

COST OF CAPITAL

Source of Capital (Long term funds)

Debt (K_p/K_t) (debentures & term loan)	Preference Share (K_p) Capital	Equity Share (K_e) Capital	Retained (K_{re}) Earnings
<ul style="list-style-type: none"> - Term Loan $K_t = I(1-t)$ - Irredeemable Deb $K_d = \frac{I(1-t)}{NP} \times 100$ - Redeemable Deb (Approximation Method) $K_d = \frac{I(1-t) + (RV-NP)/n}{(RV+NP)/2}$ (Yield to maturity) $K_d = LR + \frac{NPV_{LR}}{NPV_{LR} - NPV_{HR}} \times (H-L)$ - Convertible Deb $RV = \text{higher of cash or equity value}$ - Zero Coupon bond / Deep Discount bond $K_d = \left(\frac{RV}{FP}\right)^{1/n} - 1$ 	<ul style="list-style-type: none"> - Irredeemable PS $K_p = \frac{D}{NP/MP} \times 100$ - Redeemable PS (Approximation method) $K_p = \frac{D + (RV-NP)/n}{(RV+NP)/2}$ (yield to maturity) $K_p = LR + \frac{NPV_{LR}}{NPV_{LR} - NPV_{HR}} \times (H-L)$ 	<ul style="list-style-type: none"> - Dividend yield Approach $K_e = \frac{D}{P_0} \times 100$ & $K_e = \frac{D}{NP} \times 100$ (existing issue) (new issue) - Earning yield approach $K_e = \frac{E}{P_0} \times 100$ & $K_e = \frac{E}{NP} \times 100$ (existing issue) (new issue) - Dividend Growth model $K_e = \frac{D_1}{P_0} + g$ & $K_e = \frac{D_1}{NP} + g$ (existing issue) (new issue) $g = b \times r$ $g = \left(\frac{FV}{PV}\right)^n - 1$ - Realised Yield Approach - CAPM Model $K_e = R_f + \beta(R_m - R_f)$ - K_e v/s K_{re} $K_e = \frac{D_1}{IP-f(NP)} \times 100$ & $K_{re} = \frac{D_1}{P_0} \times 100$ $K_{re} = K_e(1-t_p)(1-g)$ 	

① Cost of term loan

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

I = Interest rate

t = Corporate tax rate

② Cost of Irredeemable Debenture

$$K_d = \frac{I(1-t)}{NP}$$

I = Interest \Rightarrow Coupon rate \times face value

T = Corporate tax rate

NP =	face value of debenture	-
	- Discount at the time of issue	-
	+ Premium at the time of issue	-
	Issue Price	-
	- Flotation Cost	-
	Net Proceeds	=

Key points to remember

- Assume face value as Rs 100, if not given
- Flotation cost in percentage will be computed on Issue Price if question is silent
- If IP or RV not given, assume face value as issue price

③ Cost of Redeemable Debentures (Approximation Method)

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

n = number of years

RV = Redemption value

In case tax benefit is available on both interest & premium
[Not Preferable]

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

Key points to remember

- If question is silent, use approximation method
- This method can also be used when there is one time repayment (lump-sum)
- If market price is given, use it instead of net proceeds

④ Cost of Redeemable Debentures (Yield to maturity)

Step 1 - Identify all cash flows along with time periods

Step 2 - Use the discount rate to determine present value of cash flows

Step 3 - Select the rate at which $NPV = 0$

$$\text{ie. } PVCO - PVCI = 0$$

$$PVCO = PVCI$$

Step 4 - If no direct rate can be found. Identify two rates at which NPV is positive & negative.
Apply Interpolation

$$Kd = \text{Lower Rate} + \frac{NPV_L}{NPV_L - NPV_H} \times (H - L)$$

Key points to remember

- The gap b/w two rates should not exceed 5%
- In case yearly cash flows are same, use cumulative PVF
ie Annuity factor

⑤ Cost of zero coupon bond / Deep Discount bond

$$K_d = \left[\frac{RV}{IP} \right]^{1/n} - 1$$

⑥ Cost of convertible debentures

The key point is to find redemption value.
Then we can apply approximation or YTM as prescribed

$$RV = \text{Higher of} \quad \begin{array}{l} \text{Cash value} \\ \text{or} \\ \text{Convertible equity value} \end{array}$$

future equity value can be derived basis below approach

(i) $P_n = P_0 (1+r)^n$

P_n = Share price at n^{th} year
 P_0 = Today's share price
 r = Growth rate of share price

ii) $P_n = \frac{D_0(1+g)^{n+1}}{k_e - g}$

⑦ Cost of Irredeemable Preference Shares

$$K_p = \frac{D}{NP} \times 100 \quad \text{or} \quad \frac{D}{MP} \times 100$$

D = Constant Dividend on Preference Shares

MP = Market price

⑧ Cost of redeemable Preference Shares

$$K_p = \frac{D + (RV - NP)/n}{(RV + NP)/2}$$

Key points to remember

- If issue price or redemption value not given assume at par value
- If market price given in question, consider it instead of Issue Price
- Price of preference shares should be ex-dividend
Ex-dividend Price = Cum dividend Price - Dividend

⑨ Cost of redeemable Preference Shares (YTM)

Similar to Cost of Debt (YTM)

⑩ Cost of equity shares (Dividend Price/Yield Method)

$$K_e = \frac{D}{P_0} \times 100$$

Dividend will remain constant

D = Current or expected dividend

P₀ = Market price

⑪ Cost of equity shares (Earning Price/Yield Approach)

$$K_e = \frac{E}{P_0} \times 100$$

Earnings will remain constant E = Current/expected earnings

⇒ P/E ratio = $\frac{MPS}{EPS}$ which is exactly reverse of K_e

$$\therefore K_e = \frac{1}{P/E \text{ ratio}}$$

⑫ Cost of equity shares (Dividend Growth Model)

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

D₁ = Expected Dividend or D₀(1+g)

P₀ = Current Market Price

g = Constant growth rate of dividend

Key points to remember

- If issue price not given assume at par value
- If there is fresh issue, use net proceeds instead of MP
- Price of share must be ex-dividend

(13) Estimation of growth rate

i) Gordon Model

$$g = b \times r$$

b = retention ratio of earnings

r = rate of return

ii) Average method

$$g = \left(\frac{D_0}{D_n} \right)^{1/n} - 1$$

D_0 = Current Dividend

D_n = Dividend in n years ago

(14) Cost of equity (Realised yield approach)

i) YTM

$$K_e = \text{Lower Rate} + \frac{NPV_L}{NPV_L - NPV_H} (H-L)$$

ii) Geometric Mean Method

$$K_e = [(1+y_1) \times (1+y_2) \times (1+y_3) \times \dots \times (1+y_n)]^{1/n} - 1$$

$$1+y = \frac{D_1 + P_1}{P_0}$$

D_1 = Expected Dividend at the end of the year

P_1 = Expected Market price at the end of the year

⑮ Cost of equity (Capital Asset Pricing Model)

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

R_f = Risk free rate of return

β = Beta coefficient of the company

R_m = Rate of return in market portfolio

$R_m - R_f$ = Risk Premium

⑯ Cost of retained earnings

Generally $K_e = K_{re}$

But there are two exceptions to it

i) when personal tax & brokerage is given

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

$t_p =$ Personal tax rate
 $B =$ Brokerage

ii) When we have flotation cost

$$K_c = \frac{D_1}{P_0 - f} + g \quad \text{but} \quad K_{re} = \frac{D_1}{P_0} + g$$

(16) Overall cost of capital (Basis Book value) (WACC)

Weighted Avg cost of capital of all sources of fund

Source	Book Value	Weight	Cost	Weighted cost
Equity				
Retained earning				
Preference Share				
Debts				
Loans				
		1		WACC

(17) Overall cost of capital (Basis Market value) (WACC)

Source	Market value	Weight	Cost	Weighted cost
Equity				
Retained earning				
Preference Share				
Debts / Loan				
		1		WACC

Market value can be computed as

$$MV = \text{No. of shares} \times \text{Market price per share}$$

Key points to remember

- Distribute market value of equity into BSC & RE basis Book value ratio

(18) Marginal cost of capital (MCC)

It is the rate of only **ADDITIONAL** funds raised by the company

1. A company issued 10,000, 10% debentures of Rs. 100 each at par on 1.4.2018 to be matured on 1.4.2028. The company wants to know the cost of its existing debt on 1.4.2023 when the market price of the debentures is Rs. 80. COMPUTE the cost of existing debentures assuming 35% tax rate.

Solution

$$\text{Cost of debenture (K}_d\text{)} = \frac{I(1-t) + \frac{(RV-NP)}{n}}{\frac{(RV+NP)}{2}}$$

- I = Interest on debenture = 10% of ₹100 = ₹10
- NP = Current market price = ₹80
- RV = Redemption value = ₹100
- n = Period of debenture = 5 years
- t = Tax rate = 35% or 0.35

$$K_d = \frac{₹10(1-0.35) + \frac{(₹100-₹80)}{5 \text{ years}}}{\frac{(₹100+₹80)}{2}}$$

$$\text{Or, } K_d = \frac{(₹10 \times 0.65) + ₹4}{₹90} = \frac{₹10.5}{₹90} = 0.1166 \text{ or } 11.67\%$$

2. If the company issues 10% debentures of face value of Rs. 100 each and realises Rs. 98 per debenture while the debentures are redeemable after 12 years at a premium of 10%, CALCULATE cost of debenture using YTM? Assume Tax Rate to be 50%.

Solution

Using Present Value method (YTM)

Identification of relevant cash flows

Year	Cash flows
0	Current market price (P ₀) = ₹ 98
1 to 12	Interest net of tax [I(1-t)] = 10% of ₹ 100 (1 - 0.5) = ₹ 5
12	Redemption value (RV) = ₹ 100 (1.10) = ₹ 110

Calculation of Net Present Values (NPV) at two discount rates

Year	Cash flows (₹)	Discount factor @ 5% (L)	Present Value (₹)	Discount factor @ 10% (H)	Present Value (₹)
0	(98)	1.000	(98.00)	1.000	(98.00)
1 to 12	5	8.863	44.32	6.814	34.07
12	110	0.557	61.27	0.319	35.09
NPV			+7.59		-28.84



Calculation of IRR

$$IRR = L + \frac{NPVL}{NPVL - NPVH} (H-L)$$

$$= 5\% + \frac{7.59}{7.59 - (-28.84)} (10\% - 5\%) = 6.04\%$$

Therefore, $K_d = 6.04\%$

3. A company issued 10,000, 15% Convertible debentures of Rs.100 each with a maturity period of 5 years. At maturity, the debenture holders will have an option to convert the debentures into equity shares of the company in the ratio of 1:10 (10 shares for each debenture). The current market price of the equity shares is Rs.12 each and historically the growth rate of the shares is 5% per annum. Compute the cost of debentures assuming 35% tax rate.

Solution

Determination of Redemption value:

Higher of

- (i) The cash value of debentures = ₹100
- (ii) Value of equity shares = 10 shares × ₹12 (1+0.05)⁵
= 10 shares × 15.312 = ₹153.12

₹153.12 will be taken as redemption value as it is higher than the cash option and is more attractive to the investors.

Calculation of Cost of Convertible debenture (using approximation method):

$$K_d = \frac{I(1-t) + \frac{(RV - NP)}{n}}{\frac{(RV + NP)}{2}} = \frac{15(1-0.35) + \frac{(153.12-100)}{5}}{\frac{(153.12+100)}{2}} = \frac{9.75+10.62}{126.53} = 16.09\%$$

Alternatively:

Calculation of Cost of Convertible debenture (using present value method):

Year	Cash flows (₹)	Discount factor @ 15% (L)	Present Value (₹)	Discount factor @ 20% (H)	Present Value (₹)
0	100	1.000	(100.00)	1.000	(100.00)
1 to 5	9.75	3.352	32.68	2.991	29.16
5	153.12	0.497	76.10	0.402	61.55
NPV			+8.78		-9.29

$$IRR = L + \frac{NPVL}{NPVL - NPVH} (H-L) = 15\% + \frac{₹8.78}{₹8.78 - (-₹9.29)} (20\% - 15\%) = 0.17429 \text{ or } 17.43\%$$



4. Institutional Development Bank (IDB) issued Zero interest deep discount bonds of face value of Rs.1,00,000 each issued at Rs.2,500 & repayable after 25 years. COMPUTE the cost of debt if there is no corporate tax.

Solution

Here,

Redemption Value (RV) = ₹1,00,000

Net Proceeds (NP) = ₹ 2,500

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.

$$FV = PV \times (1+r)^n$$

$$₹ 1,00,000 = ₹ 2,500 \times (1+r)^{25}$$

$$₹ 40 = (1+r)^{25}$$

$$\text{Trial 1: } r = 15\%, (1.15)^{25} = 32.919$$

$$\text{Trial 2: } r = 16\%, (1.16)^{25} = 40.874$$

Here:

$$L = 15\%, H = 16\%$$

$$NPV_L = ₹ 32.919 - ₹ 40 = ₹ -7.081$$

$$NPV_H = ₹ 40.874 - 40 = + ₹ 0.874$$

$$\begin{aligned} IRR &= L + \frac{NPV_L}{NPV_L - NPV_H} (H - L) \\ &= 15\% + \frac{₹ - 7.081}{₹ - 7.081 - (₹ 0.874)} \times (16\% - 15\%) \\ &= 15.89\% \end{aligned}$$

5. In March, 2021 Tiruv Ltd.'s share was sold for Rs. 219 per share. A long term earnings growth rate of 11.25% is anticipated. Tiruv Ltd. is expected to pay dividend of Rs. 5.04 per share.
- DETERMINE the rate of return an investor can expect to earn assuming that dividends are expected to grow along with earnings at 11.25% per year in perpetuity?
 - It is expected that Tiruv Ltd. will earn about 15% on book equity and shall retain 60% of earnings. In this case, whether, there would be any change in growth rate and cost of equity? ANALYSE.



Solution

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

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

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.

$$\text{Therefore, } K_e = \frac{5.04}{219} + 0.1125 = 13.55\%$$

- (ii) With rate of return on retained earnings (r) of 15% and retention ratio (b) of 60%, new growth rate will be as follows:

$$g = br = 0.60 \times 0.15 = 0.09 \text{ or } 9\%$$

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

With previous Growth Rate of 11.25% and $r = 15\%$, the retention ratio comes out to be:

$$0.1125 = b_1 \times 0.15$$

$$b_1 = 0.75 \text{ and payout ratio} = 0.25$$

With 0.25 payout ratio, the EPS will be as follows:

$$\text{EPS} = \frac{5.04}{0.25} = \text{Rs. } 20.16$$

With new payout ratio of 40% ($1 - 0.60$) the new dividend will be:

$$D_1 = \text{Rs. } 20.16 \times 0.40 = \text{Rs. } 8.064$$

Accordingly new K_e will be:

$$K_e = \frac{8.064}{219} + 0.09 = 12.68\%$$

6. The current dividend (D_0) is Rs.16.10 and the dividend 5 year ago was Rs.10. Find growth rate

Solution

Step-I: Divide D_0 by D_n i.e. ₹16.10 ÷ ₹10 = 1.61

Step-II: Find out the result found at Step-I i.e. 1.61 in corresponding year's row i.e. 5th year.

Step-III: See the interest rate for the corresponding column which is 10%. Therefore, growth rate (g) is 10%.



7. CALCULATE the cost of equity from the following data using realized yield approach:

Year	1	2	3	4	5
Dividend per share (Rs.)	1.00	1.00	1.20	1.25	1.15
Price per share (at the beginning) (Rs.)	9.00	9.75	11.50	11.00	10.60

Solution

In this question, we will first calculate the yield for last 4 years and then will calculate it's geometric mean.

Yield for last 4 years:

$$1+Y_1 = \frac{D_1+P_1}{P_0} = \frac{₹1+₹9.75}{₹9} = 1.1944$$

$$1+Y_2 = \frac{D_2+P_2}{P_1} = \frac{₹1+₹11.50}{9.75} = 1.2821$$

$$1+Y_3 = \frac{D_3+P_3}{P_2} = \frac{₹1.2+₹11}{11.5} = 1.0609$$

$$1+Y_4 = \frac{D_4+P_4}{P_3} = \frac{₹1.25+₹10.60}{11} = 1.0772$$

Geometric mean:

$$K_e = [(1+Y_1) \times (1+Y_2) \times \dots \times (1+Y_n)]^{1/n} - 1$$

$$K_e = [1.1944 \times 1.2821 \times 1.0609 \times 1.0772]^{1/4} - 1 = 0.15 = 15\%$$

8. Mr. Mehra had purchased a share of Alpha Limited for Rs. 1,000. He received dividend for a period of five years at the rate of 10 per cent. At the end of the fifth year, he sold the share of Alpha Limited for Rs. 1,128. You are required to COMPUTE the cost of equity as per realised yield approach.

Solution

Year	Dividend (₹)	Sale Proceeds (₹)	Discount Factor @ 12%	Present Value (₹)
1	100	-	0.893	89.3
2	100	-	0.797	79.7
3	100	-	0.712	71.2
4	100	-	0.636	63.6
5	100	-	0.567	56.7
5	End	1,128	0.567	639.576
				1,000.076

9. CALCULATE the cost of equity capital of H Ltd., whose risk-free rate of return equals 10%. The firm's beta equals 1.75 and the return on the market portfolio equals to 15%.

Solution

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

$$K_e = 0.10 + 1.75 (0.15 - 0.10)$$

$$= 0.10 + 1.75 (0.05) = 0.1875 \text{ or } 18.75\%$$

10. Masco Limited wishes to raise additional finance of Rs. 10 lakhs for meeting its investment plans. It has Rs. 2,10,000 in the form of retained earnings available for investment purposes. Further details are as following:

(1)	Debt / Equity mix	3:7
(2)	Cost of debt:	
	Upto Rs. 1,80,000	10% (before tax)
	Beyond Rs. 1,80,000	16% (before tax)
(3)	Earnings per share	Rs. 4
(4)	Dividend pay out	50% of earnings
(5)	Expected growth rate of dividend	10%
(6)	Current market price per share	Rs. 44
(7)	Tax rate	50%

You are required to:

- DETERMINE the pattern for raising the additional finance.
- DETERMINE the post-tax average cost of additional debt.
- DETERMINE the cost of retained earnings and cost of equity.
- COMPUTE the overall weighted average after tax cost of additional finance.

Solution

- (a) Pattern for raising the additional finance:

$$\text{Equity} \quad 70\% \text{ of } ₹ 10,00,000 \quad = ₹ 7,00,000$$

$$\text{Debt} \quad 30\% \text{ of } ₹ 10,00,000 \quad = ₹ 3,00,000$$



The capital structure after raising additional finance:

		(₹)
Shareholders' funds		
Equity Capital	(₹7,00,000–₹2,10,000)	4,90,000
Retained earnings		2,10,000
Debt (Interest at 10% p.a.)		1,80,000
(Interest at 16% p.a.)	(₹3,00,000–₹1,80,000)	1,20,000
Total Funds		10,00,000

b) Determination of post-tax average cost of additional debt:

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

Where,

I = Interest Rate

t = Corporate tax-rate

On ₹ 1,80,000 = 10% (1 - 0.5) = 5% or 0.05

On ₹ 1,20,000 = 16% (1 - 0.5) = 8% or 0.08

Average Cost of Debt

$$= \frac{(\text{₹ } 1,80,000 \times 0.05) + (\text{₹ } 1,20,000 \times 0.08)}{\text{₹ } 3,00,000} \times 100 = 6.2\%$$

(c) Determination of cost of retained earnings and cost of equity by applying Dividend growth model:

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

Where,

D₀ = Dividend paid = 50% of EPS = 50% × ₹ 4 = ₹ 2

g = Growth rate = 10%

P₀ = Current market price per share = ₹ 44

$$\text{So, } K_e \text{ or } K_r = \frac{\text{₹ } 2(1+0.10)}{\text{₹ } 44} + 0.10 = \frac{\text{₹ } 2.2}{\text{₹ } 44} + 0.10 = 0.05 + 0.10 = 0.15 \text{ or } 15\%$$

(d) Computation of overall weighted average after tax cost of additional finance:

Particulars	Amount (₹)	Weights	Cost of funds	Weighted Cost (%)
Equity (including retained earnings)	7,00,000	0.70	15%	10.5
Debt	3,00,000	0.30	6.2%	1.86
WACC	10,00,000			12.36

11. Ram Ltd evaluates all its capital projects using discounting rate of 16%. Its capital structure consists of equity share capital, retained earnings, bank term loan and debentures redeemable at par. Rate of interest on bank term loan is 1.4 times that of debenture. Remaining tenure of debenture and bank loan is 4 years and 6 years respectively. Book value of equity share capital, retained earnings and bank loan is Rs. 20,00,000, Rs. 30,00,000 and Rs. 20,00,000 respectively. Debentures which are having book value of Rs. 30,00,000 are currently trading at Rs. 98 per debenture. The ongoing PE multiple for the shares of the company stands at 4. You are required to:
- (i) CALCULATE the rate of interest on bank loan and
(ii) CALCULATE the rate of interest on debentures
Tax rate applicable is 30%.

Solution**(a) Working Note:**

Let the rate of Interest on debenture be x

$$\therefore \text{Rate of Interest on loan} = 1.4x$$

$$\begin{aligned} \therefore k_d \text{ on debentures} &= \frac{\text{Int}(1-t) + \frac{RV-NP}{n}}{\frac{RV+NP}{2}} \\ &= \frac{100x(1-0.30) + \frac{100-98}{4}}{\frac{100+98}{2}} \\ &= \frac{70x+0.5}{99} \end{aligned}$$

$$\therefore K_d \text{ on bank loan} = 1.4 \times (1 - 0.30) = 0.98x$$

$$K_e = \frac{EPS}{MPS} = \frac{1}{MPS/EPS} = \frac{1}{PE} = \frac{1}{4} = 0.25$$

$$K_e = 0.25$$

Computation of WACC

Capital	Amount	Weights	Cost	Product
Equity	20,00,000	0.2	0.25	0.05
Reserves	30,00,000	0.3	0.25	0.075
Debentures	30,00,000	0.3	$(70x+0.5)/99$	$(21x+0.15)/99$
Bank Loan	20,00,000	0.2	0.98x	0.196x
	1,00,00,000	1		$0.125+0.196x$ $\frac{21x+0.15}{99}$

$$\text{WACC} = 16\%$$

$$\therefore 0.125 + 0.196x + \frac{21x + 0.15}{99} = 0.16$$

$$\therefore 12.375 + 19.404x + 21x + 0.15 = (0.16)(99)$$

$$\therefore 40.404x = 15.84 - 12.525$$

$$\therefore 40.404x = 3.315$$

$$\therefore x = \frac{3.315}{40.404}$$

$$\therefore x = 8.20\%$$

(i) Rate of interest on debenture = $x = 8.20\%$

(ii) Rate of interest on Bank loan = $1.4x = (1.4)(8.20\%) = 11.48\%$.

12. DETERMINE the cost of capital of Best Luck Limited using the book value (BV) and market value (MV) weights from the following information:

Sources	Book Value (Rs.)	Market Value (Rs.)
Equity shares	1,20,00,000	2,00,00,000
Retained earnings	30,00,000	-
Preference shares	36,00,000	33,75,000
Debentures	9,00,000	10,40,000

Additional information:

- I. Equity: Equity shares are quoted at Rs.130 per share and a new issue priced at Rs.125 per share will be fully subscribed; flotation costs will be Rs. 5 per share.
- II. Dividend: During the previous 5 years, dividends have steadily increased from Rs. 10.60 to Rs. 14.19 per share. Dividend at the end of the current year is expected to be Rs. 15 per share.
- III. Preference shares: 15% Preference shares with face value of Rs. 100 would realise Rs.105 per share.
- IV. Debentures: The company proposes to issue 11-year 15% debentures but the yield on debentures of similar maturity and risk class is 16%; flotation cost is 2%.
Tax: Corporate tax rate is 35%. Ignore dividend tax. Flotation cost would be calculated on face value.

Solution

$$(i) \text{ Cost of Equity } (K_e) = \frac{D_1}{P_0 - F} + g = \frac{₹15}{₹125 - ₹5} + 0.06^*$$

$$K_e = 0.125 + 0.06 = 0.185$$

*Calculation of g:

$$₹10.6(1+g)^5 = ₹14.19$$

$$\text{Or, } (1+g)^5 = \frac{14.19}{10.6} = 1.338$$

Table (FVIF) suggests that ₹1 compounds to ₹1.338 in 5 years at the compound rate of 6 percent. Therefore, g is 6 per cent.

$$(ii) \text{ Cost of Retained Earnings } (K_r) = \frac{D_1}{P_0} + g = \frac{₹15}{₹125} + 0.06 = 0.18$$

$$(iii) \text{ Cost of Preference Shares } (K_p) = \frac{PD}{P_0} = \frac{₹15}{₹105} = 0.1429$$

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

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

$$= \frac{₹15 \times 0.65 + ₹0.75}{₹95.875} = \frac{₹10.5}{₹95.875} = 0.1095$$

*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)

$$= ₹15 \div 0.16 = ₹93.75$$

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

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	120	160*	0.1850	22.2	29.6
Retained Earnings	30	40*	0.1800	5.4	7.2
Preference Shares	36	33.75	0.1429	5.14	4.82
Debentures	9	10.4	0.1095	0.986	1.139
Total	195	244.15		33.73	42.76

*Market Value of equity has been apportioned in the ratio of Book Value of equity and retained earnings i.e., 120:30 or 4:1.



Weighted Average Cost of Capital (WACC):

$$\text{Using Book Value} = \frac{\text{₹}33.73}{\text{₹}195} = 0.1729 \text{ or } 17.29\%$$

$$\text{Using Market Value} = \frac{\text{₹}42.76}{\text{₹}244.15} = 0.1751 \text{ or } 17.51\%$$

13. ABC Ltd. has the following capital structure, which is considered to be optimum as on 31st March, 2023.

	(Rs.)
14% Debentures	30,000
11% Preference shares	10,000
Equity Shares (10,000 shares)	1,60,000
	2,00,000

The company share has a market price of Rs. 23.60. Next year dividend per share is 50% of year 2022 EPS. Following is the uniform trend of EPS for the preceding 10 years which is expected to continue in future:

Year	EPS (Rs.)	Year	EPS (Rs.)
2013	1.00	2018	1.61
2014	1.10	2019	1.77
2015	1.21	2020	1.95
2016	1.33	2021	2.15
2017	1.46	2022	2.36

The company issued new debentures carrying 16% rate of interest and the current market price of debenture is Rs. 96.

Preference shares of Rs. 9.20 (with annual dividend of Rs. 1.1 per share) were also issued. The company is in 50% tax bracket.

- (A) CALCULATE after tax:
- Cost of new debt
 - Cost of new preference shares
 - Cost of new equity share (assuming new equity from retained earnings)
- (B) CALCULATE marginal cost of capital when no new shares are issued.
- (C) DETERMINE the amount that can be spent for capital investment before new ordinary shares must be sold. Assuming that the retained earnings for next year's investment is 50 percent of 2022.

(D) COMPUTE marginal cost of capital when the fund exceeds the amount calculated in (C), assuming new equity is issued at Rs. 20 per share.

Solution

(A) (i) Cost of new debt

$$K_d = \frac{I(1-t)}{P_0} = \frac{₹16(1-0.5)}{₹96} = 0.0833$$

(ii) Cost of new preference shares

$$K_p = \frac{PD}{P_0} = \frac{₹1.1}{₹9.2} = 0.12$$

(iii) Cost of new equity shares

$$K_e = \frac{D_1}{P_0} + g = \frac{₹1.18}{₹23.60} + 0.10 = 0.05 + 0.10 = 0.15$$

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

$$g = \frac{EPS(2014) - EPS(2013)}{EPS(2013)} = \frac{₹1.10 - ₹1.00}{₹1.00} = 0.10 \text{ or } 10\%$$

Calculation of D₁

$$D_1 = 50\% \text{ of } 2022\text{EPS} = 50\% \text{ of } 2.36 = ₹1.18$$

(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:

$$\text{Retained earnings} = 50\% \text{ of } EPS \text{ of } 2022 \times \text{outstanding equity shares} = 0.50 \times ₹2.36 \times 10,000 \text{ shares} = ₹11,800$$

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

$$\text{So, } ₹11,800 = 80\% \text{ of Total Capital}$$

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

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

$$\therefore \text{The cost of new issue of equity shares will be} = \frac{D_1}{P_0} + g = \frac{\text{₹}1.18}{\text{₹}20} + 0.10 = 0.159$$

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

14. The following is the extract of the Balance Sheet of M/s KD Ltd.:

Particulars	Amount (Rs.)
Ordinary shares (Face Value Rs. 10/- per share)	5,00,000
Share Premium	1,00,000
Retained Profits	6,00,000
8% Preference Shares (Face Value Rs. 25/- per share)	4,00,000
12% Debentures (Face value Rs. 100/- each)	6,00,000

The ordinary shares are currently priced at Rs. 39 ex-dividend and preference share is priced at Rs. 18 cum-dividend. The debentures are selling at 120 percent ex-interest. The applicable tax rate to KD Ltd. is 30 percent. KD Ltd.'s cost of equity has been estimated at 19 percent. Calculate the WACC (weighted average cost of capital) of KD Ltd. on the basis of market value.

Solution

- (a) **Computation of WACC on the basis of market value**

W.N. 1

Cum-dividend price of Preference shares = Rs. 18

Less: Dividend (8/100) x 25 = Rs. 2

∴ Market Price of Preference shares = Rs. 16

$$K_p = \frac{2}{16} = 0.125 \text{ (or) } 12.5\%$$

$$\text{No. of Preference shares} = \left(\frac{4,00,000}{25}\right) = 16,000$$

W.N. 2

$$\text{Market price of Debentures} = \left(\frac{120}{100}\right) \times 100 = \text{₹} 120$$

$$K_d = \left(\frac{12(1-0.3)}{120}\right) = 0.07 \text{ (or) } 7\%$$



$$\text{No. of Debentures} = \left(\frac{6,00,000}{100} \right) = 6,000$$

W.N.3

Market Price of Equity shares = Rs.39

K_e (given) = 19% or 0.19

$$\text{No. of Equity shares} = \frac{5,00,000}{10} = 50,000$$

Sources	Market Value (Rs.)	Nos.	Total Market value (Rs.)	Weight	Cost of Capital	Product
Equity Shares	39	50,000	19,50,000	0.6664	0.19	0.1266
Preference Shares	16	16,000	2,56,000	0.0875	0.125	0.0109
Debentures	120	6,000	7,20,000	0.2461	0.07	0.0172
					WACC =	0.1547

WACC = 0.1547 or 15.47%