3. COST OF CAPITAL

ASSIGNMENT SOLUTIONS

PROBLEM NO: 1

Estimation of Cost of Debt in each of the cases:

Particulars	CASE-A	CASE-B	CASE-C	CASE-D
	Par	Par	10% premium	10% Discount
a) Interest (1- tax)	10.5	10.5	10.5	10.5
b) Net Proceeds	100	95	104.5	85.5
c) Cost of debt= interest (1-tax)/NP	10.5%	11.05	10.05	12.28

* Net proceeds (NP) = (Face Value + Premium/ - Discount - Floatation Cost)

PROBLEM NO: 2

Estimation of Cost of Debt in each of the cases:

Particulars	CASE-A	CASE-B	CASE-C
	At Par	At Premium	At Discount
A. Interest (1 -Tax)	7.20	7.20	7.20
B. Net Proceeds	100	104.5	90.25
	(100 - (5% of 100))	(100 + (100 x 10%)) - 110 x 5%	(100 - (100 x 5%)) - 95 x 5%
Cost of debt (k_d) (A/B)	7.58%	6.89%	7.98%

* Net proceeds (NP) = (Face Value + Premium/ - Discount - Floatation Cost)

PROBLEM NO: 3

Case a: market value of debenture = $\frac{\text{Interest on Debenture}}{\text{Current yield Rate}} = \frac{12}{0.15}$ = Rs. 80

Recommendation: As the market value of debenture, as computed above is more than Rs. 75, hence the investor should buy these debentures at Rs. 75.

Case b: Effective Yield of an Investor

$$K_d = \frac{\text{Int}\,(1-T) + \left(\frac{RV - NP}{N}\right)}{\left(\frac{RV + NP}{2}\right)} \times 100 = \frac{12 + \left(\frac{100 - 80}{5}\right)}{\left(\frac{100 + 80}{2}\right)} \times 100 = \frac{12 + \left(\frac{100 - 80}{5}\right)}{\left(\frac{100 + 80}{2}\right)} \times 100 = \frac{16}{90} \times 100 = 17.77\%$$

PROBLEM NO: 4

a) Market Price = $\frac{100 \times 15\%}{12\%} = \frac{15}{0.12} = 125$

b) Market Price if debenture rises to 18% = $\frac{100 \times 18\%}{12\%} = 150$

Market Price if debenture drops to 12% = $\frac{100 \times 12\%}{12\%} = 100$

c) Estimation of market value of Debentures:

Years	Particulars	Cash Flows	PVF @ 10%	P.V. of Cash Flows
Y_1 - Y_5	Interest	12	3.79	45.48
Y_5	Net sale Proceeds	100	0.621	62.1
Market Value				104.58

d) Yes, it is advisable to purchase debentures at an amount of Rs. 90 when its market price is Rs.104.58

PROBLEM NO: 5

Calculation of Post tax cost of debentures

Step-1: Identification of cash flows in different years

Year	Repayment		Total	Tax Shield on interest @ 50%	Post Tax Net cash Outflows
	Principal	Interest			
1	200	150	350	75	275
2	200	120	320	60	260
3	200	90	290	45	245
4	200	60	260	30	230
5	200	80	230	15	215

Net sale proceeds on issue of each debenture = 1,000-100 = Rs.900

Step-2: Calculation of Post Tax cost of debenture

Year	Cash flow	NPV @ 10%		NPV @ 12%	
		PVF	Present Value	PVF	Present Value
0	900	1	900	1	900
1	275	0.909	(249.98)	0.893	(245.58)
2	260	0.826	(214.76)	0.797	(207.22)
3	245	0.751	(183.90)	0.712	(174.44)
4	230	0.683	(157.09)	0.636	(146.28)
5	215	0.621	(133.52)	0.567	(121.91)
			(39.34)		**4.58**

Using Interpolation,

$$IRR = I_1 + \frac{NPV@I_1}{NPV@I_2 - NPV@I_1} x(I_2 - I_1) = 10 + \frac{39.34}{4.58+39.34} x (12 - 10)$$

IRR = 11.79%

PROBLEM NO: 6

a) Equated annual instalment = $\frac{\text{Rs. 100 lakhs}}{\text{PV of Annuity of Re. 1 for 5 years @ 12\%}} = \frac{100}{3.605}$ = Rs. 27.74 lakh

Statement showing the payment of principal and interest

Year A	Debentures at year beginning B	Interest C = B x Rate	Instalment D	Principal E = D-C	Debentures at year end F = B+C-D	Tax saving on interest G = C x 40%	Cash outflow H = D - G
1	100.00	12.00	27.74	15.74	84.26	4.80	22.94
2	84.26	10.11	27.74	17.63	66.63	4.04	23.70
3	66.63	8.00	27.74	19.74	46.89	3.20	24.54
4	46.89	5.63	27.74	22.11	24.78	2.25	25.49
5	24.78	2.96	27.74	24.78	-	1.18	26.56

Instead of interest of Rs. 2.9736, it has been taken at 2.96 so as bring the figure of Debentures at year end to nil. The need for this adjustment has arisen because of use of approximation in equated annual instalment.

Calculation of PV at 11% and 12%

Year A	Outflow B	PV Factor @ 11% C	PV Factor @ 12% D	PV @ 11% E = B x C	PV @ 12% F = B x D
1	22.94	0.901	0.893	20.669	20.485
2	23.70	0.812	0.797	19.244	18.889
3	24.54	0.731	0.712	17.939	17.472
4	25.49	0.659	0.636	16.798	16.212
5	26.56	0.593	0.567	15.750	15.060
			Total	**90.400**	**88.118**

$$K_d = R_L + \frac{NPV_L}{NPV_L - NPV_H} \times R_H - R_L$$

$$K_d = 11\% + \frac{0.400}{0.400 - (-1.882)} \times (12\% - 11\%)$$

$$K_d = 11.175\%$$

PROBLEM NO: 7

In the given case, the convertible debentures are being traded at Rs. 140 per debenture. The company has to pay interest of Rs.11 per debenture for 5 years and thereafter it will be the converted into 5 equity shares. The market price of equity share is growing @ 5% p.a. So, the price of equity share after 5 years would be:

P_1 = Rs. 22 x $(1 + 0.05)^5$ = Rs. 28.08

The cost of convertible debenture is the value of k_d in the following equation (Net Interest cost is Rs. 11 X (1 - 0.3) = Rs. 7.70):

$$\text{Rs. } 140 = \frac{\text{Rs. } 7.70}{1+k_d} + \frac{\text{Rs. } 7.70}{(1+k_d)^2} + \frac{\text{Rs. } 7.70}{(1+k_d)^3} + \frac{\text{Rs. } 7.70}{(1+k_d)^4} + \frac{\text{Rs. } 7.70}{(1+k_d)^5} + \frac{\text{Rs. } 28.08 \times 5}{(1+k_d)^6}$$

The value of k_d in the equation may be found by trial and error method. At 5% rate of discount, the value of right hand side is Rs. 143.10 and at 6% rate of discount the value of right hand side is Rs. 137.32. The value of k_d. Therefore, may be taken at 5.5%

PROBLEM NO: 8

Given information,

Face value = 100

Coupon rate = 14%

Floatation cost = 5%

Estimation of Cost of Debt in each of the cases:

Particulars	CASE-A	CASE-B	CASE-C
	Par	10% premium	5% Discount
a) Net Proceeds (Face Value + Premium /- Discount - Floatation Cost)	95	104.5	90.25
b) Cost of preference shares (%)	14.73% $\left(\frac{14}{95} \times 100\right)$	13.39% $\left(\frac{14}{104.5} \times 100\right)$	15.51% $\left(\frac{14}{90.25} \times 100\right)$

PROBLEM NO: 9

Given information,

Face Value = 100

Coupon rate = 15%

Floatation Cost = 4% (Net Proceeds (Redeemable Value) = Face value - Floatation Cost = 100 - 4 = 96)

Redeemable Period = 10 years

Assumption: Face Value = Redeemable Value

Using Shortcut Method;

$$K_p = \frac{\text{Preference dividend} + \left(\frac{\text{Redeemable Value} - \text{Net Proceeds}}{\text{Redeemable Period}}\right)}{\left(\frac{RV + NP}{2}\right)} \times 100 = \frac{15 + \left(\frac{100 - 96}{10}\right)}{\left(\frac{100 + 96}{2}\right)} \times 100 = 15.71\%$$

PROBLEM NO: 10

Calculation of cash outflow (including dividend tax)

Year	Op Bal. B	Dividend C = B x Rate	Principal D	Instalment E = C + D	Cl. Bal. F = B - D	Dividend Tax G = c x 20%	Cash Outflow H = E + G
1	100	12.0	20	32.0	80	2.40	34.40
2	80	9.6	20	29.6	60	1.92	31.52
3	60	7.2	20	27.2	40	1.44	28.64
4	40	4.8	20	24.8	20	0.96	25.76
5	20	2.4	20	22.4	0	0.48	22.88

Net proceeds of preference share = $\frac{D_1(1+D_1)+Principal_1}{(1+K_p)^1} + \frac{D_1(1+D_1)+Principal_2}{(1+K_p)^2} + ...+ \frac{D_n(1+D_t)+Principal_n}{(1+K_p)^n} = \sum_{t=1}^{n}\frac{D_t(1+D_t)}{(1+K_p)^t} + \frac{RV_n}{(1+K_p)^n}$

$$90 = \frac{12(1+.2)}{(1+K_p)^1} + \frac{9.6(1+.2)+20}{(1+K_p)^2} + \frac{7.2(1+.2)+20}{(1+K_p)^3} + \frac{4.8(1+.2)+20}{(1+K_p)^4} + \frac{2.4(1+0.2)+20}{(1+K_p)^5}$$

Calculation of present values at 19% and 20%

Year A	Outflow B	PV Factor @ 19% C	PV Factor @ 20% D	PV Factor @19% E = B x C	PV Factor @20% F = B x D
1	34.40	0.840	0.833	28.896	28.655
2	31.52	0.706	0.694	22.253	21.875
3	28.64	0.593	0.579	16.984	16.583
4	25.76	0.499	0.482	12.854	12.416
5	22.88	0.419	0.402	9.587	9.198
			Total	**90.574**	**88.727**

$$K_p = R_L + \frac{NPV_L}{NPV_L - NPV_H} \times (R_H - R_L)$$

$$K_p = 19\% + \frac{0.574}{0.574 - (-1.273)} \times (20\% - 19\%)$$

$$K_p = 19.31\%$$

PROBLEM NO: 11

a) Given, Dividend at the end of 1st year (DPS_1) = Rs.12

Cost of equity share capital (K_e) = 10%

Given that, the company is expected to pay the same dividend of Rs.12 forever.

Therefore, growth rate = 0

We know that, $K_e = \frac{DPS_1}{MP_0}$, $MP_0 = \frac{DPS_1}{k_e} = \frac{12}{0.1}$ = Rs.120

PROBLEM NO: 12

Market price as on today (MP_0) = 168

Dividend per share as on today = 100 X 15% = Rs.15

Growth rate in dividends (g) = 12%

Cost of equity share capital (K_e) = $\frac{DPS_1}{MP_0} + g = \frac{15x112\%}{168} + 0.12 = \frac{16.8}{168} + 0.12$ = 0.1+0.12 = 0.22 = 22%

PROBLEM NO: 13

Given information,

DPS_1 = 1.4 MP_0 = 19.5 Growth Rate = 12%

$$K_e = \frac{DPS_1}{MP_0} + g = \frac{1.4}{19.5} + 0.12 = 19.17\%$$

PROBLEM NO: 14

Given information,

DPS_0 = 4.5

Growth Rate = 7% Net Proceeds = MP - FC = 95 - 5 = 90

MP_0 = Rs. 95 Floatation Costs = Rs. 5

$$K_e = \frac{DPS_0\,(1+g)}{NP} + g = \frac{4.5\,(1+0.07)}{90} + 0.07 = 12.35\%$$

Note: In the absence of information, whether it is DPS_0 or DPS_1, it is assumed that DPS_0

PROBLEM NO: 15

Calculation of dividend growth rate:

During the last 5 years (Years 2000 is ignored since the dividend of 2000 is compared with the dividend of 2005), the dividend has increased from Rs. 1.05 to 1.34

$$\text{Compound Factor} = \frac{\text{Rs. } 1.34}{\text{Rs. } 1.05} = 1.2762$$

By looking into compound value of Rs.1 (compound table given at the end of the book) the sum of Rs. 1 would accumulate to Rs. 1.2762 in five years is 5%. Therefore, the dividend growth rate is 5%

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

D_1 = Expected dividend of current year (2005) i.e., Rs. 140

NP = Net proceeds i.e., Rs. 40- Rs. 0.50= Rs. 39.5

g = 5% or 0.05

$$K_e = \frac{1.40}{39.50} + 0.05 = 8.54\%$$

PROBLEM NO: 16

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

$$= \frac{D_1}{p_0} + g$$

Where,

K_e = Cost of equity share capital

D_1 = Expected dividend at the end of year 1

P_0 = Current market price of the share

g = Expected growth rate of dividend

Therefore, $k_e = \frac{3.36}{1.46} + 7.5\% = 0.0230 + 0.075 = 0.098$ Or, K_e=9.80%

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

$g = br$ i.e. $= 0.10 \times 0.60 = 0.06$

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

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

$0.075 = b_1 \times 0.01$

$b_1 = 0.75$ and payout ratio = 0.25

With 0.25 payout ratio the EPS will be as follows: $\frac{3.36}{0.25} = 13.44$

With new 0.40 (1 - 0.60) payout ratio the new dividend will be $D_1 = 13.44 \times 0.40 = 5.376$

Accordingly new k_e will be

$K_e = \frac{5.376}{1.46} + 6.0\% = 9.68\%$

PROBLEM NO: 17

Important Issues:

i) Growth rate is staggering for the first 6 years

ii) Consistent growth rate is only from year 7.

iii) Therefore, constant growth model formula cannot be used at year 0. However it shall be the beginning of year 7 or end of year 6

iv) In order to evaluate value per share presently, future cash flows of the security shall be disclosed using opportunity cost of capital

v) P_0 formula shall be re-modified at P_6 as follow

$P_0 = \frac{d_1}{k_e - g}$ $P_6 = \frac{d_7}{k_e - g}$

a) Estimation of Fair Market Value of Equity:

Year	Event	Cash flow	PVF 18%	Disc. CF
1	Dividend 1	$2 (1 + 0.15)^1 = 2.30$	0.8475	1.95
2	Dividend 2	$2 (1 + 0.15)^2 = 2.645$	0.7182	1.90
3	Dividend 3	$2 (1 + 0.15)^3 = 3.04175$	0.6086	1.85
4	Dividend 4	$3.04175 (1 + 0.1)^1 = 3.345925$	0.5158	1.73
5	Dividend 5	$3.04175 (1 + 0.1)^2 = 2.6805175$	0.4371	1.61
6	Dividend 6	$3.04175 (1 + 0.1)^3 = 4.04856925$	0.3704	1.50
6	Market price at the end of the 6th year	W.N.1 = 32.69	0.3704	12.11
	Market Value			22.65

Working Note 1:

a) $D_7 = D_6 (1 + g) = 4.04856925 (1+0.05)=4.25$

b) $P_6 = \frac{d_7}{k_e - g} = \frac{4.25}{0.18 - 0.05} =$ Rs. 32.69

Working Note 2:

$P_0 \times (1 + K_e)$	$= D_1 + P_1$
P_1	$= P_0 (1 + K_e) - D_1 = 22.65 (1 + 0.18) - 2.30 = 24.43$
P_2	$= P_1 (1 + K_e) - D_2 = 24.43 (1 + 0.18) - 2.645 = 26.18$
P_3	$= P_2 (1 + K_e) - D_3 = 26.18 (1 + 0.18) - 3.04 = 27.85$

Year	Event	Cash flow	PVF 18%	Disc. CF
1	Dividend 1	$2(1+0.15)^1$ = 2.30	0.8475	1.95
2	Dividend 2	$2(1+0.15)^2$ = 2.645	0.7182	1.90
3	Dividend 3	$2(1+0.15)^3$ = 3.04175	0.6086	1.85
3	Price 3	W.N.2 = 27.85	0.6086	16.95
				22.65

Holding and value of security has no nexus and the value would remain same at Rs. 22.65

PROBLEM NO: 18

Calculation of EPS = Rs. 9,60,000 / 50,000 Equity shares = Rs. 19.20

K_e = E / M = Rs. 19.20 / Rs. 45 = 0.4267 or 42.67%

PROBLEM NO: 19

$$K_e = \frac{E_1}{P_0} + g = \frac{Rs.\ 10}{Rs.\ 50} + 0.08 = 0.20 + 0.08 = 28\%$$

PROBLEM NO: 20

Given information,

IERR = Total yield = 18%

DPS_0 = 2

Growth rate = 10%

MP_0 = 40

1. Dividend yield = $\frac{DPS_0(1+g)}{MP} \times 100$ = $\frac{2(1+0.10)}{40} \times 100 = 5.5\%$

2. Capital gain yield = Total yield - Dividend yield = 18% - 5.5% = 12.5%

PROBLEM NO: 21

From the given information it is not possible to calculate cost of equity capital directly. So let us calculate IRR from investors' point of view.

Year	Particulars	Cash flow	PVF@11%	P.V	PVF @ 12%	P.V
01-01-1990	Purchase of shares	(318)	1	(318)	1	(318)
31-12-1990	Dividend	20	0.900	18	0.892	17.84
31-12-1991	Dividend	20	0.812	16.24	0.797	15.94
31-12-1992	Dividend	20	0.731	16.082	0.711	15.642
31-12-1993	Dividend	22.25	0.658	14.6405	0.636	14.151
31-12-1993	Sale of shares	400	0.658	263.2	0.636	254.4
				10.1625		0.027

Using interpolation,

$$IRR = L_1 + \frac{NPV\ @L_1}{NPV\ @L_1 - NPV\ @L_2} X(L_2 - L_1) = 11 + \frac{10.1625}{10.1625 + 0.027} x\ (12 - 11) = 11 + \frac{10.1625}{10.1895} = 11.99\%$$

PROBLEM NO:22

a) According to CPM, $(K_e) = R_f + ß\ (R_m - R_f)$

Given: R_f = 8%, ß = 1.5, R_m=16%

Required rate of return of the shares of EPL= 8+1.5(16-8) = 20%

Current market price per share = Rs.15.75

Present expected rate of return = $\frac{D_1}{P_0} + g = \frac{D_0(1+g)}{P_0} + g = \frac{3.00 \times 1.05}{15.75} + 0.05 = 25\%$

Since the expected rate of return is more than the required rate of return as per the CAPM, We can say that the share is priced below its equilibrium price. Thus, the present market price of the share is not at equilibrium.

b) The market adjusts itself in such a way that the share is valued at its equilibrium price. Let the equilibrium price be P_0.

$$\therefore 0.20 = \frac{3.00 \times 1.05}{P_0} + 0.05$$

$$\therefore P_0 = \text{Rs. } 21$$

$\therefore$ The Market Price will increase from Rs. 15.75 per share to Rs.21 per share.

For an investment in 1,000 shares of the company the change in market value = 1,000 (21 - 15.75) = Rs.5,250 (increase).

PROBLEM NO: 23

Given information,

R_f	=	9%	R_m	=	18%
Beta (β)	=	1.5	K_e	=	?

$K_e = R_f + \beta (R_m - R_f) = 9\% + 1.5 (0.18 - 0.09) = 22.5\%$

Now, estimation of MP_0 as on today

We know that, $MP_0 = \frac{DPS_1}{K_e - g} = \frac{3}{0.225 - 0.08} = 20.68$ (or) 21

PROBLEM NO: 24

Workings:

P_0 = EPS × P/E = 20 × 6.25 = 125

r = Rate of Return on Retained Earnings = 10/6.25 = 16%

Retention ratio = b = 1 - Dividend Payout Ratio = 1 - 0.60 = 0.40

Growth rate = g = br = 0.40 ×0.16 = 0.064

D_0 = EPS × Dividend Payout = 20 × 60% = 12

$D_1 = D_0 (1 + g) = 12 (1 + 0.064) = 12.768$

Cost of Equity before issue:

$$k_e = \frac{D_1}{P_0} + g = \frac{12.768}{125} + 0.064 = 0.1021 + 0.064 = 0.1661 \text{ or } 16.61\%$$

Cost of Equity after issue:

$$k_e = \frac{D_1}{P_0} + g = \frac{12.768}{120} + 0.064 = 0.1064 + 0.064 = 0.1704 \text{ or } 17.04\%$$

PROBLEM NO: 25

Part A - Calculation of weighted average cost of capital

Step 1: Estimation of specific cost of capital

a) Cost of debt = I (1 - t) = 12 (1 - 0.5) = 6%

b) Cost of preference (K_p) $= \frac{PD}{MP_0} = \frac{10}{100} = 10\%$

c) Cost of equity (K_e) $= \frac{DPS_1}{MP_0} + g = \frac{10}{110} + 0.06 = 15.09\%$

Step 2: Calculation of weighted average cost of capital

K_0 = Weighted average cost of capital $= \frac{6 \times 6,00,000}{20,00,000} + \frac{10 \times 4,00,000}{20,00,000} + \frac{15.09 \times 10,00,000}{20,00,000}$ = 11.34%

Part B - Calculation of revised weighted average cost of capital when company makes additional borrowings amounting to 10,00,000.

Step I: Calculation of specific cost of capital

a) $k_e = \frac{DPS_1}{MP_0} + g$ = $\frac{12}{105} + 0.06$ = 17.42%

b) Cost of old debt = 6%

c) Cost of preference = 10%

d) Cost of new debt = Where rate of interest = 14%

$K_d = I (1 - t)$ = 14 (1 - 0.5) = 7%

Step II: Calculation of weighted average cost of capital

K_0 or WACC $= 6\%\left(\frac{6,00,000}{30,00,000}\right) + 7\%\left(\frac{10,00,000}{30,00,000}\right) + 10\%\left(\frac{4,00,000}{30,00,000}\right) + 17.42\%\left(\frac{10,00,000}{30,00,000}\right)$ = 10.67%

Note: Total capital after raising new debt

Equity	10,00,000
10% preference shares	4,00,000
12% debentures	6,00,000
14% new debentures	10,00,000
	30,00,000

PROBLEM NO.26

i) Computation of Costs of Different Components of Capital :

a) Equity Shares:

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

$= \frac{3.60 \times 1.09}{54} + 0.09 = 0.0727 + 0.09 = 16.27\%$.

b) Preference Shares:

$K_P = \frac{\text{Preference share dividend}}{P_0} = \frac{11}{Rs.95} = 11.58\%$.

c) Debt at 12%:

$K_d (1 - t) = 12\% (1 – 0.4) = 12\% \times 0.6 = 7.20\%$.

ii) Weighted Average Cost of Capital (WACC):

WACC = $W_d K_d + W_p K_p + W_e K_e$

WACC = 0.25 (7.2%) + 0.15 (11.58%) + 0.60 (16.27%)

= 1.8 + 1.737 + 9.762 = 13.30%.

PROBLEM NO.27

Calculation of WACC

Step: 1 Calculation of Specific COC

i) Calculation of K_d

$K_d = \frac{Int \times (1 - Tax) + \left(\frac{RV - NP}{N}\right)}{\left(\frac{RV + NP}{2}\right)} \times 100 = \frac{10(1 - 0.5) + \left(\frac{100 - 96}{10}\right)}{\left(\frac{100 + 96}{2}\right)} = \frac{5 + 0.4}{98} = \frac{5.4}{98} = 0.055 = 5.5\%$

ii) Calculation of K_p:

$$K_p = \frac{PD + \left(\frac{RV - NP}{N}\right)}{\left(\frac{RV + NP}{2}\right)} x100 = \frac{5 + \left(\frac{100 - 98}{10}\right)}{\left(\frac{100 + 98}{2}\right)} x100 = \frac{5.2}{149} x100 = 0.053 = 5.3\%$$

iii) Calculation of K_e:

$$K_e = \frac{DPS_1}{MP_0 - F} + g = \frac{1}{24 - 4} + 0.05 = \frac{1}{20} + 0.05 = 10\%$$

Step: 2:

i) Calculation of WACC based on Book value weights.

$$WACC = \left(\frac{5L}{20L}\right)(5.5\%) + \left(\frac{5L}{20L}\right)(5.3\%) + \left(\frac{10L}{20L}\right)(10) = 7.69\%$$

ii) Calculation of WACC based on market value weights

$$WACC = \left(\frac{5.25L}{34.75}\right)(5.5\%) + \left(\frac{5.5L}{34.75L}\right)(5.3\%) + \left(\frac{24L}{34.75}\right)(10\%)$$

$$= 0.8309 + 0.8388 + 6.9065 = 8.6\% \text{ (App)}$$

Workings:

Book Value weights:

10% debentures	= 5,00,000
Preference Share	= 5,00,000
Equity Share	= 10,00,000
	= 20,00,000

Market Value weights:

Debt	= 5,00,000x$\frac{105}{100}$	= 5,25,000
Preference Share	= 5,00,000x$\frac{110}{100}$	= 5,50,000
Equity Share	= 1,00,000 Shares x 24	= 24,00,000
		= 34,75,000

PROBLEM NO.28

i) Calculation of Cost of Capital for each source of Capital

a) Cost of equity (K_e) $= \frac{D_0 (1+g)}{\text{Market Price per share}} + g = \frac{25\% \text{ x Rs. } 100 (1+0.05)}{\text{Rs. } 200} + 0.05$

$$= \frac{\text{Rs. } 26.25}{\text{Rs. } 200} + 0.05 = 0.18125 \text{ (or) } 18.125\%$$

b) Cost of Preference share Capital (K_P) = 9%

c) Cost of debentures (K_d) = r (1 - t) = 11% (1 - 0.3) = 7.7%

d) Cost of Retained Earnings (K_s) = K_e (1 - t_p) = 18.125 (1 - 0.2) = 14.5%

ii) Calculation of weighted average cost of capital by using Book Value Weights:

Source	Amount (Rs.)	Weights (a)	After tax Cost of Capital (%) (b)	WACC (%) (c) = (a) x (b)
Equity shares	80,00,000	0.40	18.125	7.25
9% Preference shares	20,00,000	0.10	9.000	0.90
11% Debentures	60,00,000	0.30	7.700	2.31

Retained earnings	40,00,000	0.20	14.500	2.90
	2,00,00,000	**1.00**		**13.36**

iii) Calculation of weighted marginal cost of capital of company by using Market Value Weights:

Source	Amount (Rs.)	Weights (a)	After tax Cost of Capital (%) (b)	WACC (%) (c) = (a) x (b)
Equity share	1,60,00,000	0.640	18.125	11.60
9% Preference share	24,00,000	0.096	9.000	0.864
11% Debentures	66,00,000	0.264	7.700	2.033
	2,50,00,000	**1.000**		**14.497**

PROBLEM NO.29

Working Notes:

1. Computation of cost of debentures (K_d):

$$K_d = \frac{\text{Interest}(1-t) + \frac{RV - NP}{3 \text{ years}}}{\frac{RV + NP}{2}} = \frac{\text{Rs. } 95(1-0.35) + \frac{\text{Rs. } 1000 - \text{Rs. } 981.05}{3 \text{ years}}}{\frac{\text{Rs. } 1000 + \text{Rs. } 981.05}{2}} = 0.0687 \text{ or } 6.87\%$$

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

= r (1 - t) = 0.085 (1 - 0.35) = 0.05525 or 5.525%

3. Computation of cost of preference capital (KP):

$$= \frac{\text{PreferenceDividend} + \frac{RV - NP}{n}}{\frac{RV + NP}{2}} = \frac{10.5 + \frac{100 - 98.5}{5}}{\frac{100 + 98.5}{2}} = 0.1097 = 10.97\%$$

4. Computation of cost of equity (Ke):

= R_f + ß (R_m - R_f)

= Risk free rate + (Beta × Risk premium)

= 0.055 + (1.1875 x 0.08) = 0.15 or 15%

i) Calculation of Weighted Average Cost of Capital Using market value weights

Source of Capital	Market value of capital structure (Rs. in millions)	Weights	After tax cost of Capital (%)	WACC (%)
Equity share capital (150 million shares x Rs. 60)	9,000	0.813	15.000	12.195
10.5% Preference share capital (1 million shares x Rs.98.15)	98.15	0.0089	10.970	0.098
9.5 % Debentures (1.5 million x Rs.981.05)	1,471.575	0.1329	6.872	0.913
8.5% Term loans	500	0.0452	5.525	0.249
	11,069.725	1.000		13.455

ii) Marginal cost of capital (MCC):

New capital of Rs.750 million will be raised in proportion of 20% Debt and 80% equity share capital i.e. Rs.150 million debt and Rs.600 million equity.

Cost of equity shares (K_e) = Risk free rate + (Beta × Risk premium)

= 0.055 + (1.4375 × 0.08) = 0.17 or 17%

Cost of Debt (K_d):

for first Rs.100 million = 9.5% X (1 - 0.35) = 6.175%

for next Rs.50 million = 10% X(1 - 0.35)= 6.5%

Marginal Cost of Capital $= 0.17 \times \frac{\text{Rs. 600m}}{\text{Rs. 750m}} + 0.06175 \times \frac{\text{Rs. 100m}}{\text{Rs. 750m}} + 0.065 \times \frac{\text{Rs. 50m}}{\text{Rs. 750m}}$

$= 0.136 + (0.008 + 0.004) = 0.148$ or 14.8%

PROBLEM NO: 30

Computation of Cost of Equity:

Particulars	A	B	C
a) Dividend Per Share	2.70	4	2.88
b) Market Price	15	20	12
c) Cost of Equity (K_e)(a/b)	18%	20%	24%

Computation of Cost of Debt

Particulars	A	B	C
a) Interest	-	100 X 10% =10	100 X 8% = 8
b) Market Price	-	125	80
c) Cost of Debt (K_d)(a/b)	-	8%	10%

Computation of Weighted Average Cost of Capital:

Particulars	A	B	C
WACC	18% x 4/4	(20% x 2.50/3.50) + (8% x 1/3.50)	(24% x 5/7.50) + (10% x 2.50/7.50)
	18%	16.56%	19.33%

PROBLEM NO: 31

i)

Pattern of additional finance	(Rs.)
Equity	15,00,000
Debt	5,00,000
Total additional finance	**20,00,000**

	(Rs.)
Retained earnings	4,00,000
additional equity to be raised	11,00,000
Total equity	**15,00,000**

	(Rs.)
10% Debt	2,00,000
13% Debt	3,00,000
Total Debt	**5,00,000**

ii) Calculation of post-tax average cost of additional debt

Interest = (Rs. 2,00,000 x 10/100) + (Rs. 3,00,000 x 13/100)

= Rs. 20,000 + Rs. 39,000 = 59,000

$K_d = \frac{\text{Rs. 59, 000 (1 – 03)}}{\text{Rs. 5,00,000}} \times 100 = \frac{\text{Rs. 41,300}}{\text{Rs. 5,00,000}} \times 100 = 8.26\%$

iii) Calculation of cost of retained earnings and cost of equity

$K_e = \frac{\text{EPS x Payout}}{\text{Market price}} + g = \frac{\text{Rs. 12 x 50/100}}{\text{Rs. 60}} + 10\% = 20\%$

iv) Calculation of overall weighted average (after tax) cost of additional finance

Particulars	Amount (Rs.)	After Tax	Cost (Rs.)
Equity capital	11,00,000	20%	2,20,000
Retained earnings	4,00,000	16%	64,000
Debt	5,00,000	8026%	41,300
	20,00,000		**3,25,300**

Overall cost of capital $(K_o) = \frac{\text{Rs. 3,25,300}}{\text{Rs. 20,00,000}} \times 100 = 16.27\%$

PROBLEM NO: 32

i) Calculation of after tax coat

After tax cost of new Debt (K_d)

$$K_d = \frac{14}{98}(1 - 0.5) \qquad = 0.07$$

After tax cost of new preference capital (K_p)

$$K_p = \frac{1.20}{9.80} \qquad = 0.12$$

After tax cost of retained earnings (K_g)

$$K_g = \frac{1.3865}{27.75} + 0.12 \qquad = 0.17$$

ii) Calculation of Marginal cost of capital

Capital Structure	Amount (Rs.)	Proportion	Cost of Capital	Product
Equity capital	19,20,000	0.80	0.17	0.136
11% preference capital	1,20,000	0.05	0.12	0.006
13% debentures	3,60,000	0.15	0.07	0.011
	24,00,000	**1.00**		**0.153**

Marginal cost of capital at existing capital structure is 15.3%

iii) Computation of amount that can be spent for capital investment before sale of new ordinary shares

Retained earnings = 2,00,000 shares x Rs. 1.3865 = Rs. 2,77,300

The ordinary equity (retained earnings) is 80% of total capital

Investment before issuing equity = 2,77,300 x 100/80 = Rs. 3,46,625

iv) Computation of marginal cost of capital if the company spends more than Rs. 3,46,625

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

Capital structure	Proportion	Cost of capital	Product
Equity (new)	0.80	0.1893	0.1514
Preference capital	0.05	0.1224	0.0061
Debt	0.15	0.0714	0.0107
			0.1682

Marginal cost of capital at existing capital structure is 16.82%

THE END