3. COST OF CAPITAL

PROBLEM NO: 1

Calculation of K_d

From the given information

Face value = 100

NSP = 97.75

Redemption value = 105

Rate of Int = 15%

No of yrs (N) =7yrs

Tax Rate = 55%

We Know That

$$K_d = \frac{\text{Int}\,(1-\text{Tax}) + \left(\frac{\text{RV} - \text{NSP}}{\text{N}}\right)}{\left(\frac{\text{RV} + \text{NSP}}{2}\right)}$$

$$= \frac{15(1-0.55) + \left(\frac{105-97.75}{7}\right)}{\left(\frac{105+97.75}{2}\right)} x100$$

$$= \frac{6.75+1.0357}{101.375} x100$$

= 7.68%

PROBLEM NO: 2

Calculation of K_d

Face value = 100

NSP = 90

Redemption value = 105

Rate of Int = 12%

No of yrs (N) = 5yrs

Tax Rate = 35%

We Know That

$$K_d = \frac{\text{Int}\,(1-\text{Tax}) + \left(\frac{\text{RV} - \text{NSP}}{\text{N}}\right)}{\left(\frac{\text{RV} + \text{NSP}}{2}\right)} x100$$

$$= \frac{12(1-0.35) + \left(\frac{105-90}{5}\right)}{\left(\frac{105+90}{2}\right)} x100$$

$$= \frac{7.8+3}{97.5} x100$$

= 11.07%

PROBLEM NO: 3

Calculation of K_d

Face value = 1000

Flotation Cost = 100

NSP = 900 (1,000 – 100)

Interest Rate = 15%

Tax Rate = 50%

Step: 1 Calculation of CFS

Year	Installment	Int (1-Tax)	CFS
1	200	75	275
2	200	60	260
3	200	45	245
4	200	30	230
5	200	15	215

Step: 2 Calculation of K_d in IRR method.

IRR Calculation in company's point of vice because there is involvement of flotation co

NPV at 1st guess rate NPV at 2nd guess rate

Year	CFS	P.V.F @ 11%	P Values	PVF @12%	p. Values
0	900	1	900	1	900
1	275	0.901	(248)	0.893	(245)
2	260	0.812	(211)	0.97	(207)
3	245	0.731	(179)	0.712	(174)
4	230	0.659	(152)	0.635	(146)
5	215	0.593	(127)	0.567	(122)
			(17)		6

$$IRR = L_1 + \frac{NP\ V at\ L_1}{NPV\ at\ L_1 - NPV\ at\ L_2} x(L_2 - L_1)$$

$$= 11\% + \frac{-17}{-17-6} x(12\% - 11\%)$$

$$= 11\% + \frac{17}{23}(1\%)$$

$$= 11.74\%(App.)$$

PROBLEM NO: 4

Calculation of K_p

From the given information

Face value = 100

Flotation cost @ 4% = 4

NSP = 96 (100 – 4)

Rate of P.D = 15%

We Know That

$$K_p = \frac{P.D}{NSP}$$

$= \frac{15}{96} x 100$

= 15.625%

PROBLEM NO: 5

Calculation of K_p

i) If issued at 5% Discount from the given information.

Fv = 100

Discount = 5

Issue price = 100 - 5 = 95

Flotation cost = 0

NSP = 95

Rate of P.D = 10%

We Know That

$K_p = \frac{P.D}{NSP} x 100$

$= \frac{10}{95} x 100$

= 10.5%

ii) If issued at 5% premium.

NSP = 105 (100 + 5(Premium))

$K_p = \frac{10}{105} x 100$

= 9.5%

PROBLEM NO: 6

Calculation of ke under CAPM approach.

From the given information

Risk free Return R_f = 10%

Market Return R_m = 15%

Risk factor B = 1.75

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

= 10% + 1.75 (15%-10%)

= 18.75%

PROBLEM NO: 7

From the given information

Face value = 100

DPS_0 (100x15%) = 15

Growth Rate (g) = 12%

$DPS_1 = (15)(1.12)$ = 16.8

MP_0 = 168

We Know That

$$K_e = \frac{DPS_1}{MP_0} + g$$

$$= \frac{16.8}{168} + 0.12$$

= 0.1 + 0.12

= 0.22

= 22%

PROBLEM NO: 8

Calculation of cost of equity (IRR method) NPV at 1st guess rate 11% NPV at 2nd guess rate 12%

Year	CFS	PVF@11%	P Values	PVF@12%	P Values
0	(318)	1	(318)	1	(318)
1	20	0.901	18.02	0.893	17.86
2	20	0.812	16.24	0.797	15.94
3	22	0.731	16.08	0.712	15.664
4	22.5	0.659	14.82	0.635	14.29
4th	400	0.659	263.6	0.635	254
		NPV	10.76		(0.25)

$$IRR = L1 + \frac{NPV\ at\ L_1}{NPV\ at\ L_1 - NPV\ at\ L_2} + (L_2 - L_1)$$

$$= 11\% + \frac{10.76}{10.76 + 0.25}(12\% - 11\%)$$

= 11.98%

PROBLEM NO: 9

Part – I Calculation of WACC

Step - 1 Calculation of Specific COC

i) Calculation of K_d

K_d = 10% (1 - 0.5) = 5%

ii) Calculation of K_p

K_p = 9%

iii) Calculation of K_e

$$K_e = \frac{DPS_1}{MP_0} + g$$

$$= \frac{9}{102} + 5\%$$

=13.82%

Step-2

$$WACC = 5\%\left(\frac{3L}{10L}\right) + 9\%\left(\frac{2L}{10L}\right) + 13.82\%\left(\frac{5L}{10L}\right) = 10.21\%$$

Part – II Calculation of WACC

Step1 : Calculation of Specific COC

i) Calculation of K_d

$Kd_1 = 10\% (1-0.5) = 5\%$

$Kd_2 = 12\% (1-0.5) = 6\%$

ii) Calculation of K_p

$K_p = 9\%$

iii) Calculation of K_e

$$K_e = \frac{DPS_1}{MP_0} + g$$

$$= \frac{9}{96} + 5\%$$

$= 14.375\%$

MP_0 : New market Price i.e. Rs.96 per share

Step2: Calculation of WACC

$$\text{WACC } (K_0) = \left(\frac{3L}{15L}\right)(5\%) + \left(\frac{5L}{15L}\right)(6\%) + \left(\frac{2L}{15L}\right)(9\%) + \left(\frac{5L}{15L}\right)(14.375\%)$$

$= 9\%$

PROBLEM NO: 10

Step: 1 Calculation of Specific COC

i) Calculation of K_d

$$K_d = \frac{Int(1-t)}{MP_0}$$

$$= \frac{12\%(100)}{80} = \frac{12}{80} = 15\%$$

ii) Calculation of K_p

K_p = N.A

iii) Calculation of K_e

$$K_e = \frac{DPS_1}{MP_0} + g$$

Where $DPS_1 = DPS_0 (1 + g)$

$= 2 (1 + 0.1)$

$= 2.2$

$$= \frac{2.20}{27.50} + 10\%$$

$= 18\%$

iv) Calculation of K_r

$K_r = K_e = 18\%$

Step: 2 calculation of WACC

Source	Amount	Spec. CoC	Cost
Equity	2200000 (80,000 x 27.5)	18%	396000
Debt	320000	15%	48000

	(4,00,000 x 80%)		
	2520000		444000

$$\therefore \text{WACC} = \frac{444000}{2520000} x100$$

$$= 17.62\%$$

PROBLEM NO: 11

Calculation of WACC

Step: 1 Calculation of Specific COC

i) Calculation of K_d

$$K_d = \frac{\text{Int } x\left(1 - \text{Tax }\right) + \left(\frac{\text{RV } - \text{NSP}}{N}\right)}{\left(\frac{\text{RV } + \text{NSP}}{2}\right)} x100$$

$$= \frac{10(1-0.5) + \left(\frac{100-96}{10}\right)}{\left(\frac{100+96}{2}\right)}$$

$$= \frac{5+0.4}{98}$$

$$= \frac{5.4}{98}$$

$$= 0.055$$

$$= 5.5\%$$

ii) Calculation of Kp

$$K_p = \frac{PD + \left(\frac{RV - NSP}{N}\right)}{\left(\frac{RV + NSP}{2}\right)} x100$$

$$= \frac{5 + \left(\frac{100-98}{10}\right)}{\left(\frac{100+98}{2}\right)} x100$$

$$= \frac{5.2}{149} x100$$

$$= 0.053$$

$$= 5.3\%$$

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

PROBLEM NO: 12

Step:1 Calculation of Specific COC

i) Calculation of Cost of Equity (K_e)

For the equity share capital

Ke = $\frac{DPS_1}{MP_0 - F.} + g$

$\frac{Rs.15}{Rs.125 - Rs.5}$ + 0.06 (Working note)

K_e = 0.125 + 0.06

= 0.185 or 18.5%

For retained earnings
No floatation cost

Ke = $\frac{DPS_1}{MP_0 - F.} + g$

$\frac{Rs.15}{Rs.125 - Rs.0}$ + 0.06

= 0.18 or 18%

WORKING NOTE:

Calculation of growth rate (g):

Present Value = 10.6

Future value = 14.19

No. of Years = 5

We Know,

PV = FV x PVF (n yrs, %)

10.6 = 14.19 x PVF (5yrs, r%)

$\therefore$ PVF (5yrs, r%) = $\frac{10.60}{14.19}$ = 1.338

Trace this value against 5 years in PVF table

$\therefore$ g = 6%

ii) Calculation of K_P

$$K_p = \frac{PD}{MP_0}$$

$$= \frac{Rs.15}{Rs.105} = 0.1429 \text{ or } 14.29\%$$

iii) Calculation of K_d

$$K_d = \frac{Int\ (1 - Tax) + \left(\frac{RV - NSP}{N}\right)}{\left(\frac{RV + NSP}{2}\right)} \times 100$$

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

$$= \frac{15 \times 0.65 + 0.75}{Rs.95.875}$$

= 0.1095 or 10.95%

*Since yield on similar type of debentures is 16% so, company is required to issue debentures at discount.

Market Price of Debentures = $\frac{\text{Coupon rate}}{\text{Market rate of interest}}$

= $\frac{Rs.15}{0.16}$

= Rs.93.75

Sale proceeds from debentures issue = Rs.93.75 – Rs.2 (i.e flotation cost)

= Rs. 91.75

Step 2:

Calculation of WACC based on book value weights

$$\text{WACC} = \left(\frac{120L}{195L}\right)(18.5\%) + \left(\frac{30L}{195L}\right)(18\%) + \left(\frac{9L}{195L}\right)(14.29\%) + \left(\frac{36L}{195L}\right)(10.95\%)$$

↓ ESC ↓ Retained Earnings ↓ PSC ↓ Debentures

= 11.38 + 2.77 + 0.66 + 2.02

= 0.1683 or 16.83%

Calculation of WACC based on Market value weights **(in Lakhs)**

Source of capital	Weights	Specific Cost (K)	(MV × K)
Equity Shares	160*	0.1850	29.6
Retained Earnings	40*	0.1800	7.2
Preference Shares	10.4	0.1429	1.49
Debentures	33.75	0.1095	3.70
Total	**244.15**	**32.83**	**41.99**

*** Market Value of equity shall be apportioned between equity share capital and retained earnings in the ratio of book values**

a) Equity shares - $\left(200 \times \frac{120}{150}\right) = 160$

b) Retained earnings - $\left(200 \times \frac{30}{150}\right) = 40$

$\therefore$ Weighted average cost of capital (WACC) = $\frac{Rs.41.99L}{Rs.244.15L}$

= 0172 or 17.2%

PROBLEM NO: 13

Calculation of WACC

Particulars	A	B	C
i) Cost of Equity	18% $\left[\frac{2.70}{15} x100\right]$	20% $\left[\frac{4}{20} x100\right]$	24% $\left[\frac{2.88}{12} x100\right]$
ii) Cost of Debt	N.A	4% $\left[\frac{5}{125} x100\right]$	5% $\left[\frac{4}{80} x100\right]$
iii) WACC	18% $\left[\frac{6L}{6L} x18\% + 0\right]$	16.8% $\left[\frac{5L}{6.25L}(20\%) + \frac{1.25L}{6.25L}(4\%)\right]$	19.25% $\left[\frac{6L}{8L}(24\%) + \frac{2L}{8L}(5\%)\right]$
Workings			
Market value of Eq	Rs.600000 $\left[\frac{400000}{10} x15\right]$	Rs.500000 $\left[\frac{250000}{10} x20\right]$	Rs.600000 $\left[\frac{500000}{10} x12\right]$
Market value of debt	N.A.	Rs.125000 $\left[\frac{100000}{100} x125\right]$	Rs.200000 $\left[\frac{250000}{100} x80\right]$
Total market value	Rs.600000	Rs.625000	Rs.800000

THE END