Equity Mix

EBIT	Rs. 62,500	Rs. 1,25,000	Rs. 2,50,000	Rs. 3,75,000	Rs. 6,25,000
Less: Interest	1,25,000	1,25,000	1,25,000	1,25,000	1,25,000
EBT	(62,500)	0	1,25,000	2,50,000	5,00,000
Less: Taxes 40%	25,000*	0	50,000	1,00,000	2,00,000
PAT	(37,500)	0	75,000	1,50,000	3,00,000
No. of equity shares	1,56,250	1,56,250	1,56,250	1,56,250	1,56,250
EPS	(Rs. 0.24)	0	0.48	0.96	1.92

* The Company will be able to set off losses against other profits. If the Company has no profits from operations, losses will be carried forward.

Plan III : Preference Shares – Equity Mix

EBIT	Rs. 62,500	Rs 1,25,000	Rs. 2,50,000	Rs. 3,75,000	Rs. 6,25,000
Less: Interest	0	0	0	0	0
EBT	62,500	1,25,000	2,50,000	3,75,000	6,25,000
Less: Taxes (40%)	25,000	50,000	1,00,000	1,50,000	2,50,000
PAT	37,500	75,000	1,50,000	2,25,000	3,75,000
Less: Pref. dividend	1,25,000	1,25,000	1,25,000	1,25,000	1,25,000
PAT for ordinary shareholders	(87,500)	(50,000)	25,000	1,00,000	2,50,000
No. of Equity shares	1,56,250	1,56,250	1,56,250	1,56,250	1,56,250
EPS	(0.56)	(0.32)	0.16	0.64	1.60

- (ii) The choice of the financing plan will depend on the state of economic conditions. If the company's sales are increasing, the EPS will be maximum under Plan II: Debt – Equity Mix. Under favourable economic conditions, debt financing gives more benefit due to tax shield availability than equity or preference financing.

(iii) EBIT – EPS Indifference Point : Plan I and Plan II

$$\frac{(\text{EBIT}^*) \times (1 - T_c)}{N_1} = \frac{(\text{EBIT}^* - \text{Interest}) \times (1 - T_c)}{N_2}$$

$$\frac{\text{EBIT}^* (1 - 0.40)}{3,12,500} = \frac{(\text{EBIT}^* - 1,25,000) \times (1 - 0.40)}{1,56,250}$$

$$\begin{aligned} \text{EBIT}^* &= \frac{3,12,500}{3,12,500 - 1,56,250} \times 1,25,000 \\ &= \text{Rs. } 2,50,000 \end{aligned}$$

EBIT – EPS Indifference Point: Plan I and Plan III

$$\frac{\text{EBIT}^* (1 - T_c)}{N_1} = \frac{\text{EBIT}^* (1 - T_c) - \text{Pref. Div.}}{N_2}$$

$$\text{EBIT}^* = \frac{N_1}{N_1 - N_2} \times \frac{\text{Pref. Div.}}{1 - T_c}$$

6.26 Financial Management

$$= \frac{3,12,500}{3,12,500 - 1,56,250} \times \frac{1,25,000}{1 - 0.4}$$
$$= \text{Rs. } 4,16,666.67$$

Question 14

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

Required:

(i) Calculate the cost of debt after tax, if debentures are issued at

- (a) Par
- (b) 10% Discount
- (c) 10% Premium.

(ii) If brokerage is paid at 2%, what will be the cost of debentures, if issue is at par?

(PE-II-May 2006)(6 marks)

Answer

$$K_d = \frac{I(1 - T_c) + \frac{(RV - NP)}{N}}{\left(\frac{RV + NP}{2} \right)}$$

Where,

I = Annual Interest Payment

NP = Net proceeds of debentures

RV = Redemption value of debentures

T_c = Income tax rate

N = Life of debentures

(i) (a) Cost of debentures issued at par.

$$= \frac{1,20,000 \times (1 - 0.35) + \frac{(10,00,000 - 10,00,000)}{7}}{\left(\frac{10,00,000 + 10,00,000}{2} \right)} = \frac{78,000}{10,00,000} = 7.8\%$$

(b) **Cost of debentures issued at 10% discount**

$$= \frac{1,20,000 \times (1 - 0.35) + \frac{(10,00,000 - 9,00,000)}{7}}{\left(\frac{10,00,000 + 9,00,000}{2} \right)}$$

$$= \frac{78,000 + 14,286}{9,50,000} = 9.71\%$$

(c) **Cost of debentures issued at 10% Premium**

$$K_d = \frac{1,20,000 \times (1 - 0.35) + \frac{(10,00,000 - 11,00,000)}{7}}{\left(\frac{10,00,000 + 11,00,000}{2} \right)}$$

$$= \frac{78,000 - 14,286}{10,50,000} = 6.07\%$$

(ii) **Cost of debentures, if brokerage is paid at 2% and debentures are issued at par**

$$K_d = \frac{1,20,000 \times (1 - 0.35) + \frac{(10,00,000 - 9,80,000)}{7}}{\left(\frac{(10,00,000 - 20,000) + 10,00,000}{2} \right)}$$

$$= \frac{80,857}{9,90,000} = 8.17\%$$

Question 15

You are required to determine the weighted average cost of capital of a firm using (i) book-value weights and (ii) market value weights. The following information is available for your perusal:

Present book value of the firm's capital structure is:

	Rs.
Debentures of Rs. 100 each	8,00,000
Preference shares of Rs. 100 each	2,00,000
Equity shares of Rs. 10 each	<u>10,00,000</u>
	<u>20,00,000</u>

All these securities are traded in the capital markets. Recent prices are:

6.28 Financial Management

Debentures @ Rs. 110, Preference shares @ Rs. 120 and Equity shares @ Rs. 22.

Anticipated external financing opportunities are as follows:

- (i) Rs. 100 per debenture redeemable at par : 20 years maturity 8% coupon rate, 4% flotation costs, sale price Rs. 100.
- (ii) Rs. 100 preference share redeemable at par : 15 years maturity, 10% dividend rate, 5% flotation costs, sale price Rs. 100.
- (iii) Equity shares : Rs. 2 per share flotation costs, sale price Rs. 22.

In addition, the dividend expected on the equity share at the end of the year is Rs. 2 per share; the anticipated growth rate in dividends is 5% and the firm has the practice of paying all its earnings in the form of dividend. The corporate tax rate is 50%.

(PE-II-May 2007) (9 marks)

Answer

(a) Working Notes:

Determination of Specific Costs:

- (i) Cost of Debentures before tax (k_d)

$$k_d = \frac{I + \frac{(P - NP)}{n}}{\frac{(P + NP)}{2}}$$

Where,

I = Annual interest payment

P = Redeemable/payable value of debenture at maturity

NP = Net sale value from issue of debenture/face value – expenses

$$\begin{aligned} k_d &= \frac{8 + \frac{(100 - 96)}{20}}{\frac{(100 + 96)}{2}} \\ &= \frac{8 + .20}{98} = .0836 \text{ or } 8.36\% \end{aligned}$$

Cost of debenture after tax = $K_d (1 - t)$

$$= 8.36 (1 - .50) = 4.18\%.$$

(ii) *Cost of Preference Shares (k_p)*

$$k_p = \frac{D + \frac{(P - NP)}{n}}{\frac{(P + NP)}{2}}$$

Where,

- D = Fixed annual dividend
P = Redeemable value of preference shares
n = Number of years to maturity.

$$K_p = \frac{10 + \frac{(100 - 95)}{15}}{\frac{(100 + 95)}{2}} = \frac{10.33}{97.5} = .1059 \text{ or } 10.59\%$$

(iii) *Cost of Equity (k_e)*

$$k_e = \frac{D}{NP} + g$$

Where,

- D = Expected dividend per share
NP = Net proceeds per share
g = Growth expected in dividend

$$k_e = \frac{2}{22 - 2} + .05 = \frac{2}{20} + .05 = .10 + .05 = .15 \text{ or } 15\%.$$

(i) **Computation of Weighted Average Cost of Capital based on Book Value Weights**

<i>Source of Capital</i>	<i>Book Value Rs.</i>	<i>Weights to Total Capital</i>	<i>Specific Cost</i>	<i>Total Cost</i>
Debentures (Rs. 100 per debenture)	8,00,000	0.40	0.0418	0.0167
Preference Shares (Rs. 100 per share)	2,00,000	0.10	0.1059	0.0106
Equity Shares (Rs. 10 per share)	<u>10,00,000</u>	<u>0.50</u>	0.1500	<u>0.0750</u>
	<u>20,00,000</u>	<u>1.00</u>		<u>0.1023</u>

Cost of Capital = 10.23%

6.30 Financial Management

(ii) **Computation of Weighted Average Cost of Capital
based on Market Value Weights**

Source of Capital	Market Value Rs.	Weights to Total Capital	Specific Cost	Total Cost
Debentures (Rs. 110 per debenture)	8,80,000	0.2651	0.0418	0.01108
Preference Shares (Rs. 120 per share)	2,40,000	0.0723	0.1059	0.00766
Equity Shares (Rs. 22 per share)	<u>22,00,000</u>	<u>0.6626</u>	0.1500	<u>0.09939</u>
	<u>33,20,000</u>	<u>1.00</u>		<u>0.11813</u>

Cost of Capital = 11.81%

Question 16

A new project is under consideration in Zip Ltd., which requires a capital investment of Rs. 4.50 crore. Interest on term loan is 12% and Corporate Tax rate is 50%. If the Debt Equity ratio insisted by the financing agencies is 2 : 1, calculate the point of indifference for the project.

(PE-II-May 2008) (4 marks)

Answer

If financing agencies insist 2 : 1 Debt equity ratio then company has two options:

- (i) To Arrange whole amount the company can issue equity shares.
- (ii) Company should arrange 3 crores by 12% term loan and 1.50 crore through equity share so that 2:1 Debt-equity ratio can be maintained.

In first option interest will be Zero and in second option the interest will be Rs. 36,00,000

Point of Indifference

$$\frac{(x - R_1)(1 - T)}{N_1} = \frac{(x - R_2)(1 - T)}{N_2}$$

$$\text{or } \frac{(x - 0)(1 - 0.5)}{450 \text{ Lakhs}} = \frac{(x - 36 \text{ Lakhs})(1 - 0.5)}{150 \text{ Lakhs}}$$

$$\text{or } \frac{0.5x}{450} = \frac{0.5x - 18}{150}$$

$$\text{or } 75x = 225x - 8100$$

$$\text{or } 8100 = 225x - 75x$$

$$\text{or } 8100 = 150x$$

$$x = \frac{8100}{150} = 54 \text{ Lakhs}$$

EBIT at point of Indifference will be Rs.54 Lakhs.

Note: The aforesaid solution is based on the assumption that the face value of a share is Re. 1. Hence, the number of shares in denominator being 450 lakhs and 150 lakhs respectively. However, if a student assumes face values being Rs. 10 per share and Rs. 100 per share, the conclusion will remain the same.

Alternative presentations are as follows:

(A) Point of Indifference at share value being Rs. 10.

$$\frac{(x - R_1)(1 - T)}{N_1} = \frac{(x - R_2)(1 - T)}{N_2}$$

$$\text{or } \frac{(x - 0)(1 - 0.5)}{45 \text{ Lakhs}} = \frac{(x - 36 \text{ Lakhs})(1 - 0.5)}{15 \text{ Lakhs}}$$

$$\text{or } \frac{0.5x}{45} = \frac{0.5x - 18}{15}$$

$$\text{or } 7.5x = 22.5x - 810$$

$$\text{or } 810 = 22.5x - 7.5x$$

$$\text{or } 810 = 15x$$

$$x = \frac{810}{15} = 54 \text{ Lakhs}$$

EBIT at point of Indifference will be Rs.54 Lakhs.

(B) Point of Indifference at share value being Rs. 100.

$$\frac{(x - R_1)(1 - T)}{N_1} = \frac{(x - R_2)(1 - T)}{N_2}$$

$$\text{or } \frac{(x - 0)(1 - 0.5)}{4.50 \text{ Lakhs}} = \frac{(x - 36 \text{ Lakhs})(1 - 0.5)}{1.50 \text{ Lakhs}}$$

$$\text{or } \frac{0.5x}{4.50} = \frac{0.5x - 18}{1.50}$$

$$\text{or } 0.75x = 2.25x - 81$$

$$\text{or } 81 = 2.25x - 0.75x$$

$$\text{or } 81 = 1.5x$$

$$x = \frac{81}{1.5} = 54 \text{ Lakhs}$$

EBIT at point of Indifference will be Rs.54 Lakhs.

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Question 17

The following is the capital structure of a Company:

Source of capital	Book value Rs.	Market value Rs.
Equity shares @ Rs. 100 each	80,00,000	1,60,00,000
9 per cent cumulative preference shares @ Rs. 100 each	20,00,000	24,00,000
11 per cent debentures	60,00,000	66,00,000
Retained earnings	<u>40,00,000</u>	<u>—</u>
	<u>2,00,00,000</u>	<u>2,50,00,000</u>

The current market price of the company's equity share is Rs. 200. For the last year the company had paid equity dividend at 25 per cent and its dividend is likely to grow 5 per cent every year. The corporate tax rate is 30 per cent and shareholders personal income tax rate is 20 per cent.

You are required to calculate:

- Cost of capital for each source of capital.
- Weighted average cost of capital on the basis of book value weights.
- Weighted average cost of capital on the basis of market value weights.

(PE-II-Nov. 2008) (7 marks)

Answer

(i) Calculation of Cost of Capital for each source of capital:

- Cost of Equity Capital:

$$\begin{aligned}K_e &= \frac{\text{DPS} (1+g)}{\text{MP}} \times 100 + g \\&= \frac{25 (1+0.05)}{200} \times 100 + 5 \\&= \frac{26.25}{200} \times 100 + 5 \\&= 13.125 + 5 \\&= 18.125\%.\end{aligned}$$

- Cost of preference capital or $K_p = 9\%$.

- Cost of Debentures: K_d (after tax) = $r (1 - T)$
 $= 11 (1 - 0.3)$
 $= 7.7\%$.

$$\begin{aligned}
 4. \quad \text{Cost of Retained Earnings: } K_r &= K_e (1 - T_p) \\
 &= 18.125 (1 - 0.2) \\
 &= 14.5\%.
 \end{aligned}$$

(ii) **Weighted average cost of capital**

(On the basis of Book Value Weights)

Source	Amount (Book Value) (Rs.)	Weights	Cost of Capital (after tax) (%)	WACC (%)
(1)	(2)	(3)	(4)	(5) = (3) × (4)
Equity Capital	80,00,000	0.4	18.125	7.25
Preference Capital	20,00,000	0.1	9	0.90
Debentures	60,00,000	0.3	7.7	2.31
Retained earnings	<u>40,00,000</u>	<u>0.2</u>	14.5	<u>2.90</u>
	<u>2,00,00,000</u>	<u>1.00</u>		<u>13.36</u>

Hence, WACC on the basis of Book Value Weights = 13.36%.

(iii) **Weighted Average Cost of Capital**

(On the basis of Market value weights)

Source	Amount (Market Value) (Rs.)	Weights	Cost of Capital (after tax) (%)	WACC (%)
(1)	(2)	(3)	(4)	(5) = (3) × (4)
Equity Capital	1,60,00,000	0.640	18.125	11.600
Preference Capital	24,00,000	0.096	9	0.864
Debentures	66,00,000	0.264	7.7	2.033
Retained earnings	—	—	—	—
	<u>2,50,00,000</u>	<u>1.000</u>		<u>14.497</u>

Hence, WACC on the basis of Market Value Weights = 14.497%

Question 18

Discuss briefly the impact of taxation on Corporate Financing. (Final-Nov. 1996) (8 marks)

Answer

Impact of Taxation on Corporate Financing: Tax is levied on the profits of the company. Tax is also levied on the dividends received by the shareholders in their hands though such dividends are declared out of after tax profits. Thus the corporate entity and the owners suffer tax twice in a sense. This pushes the cost of equity capital. On the other hand interest paid on the debt capital is a deductible expenditure and hence company does not pay tax on interest on debt capital. This reduces the cost of debts. Debt is a less costly source of funds and if the

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finance manager prudently mixes debt and equity, the weighted average cost of capital will get greatly reduced.

Depreciation is not an outgo in cash but it is deductible in computing the income subject to tax. There will be saving in tax on depreciation and such savings could be profitably employed. Thus both interest and depreciation provide tax shield and have a tendency to increase EPS. Further the unabsorbed depreciation can be carried forward indefinitely and this will be helpful for loss making concerns which start earning profits in future. The depreciation loss of one company can be carried forward for set off in another company's profits in the case of amalgamations in specified circumstances and such a provision will help growth of companies and rehabilitation of sick units. The finance manager of amalgamating company will bear this benefit for the tax shield it carries in planning the activities.

Thus the impact of tax will be felt in cost of capital, earnings per share and the cash inflows which are relevant for capital budgeting and in planning the capital structure.

Tax considerations are important as they affect the liquidity of the concerns. They are relevant in deciding the leasing of the assets, transactions of sale and lease back, and also in floating joint venture in foreign countries where tax rate and concessions may be advantageous. Tax implications will be felt in choosing the size and nature of industry and in its location as the tax laws give fillip to small units producing certain products and incentives are given for backward areas. Tax considerations in these matters are relevant for purposes of preserving and protecting internal funds.

Question 19

Explain, briefly, Modigliani and Miller approach on Cost of Capital

(Final May 1997)(PE-II-Nov. 2002 & May 2007) (10 marks)

Answer

Modigliani and Miller approach to Cost of Capital: Modigliani and Miller's argue that the total cost of capital of a particular corporation is independent of its methods and level of financing. According to them a change in the debt equity ratio does not affect the cost of capital. This is because a change in the debt equity ratio changes the risk element of the company which in turn changes the expectations of the shareholders from the particular shares of the company. Hence they contend that leverages has little effect on the overall cost of capital or on the market price.

Modigliani and Miller made the following assumptions and the derivations there from:

Assumptions:

- (i) Capital markets are perfect. Information is costless and readily available to all investors, there are no transaction costs; and all securities are infinitely divisible. Investors are assumed to be rational and to behave accordingly.
- (ii) The average expected future operating earnings of a firm are represented by a subjective random variable. It is assumed that the expected values of the probability distributions of all investors are the same. Implied in the MM illustration is that the expected values of

the probability distributions of expected operating earnings for all future periods are the same as present operating earnings.

- (iii) Firms can be categorised into “equivalent return” classes. All firms within a class have the same degree of business risk.
- (iv) The absence of corporate income taxes is assumed.

Their three basic propositions are :

- (i) The total market value of the firm and its cost of capital are independent of its capital structure. The total market value of a firm is given by capitalising the expected stream of operating earnings at a discount rate appropriate for its risk class.
- (ii) The expected yield of a share of stock, K_e is equal to the capitalisation rate of a pure equity stream, plus a premium for financial risk equal to the difference between the pure equity capitalization rate and K_g times the ratio B/S . In other words, K_e increases in a manner to exactly offset the use of cheaper debt funds.
- (iii) The cut-off rate for investment purposes is completely independent of the way in which an investment is financed. This proposition alongwith the first implies a complete separation of the investment and financing decisions of the firm.

Conclusion: The theory propounded by them is based on the prevalence of perfect market conditions which are rare to find. Corporate taxes and personal taxes are a reality and they exert appreciable influence over decision making whether to have debt or equity.

Question 20

Discuss the relationship between the financial leverage and firms required rate of return to equity shareholders as per Modigliani and Miller Proposition II.

(PE-II-May 2003 & May 2004) (3 marks)

Answer

Relationship between the financial leverage and firm's required rate of return to equity shareholders with corporate taxes is given by the following relation :

$$r_E = r_0 + \frac{D}{E}(1 - T_C)(r_0 - r_B)$$

Where,

r_E = required rate of return to equity shareholders

r_0 = required rate of return for an all equity firm

D = Debt amount in capital structure

E = Equity amount in capital structure

T_C = Corporate tax rate

r_B = required rate of return to lenders

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Question 21

Discuss the major considerations in capital structure planning.

(PE-II-Nov. 2003, May 2006 & Nov. 2007) (6 marks)

Answer

Major considerations in capital structure planning

There are three major considerations, i.e. risk, cost of capital and control, which help the finance manager in determining the proportion in which he can raise funds from various sources.

Although, three factors, i.e., risk, cost and control determine the capital structure of a particular business undertaking at a given point of time.

Risk: The finance manager attempts to design the capital structure in such a manner, so that risk and cost are the least and the control of the existing management is diluted to the least extent. However, there are also subsidiary factors also like – marketability of the issue, maneuverability and flexibility of the capital structure, timing of raising the funds. Risk is of two kinds, i.e., Financial risk and Business risk. Here we are concerned primarily with the financial risk. Financial risk also is of two types:

- Risk of cash insolvency
- Risk of variation in the expected earnings available to equity share-holders

Cost of Capital: Cost is an important consideration in capital structure decisions. It is obvious that a business should be at least capable of earning enough revenue to meet its cost of capital and finance its growth. Hence, along with a risk as a factor, the finance manager has to consider the cost aspect carefully while determining the capital structure.

Control: Along with cost and risk factors, the control aspect is also an important consideration in planning the capital structure. When a company issues further equity shares, it automatically dilutes the controlling interest of the present owners. Similarly, preference shareholders can have voting rights and thereby affect the composition of the Board of Directors, in case dividends on such shares are not paid for two consecutive years. Financial institutions normally stipulate that they shall have one or more directors on the Boards. Hence, when the management agrees to raise loans from financial institutions, by implication it agrees to forego a part of its control over the company. It is obvious, therefore, that decisions concerning capital structure are taken after keeping the control factor in mind.

Question 22

Discuss the dividend-price approach, and earnings price approach to estimate cost of equity capital.

(PE-II-Nov. 2006) (2 marks)

Answer

In dividend price approach, cost of equity capital is computed by dividing the current dividend by average market price per share. This ratio expresses the cost of equity capital in relation to what yield the company should pay to attract investors. It is computed as:

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

Where,

D_1 = Dividend per share in period 1

P_0 = Market price per share today

Whereas, on the other hand, the advocates of earnings price approach co-relate the earnings of the company with the market price of its share. Accordingly, the cost of ordinary share capital would be based upon the expected rate of earnings of a company. This approach is similar to dividend price approach, only it seeks to nullify the effect of changes in dividend policy.

Question 23

Write a short note on Pecking order theory of capital structure. (Final- Nov. 2000) (5 marks)

Answer

Pecking order Theory of Capital Structure: The pecking order theory was proposed by Donaldson in 1961. The pecking order theory suggests that firm rely for finance, as much as they can, on internally generated funds. If internally generated funds are not enough then they will move to additional debt finance then equity. This is because the issue cost of internally generated funds have the lowest issue cost and cost of new equity is the highest. Myers has suggested that the firm follows a 'modified pecking order' in their approach to financing. Myers has suggested asymmetric information as a reason for heavy reliance on internal generated funds. He demonstrates that with asymmetric information, equity shares are interpreted by the market as bad news since managers are only motivated to issue equity share when share markets are undeveloped. Further, the use of internal finance ensures that there is regular source of finance which might be in line with company's expansion programme. If additional funds are required over and above internally generated funds, then borrowings will be next alternative in this theory.

Thus, pecking order theory rests on:

- (i) Stickly dividend policy,
- (ii) A preference for internal funds,
- (ii) An aversion to issue equity shares.