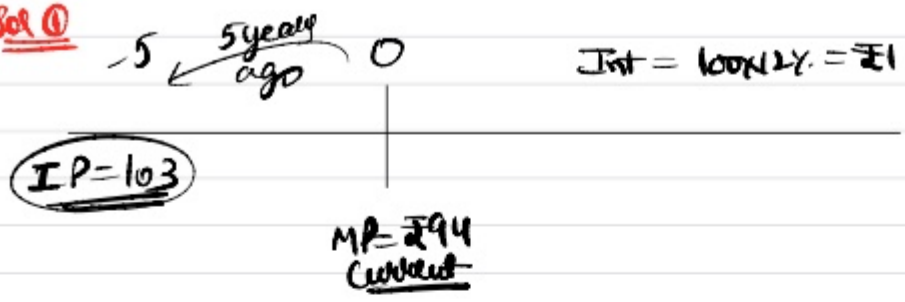
Questions	COST OF CAPITAL	Questions	COST OF CAPITAL	Questions	COST OF CAPITAL
1	CW	31	HW Typed	61	CW
2	CW	32	CW	62	CW
3	CW	33	CW		
4	CW	34	CW		
5	CW	35	HW Typed - Discusssed in class		
6	CW	36	Handwritten solution provided		
7	CW	37	HW Typed		
8	CW	38	Handwritten solution provided		
9	CW	39	Handwritten solution provided		
10	CW	40	HW Typed		
11	CW	41	CW		
12	CW	42	CW		
13	CW	43	CW		
14	Handwritten solution provided	44	CW		
15	CW	45	HW Typed		
16	CW	46	HW Typed		
17	CW	47	HW Typed		
18	CW	48	CW		
19	CW	49	CW		
20	CW	50	CW		
21	CW	51	CW		
22	CW	52	CW		
23	CW	53	CW		
24	CW	54	HW Typed		
25	CW	55	HW Typed		
26	CW	56	CW		
27	CW	57	CW		
28	CW	58	CW		
29	CW	59	CW		

30	CW	60	CW		

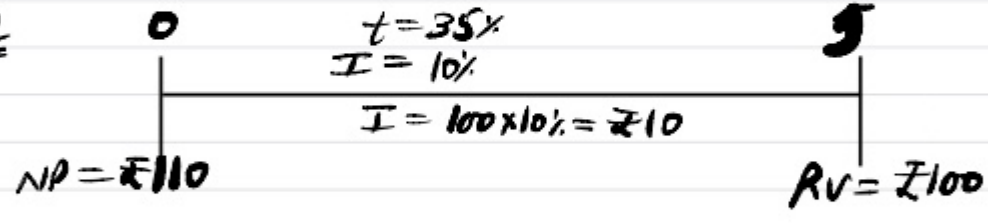
Sol ①



tax = 35%

$$K_d = \frac{I(1-t)}{NP \text{ or } P_0} = \frac{₹12(1-35\%)}{94 \rightarrow \text{current Price}} = 8.3\% \text{ (approx)}$$

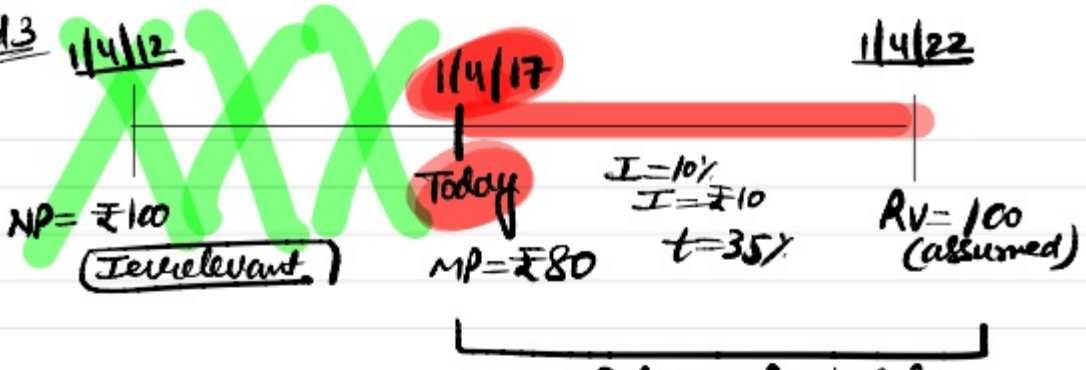
Sol 2



$$K_d = \frac{10(1-35\%) + \left(\frac{100-110}{5}\right)}{\left(\frac{100+110}{2}\right)} = 4.28\%$$

Common Sense 1/4/17 to 1/4/22 = 5 years = n

Qd 3



$$K_d = \frac{₹10(1-35\%) + \left(\frac{100-80}{5}\right)}{\left(\frac{100+80}{2}\right)} = 11.67\%$$

Qd 4 Each Instalment = $\frac{₹20000}{4 \text{ years}}$ = ₹5000 per year redemption.

Year	Principal	Payment = Instalment + Int (A)	@ 12% Pf factor (B)	(A) × (B) PV
1	20,000	5000 + 20,000 × 12.5% = 7500	0.8929	6696.75
2	15,000	5000 + 15000 × 12.5% = 6875	0.7972	5480.75
3	10,000	5000 + 10,000 × 12.5% = 6250	0.7118	4448.75
4	5,000	5000 + 5000 × 12.5% = 5625	0.6355	3574.69
		Present value of cash flows ⇒		20,200.94

Present value of Bond for investor = ₹ 20,200.94

dd(5) Each Instalment = ₹5000 / 5 years = ₹1000 Redemption each year.

year	Principle	Payment = (A) Instalment + Int	@6% (B) PV factor	(A) × (B) PV
1	5000	1000 + 5000 × 8% = 1400		
2	4000	1000 + 4000 × 8% = 1320		
3	3000	1000 + 3000 × 8% = 1240		
4	2000	1000 + 2000 × 8% = 1160		
5	1000	1000 + 1000 × 8% = 1080		
		PV of Cash flows =		₹ 5262.08

Qn (6) Face Value of Debentures = ₹100
Int rate = 16% = ₹16

(i) Debentures issued at par

Issue price = ₹100
NP = ₹100

NP = Issue Price − flotation cost
NP = ₹100 − 0

$$Kd = \frac{I(1-t)}{NP} = \frac{₹16(1-35\%)}{100} = \frac{₹16 \times (0.65)}{100}$$

$$= 0.104 \text{ or } 10.4\%$$

(ii) NP = Face Value − Discount − Flotation cost
NP = ₹100 − ₹10 − 0
NP = ₹90

$$Kd = \frac{I(1-t)}{NP} = \frac{₹16(1-35\%)}{90} = \frac{16 \times 0.65}{90} = 0.115 \text{ or } 11.5\%$$

(iii) NP = ₹100 + 10% ₹10 − 0
NP = ₹110

$$Kd = \frac{I(1-t)}{NP} = \frac{16(1-35\%)}{110} = 0.0945 \text{ or } 9.45\%$$

(b)

NP = Face Value − Discount / +Premium − Flotation cost

= ₹100 ± 0 − 2% × 100

= ₹98

$K_d = \frac{16(1-0.35)}{98} =$ 0.106 & 10.6%

Sol (f) Face Value of Debenture (Par) = ₹100

Int rate = 12%

Interest = ₹100 × 12% = ₹12

$I(1-t)$ = 12(1 − 0.35) = 12 × 0.65 = ₹7.8

n = 7 years

RV = Redemption Value = ₹100 (assumed Par)

(i)(a) Issued at Par

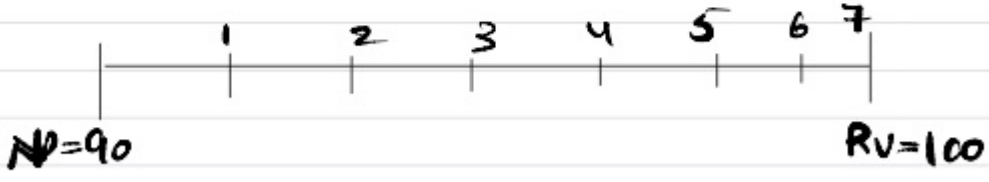
NP = ₹100

$$K_d = \frac{I(1-t) + \left(\frac{RV - NP}{n}\right)}{\left(\frac{RV + NP}{2}\right)} = \frac{7.8 + \left(\frac{100-100}{7}\right)}{\left(\frac{100+100}{2}\right)} = \frac{7.8}{100} \times 100$$

$$= 7.8\%$$

(i)(b) Issued at Discount

NP = ₹100 − 10% = ₹90



$$K_d = \frac{7.8 + \left(\frac{100-90}{7}\right)}{\left(\frac{100+90}{2}\right)} = \left(\frac{7.8 + 1.4286}{95}\right) \times 100$$

$$= 9.714\%$$

(i) NP = ₹100 + 10% = ₹110

$$Kd = \frac{7.8 + \left(\frac{100-110}{7}\right)}{\left(\frac{100+110}{2}\right)} = \frac{7.8 - 1.4286}{105} \times 100 = 6.07\%$$

(ii) NP = ₹100 − 2% flotation cost = ₹98

NP = 98 ——— 100 = RV

$$Kd = \frac{7.8 + \left(\frac{100-98}{7}\right)}{\left(\frac{100+98}{2}\right)} = \frac{7.8 + 0.286}{99}$$

$$= 8.167\%$$

$$PV(1+i)^{25} = FV$$

$$2500(1+i)^{25} = 1,00,000$$

$$(1+i)^{25} = \frac{1,00,000}{2500}$$

$$(1+i)^{25} = 40$$

$$(1+i) = (40)^{1/25}$$

$$(1+i) = 1.15907$$

$$i = 1.15907 - 1$$

$$i = 0.15907$$

$$i = 15.91\%$$

$$Kd = I(1-t)$$

$$Kd = I$$

$$Kd = 15.91\%$$

Sol 8B

$t = 25\%$

0 — 5 years — 5 years

$I = ₹10$

10% Intrate

IP = ₹100

Options

Redemption of debentures → RV = ₹100

1 Share MP = ₹20

X

or

Conversion into Equity Shares

5 Shares for 1 Debenture

1 Share $MP = 20(1+4\%)^5$

Share $MP_5 = 24.33$

5 Sh × 24.33 = 121.67

RV

✓

0 — 5 years, $I = ₹10$, $t = 25\%$

1 2 3 4 5

$I(1-t)$

$10(1-25\%)$

7.5 7.5 7.5 7.5 75

IP = ₹100

RV = 121.67

$$Kd = \frac{\left(10(1-25\%) + \frac{121.67-100}{5}\right)}{\left(\frac{121.67+100}{2}\right)}$$

Sol 8B

Method (i) Approximation Method.

$$Kd = \frac{I(1-t)+\left(\frac{RV-NP}{n}\right)}{\left(\frac{RV+NP}{2}\right)} = \frac{10(1-25\%)+\left(\frac{121.67-100}{5}\right)}{\left(\frac{121.67+100}{2}\right)}$$

$$Kd = 10.67\%$$

Method (ii) IRR & YTM

Calculation of NPV

Particulars	Year	Amt	At 7% / 10% PV factor	At 7% / 10% PV	At 12% PV factor	At 12% PV
Issue price	0	100	1	(100)	1	(100)
Int(1-t)	1-5	7.5	3.790	28.425	3.605	27.0375
RV	5	121.67	0.621	75.557	0.567	68.9869
			NPV	+3.982	NPV	-.39756

$$Kd = 10\% + 3.982 \times \frac{(12\%-10\%)}{3.982-(-.39756)}$$

$$= 10\% + 3.982 \times \frac{2\%}{7.9576} = 11\% \text{ (approx)}$$

option (A)

Sol (1) Institutional Term loan

Int rate = 14%

t = 50%

Int = ₹100L × 14% = ₹14L

Value of loan = ₹100L

$$Kd_1 = \frac{I(1-t)}{NP} = \frac{₹14(1-50\%)}{100}$$

$Kd_1 = 7\%$

Rank (II)

Advice: use Debentures as they are cheaper for company

option (B)

Non Convertible Debentures

Int rate = 13%

Issue Discount = 2.5%

Issue expenses = ₹1L

t = 50%

NP = ₹100L − 2.5L − 1L
(Discount, Issue exp)

NP = ₹96.5L

Int = 100L × 13% = 13L

$$Kd_2 = \frac{13L(1-50\%)}{96.5L}$$

$Kd_2 = 6.735\%$

Rank (I)

Sol 10 $Pd = \frac{₹12}{97} \times 100 = 12.37\%$

Sol 10 Face value = ₹100
Flotation cost = 3%

NP = Net Proceed = ₹100 − 3% = ₹97
Pd = Pref DIV = = ₹12

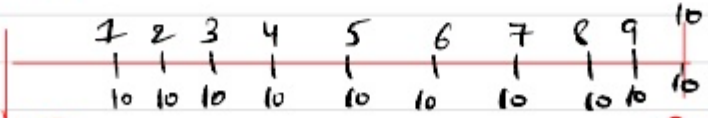
$$K_P = \frac{P_d}{NP} = \frac{12}{97} \times 100 = 12.37\%$$

Sol (11)

NP = ₹95, Face value = ₹100
Pref div = 10% × 100 = ₹10

$$K_P = \frac{P_d}{NP} = \frac{₹10}{95} \times 100 = 10.53\%$$

Sol 12 NP = ₹95
n = 10 years
RV = ₹100
Pd = ₹10



NP = 95

RV = 100 (assumed at Par)

$$K_P = \frac{P_d + \left(\frac{RV - NP}{n}\right)}{\left(\frac{RV + NP}{2}\right)}$$

$$K_p = \frac{10 + \left(\frac{100-95}{10}\right)}{\left(\frac{100+95}{2}\right)} = \frac{10+0.5}{97.5} \times 100 = 10.77\%$$

Sol 13

NP = ₹100 + ₹5 − ₹2 = ₹103
(Premium, flotation cost)

RV = ₹100 + ₹10 = ₹110

Pd = 12% × 100 = ₹12

n = 10 years

$$K_P = \frac{Pd + \left(\frac{RV-NP}{n}\right)}{\left(\frac{RV+NP}{2}\right)} = \frac{12 + \left(\frac{110-103}{10}\right)}{\left(\frac{110+103}{2}\right)} = 11.92\%$$

Sol (14) Number of Pref shares issued = 39000

Face value = ₹100

PD = 15% = 15% × 100 = ₹15 per Pref share

RV = Redemption = ₹100 + 10% = ₹110

n = Life of Pref shares = 20 years

Issue expenses = ₹39000 / 39,000 = ₹1 per share

(a) If shares issued at Par

NP = ₹100 − ₹1 = ₹99

$$K_p = \frac{PD + \left(\frac{RV - NP}{n}\right)}{\left(\frac{RV + NP}{2}\right)} = \frac{15 + \left(\frac{110 - 99}{20}\right)}{\left(\frac{110 + 99}{2}\right)} = 14.88\%$$

(b) If shares issued at Premium of 10%

NP = ₹100 + ₹10 − ₹1 = ₹109

FV + Premium − Issue Exp

$$K_p = \frac{15 + \left(\frac{110 - 109}{20}\right)}{\left(\frac{110 + 109}{2}\right)} = \frac{15 + 0.05}{109.5} = 13.74\%$$

(c) If shares issued at Discount of 10%

NP = 100 − 10 − 1 = 89

$$K_p = \frac{15 + \left(\frac{110 - 89}{20}\right)}{(110 + 89)/2} = 16.13\%$$

Sol 15 Dividend per share = DPS = ₹27.

① MPS = ₹150 [year 1]

$$Ke = \frac{DPS}{MPS} = \frac{₹27}{₹150} = 18\%$$

---

② MPS = ?
Ke = 20%
DPS = ₹27 (stable) [year 2]

$$Ke = \frac{DPS}{MPS}$$

$$20\% = \frac{27}{MPS}, \quad MPS = \frac{27}{20\%} = \frac{27}{0.20} = ₹135$$

---

③ MPS = ₹160, DPS = ? [year 2]
Existing Ke = 18%

$$Ke = \frac{DPS}{MPS}, \quad 18\% = \frac{DPS}{160}, \quad ₹28.8 = DPS$$

Note:
we have assumed that existing Ke mean year 1's Ke i.e. 18%.

Alternative viewpoint can be existing Ke = year 2's Ke = 20%.

Sol 16 Fair value of Share = ₹100
EPS = ₹25

① Ke = ?, EPS = ₹25, MPS = ₹150

$$Ke = \frac{EPS}{MPS} = \frac{25}{150} = 16.67\%$$

---

② Ke = 18%, MPS = ?, EPS = ₹25

$$Ke = \frac{EPS}{MPS}$$

$$18\% = \frac{25}{MPS}, \quad MPS = \frac{25}{18\%} = \frac{25}{0.18} = ₹138.89$$

---

③ EPS = ?, MPS = ₹160,

Existing Ke = year 1's Ke = 16.67%

$$Ke = \frac{EPS}{MPS}$$

$$16.67\% = \frac{EPS}{160}, \quad EPS = ₹26.67$$

Note: we have used Ke of year 1 as existing Ke.
Alternative view point is possible.

Q17 $D_0 = ₹1$ (already Paid dividend)

g = growth rate = 10%

MPS = P_0 = Price of Share today = ₹55

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

$$K_e = \frac{1(1+10\%)}{55} + 10\%$$

$$K_e = \frac{1.1}{55} \times 100 + 10\%$$

$$K_e = 2\% + 10\% = 12\%$$

⇒ Alternative Presentation.

$$K_e = \frac{1.1}{55} + 10\%$$

$$K_e = .02 + 0.1$$

$$K_e = 0.12 = 12\%$$

Q of 18 $P_0 = ₹60$ current Market Price

$D_0 = ₹4$ current dividend

$K_e = 12\%$

let growth rate = g

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

$$12\% = \frac{4(1+g)}{60} + \frac{g}{1}$$

$$12\% = \frac{4(1+g) + 60g}{60}$$

$$12\% \times 60 = 4 + 4g + 60g$$

$$7.2 = 64g + 4$$

$$3.2 = 64g$$

$$\frac{3.2}{64} = g$$

$$0.05 = g$$

$$\boxed{g = 5\%}$$

Qd 19 $P_0 = ₹40$

$D_0 = ₹2$

$g = 10\%$

(a) $Ke = \frac{D_0(1+g)}{P_0} + g \Rightarrow \frac{2(1+10\%)}{40} \times 100 + 10\%$

$\Rightarrow \frac{2.2}{40} \times 100 + 10\%$

$Ke \Rightarrow 5.5\% + 10\% = 15.5\%$

(b) $P_0 = ?$, $g = 11\%$, $D_0 = 2$, $Ke = 15.5\%$

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

$$15.5\% = \frac{2(1+11\%)}{P_0} + 11\%$$

$$15.5\% - 11\% = \frac{2.22}{P_0}$$

$$4.5\% = \frac{2.22}{P_0}$$

$$P_0 = \frac{2.22}{4.5\%} = \frac{2.22}{0.045} = ₹49.33$$

Self Note → Humne 1st part wale Ke ko 2nd part mei use kiya hai to derive P_0.

(c) $K_e = 16\%$
$g = 10\%$
$D_0 = ₹2$
$P_0 = ?$

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

$$16\% = \frac{2(1+10\%)}{P_0} + 10\%$$

$$16\% - 10\% = \frac{2.2}{P_0}$$

$$6\% = \frac{2.2}{P_0}$$

$$P_0 = \frac{2.2}{6\%} = \frac{2.2}{0.06} = ₹36.67$$

WN ①

Sol 20 Cum dividend price = ₹235 ×
− Dividend = ₹30
Ex dividend price = ₹205 ✓

WN ②

$26(1+g)(1+g)(1+g) = 30$

$26(1+g)^3 = 30$

$(1+g)^3 = \frac{30}{26}$

$(1+g) = \left(\frac{30}{26}\right)^{\frac{1}{3}}$

$(1+g) = 1.0488$

$g = 0.0488 = 4.88\% \sim 4.9\%$

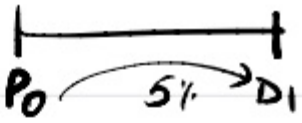
$$Ke = \frac{D_0(1+g)}{P_0} + g = \frac{30(1+4.9\%)}{205} + 4.9\%$$

$$= \frac{30 \times 1.049}{205} \times 100 + 4.9\%$$

$$= 15.35\% + 4.9\%$$

$Ke = 20.25\%$

Sol 21



Dividend$_1$ = 5% × Share Price in beginning

$D_1 = 5\% \times P_0$

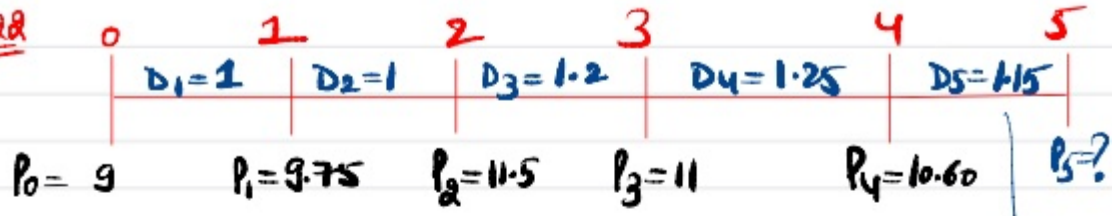
$\frac{D_1}{P_0} = 5\%$, $Ke = 12\%$

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

$12\% = 5\% + g$

$7\% = g$

Sol22



(Ignore this year because Closing Price is not available)

Step ① Calculate Realised Yield for each year

$$= \frac{D_1 + (P_1 - P_0)}{P_0}$$

For year 1 = $\frac{1 + (9.75 - 9)}{9}$ = 19.44%

For year 2 = $\frac{1 + (11.50 - 9.75)}{9.75}$ = 28.21%

For year 3 = $\frac{1.2 + (11 - 11.50)}{11.5}$ = 6.09%

For year 4 = $\frac{1.25 + (10.60 - 11)}{11}$ = 7.72%

For year 5 = ignore

Step ② Finding geometric mean

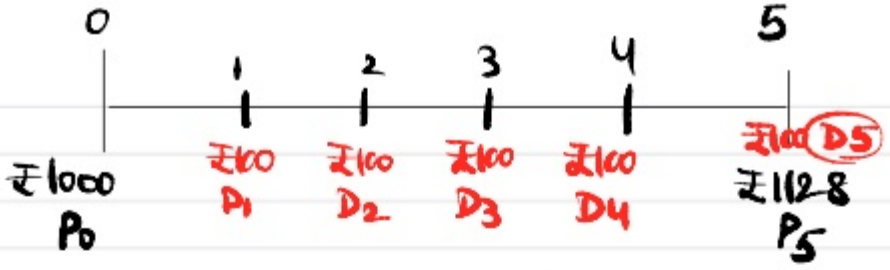
$$Ke = \left[(1+r_1)(1+r_2)(1+r_3)(1+r_4)\right]^{\frac{1}{4}} - 1$$

$$Ke = \left[(1+19.44\%)(1+28.21\%)(1+6.09\%)(1+7.72\%)\right]^{\frac{1}{4}} - 1$$

$$Ke = \left[(1.1944)(1.2821)(1.0609)(1.0772)\right]^{\frac{1}{4}} - 1$$

$$\boxed{Ke = 15\%}$$

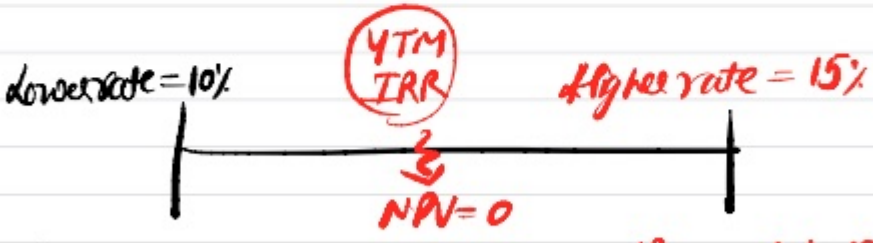
Ed 23



Apply YTM for realised yield approach.

Statement of NPV

Particulars	Year	Amount	At 10% PV factor	At 10% PV	At 15% PV factor	At 15% PV
Purchase Price	0	(₹1000)	1	(1000)	1	(₹1000)
Dividend	1-5	₹100	3.790	379.0	3.352	335.2
Sale Price	5	₹1128	0.621	700.488	0.497	560.616
			$NPV_{10\%}$ =	79.488	NPV at 15%	-104.184



$$Ke = YTM = 10\% + 79.488 \times \frac{(15\% - 10\%)}{79.488 - (-104.184)}$$

$$Ke = 12.164\%$$

Sol 24 $R_f = 10\%$

$\beta = 1.75$

ER_m = Expected Return in market = 15%

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

$$= 10\% + 1.75 (15\% - 10\%) = 18.75\%$$

Sol 25 $K_e = R_f + \beta (ERm - R_f)$

$= 6\% + 1.10 (18\% - 6\%)$

$= 6\% + 1.10 \times 12\%$

$\Rightarrow 19.2\%$

Sol 26

$R_F = 9\%$

$ER_m = 15\%$

Mr. Ram

- 80% funds (1) → $\beta = 0.8$
- 20% funds (2) → $\beta = 1.4$

(i) $Ke = Rf + B(ERm - Rf)$

$Ke_1 = 9\% + 0.8(15\% - 9\%) = 13.8\%$

$Ke_2 = 9\% + 1.4(15\% - 9\%) = 17.4\%$

(ii) Overall return for Mr. Ram $= 13.8\% \times 80\% + 17.4\% \times 20\%$

$= \boxed{14.52\%}$

(iii) Beta of overall Investment $= 0.8 \times 80\% + 1.4 \times 20\%$

$= \boxed{0.92}$

(Q27) $E(Rm) = 15\%$, $Rf = 10\%$

x Beta	f Probability	fx
1.0	0.2	0.2
1.1	0.3	0.33
1.2	0.2	0.24
1.3	0.2	0.26
1.4	0.1	0.14
	1	1.17

Expected value of Beta (mean of Beta)

$= \frac{\Sigma fx}{\Sigma f} = \frac{1.17}{1} = 1.17$

(a) For Mode Beta ($\beta = 1.1$)

$Ke = Rf + \beta(ERm - Rf)$

$= 10\% + 1.1(15\% - 10\%) = 15.5\%$

Self Note: Mode means 'value' for which Probability is highest
so in this question highest probability is 0.3
& value of Beta (having highest Probability) = 1.1 → Mode

(b) For Range

Maximum Ke (using maximum Beta)

$Ke = 10\% + 1.4(15\% - 10\%) = 17\%$

Minimum Ke (using minimum Beta)

$Ke = 10\% + 1.0(15\% - 10\%) = 15\%$

(c) For Expected value (Average Beta) (Mean Beta)

Expected value of Beta $= \frac{\Sigma fx}{\Sigma f} = \frac{1.17}{1} = 1.17$

$Ke = 10\% + 1.17(15\% - 10\%) = 15.85\%$

Sol 28

@

Business	Beta (x)	Equity (w)	w.x
Main frame	1.10	100	110
Personal	1.50	100	150
Software	2.00	50	100
Printer	1.00	150	150
		400	510

Expected Beta = Mean Beta = weighted Beta = Average Beta $= \frac{\Sigma wx}{\Sigma w} = \frac{510}{400} =$ **1.275**

So, Beta of XYZ Computers as a Company = **1.275**

(ii) $R_f = 7.5\%$, $ER_m - R_F$ = Risk Premium = 8.5%

Cost of Equity $= R_f + \beta (ER_m - R_f)$

For XYZ Co. $\Rightarrow$ $7.5\% + 1.275(8.5\%) = 18.3375\%$

For mainframe Division, $K_e = 7.5\% + 1.10 \times 8.5\% = 16.85\%$
For Personal comp Division, $K_e = 7.5\% + 1.5 \times 8.5\% = 20.25\%$
For Software Division, $K_e = 7.5\% + 2.0 \times 8.5\% = 24.5\%$
For Printer Division $K_e = 7.5\% + 1 \times 8.5\% = 16\%$

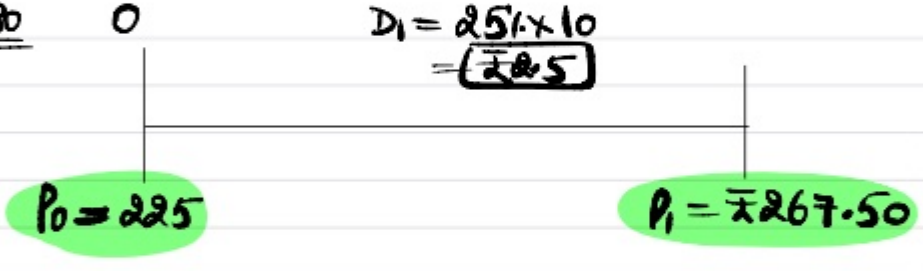
Sol 29

Realised yield approach

$$Ke = \frac{D_1 + (P_1 - P_0)}{P_0} = \frac{40 + (520 - 500)}{500}$$

Ke = 12%

Sol 30



$$Ke = \frac{D_1 + (P_1 - P_0)}{P_0} = \frac{2.5 + (267.50 - 225)}{225} = 20\%$$

Cash inflow ⇒ Dividend $2.5 \times 100 = ₹250$
Share Sale $267.5 \times 100 = ₹26750$

Total Cash inflow = ₹27,000.

Sol 33 Ke = Expected Return of equity = 10%

β = Brokerage (floatation cost) = 3%

tp = personal Tax of shareholder = 30%

$K_{re} = Ke(1-tp)(1-\beta) = 10\%(1-30\%)(1-3\%) = 6.79\%$

Sol 34

Step① Calculate Ke of existing shares (old shares)

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

$$\text{old } Ke = \left(\frac{14}{140} + 5\%\right) = 15\%$$

Step②

$K_{re} = Ke(1-tp)(1-\beta)$

$K_{re} = 15\%(1-22\%)(1-3\%)$

$K_{re} = 15\% \times 0.78 \times 0.97 = 11.35\%$

Q.34

Statement for Calculation of WACC (MV weights)

Source	Amount (MV)		Weight (A)	Rate/Cost (B)	(A) × (B)
Equity	(FSC Rate Shares Nos) ⇒ 50000 × 39	= 19,50,000	1950/2926	19%	
8% PSC	(4,00,000/25) × 16*	= 2,56,000	256/2926	12.5%	
12% Debt	(6,00,000/100) × 120	= 7,20,000	720/2926	7%	
		29,26,000		WACC ⇒ 15.48%	

WN(i) K_e = 19% (given)

K_{ee} = 19%, $K_{re} = K_e(1-t_e)(1-\beta)$

WN(ii) Pref share Cum Dividend Price = ₹18

− Pref Div (8% × 25) = −₹2

M price of Pref share Ex-dividend = ₹16

WN(iii) $K_p = \frac{\text{Pref Div}}{NP}$

$= \frac{₹2\ (25 \times 8\%)}{₹16\ MV}$

$= 12.5\%$ ✔

$K_p = \frac{\text{Pref Div Rate}}{100} \times 100$

$K_p = 8\%$ (ignore)

WN(iv) $K_d = \frac{I(1-t)}{NP} = \frac{12(1-30\%)}{120\ MV}$

$K_d = 7\%$ ✔

$\frac{12(1-30\%)}{100 \to BV}$

8.4% (ignore)

Sol 35 (Kd)

New Issue	Similar
11 years	
15% rate	16% yield
MP = ?	MP = ₹100

$$\frac{Int}{MP} = \frac{15}{MP} = \frac{16}{100}$$

$$\frac{15 \times 100}{16} = MP$$

So, MP of new Debenture = ₹93.75
− flotation cost (2% × 100) − 2.00

NP = 91.75

$$Kd = \frac{I(1-t) + \left(\frac{RV - NP}{n}\right)}{\left(\frac{RV + NP}{2}\right)} = \frac{15(1-30\%) + \left(\frac{100 - 91.75}{11}\right)}{\left(\frac{100 + 91.75}{2}\right)}$$

Kd = 11.73%

Q.26

Statement for Computation of WACC

Source	Amount	Weight × Rate	WACC
ESC	₹30,00,000	$\frac{30}{38}$ × 15%	11.842%
PSC	₹8,00,000	$\frac{8}{38}$ × 8%	1.684%
	₹38,00,000	WACC =	13.526%

$D_0 = 24\% \times 100 = ₹24$

Sol 38 (1) $K_e = \frac{D_1}{P_0} + g = \frac{D_0(1+g)}{P_0} + g$

$K_e = \frac{24(1+5\%)}{600} + 5\% = 9.2\%$

$K_{re} = K_e = \boxed{9.2\%}$

$K_d = \frac{I(1-t)}{NP} = \frac{12(1-30\%)}{100} = 8.4\%$

Statement for WACC

Sources	Amt	Weight	Rate	WACC
Equity	6 Cr	$\frac{6}{9}$	9.2%	
Res	1.2 Cr	$\frac{1.2}{9}$	9.2%	
Debt	1.8 Cr	$\frac{1.8}{9}$	8.4%	
	9 Cr		WACC ⇒	9.04%

Sol 38 (ii)

Statement for WACC

Source	Amt	weight	Rate	WACC
Equity &	6 cr	0.5	10.04%	
R&S	1.2 cr	0.1	10.04%	
12% Debt	1.8 cr	0.15	8.4%	
18% Term loan	3 cr	0.25	12.6%	
	12 cr	1	K_0 =	10.43%

$K_{d_2} = 18\%(1-30\%) = 12.6\%$

$K_e = \frac{D_1}{P_0} + g = \frac{24(1+5\%)}{500} + 5\% = 10.04\%$

Note: we have solved question on Book value weights basis, whereas this could also be solved using market value weights.

Sol 39

Statement for WACC (using MV weights)

Sources	Market Value		weights (A)	Rate (B)	(A) x (B)
ESC	$\left(\frac{50,000}{10}\right) \times \overset{MP}{25} =$	12,50,000	$\frac{125}{185}$	14.52%	9.81%
12% PSC	$\left(\frac{2,50,000}{100}\right) \times 108 =$	2,70,000	$\frac{27}{185}$	11.26%	1.64%
10% Debt	$\left(\frac{3,00,000}{100}\right) \times 110 =$	3,30,000	$\frac{33}{185}$	5.99%	1.07%
		18,50,000		WACC	12.52%

WN(1) For Kd.

NP = ₹110 - 2% = 107.8

RV = 100

n = years 10.

I = 10% x 100 = ₹10

t = 30%

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

$$K_d = \frac{10(1-30\%) + \left(\frac{100 - 107.8}{10}\right)}{\left(\frac{100 + 107.8}{2}\right)}$$

$$K_d = \frac{10 \times 0.7 - 0.78}{103.9}$$

$$K_d = \frac{7 - 0.78}{103.9} = 5.99\%$$

WN(ii) For KP

MP = ₹108, RV FV = 100, PD = 12% × 100 = ₹12, n = 10 yrs

$$K_P = \frac{PD + \left(\frac{RV - NP}{n}\right)}{\left(\frac{RV + NP}{2}\right)} = \frac{12 + \left(\frac{100 - 104.76}{10}\right)}{\left(\frac{100 + 104.76}{2}\right)} = 11.26\%$$

NP = 108 − 3½ × 108 = 104.76

WN(iii) $K_e = \frac{D_1}{NP} + g$

$= \frac{2}{25 - 4} + 5\%$

$= 14.52\%$

Ques 41

Statement for WACC

Source	Book value (₹ in lakhs)	weights (A)	cost (B)	(A) × (B) Weighted cost
ESC	65	65/105	16.3%	10.09%
Pref shares	12	12/105	12%	1.37%
Red. Debt	20	20/105	10.5%	2.00%
Con. Debt	8	8/105	7%	0.53%
	105			13.99%

WACC ✓

WN(1) $K_e = 16.3\%$ (given)

(ii) $K_P = \frac{P_d}{NP} = 12\%$ (given)

(iii) K_{d_1} (Red. Debt) $= \frac{I(1-t)}{NP} \times 100$

$= 15\%(1-30\%) = 10.5\%$ ✓

(iv) K_{d_2} (Con. Debt) $= I(1-t) = 10\%(1-30\%) = 7\%$ ✓

Sol 42

Statement for calculation of WACC (Book Value weight)

Source	Book Value (₹ in lakhs)	weight (A)	Cost/Rate (B)	(A) x (B)
Equity Share	120	120/195	18.5%	
RE	30	30/195	18%	
Pref sh.	36	36/195	14.29%	
Debt	9	9/195	10.95%	
	195		WACC =	17.29%

Statement for calculation of WACC (Market Value weight)

Source	Market Value ₹ in lakhs.	weight (A)	Cost/Rate (B)	(A) x (B)
Equity Share (200)	160	160/244.15	18.5%	
RE (120:30 By Ratio)	40	40/244.15	18%	
Pref sh.	33.75	33.75/244.15	14.29%	
Debt	10.40	10.40/244.15	10.95%	
	244.15		WACC =	17.51%

Working (i) Issue Price = ₹125, Flotation Cost = ₹5, D_1 = ₹15

Working (ii) Dividend

5 years

₹10.60 ——— ₹14.19

$10.60(1+g)^5 = 14.19$

$(1+g)^5 = \frac{14.19}{10.60}$

$(1+g) = \left(\frac{14.19}{10.60}\right)^{\frac{1}{5}}$

$g = \left(\frac{14.19}{10.60}\right)^{\frac{1}{5}} - 1 = 6\%$

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

$Ke = \frac{15}{125-5} + 6\%$

$Ke = 18.5\%$

$Kee = \frac{D_1}{Po} + g$

$Kee = \frac{15}{125} + 6\%$

$Kee = 18\%$

Working (iii) $Kp = \frac{Ref\ Div}{NP} = \frac{15\% \times 100}{105} = \frac{₹15}{105} = 14.29\%$

Working (iv)

	Over Debenture	Others Debentures
FV =	₹100	₹100
Int 15% =	₹15	₹16 (16%)

MP = [ ] ← derive MP of our Debenture. ₹100 (assume)

As we pay less Interest, then our Debenture should be sold in market at lower price.

$$\frac{Int}{MP} = \frac{₹15}{MP = x} = \frac{₹16}{₹100}$$

$$\frac{15}{x} = \frac{16}{100}$$

$$\frac{15 \times 100}{16} = x \quad , \quad x = 93.75$$

So, MP (Issue Price) of our Debenture = ₹93.75

− flotation cost 2% × ~~MP~~ Face value (As this Question) 2% × 100 = −₹2

NP = ₹91.75

$$Kd = \frac{I(1-t) + \left(\frac{RV - NP}{n}\right)}{\left(\frac{RV + NP}{2}\right)} = \frac{15(1-35\%) + \left(\frac{100 - 91.75}{11}\right)}{\left(\frac{100 + 91.75}{2}\right)}$$

$$= 10.95\%$$

Sol (43)

(i) Calculation of cost of Capital.

(a) $K_e = \frac{D_1}{P_0} + g = \frac{25(1+5\%)}{200} + 5\% = \frac{26.25}{200} \times 100 + 5\% = 18.125\%$

$D_0 = 25\% \times ₹100$ (Face value) $= ₹25$ (already Paid)

$g = 5\%$, $P_0 = ₹200$

(b) $K_{re} = K_e(1-t_p)(1-B)$

$= 18.125\%\ (1-20\%)$

$= 18.125 \times 0.80$

$K_{re} = 14.5\%$

(c) $K_p = \frac{P_d}{NP} \times 100 \Rightarrow \frac{9}{100} \times 100 = 9\%$

(d) $K_d = I(1-t) = 11\%(1-30\%) = 7.7\%$

(ii) Statement for Calculation of WACC (Book Value weights)

Source	Book value (₹ in lakhs)	weights (A)	Cost (B)	weighted Cost
Equity share	80	80/200	18.125%	7.25%
Retained Ear	40	40/200	14.5%	2.9%
Pref shares	20	20/200	9%	0.9%
Debentu	60	60/200	7.7%	2.31%
	200		WACC ⇒	13.36%

(3) Statement for WACC (MV weights)

Sources	Market Value (₹ in lakhs)		weight Ⓐ	Rate Ⓑ	Ⓐ × Ⓑ
Equity shares (160)	2 : 1 (Book value ratio)	106.67	106.67/250	18.125%	7.734%
Retained Earnings		53.33	53.33/250	14.5%	3.093%
PSC		24	24/250	9%	0.864%
Debt		66	66/250	7.7%	2.033%
		250		WACC	13.724%

Sol 44

WN(1) Total Finance required = ₹20,00,000

Debt : Equity

25% : 75%

Debt ₹5,00,000

- First 2L, I = 10%
- Next 3L, I = 13%

$Kd = I(1-t)$

$Kd_1 = 10\%(1-30\%)$

$Kd_1 = 7\%$

$Kd_2 = 13\%(1-30\%)$

$Kd_2 = 9.1\%$

Equity ₹15,00,000

- Retained Earning ₹4,00,000
- Fresh issue of Equity ₹11,00,000, Ke = 21%

$Kre = Ke(1-tp)(1-\beta)$

$Kre = 21\%(1-20\%)$

$Kre = 16.8\%$

WN(2) For Ke (Dividend growth model)

EPS = ₹12

- 50% Dividend = ₹6 = D_0
- 50% Retained earning = ₹6 = RE

$$Ke = \frac{D_1}{P_0} + g = \frac{D_0(1+g)}{P_0} + g = \frac{6(1+10\%)}{60} + 10\%$$

$$Ke = \frac{6.6}{60} + 10\% = 11\% + 10\% = 21\%$$

Main Solution

(i) Calculation of average cost of Debt

Particulars	Amount	weight	Rate	Average Cost
Debt 1	2,00,000	2/5	7%	
Debt 2	3,00,100	3/5	9.1%	
	5,00,000			Avg Debt cost = 8.26%

(ii) Cost of Equity = Ke = 21%
Cost of Retained Earning = Kre = Ke(1-tp) = 16.8%
(Refer to con (i) & (ii))

(iii) Calculation of WACC for additional finance

Particulars	Amount	weight (A)	Rate (Cost) (B)	(A) × (B)
RE	₹4,00,000	4/20 = 0.2	16.8%	3.36%
Equity	₹11,00,000	11/20 = 0.55	21%	11.55%
Debt	₹ 5,00,000	5/20 = 0.25	8.26%	2.065
	₹20,00,000	1		Ko = 16.975%

Sol 48

	(A) Weight	(B) Cost	(A) × (B)
Equity	(1−x)	25%	25 − 25x
Debt	(x)	9.75%	9.75x
	1		WACC = 18

$K_d = I(1-t) = 15\%(1-35\%) = 9.75\%$

$K_e = \frac{1}{P/E} = \frac{1}{4} \times 100 = 25\%$

$K_e = \frac{EPS}{MPS}$, $P/E = \frac{MPS}{EPS}$

$K_e = \frac{1}{P/E}$

$25 - 25x + 9.75x = 18$

$25 - 15.25x = 18$

$25 - 18 = 15.25x$

$\frac{7}{15.25} = x$

$0.459 = x$

So, $w_d = 0.459 = 46\%$ (approx)

$w_e = 1 - 0.459 = 0.5409 = 54\%$ (approx)

$\frac{D}{E} = \frac{46}{54}$

Sol 49

	weight	Cost Rate	
Equity	0.7-x	25%	17.5-25x
PSC	0.3	18%	5.4
Debt	x	9.75%	9.75x
	1	WACC =	20

$$We + Wp + Wd = 1$$
$$We + 0.3 + x = 1$$
$$We = 1 - 0.3 - x$$
$$We = 0.7 - x$$

① $$Kp = \frac{Pd}{NP} = \frac{18}{100} = 18\%$$

② $$Kd = I(1-t) = 15\%(1-35\%) = 9.75\%$$

③ $$Ke = \frac{1}{P/E\ ratio} = \frac{1}{4} \times 100 = 25\%$$

$$17.5 - 25x + 5.4 + 9.75x = 20$$

$$x = 0.19$$

$w_d = x = 0.19 = 19\%$

$w_p = 0.3 = 30\%$

$w_e = 0.7 - x = 0.51 = 51\%$

$\frac{\text{Debt}}{\text{Equity}} = \frac{19}{51}$ Ans

Qol 50

Present

Only Equity Case

Shares MV = ₹6,00,000

Dividend Paid = ₹1,20,000

Proposed Situation

Equity + Debt

18% 5,00,000

This is what we want to calculate (New Value of Equity)

(from new Proposal)

New Cash Inflows = ₹105000

− Int Paid (5,00,000 × 18%) −₹90000

Additional PBT = 15000

− Tax ignore

Additional EAES = 15000

+ Original EAES = 1,20,000

(as Dividend expected to continue at this rate from original Project)

New Total EAES = 1,35000

n = number of shares

$$K_e = \frac{EPS \times n}{MPS \times n} = \frac{EAES}{MV}$$

$$21.6\% = \frac{135000}{MV}$$

$$MV = 625000$$

(i) Value of shares after accepting Proposal = ₹ 6,25,000.

− original value of shares = ₹ 6,00,000

Gain in value of Equity Shares = ₹ 25,000

(ii)

Present	Proposed
$K_e = \frac{EAFS}{MV} = \frac{1,20,000}{6,00,000} = 20\%$	K_e = 21.6% (given)
K_d = −	$K_d = I(1-t) = 18\%$ (Issue)
$V_E = 6,00,000$	$V_E = 6,25,000$
$V_D = 0$	$V_D = 5,00,000$
$K_o = K_e \times \frac{E}{D+E} + K_d \times \frac{D}{D+E}$	$K_o = K_e \times \frac{E}{D+E} + K_d \times \frac{D}{D+E}$
$K_o = 20\% \times \frac{6}{6} + - \times \frac{0}{6}$	$K_o = 21.6\% \times \frac{6.25}{5+6.25} + 18\% \times \frac{5}{5+6.25}$
$K_o = 20\%$	$K_o = 20\%$ (approx)

So, we can say that WACC is not affected by Gearing.

Sol 5! WN(i) Last year EPS = ₹5

Last year
→ Dividend Payout 60%
5 × 60% = ₹3 Per Share

Retained Earning
5 × 40% = ₹2 per share

MPS = P_0 = ₹20.8
D_0 = ₹3

$g = b \times r$
g = 40% × 10% = 4%

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

$K_e = \frac{3(1+4\%)}{20.8} + 4\% = 19\%$

$K_e = K_{ee}$ (for this Question)

WN(iii)

$K_P = \frac{P_d + \left(\frac{RV - NP}{n}\right)}{\left(\frac{RV+NP}{2}\right)} = \frac{15 + \left(\frac{100-90}{10}\right)}{\left(\frac{100+90}{2}\right)} = \frac{16}{95} \times 100 = 16.84\%$

WN(iv) (Debentures) $K_{d_1} = \frac{I(1-t) + \left(\frac{RV-NP}{n}\right)}{\left(\frac{RV+NP}{2}\right)} = \frac{14(1-40\%) + \frac{(100-75)}{6}}{\frac{100+75}{2}} = 14.3\%$

WN(v) Term loan $K_{d_2} = I(1-t) = 13\%(1-40\%) = 7.8\%$

Fair solution

Sol 5 (i)

Statement for calculation of WACC (MV weights)

Source	Market value	Ⓐ Weights	Ⓑ Cost	Ⓐ × Ⓑ
ESC 502 × 2.08 =	1040 L	1040/1672.5	18%	
Retained Earning				
15% PSC	50000 × 90 = 45 L	45/1672.5	16.84%	
14% Debentures	250000 × 75 = 187.5 L	187.5/1672.5	14.36%	
13% Term loan	400 L	400/1672.5	7.80%	
	1672.5 L		WACC = 15.79%	

Sol 5 (ii)

Statement for WMCC

Source			weight	Rate
Equity	60%	300 L	0.6	26.28%
RE Reserves	20%	100 L	0.2	19%
Debt	20%	100 L	0.2	8.52%
		500 L		WMCC = 21.27%

$I(1-t)$

Q.No(i)

Debt → first 40L → $13\%(1-40\%) = 7.8\%$ Kd_1

Debt → Next 60L → $15\%(1-40\%) = 9\%$ Kd_2

Average Kd = $7.8\% \times \frac{40L}{100L} + 9\% \times \frac{60L}{100L} = 8.52\%$

Kd = 8.52%

Q.No(ii)

Retained Earning

old share price = 20.8

$$\text{old } Ke = \frac{D_1}{P_0} + g$$

$$\frac{3(1+4\%)}{20.8} + 4\% = 19\%$$

Kre = old Ke = 19%

↓

in part (ii) of question, we have assumed that RE belongs to old Equity shares (MP = 20.8), Thus we have used old Ke = Kre. (not assuming it to be from new Equity)

Fresh Equity

Issue Price = NP = ₹14

$$\text{New } Ke = \frac{D_1}{NP} + g$$

$$= \frac{3(1+4\%)}{14} + 4\% = 26.28\%$$

Q(52 Cont'd

Existing	
Debt	30m
Equity	30m
	60m

Additional	
Debt	15m
Equity	15m
	30m

Optimal Structure

	weight
Debt	0.5
Equity	0.5
	1

Cont'd ② Existing MPS = ₹30, NP = ₹27 (for new shares)

Shareholders expectation ⇒ $12\% = \frac{D_1}{P_0} + g$

$12\% = 4\% + 8\%$

$12\% = \left(\frac{1.2}{30} \times 100\right) + 8\%$

K_e = old K_e = 12%

(old shares)

K_e (New fresh Equity) $= \frac{D_1}{P_0 NP} + g = \frac{1.2}{27} + 8\%$

K_e New = 12.44%

Cont'd ③

$K_d = \frac{I(1-t)}{NP} = \frac{₹8(1-40\%)}{100} = 4.8\%$

Fair solution
Solution 5a

(a) Present Capital structure

Debt 30m
Equity 30m
60m

weights
0.5
0.5
→ These are optimal weights

Additional Capital To be raised = 30m

Debt (0.5) 15m

Equity (0.5) 15m

RE 3m

Fresh Equity 12m (C&B)

(b) Internally generated Equity = RE = 3m

(c)

Components of Equity

Kee = (old Ke) = 12% (given)

Ke (fresh) = 12.44% (Calculated in con 2)

(d)

Level when WACC increase = Breaking Point

Breaking Point = Source of Capital / weight = RE / weight = 3m / 0.5 = 6m

Self note:

6m

first 6m			Next 24m		
	weight	Rate		weight	Rate
E	0.5	12% (Ke)	E	0.5	12.44%
D	0.5	4.8%	D	0.5	4.8%

(c) Calculation of WACC

(1) upto first Breaking point (first 6m)

$K_o = K_e \times w_e + K_d \times w_d$

$K_o = 12\% \times 0.5 + 4.8\% \times 0.5$

$K_o = 8.4\%$

(2) WACC upto 2nd Breaking Point (last 24m)

$K_o = K_e \times w_e + K_d \times w_d$

$K_o = 12.44\% \times 0.5 + 4.8\% \times 0.5$

$K_o = 8.62\%$

(3) WACC for Total 30m

$$K_o = 8.4\% \times \frac{6}{30} + 8.62\% \times \frac{24}{30}$$

$K_o = 8.576\%$

Q.53 WN

WN(1) Existing Capital Structure

		weight
Debt	360,000	0.15
PSC	120000	0.05
ESC	1920000	0.80
	24,00000	

These are optimum weights.

WN(2) Equity shares

current MP = P_0 = ₹27.75

D_1 = 2.773 × 50% = ₹1.3865 (50% of 2010 EPS)

RE = 2.773 × 50% = ₹1.3865 per share Retained Earning

Total RE = 2,00000 Shares × 1.3865 = ₹277300

EPS = 2.773

→ 50% Dividend = 1.3865 per share (D_1)

→ 50% RE = 1.3865 per share × 2,00000 Shares = ₹277300

WN(3) Calculation of growth rate

$$g = \frac{1.12 - 1}{1} \times 100 = 12\%$$

we can verify in the given data that EPS has grown by 12% each year.

Thus g = 12%

Alternative Method

$$g = \left(\frac{\text{Last value}}{\text{first value}}\right)^{\frac{1}{n}} - 1 = \left(\frac{2.773}{1}\right)^{\frac{1}{9}} - 1 = 12\%$$

Ans (4)

	Old Debenture	New Debenture
Int rate	13%	14%
Market price	₹98	$x = 105.54$

Currently selling

derive price of New Debenture

$$\frac{13}{98} = \frac{14}{x} \Rightarrow x = \frac{14}{13} \times 98 = 105.54$$

Sol 53 Main Solution

① (a) New $K_d = \frac{I(1-t)}{NP} = \frac{14(1-50\%)}{105.54} = 6.63\%$

New $K_P = \frac{P_d}{NP} = \frac{₹1.2}{9.8} = 12.24\%$

(b) $K_e = \frac{D_1}{P_0} + g = \frac{1.3865}{27.75} + 12\%$

Assuming to come from Retained earning (So we will use old Ke)

Old Ke = New = 17%

② Calculation of WMCC

Source	Amount	weight (A)	Rate (B)	(A) × (B)
Debt		0.15	6.63%	
Pref		0.05	12.24%	
Equity		0.80	17%	
			WMCC	15.2065%

③ Breaking Point = $\frac{\text{Amount of Capital (before rate change)}}{\text{weight}}$

$= \frac{\text{Amount of RE}}{\text{weight}} = \frac{₹277300}{0.80}$

Breaking Point = ₹346625

(Yani ₹ 346625 Total capital kay' neeo Equity-shares issue karne se pehle)

(4)

346625

~~Debt~~	Debt
PSC	PSC
Equity (RE) = 277300 (17%)	Fresh Equity =

Calculation of WMCC beyond ₹ 346625 of marginal capital.

Particulars	Amount	weight	Rate
~~Debt~~	—	0.15	6.63%
PSC	—	0.05	12.24%
New Equity	—	0.80	18.93%
			WMCC 16.75%

WMCC New Equity $\Rightarrow Ke = \frac{D_1}{NP} + g$

$= \frac{1.3865}{20^*} + 12\% = 18.93\%$

Q.56 | Dividend Growth model | CAPM

Given $D_1 = ₹3$, $g = 8\%$, | $R_f = 10\%$, $ER_m = 14\%$, Beta $= \beta = 1.5$

Step ① Calculate Ke using CAPM.

$Ke = R_f + \beta(ER_m - R_f) = 10\% + 1.5(14\% - 10\%) = 16\%$

Step ② use Dividend Growth model.

$Ke = \frac{D_1}{P_0} + g \Rightarrow 16\% = \frac{3}{P_0} + 8\%$

$16\% - 8\% = \frac{3}{P_0}$

$8\% = \frac{3}{P_0}$

$0.08 = \frac{3}{P_0}$

$P_0 = \frac{3}{0.08} = ₹37.5$

Equilibrium price of share $= ₹37.5$

So, ~~Price of share~~ ₹37.5

(ii) After decision of finance manager, New Beta = 1.75

Step ① $Ke = 10\% + 1.75(14\% - 10\%) = 17\%$

Step ② $Ke = \frac{D_1}{P_0} + g \Rightarrow 17\% = \frac{3}{P_0} + 8\%$

$P_0 = ₹33.33$

Equilibrium price after decision $= ₹33.33$

Sol 57

Calculation of WACC

Cost	Kd = I(1-t)	Ke	WACC = Ko = Kd x wd + Ke x we
(1) Upto 5 Lakh	9%(1-50%) = 4.5%	13%	Ko = 4.5% x 30% + 13% x 70% = 10.45%
(2) Between 5L-20L	10%(1-50%) = 5%	14%	Ko = 5% x 30% + 14% x 70% = 11.3%
(3) Between 20L-40L	11%(1-50%) = 5.5%	15%	Ko = 5.5% x 30% + 15% x 70% = 12.15%
(4) Above 40L upto ∞	12%(1-50%) = 6%	15.5%	Ko = 6% x 30% + 15.5% x 70% = 12.65%

(1) Cost of Capital estimation

Project A (Fund requirement 8 Lakhs) = 11.3%

Project B (Fund requirement 20 Lakhs) = 12.15%

(2) If Project earns 11%.

Then it can only be accepted if projects investment is upto 5 Lakhs (because Ko = 10.45% < 11%)

In all other cases Ko > 11%, then Projects of heavy Capital requirement cannot be accepted.

Qd 58

Statement for Ko (WACC)

% Debt	% Equity	Kd	Ke	Ko = Kd x wd + Ke x we
0%	100%	-	15%	Ko = 0x - + 100% x 15% = 15%
10%	90%	7%	15%	Ko = 7% x 10% + 15% x 90% = 14.2%
20%	80%	7%	15.5%	Ko = 7% x 20% + 15.5% x 80% = 13.8%
30%	70%	7.5%	16%	Ko = 7.5% x 30% + 16% x 70% = 13.45%
40%	60%	8%	17%	Ko = 8% x 40% + 17% x 60% = 13.40%
50%	50%	8.5%	19%	Ko = 8.5% x 50% + 19% x 50% = 13.75%
60%	40%	9.5%	20%	Ko = 9.5% x 60% + 20% x 40% = 13.7%

So, optimum Debt Equity Mix ⇒ Debt = 0.4
Equity = 0.6

Q 59 $K_d = I(1-t) = 15\%(1-35\%) = 9.75\%$

$K_e = ?$

$\frac{D}{E} = \frac{2}{1}$ So, $\frac{D}{D+E} = \frac{2}{2+1} = \frac{2}{3} = w_d$

$\frac{E}{D+E} = \frac{1}{2+1} = \frac{1}{3} = w_e$

$K_o = K_d \times w_d + K_e \times w_e$

$12\% = 9.75\% \times \frac{2}{3} + K_e \times \frac{1}{3}$

$12\% = 6.5\% + \frac{K_e}{3}$

$12\% - 6.5\% = \frac{K_e}{3}$

$5.5\% \times 3 = K_e$

So, $K_e = 16.5\%$

Q.60 Present Capital Structure

Sources	Book Value	Weight	Rate	
ESC	10,00,000	0.2	0.2	0.04
RE (Rs)	15,00,000	0.3	0.2	0.06
1.5x% Term loan	10,00,000	0.2	$0.01125x$	$0.00225x$
x% Red Debentures	15,00,000	0.3	$\left(\frac{0.75x+1}{98.5}\right)$	$0.3\left(\frac{0.75x+1}{98.5}\right)$
	50L			WACC = 0.15

Red Debenture Int rate = x%

Term loan Int rate = 1.5x%

WN① Debenture, $n = 3$ years

Interest rate = x%, MP = ₹97 (NP)

Interest = $100 \times x\% = \boxed{₹x}$

$$K_d = \frac{I(1-t) + \left(\frac{RV-NP}{n}\right)}{\left(\frac{RV+NP}{2}\right)} = \frac{x(1-25\%) + \left(\frac{100-97}{3}\right)}{\left(\frac{100+97}{2}\right)}$$

$$K_{d_1} = \frac{0.75x+1}{98.5}$$

WN② Term loan, $n = 5$ years,

Int rate = 1.5x%, Int = $100 \times 1.5x\% = \boxed{1.5x}$

$$K_{d_2} = \frac{1.5x(1-25\%) + \left(\frac{100-100}{5}\right)}{\left(\frac{100+100}{2}\right)} = \frac{1.125x+0}{100} = 0.01125x$$

WN ③ P/E = 5 Times

$$Ke = \frac{EPS}{MPS} = \frac{1}{P/E\ ratio} = \frac{1}{5} \times 100 = 20\%$$

WN ④ ~~$Ke = Ke(1-tp)(1-\beta)$~~

$Ke = Ke = 20\%$

WN ⑤ Solving WACC

$$0.04 + 0.06 + 0.00225x + 0.3\left(\frac{0.75x+1}{98.5}\right) = 0.15$$

$$0.10 + 0.00225x + \left(\frac{0.225x + 0.3}{98.5}\right) = 0.15$$

$$\frac{0.00225x}{1} + \left(\frac{0.225x+0.3}{98.5}\right) = 0.15 - 0.10$$

$$\frac{0.00225x \times 98.5 + 0.225x + 0.3}{98.5} = 0.05$$

$$0.221625x + 0.225x + 0.3 = 0.05 \times 98.5$$

$$0.446625x + 0.3 = 4.925$$

$$0.446625x = 4.625$$

$$x = \frac{4.625}{0.446625} = 10.355 \sim 10.36\%$$

Debenture Int = x = 10.36%

Term loan Int = $1.5x$ = $1.5 \times 10.36\%$ = 15.54%

Lol 61

Statement for WACC Calculation (Book value wise)

Source	Book value	weight (A)	Rate (B)	(A) x (B)
ESC	10,00,000	0.5	10%	
PSC	5,00,000	0.25		
Debt	5,00,000	0.25	6.89%	
	20,00,000			

Statement for WACC Calculation (Market value wise)

Source	Market value	weight (A)	Rate (B)	(A) x (B)
ESC	$\frac{10,00,000}{10} \times 24 = 24,00,000$		10%	
PSC	$\frac{5,00,000}{100} \times 110 = 5,50,000$			
Debt	$\frac{5,00,000}{100} \times 105 = 5,25,000$		6.89%	

WN ① $Ke = \frac{D_1}{P_0} + g$ & $\frac{D_1}{NP} + g$

$Ke = \frac{1}{24} + 5\%$ & $\frac{1}{20} + 5\%$ → Ke Preferred

Ke = 9.16% & 10% Preferred

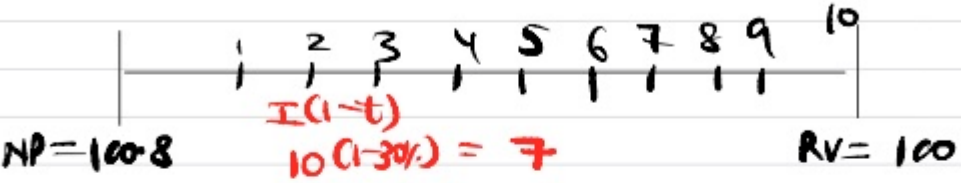
Sol 6.2
WN 2

Kd by YTM

Face value = ₹100, Int rate = 10%, Int = ₹10,
Tax rate = t = 30%

NP = ₹105 − 4% of flotation cost = ₹100.8

RV = 100



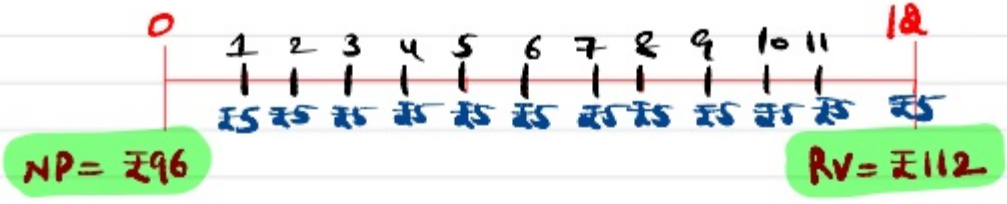
Statement for NPV calculation.

Particulars	Yr	Amt	At 7%		At 5%	
			PV factor	PV	PV factor	PV
Net Proceeds	0	(100.8)	1	(100.8)	1	(100.8)
I(1−t)	1–10	7	7.024	49.17	7.722	54.05
Red Value	10	₹100	0.508	50.8	0.614	61.40
			NPV	−0.83	NPV	+14.65

$$YTM = 5\% + 14.65 \times \frac{(7\% - 5\%)}{14.65 + 0.83} = 6.89\%$$

So, **Kd = 6.89%**

Sol 62(ii) **Kp using YTM**



Interest = ₹100 × 10% = ₹10

I(1-t) = ₹10(1-50%) = ₹5

Approximation Method

$$Kd = \frac{I(1-t) + \left(\frac{RV-NP}{n}\right)}{\left(\frac{RV+NP}{2}\right)} = \frac{5 + \left(\frac{112-96}{12}\right)}{\left(\frac{112+96}{2}\right)}$$

$$Kd \Rightarrow \frac{5+1.333}{104} = 6.08\%$$

Statement of NPV

Particulars	Years	Amount A	At 5% PV factor (B)	At 5% PV (A×B)	At 7% PV factor (C)	At 7% PV (A×C)
Net Proceeds	0	(96)	1	(96)	1	(96)
I(1-t)	1-12	5	8.863	44.315	7.943	39.715
Redemption Value	12	112	0.557	62.384	0.444	49.728
			NPV →	10.699	NPV	-6.557

$$YTM = \text{Lower rate} + \text{lower rate NPV} \times \frac{\text{Diff of rates}}{\text{Diff of NPV}}$$

$$= 5\% + 10.699 \times \frac{(7\% - 5\%)}{10.699 - (-6.557)}$$

$$\Rightarrow 5\% + 10.699 \times \frac{2\%}{17.256} = 6.24\%$$

$K_d = 6.24\%$ by YTM.

Cost Of Capital

Solution 4:

Particulars	Year 1 (₹)	Year 2 (₹)	Year 3 (₹)	Year 4 (₹)
Principal Outstanding	20,000	15,000	10,000	5,000
Principal repaid	5,000	5,000	5,000	5,000
Add: Interest at 12.5% p.a. on Principal Outstanding = Coupon Payment	2,500	1,875	1,250	625
Total Cash Flows p.a. (A)	7,500	6,875	6,250	5,625
$(1 + 0.12)^n$ where n = nth year (B)	1.1200	1.2544	1.4049	1.5735
PV of Cash Flows (A)/(B)	6,696	54,811	4,448	3,575

Hence, Present value of Bond = Total of PV of Cash Flows = ₹ 20,200

Solution 5:

The amount of interest for five years will be:

First year	₹ 5,000 × 0.08 = ₹ 400;
Second year	(₹ 5,000 – ₹ 1,000) × 0.08 = ₹ 320;
Third year	(₹ 4,000 – ₹ 1,000) × 0.08 = ₹ 240;
Fourth year	(₹ 3,000 – ₹ 1,000) × 0.08 = ₹ 160; and
Fifth year	(₹ 2,000 – ₹ 1,000) × 0.08 = ₹ 80.

The outstanding amount of bond will be zero at the end of fifth year.

Since Reserve Bank of India will have to return ₹ 1,000 every year, the outflows every year will consist of interest payment and repayment of principal:

First year	₹ 1,000 + ₹ 400 = ₹ 1,400;
Second year	₹ 1,000 + ₹ 320 = ₹ 1320;
Third year	₹ 1,000 + ₹ 240 = ₹ 1,240;
Fourth year	₹ 1000 + ₹ 160 = ₹ 1,160; and
Fifth year	₹ 1000 + ₹ 80 = ₹ 1080.

V_8 = $1,400/(1.06)^1 + 1,320/(1.06)^2 + 1,240/(1.06)^3 + 1,160/(1.06)^4 + 1,080/(1.06)^5$
= 1,400 × 0.943 + 1,320 × 0.890 + 1,240 × 0.840 + 1,160 × 0.792 + 1,080 × 0.747
= 1,320.20 + 1,174.80 + 1,041.60 + 918.72 + 806.76
= ₹ 5,262.08

Solution 8.b.:

Here,
Redemption Value (RV)= ₹1,50,000
Net Proceeds (NP) = ₹ 3,750
Interest = 0
Life of bond = 25 years
There is huge difference between RV and NP therefore in place of approximation method we should use trial & error method.
FV = PV x (1 + r)n
1,50,000 = 3,750 x $(1 + r)^{25}$
40 = $(1 + r)^{25}$
Trial 1: r = 15%, (1.15)25 = 32.919
Trial 2: r = 16%, (1.16)25 = 40.874
Here:
L = 15%; H = 16%
NPVL = 32.919 - 40 = - 7.081
NPVH = 40.874 - 40 = + 0.874

IRR = L + $\frac{NPV_L}{NPV_L - NPV_H}$(H-L)

= 15% + $\frac{-7.081}{-7.081 - (0.874)}$ x (16% -15%) = 15.89%

Solution 8B:

Determination of Redemption value:

Higher of-

(i) The cash value of debentures = ₹ 100

(ii) Value of equity shares = 5 shares × ₹ 20 $(1+0.04)^5$

= 5 shares × ₹ 24.333

= ₹ 121.665 rounded to ₹ 121.67

₹ 121.67 will be taken as redemption value as it is higher than the cash option and attractive to the investors.

Calculation of Cost of 10% Convertible debenture

(i) Using Approximation Method:

$$K_d = \frac{I(1-t)+\frac{(RV-NP)}{n}}{\frac{(RV+NP)}{2}} = \frac{10(1-0.25)+\frac{(121.67-100)}{5}}{\frac{(121.67+100)}{2}} = \frac{7.5+4.334}{110.835} = 10.676\%$$

(ii) Using Internal Rate of Return Method

Year	Cash flows (₹)	Discount factor @ 10%	Present Value	Discount factor @ 15%	Present Value (₹)
0	100	1.000	(100.00)	1.000	(100.00)
1 to 5	7.5	3.790	28.425	3.353	25.148
5	121.67	0.621	75.557	0.497	60.470
NPV			+3.982		-14.382

$$IRR = L + \frac{NPV_L}{NPV_L - NPV_H}(H-L) = 10\% + \frac{3.982}{3.982-(-14.382)}(15\% - 10\%) = 0.11084 \text{ or } 11.084\% \text{ (approx.)}$$

Solution 31:

(i) Calculation of Cost of Convertible Debentures:

Given that,

RF = 10%

Rm – Rf = 18%

B = 1.25

D0 = 12.76

D-5 = 10

Flotation Cost = 5%

Using CAPM,

Ke = Rf + β (Rm – Rf)

= 10%+1.25 (18%)

= 32.50%

Calculation of growth rate in dividend

12.76 = 10 (1+g)5

1.276 = (1+g)5

(1+5%)5 = 1.276..... from FV Table

g = 5%

Price of share after 6 years $= \frac{D7}{k_e - g} = \frac{12.76(1.05)^7}{0.325-0.05}$

P6 $= \frac{12.76\times1.407}{0.275}$

P6 = 65.28

Redemption Value of Debenture (RV) = 65.28 × 2 = 130.56 (RV)

NP = 95

n = 6

$$K_d = \frac{Int(1-t)+\frac{(RV-NP)}{n}}{\frac{(RV-NP)}{2}} \times 100$$

$$= \frac{15(1-0.4)+\frac{(130.56-95)}{6}}{\frac{(130.56+95)}{2}} \times 100$$

$$= \frac{9+5.93}{112.78} \times 100$$

Kd = 13.24%

(ii) Calculation of Cost of Preference Shares:

Net Proceeds = 100 (1.1) - 6% of 100 (1.1)
= 110 - 6.60
= 103.40
Redemption Value = 100

Year	Cash Flows (₹)	PVF @ 3%	PV (₹)	PVF @ 5%	PV (₹)
0	103.40	1	103.40	1	103.40
1-10	-5	8.530	-42.65	7.722	-38.61
10	-100	0.744	-74.40	0.614	-61.40
			-13.65		3.39

$Kp = 3\% + \frac{5\%-3\%}{\{3.39-(-13.65)\}} \times 13.65$

$= 3\% + \frac{2\%}{17.04} \times 13.65$

Kp = 4.6021%

Solution 35:

1. Cost of Equity (K) $= \frac{D1}{Po-F} + g = \frac{₹17.716}{₹125-₹5} + 0.10$ *

$K_e = 0.2476$

*Calculation of g:

₹ 10 $(1+g)^5$ = ₹ 16.105

Or, $(1+g)^5 = \frac{16.105}{10} = 1.6105$

Table (FVIF) suggests that ₹ 1 compounds to ₹ 1.6105 in 5 years at the compound rate of 10 percent. Therefore, g is 10 per cent.

(ii) Cost of Retained Earnings (K) = $\frac{D1}{Po}$+g = $\frac{₹17.716}{125}$ + 0.10 = 0.2417

(iii) Cost of Preference Shares (K_p) = $\frac{PD}{Po} = \frac{₹15}{₹105}$ = 0.1429

(iv) Cost of Debentures (K_d) $= \frac{I(1-t)+\left(\frac{RV-NP}{n}\right)}{\left(\frac{RV+NP}{2}\right)}$

$= \frac{₹15(1-0.30)+\left(\frac{₹100-₹91.75^*}{11\ years}\right)}{\frac{₹100+₹91.75}{2}}$

$= \frac{₹15\times0.70+₹0.75}{₹95.875} = \frac{₹11.25}{₹95.875} = 0.1173$

*Since yield on similar type of debentures is 16 per cent, the company would be required to offer debentures at discount.

Market price of debentures (approximation method)

= ₹ 15 ÷ 0.16 = ₹ 93.75

Sale proceeds from debentures = ₹ 93.75 – ₹ 2 (i.e., floatation cost) = ₹91.75

Market value (P_0) of debentures can also be found out using the present value method:

P_0 = Annual Interest × PVIFA (16%, 11 years) + Redemption value × PVIF (16%, 11 years)

P_0 = ₹ 15 × 5.0287 + ₹ 100 × 0.1954

P_0 = ₹ 75.4305 + ₹ 19.54 = ₹ 94.9705

Net Proceeds = ₹ 94.9705 – 2% of ₹ 100 = ₹ 92.9705

Accordingly, the cost of debt can be calculated

Total Cost of capital [BV weights and MV weights]

(Amount in (₹) lakh)

Source of capital	Weights		Specific Cost (K)	Total cost	
	BV	MV		(BV × K)	(MV × K)
Equity Shares	240	320**	0.2476	59.4240	79.2320
Retained Earnings	60	80**	0.2417	14.502	19.336
Preference Shares	72	67.50	0.1429	10.2888	9.6458
Debentures	18	20.80	0.1173	2.1114	2.4398
Total	390	488.30		86.3262	110.6536

**Market Value of equity has been apportioned in the ratio of Book Value of equity and retained earnings i.e., 240:60 or 4:1.

Weighted Average Cost of Capital (WACC):

Using Book Value $= \frac{₹86.3262}{₹390} = 0.2213$ or 22.13%

Using Market Value $= \frac{₹110.6536}{₹488.30} = 0.2266$ or 22.66%

Solution 37:

Statement of WACC

Source	Amount	Weight	Cost of Capital	WACC
Equity (2,00,000 × 30)	₹ 60,00,000	0.6	17.00%	10.20%
Preference Capital	₹ 10,00,000	0.10	12.00%	1.20%
Debt	₹ 30,00,000	0.30	5.40%	1.62%
Total	₹ 1,00,00,000	1.00	WACC = K_0	13.02%

Working Notes:

(1) Revised $K_e = \frac{DPS}{MPS} + g = \frac{₹3}{₹30} + 7\% = 17.00\%$

(2) $K_d = 9\% \times (100\% - 40\%) = 5.40\%$

Solution 40:

Market Value of Equity, E = 5,00,000 × 1.50 = ₹ 7,50,000
Market value of Debt, D = Nil
Cost of Equity Capital, K_e = Dividend/Market value of Share = 27/150 = 0.18
Since there is no Debt Capital, WACC = K_e = 18%

Solution 45:

(a) Cost of Equity / Retained Earnings (using dividend growth model)

$Ke = \frac{D1}{Po}$

where D1 = Do (1 + g) = 2 (1 + .10) = 2.2

$Ke = \frac{2.2}{44} + 0.10 = 0.15$ or 15 %

(b) Cost of Debt (Post Tax)

Kd = I (1-t)
Upto 3,60,000 Kd = .08 (1-0.4) = 0.048
Beyond 3,60,000 = .12 (1-0.4) = 0.072
Thus, post-tax cost of additional debt = 0.048 x 3,60,000 / 6,00,000 + 0.072 x 2,40,000/ 6,00,000 = 0.0288 + 0.0288 = 0.0576 or 5.76%

(c) Pattern for Raising Additional Finance

Debt = 20,00,000 x 30% = 6,00,000
Equity = 20,00,000 x 70 % = 14,00,000

Out of this total equity amount of
₹ 14,00,000 - Equity Shares = 14,00,000 – 4,20,000
= 9,80,000
And Retained Earnings = 4,20,000

(d) Overall Weighted Average after tax cost of additional finance

WACC = Kd x Debt Mix + Ke x Equity Mix
= 0.0576 x 30% + 0.15 x 70% = 0.01728 + 0.105 = 0.1223 or 12.23% (approx.)

Solution 46.

Statement to find WACC

(i) Using Book value weights

Source	Amount (in lakhs)	Weight	Rate	WACC
Debt	8,00,000	0.4	3.619%	1.4476%
Preference	2,00,000	0.1	8.474%	0.8474%
Equity	10,00,000	0.5	15%	7.5%
	20,00,000			Ko = 9.795%

(ii) Using market value weights

Source	Amount (in lakhs)	Weight	Rate	WACC
Debt	8,00,000/100 x 110 =8,80,000	0.265	3.619%	0.959%
Pref	2,00,000/100 x 120 = 2,40,000	0.072	8.474%	0.610%
Equity	10,00,000/10 x 22 = 22,00,000	0.663	15%	9.945
	33,20,000			Ko = 11.514%

Working note 1

$$Kd = \frac{I(1-t)+\frac{(RV-NP)}{n}}{\frac{(RV+NP)}{2}} = \frac{8(1-50\%)+\frac{(100-105.6)}{20}}{\frac{(100+105.6)}{2}} = \frac{3.72}{102.8} = 3.619\%$$

Working Note 2

$$Kp = \frac{I(1-t)+\frac{(RV-NP)}{n}}{\frac{(RV+NP)}{2}} = \frac{10+\frac{(100-114)}{15}}{\frac{(100+114)}{2}} = \frac{10-0.933}{107} = 8.474\%$$

Working Note 3
Ke = D1/Po + g
= 2/(22 – 2) + 5%
= 15%

Solution 47:

(i) Weighted Average Cost of Capital of the Company is as follows:

Capital Structure	Amount	Cost of Capital	Weights	WACC
Equity Share Capital	40,00,000	15%	0.500	7.50%
11.5% Preference Shares	10,00,000	11.5%	0.125	1.4375%
10% Debentures	30,00,000	6.5%	0.375	2.4375%
	80,00,000		1.000	11.375%

Working Notes:

1. Cost of Equity Capital:

$$K_e = \frac{D_1}{P_0} + g = \frac{₹2}{₹20} + 5\% = 15\%$$

2. Cost of Preference Share Capital:

$$K_p = \frac{D}{P} = \frac{₹1,15,000}{₹\,10,00,000} = 0.115 = 11.5\%$$

3. Cost of Debentures:

$$K_d = \frac{I\,(1-t)}{P} = \frac{₹\,3,00,000\,(1-0.35)}{₹\,30,00,000} = 6.5\%$$

(ii) New Weighted Average Cost of Capital of the company is as follows:

Capital Structure	Amount	Cost of Capital	Weights	WACC

Equity share capital	40,00,000	20%	0.40	8.00%
11.5% preference shares	10,00,000	11.50%	0.10	1.15%
10% debentures	30,00,000	6.50%	0.30	1.95%
12% debentures	20,00,000	7.80%	0.20	1.56%
	1,00,00,000		1.00	12.66%

Working Notes:

Cost of Equity Capital (K_e) = $\frac{D_1}{P_0}$ + g = $\frac{₹2.40}{₹16}$ + 5% = 20%

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.

Solution 51:

Calculation of Cost of Equity

(i) D0 = ₹ 5x 60%
D0 = ₹ 3
g = b x r = (1-0.6) x 10% = 4%

D1 = D0 x (1 + g) = 3 x (1 + 4%) = 3 x 1.04 = 3.12

Ke=$\frac{D1}{Po} + g$
Ke= $\frac{3.12}{20.8} + 0.04$
Ke= 19%

(ii) Calculation of Cost of Preference Shares
N =10 years
NP = ₹ 90
PD = ₹ 15
RV = ₹ 100
Kp=$\frac{PD+(RV-NP)/N}{(RV+NP)} \times 100$
Kp= $\frac{15+(100-90)/10}{(100+90)/2} \times 100$
Kp = 16/95 x 100
Kp= 16.84%

(iii) Calculation of Cost of Debentures
N = 6 years
NP = ₹ 75
Interest = ₹ 14 RV = ₹ 100
T = 40%
Kd =$\frac{Int(1-t)+(RV-NP)/N}{(RV+NP)/2} \times 100$
Kd = $\frac{14\times(1-0.04)+(100-75)/6}{(100+75)/2} \times 100$
Kd= $\frac{8.4-4.17}{87.5} \times 100$
Kd= 14.37%

(iv) Cost of Term Loan
Kd = Interest rate (1-t) Kd = 13% (1-40%)
Kd = 7.8%

Calculation of Weighted Average Cost of Capital (WACC) (using market weights)

Capital	Cost of Capital	Market Value		Market Value Weights	Product (Cost x weights)
Equity	19.00%	20.8 x 50,00,000	₹10,40,00,000	0.6218	11.81%
Preference Shares	16.84%	90 x 50,000	₹ 45,00,000	0.0269	0.45%
Debentures	14.37%	75 x 2,50,000	₹ 1,87,50,000	0.1121	1.61%

Term Loan	7.80%		₹ 4,00,00,000	0.2392	1.87%
Total			₹16,72,50,000	1	15.74%

WACC= 15.74%

(b)Calculation of Marginal Cost of Capital (MACC)
The required capital of ₹ 50,000,000 will be raised as follows:
Equity = 60% of ₹ 50,000,000 = ₹ 30,000,000
Deby = 20% of ₹ 50,000,000 = ₹10,000,000
Retained Earnings= 20% of ₹ 50,000,000 = ₹ 10,000,000
Marginal Cost of Equity= $\frac{3.12}{1.4} + 0.04$
= 26.28%
Marginal Cost of Debt
Cost of Debt (before tax)= $\frac{13\% \ of \ ₹40,00,000 + 15\% \ of \ ₹60,00,000}{₹1,00,00,000}$
= $\frac{₹5,20,000+₹9,00,000}{₹1,00,00,000}$= 14.2%
Cost of Debt (after tax)). = 14.2% (1-t)
= 14.2% (1-0.4)
= 8.52%

Calculation of marginal cost of capital

Capital	Cost of Capital	Value	Weights	Product (Cost x weights)
Equity	26.28%	₹ 3,00,00,000	0.6	15.77%
Reserves	26.28%	₹ 1,00,00,000	0.2	5.26%
Debt	8.52%	₹ 1,00,00,000	0.2	1.70%
Total		₹ 5,00,00,000	1	22.73%

Marginal Cost of Capital (MACC) = 22.73%

Solution 54:

(A) (i) Cost of new debt

Kd = $\frac{I(1-t)}{P0}$

= $\frac{₹16(1-0.5)}{₹96}$ = 0.0833

(ii) Cost of new preference shares

Kp = $\frac{PD}{P0}$ = $\frac{₹1.1}{₹9.2}$ = 0.12

(iii) Cost of new equity shares

Ke = $\frac{D1}{P0} + g$

= $\frac{₹1.18}{₹23.60} + 0.10$= 0.05+0.10 = 0.15

Calculation of g when there is a uniform trend (on the basis of EPS)
= $\frac{EPS(2014)-EPS(2013)}{EPS(2013)}$
= $\frac{₹1.10-₹1.00}{₹1.00}$ = 0.10 or 10%
Calculation of D1
D1 = 50% of 2022 EPS = 50% of 2.36 = ₹ 1.18

(B) Calculation of marginal cost of capital

Type of Capital	Proportion	Specific Cost	Product
(1)	(2)	(3)	(2) × (3) = (4)
Debenture	0.15	0.0833	0.0125
Preference Share	0.05	0.1200	0.0060
Equity Share	0.80	0.1500	0.1200
Marginal cost of capital			**0.1385**

(C) The company can spend the following amount without increasing marginal cost of capital and without selling the new shares:
Retained earnings = 50% of EPS of 2022 × outstanding equity shares

= 0.50×₹2.36 × 10,000 shares = ₹ 11,800

The ordinary equity (Retained earnings in this case) is 80% of total capital

So, ₹11,800 = 80% of Total Capital

∴ Capital investment before issuing equity shares = $\frac{₹11,800}{0.80}$ = ₹ 14,750

(D) If the company spends in excess of ₹ 14,750, it will have to issue new equity shares at ₹20 per share.

∴ The cost of new issue of equity shares will be = $\frac{D1}{P0}$ +g = $\frac{₹1.18}{₹20}$ + 0.10 = 0.159

The marginal cost of capital will be:

Type of Capital	Proportion	Specific Cost	Product
(1)	(2)	(3)	(2) × (3) = (4)
Debentures	0.15	0.0833	0.0125
Preference Shares	0.05	0.1200	0.0060
Equity Shares (New)	0.80	0.1590	0.1272
			0.1457

Solution 55:

(a) **(i) After tax cost of new Debt:**

$$Kd = \frac{I(1-t)}{P} = 15\frac{(1-0.3)}{96}$$

= 0.1094 (or) 10.94%

(ii) After tax cost of New Preference share capital:

$$K_p = \frac{PD}{P_o} - \left(\frac{12}{91.5}\right) = 0.1311 \text{ (or) } 13.11\%$$

(iii) **After tax cost of Equity shares:**

$$K = \frac{D_1}{P_o} + g = \frac{(2.50 \times 50\%)}{25} + 0.10$$

= 0.15 (or) 15%

(b) Marginal Cost of Capital

Type of capital	Proportions	Specific cost	Product
Equity Shares	0.8	0.15	0.12
Preference Shares	0.05	0.1311	0.0066
Debentures	0.15	0.1094	0.0164
\Marginal cost of capital			0.143

(c) Amount that can be spend for capital investment

Retained earnings = 50% of EPS x No. of outstanding Equity shares

= 1.25 x 50,000

= ₹ 62,500

Proportion of equity (Retained earnings here) capital is 80% of total capital. Therefore, ₹ 62,500 is 80% of total capital.

Amount of Capital Investment = $\frac{62,500}{0.80}$ = ₹ 78,125

Solution 63:

(A) (i) **Cost of new debt**

Kd $= \frac{I(1-t)}{Po} = \frac{₹\,16(1-0.3)}{₹\,96} = 0.11667$

(ii) **Cost of new preference shares**

Kp $= \frac{₹\,2.22}{₹\,18.5} = 0.12$

(iii) **Cost of new equity shares**

Ke $= \frac{D1 + g}{Po} = \frac{2.36 + 0.10}{47.20} = 0.05 + 0.10 = 0.15$

Calculation of g when there is a uniform trend (on the basis of EPS)

$= \frac{EPS\ (2012) - EPS\ (2011)}{EPS\ (2011)} = \frac{₹\,2.20 - ₹\,2.00}{₹\,2.00} = 0.10$ or 10%

Calculation of D1

D1 = 50% of 2020 EPS = 50% of ₹ 4.72 = ₹ 2.36

(B) Calculation of marginal cost of capital

Type of Capital	Proportion	Specific Cost	Product
(1)	(2)	(3)	(2) × (3) = (4)
Debentures	0.15	0.11667	0.0175
Preference Share	0.05	0.1200	0.0060
Equity Share	0.80	0.1500	0.1200
Marginal cost of capital			0.1435

(C) The company can spend the following amount without increasing marginal cost of capital and without selling the new shares:

Retained earnings = 50% of EPS of 2020 × outstanding equity shares
= 50% of ₹ 4.72 × 10,000 shares = ₹ 23,600

The ordinary equity (Retained earnings in this case) is 80% of total capital.

So, ₹ 23,600 = 80% of Total Capital

∴ Capital investment before issuing equity shares $= \frac{₹\,23,600}{0.80} = ₹\,29,500$

(D) If the company spends in excess of ₹ 29,500, it will have to issue new equity shares at ₹ 40 per share.

The cost of new issue of equity shares will be:

Ke $= \frac{D1 + g}{Po} = \frac{₹\,2.36 + 0.10}{₹\,40} = 0.159$

The marginal cost of capital will be:

Type of Capital	Proportion	Specific Cost	Product
(1)	(2)	(3)	(2) × (3) = (4)
Debentures	0.15	0.11667	0.0175
Preference Shares	0.05	0.1200	0.0060
Equity Shares (New)	0.80	0.1590	0.1272
Marginal cost of capital			**0.1507**