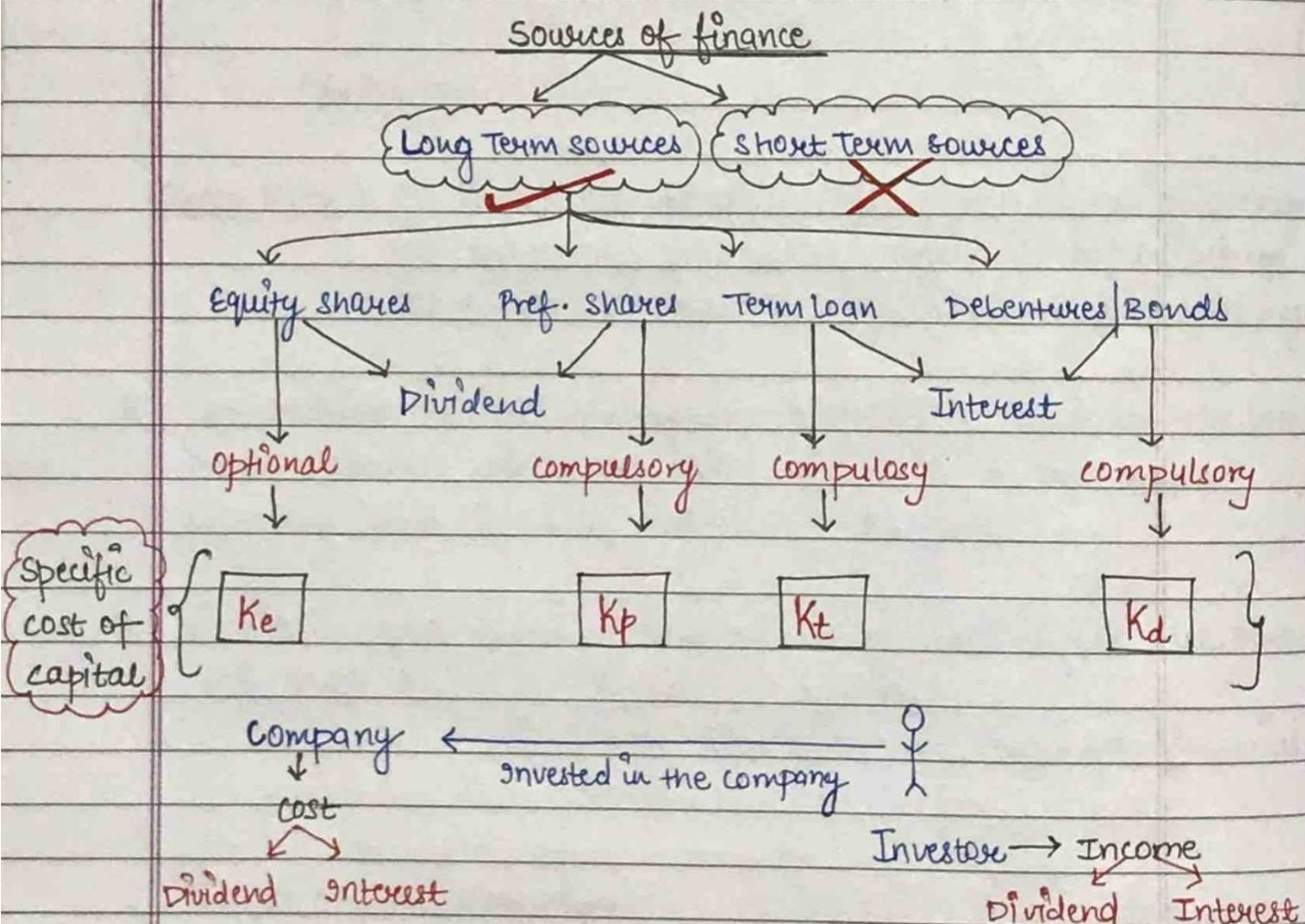


Financial Management

chapter :- Cost of Capital

- The cost of capital is the rate of return a firm must earn on its investments so that the market value of the firm remains unchanged.
- If a firm fails to earn return at the expected rate, the market value of the shares will fall and it will result in reduction of overall wealth of the shareholders.



★ In this chapter, Weighted Average cost of capital (WACC/ K_c)
 $= (K_e + K_d + K_p + K_t)$

1. Calculation of Cost of Debenture (K_d) :-

Redeemable Debentures



Amount specified in agreement.



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

Interest (net of tax) points to $I(1-t)$
Premium discount on redemption points to $(RV - NP)$

Average investment points to $\frac{RV + NP}{2}$

$$= \frac{RV + NP}{2}$$

where, I = Interest

t = Tax Rate (%)

NP = Net Proceeds

(Issued Price - Floatation cost)

RV = Redemption Value

n = no. of years

Irredeemable Debentures

(Perpetual Debentures) ↓

NO Amount specified in agreement



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

where, I = Interest

t = Tax Rate

NP = Net Proceeds

Notes :- ★ Debentures can be issued at Par, Premium, Discount.

★ Floatation cost is always calculated as a percentage of Issued Price.

★ Interest is always calculated as a percentage of face value.

★ When the Issued Price is not given always assume the debentures are issued at Par.

★ When the no. of years are not specified in the question, assume the debentures to be irredeemable.

★ Caln of K_d can be done on total basis or per debenture basis; Answer remains unchanged.

★ When the question is silent about value at which the debenture are redeemed, it is assumed that debentures are redeemed at Par.

- * If the question is silent with respect to calculation of any specific cost of capital i.e. K_d, K_e, K_p, K_t → Always calcⁿ POST TAX.
- * PRE TAX will be calculated only if asked in the question.
- * If Issued Price and current Market Price are given in the ques. always use current Market Price as Net Proceeds.

Eg 1:- ABC Ltd Issued → 1000 Debentures
8% of £100 each i.e. £1,00,000

Tax Rate = 40%

$$\text{Interest} = £1,00,000 \times 8\% = £8,000$$

$$K_d = \frac{I(1-t)}{NP} = \frac{8,000(1-40\%)}{1,00,000} = 4.80\%$$

Eg 2:- ABC Ltd Issued at Par → 1000 8% Debentures of £100 each i.e. £1,00,000

2% Commission is given to intermediary.

$$\therefore \text{Issued Price} = £1,00,000 \quad (1000 \times £100)$$

$$\text{H} \quad 2\% \text{ Commission} = £(2,000) \quad (£1,00,000 \times 2\%) \rightarrow \text{Floatation cost}$$

$$\text{Net Proceeds} = £98,000$$

$$\text{Interest} = £1,00,000 \times 8\% = £8,000$$

$$K_d = \frac{I(1-t)}{NP} = \frac{8,000(1-40\%)}{98,000} = 4.89\%$$

Suppose, in the above given case ABC Ltd has issued 1000 8% debentures at £100 each -

$$\text{i) at Premium of } 5\% \text{ (i.e. } 100 + 5\%) = £105 \text{ each}$$

$$\text{ii) at Discount of } 2\% \text{ (i.e. } 100 - 2\%) = £98 \text{ each}$$

$$\text{i) Now, Issued Price will be} = £1,05,000 \quad (1000 \times £105)$$

$$\text{H} \quad 2\% \text{ Commission} = £(2,100) \quad (£1,05,000 \times 2\%)$$

$$\text{Net Proceeds} = £1,02,900$$

$$\text{Interest} = \text{£}1,00,000 \times 8\% = \text{£}8,000$$

$$K_d = \frac{I(1-t)}{NP} = \frac{8,000(1-40\%)}{1,02,900} = 4.66\%$$

ii) Now, Issued Price will be = $\text{£}98,000$ ($1000 \times \text{£}98$)

$$\text{② } 2\% \text{ Commission} = \text{£}(1960) (\text{£}98,000 \times 2\%)$$

$$\text{Net Proceeds} = \text{£}96,040$$

$$\text{Interest} = \text{£}1,00,000 \times 8\% = \text{£}8,000$$

$$K_d = \frac{I(1-t)}{NP} = \frac{8,000(1-40\%)}{96,040} = 5\%$$

Eg 3:-

CASE-1

9% Debentures of $\text{£}100$ each issued at par, Floatation cost = 2%, Debentures are redeemed at a premium of 8%, Tax Rate = 40%, no. of years to redemption = 5 years.
Calculate K_d .

$$\text{Interest} = \text{£}9 (\text{£}100 \times 9\%)$$

$$\text{Net Proceeds} = \text{Issued Price} - \text{Floatation cost.}$$

$$= \text{£}100 - 2 = \text{£}98.$$

$$\text{Redemption value} = \text{£}108 \text{ (i.e. } 100 + 8\% \text{ premium)}$$

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

$$= \frac{9(1-40\%) + \frac{108 - 98}{5}}{\frac{108 + 98}{2}}$$

$$= 7.18\%$$

CASE-2

Here, all the information given in case-1 remains same but now, Debentures are redeemed at a discount of 10%.
Calculate K_d .

Now, only Redemption value will change i.e. $\text{£}90$ ($100 - 10\%$)

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

$$= \frac{9(1-40\%) + \frac{90 - 98}{5}}{\frac{90 + 98}{2}}$$

$$= 4.04\%$$

2. Calculation of cost of Preference share capital (K_p) :-

Redeemable Preference shares

Irredeemable Preference shares

$$= \frac{PD + (RV - NP)}{n}$$

$$= \frac{PD}{NP}$$

$$\frac{RV + NP}{2}$$

where, PD = Preference Dividend

RV = Redemption Value

NP = Net Proceeds

n = no. of years

where, PD = Preference Dividend

NP = Net Proceeds.

Note :- ★ Preference Dividend is always calculated on Face Value.
★ Net Proceeds = Issued Price - Floatation cost.

Eg 1:- JJ Ltd issued 60,000 12% Redeemable Preference shares of £100 each at a premium of £5 each, redeemable after 10 years at a premium of £10 each. The floatation cost of each share is £3. Calculate cost of preference share capital.

Preference Dividend (PD) = £100 X 60,000 shares X 12% = £7,20,000

Floatation cost = 60,000 shares X £3 = £1,80,000

Net Proceeds (NP) = £105 X 60,000 - 1,80,000 = £61,20,000

Redemption Value (RV) = 60,000 shares X £110 = £66,00,000

$$K_p = \frac{PD + (RV - NP)}{n} = \frac{7,20,000 + (66,00,000 - 61,20,000)}{10}$$

$$\frac{RV + NP}{2}$$

$$\frac{66,00,000 + 61,20,000}{2}$$

$$= 12.08\%$$

Eg 2:-

Lotus Ltd issues 10% irredeemable preference shares of £100 each for £10,00,000. What will be the cost of preference share capital (Kp), if preference shares are issued:

- at 10% premium.
- at 10% discount.

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

- When shares are issued at 10% premium i.e. at £110 per share -

$$PD = 10$$

$$NP = 110$$

$$K_p = \frac{10}{110} = 0.0909 \text{ or } 9\%$$

- When shares are issued at 10% discount i.e. at £90 per share -

$$PD = 10$$

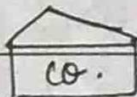
$$NP = 90$$

$$K_p = \frac{10}{90} = 0.1111 \text{ or } 11.11\%$$

★ Dividend Distribution Tax (DDT) :-

$$DDT = PD (1 + DDT\%) = 50,000 (1 + 0.10) = ₹55,000$$

Eg:- Ashok Ltd



10% Preference shares
₹5,00,000



Preference shareholder

$$\begin{aligned} \text{Preference dividend} &= 10\% \times \\ &\quad ₹5,00,000 \\ &= ₹50,000 \end{aligned}$$

suppose DDT = 10%

$$\begin{aligned} \text{Govt} &= 50,000 \times 10\% = ₹5,000 \\ \text{Total preference dividend} &= ₹55,000 \end{aligned}$$

★ Convertible Debentures :-

Guru Ltd



1000 12% convertible
Debentures of £100 each
i.e. £1,00,000

At the end of 5 years (T₅)

5 years

Preference SHs has 2 options :-

cash



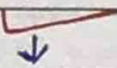
£1,00,000
(at par)

convert into equity
shares in Ratio of

2:1

£60

£12,00,000



RV = £12,00,000
(equity shares)

£35

£70,000



RV = 1,00,000
(cash)

3. Calculation of Cost of Equity (K_e) :-

5 Methods

- ★ Dividend yield approach.
- ★ Dividend yield + growth approach.
- ★ Earnings yield approach.
- ★ Earnings yield + growth approach.
- ★ Capital asset pricing model (CAPM).

A. Dividend Yield Approach = $\frac{D_1}{P_0}$

B. Dividend Yield + Growth Approach = $\frac{D_1}{P_0} + g$

C. Earnings Yield Approach = $\frac{E_1}{P_0}$

D. Earnings yield + Growth Approach = $\frac{E_1}{P_0} + g$

E. Capital Asset Pricing Model (CAPM) = $RF + \beta (RM - RF)$

where ; D_1 = Expected Dividend at the end of year 1.

P_0 = current Market Price of share

g = constant growth rate.

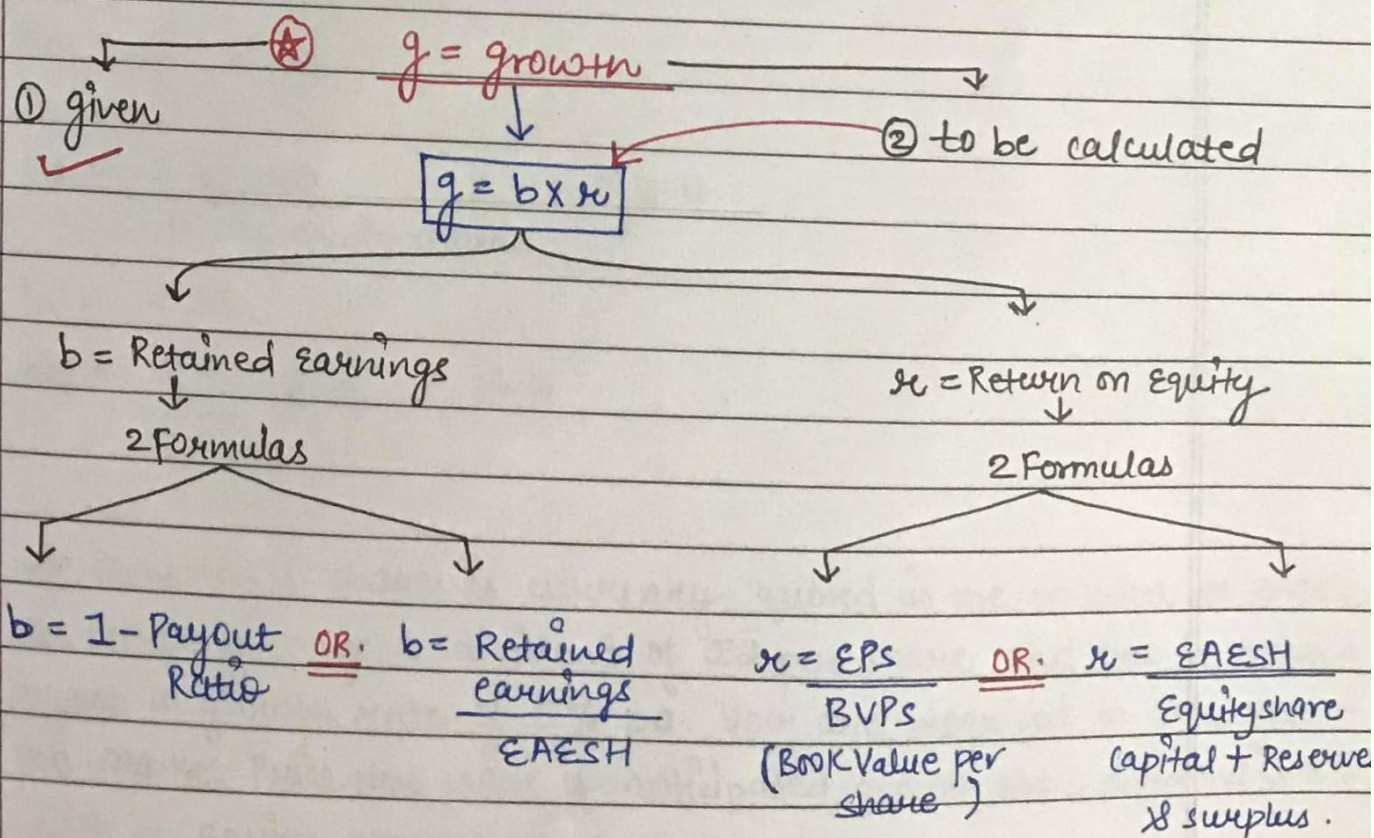
E_1 = Earnings per share (EPS)

RF = Risk Free Rate of Return.

RM = Market Rate of Return.

β = sensitivity / Beta / systematic risk.

$RM - RF$ = Market Risk premium.



Eg 1:-

AB Ltd issued shares of £100 each at a premium of 10%. The issue involved underwriting commission of 5%. The rate of dividend expected by shareholder is 12%. Determine cost of equity capital (K_e).

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

$$D_1 = \text{Dividend per share} = 100 \times 12\% = £12$$

$$P_0 = \text{Current Market price per share} = \text{Issue price} \\ = 100 + 100 \times 10\% = £110.$$

$$\text{selling price of the share} = 110 - 5\% \text{ of } 110 = £104.50$$

$$K_e = \frac{£12}{£104.5} = 0.1148 \text{ or } = 11.48\%$$

Eg 2:-

The earnings available to the shareholders amount to £40,000. Firm is represented by 10,000 equity shares & the current market price of equity shares is £25. Calculate the cost of equity share capital (K_e).

$$K_e = \frac{E_1}{P_0} \times 100$$

$$E_1 = \frac{£40,000}{10,000 \text{ equity shares}} = £4$$

$$P_0 = £25$$

$$K_e = \frac{£4}{£25} \times 100 = 16\%$$

Eg 3:-

CD Company's shares is currently quoted in the market at £20. The company pays a dividend of £2 per share and the investors expect a growth rate of 5% p.a. You are required to calculate -

- The market price per share if anticipated growth rate dividend is 7%.
- Cost of equity share capital of the co.

$$(a) \quad k_e = \frac{D_1}{P_0} + g$$

Here $D_1 = \text{£}2$, $k_e = 0.15$, $g = 0.07$

$$k_e = 0.15 = \frac{2}{P_0} + 0.07$$

$$0.15 P_0 = 2 + 0.07 P_0$$

$$P_0 = \frac{2}{0.08} = \text{£}25 \text{ per share.}$$

$$(b) \quad k_e = \frac{D_1}{P_0} + g$$

$$D_1 = \text{£}2$$

$$P_0 = \text{£}20$$

$$g = 5\% \text{ or } 0.05$$

$$\therefore k_e = \frac{\text{£}2}{\text{£}20} + 0.05 = 0.06$$

Eg 4:- If the risk free rate of return and the market rate of return of an investment are 14% and 18% respectively, calculate the cost of equity share capital if (a) $\beta = 1$ & (b) $\beta = 2/3$.

As per CAPM,

$$k_e = R_F + \beta (R_M - R_F)$$

$$\text{where, } R_F = 14\%$$

$$R_M = 18\%$$

$$(a) \quad \text{when } \beta = 1$$

$$\begin{aligned} k_e &= 14\% + 1(18\% - 14\%) \\ &= 14\% + 4\% \\ &= 18\% \end{aligned}$$

$$(b) \quad \text{when } \beta = 2/3$$

$$\begin{aligned} k_e &= 14\% + 2/3 (18\% - 14\%) \\ &= 14\% + 2.6667\% \\ &= 16.6667\% \end{aligned}$$

Notes :- ★ If the question mentions :-

→ current dividend } This is D_0 and not D_1
 → Dividend paid } $D_1 = D_0 (1 + \text{growth Rate})$

★ If question mentions :-

→ expected Dividend } This is D_1 and not D_0 .
 → company pays dividend }

★ If the question does not specify the growth Rate, then assume no growth and $D_0 = D_1$

4. Calculation of Retained Earnings (KRE) :-

$$KRE = K_e (1 - PT) (1 - b)$$

where, PT = personal tax.

b = brokerage / commission %.

Note :- ★ If personal tax and brokerage are not given in the question, assume $K_e = KRE$

5. Calculation of Cost of Term Loan (K_t) :-

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

where, I = Rate of interest.

t = tax rate.

Eg:- 10% Bank loan = ₹1,00,000

Interest = ₹10,000

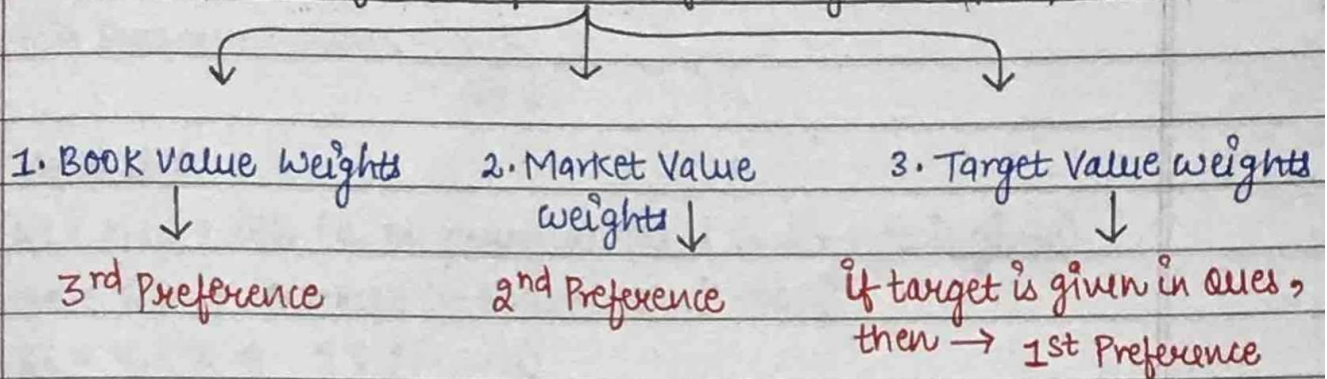
$$K_t = \frac{10,000}{1,00,000} = 10\%$$

⊖ Tax @ 40% = ₹(4,000)
 (assume)

Interest = ₹6,000

(Net of Tax)

★ Calculation of WACC / K_c (Weighted Avg cost of capital) :-



$$WACC = K_e \times W_e + K_p \times W_p + K_d \times W_d + K_t \times W_t + K_{RE} \times W_{RE}$$

★ ~~Imp~~ All the specific cost of capital i.e. K_e , K_p , K_t , K_d , K_{RE} should be taken Post Tax for the calⁿ of WACC.

Eg 1:- Given below is the information of ABC Ltd :-

		Target weights
Equity share capital (£100 per share)	= £10,00,000	25%
Reserves & surplus	= £7,50,000	15%
12% Debentures	= £12,50,000	20%
9% Term loan	= £5,00,000	15%
14% preference shares	= £15,00,000	25%
Total capital employed	= £50,00,000	100%

Assume Tax Rate = 50%.

Calculate WACC using :-

- Book Value weights.
- Market Value weights.
- Target weights.

(i) calⁿ of Book value weights :-

	BV weights	
Equity share capital	= 20%	→ $\left(\frac{10,00,000}{50,00,000} \times 100 \right)$
Reserves & surplus	= 15%	
12% Debentures	= 25%	

9% term loan = 10%

14% preference shares = 30%

100%

$K_e = 18\%$

$K_E = K_{RE} = 18\%$ (as no personal Tax & brokerage is given)

$K_d = 6\% \Rightarrow \text{Interest } (1 - \text{tax}) = 12\% (1 - 50\%)$

$K_t = 4.5\% \Rightarrow 9\% (1 - 50\%)$

$K_p = 14\%$

$WACC = W_e \times K_e + W_{RE} \times K_{RE} + W_d \times K_d + W_p \times K_p + W_t \times K_t$

$WACC = 18 \times 0.20 + 18 \times 0.15 + 6 \times 0.25 + 14 \times 0.30 + 4.5 \times 0.10$

$WACC = 3.6 + 2.7 + 1.5 + 4.2 + 0.45 = 12.45\%$

(ii) calⁿ of WACC using Target weights :- $\rightarrow$ given in ques always.

$WACC = 0.25 \times 18 + 18 \times 0.15 + 6 \times 0.20 + 14 \times 0.25 + 4.5 \times 0.15$

$WACC = 4.5 + 2.7 + 1.2 + 3.5 + 0.675 = 12.57\%$

(iii) calⁿ of WACC using Market value weights :-

Suppose the current Market Price of Equity share capital = £ 350 / share.

Now, no. of equity shares = 10,000 shares

Current Market Price = £ 350 / share.

Market Value = £ 35,00,000 (10,000 shares $\times$ £ 350)

Divided in the Ratio of Book value b/w

Equity share capital

Reserves & surplus

Book Value = £ 10,00,000

+ £ 7,50,000 = £ 17,50,000
(Total)

Equity share capital

$$= \frac{10,00,000}{17,50,000} \times 35,00,000$$

$$= ₹20,00,000$$

Reserves & surplus

$$= \frac{7,50,000}{17,50,000} \times 35,00,000$$

$$= ₹15,00,000$$

	Book Value	Current Market Price (assumed)	Market Value	Market Value weights
Equity share capital	10,00,000	100	20,00,000	28%
Reserves & surplus	7,50,000	—	15,00,000	21%
12% Debentures (₹100 per Deb.)	12,50,000	150	18,75,000 (12500 x ₹150)	27%
9% term loan	5,00,000	—	5,00,000	7%
14% Pref. shares (₹100 per share)	15,00,000	80	12,00,000	17%
			70,75,000	100%

$$WACC = K_e \times w_e + K_p \times w_p + K_d \times w_d + K_{RE} \times w_{RE} + K_t \times w_t$$

$$WACC = 18 \times 0.28 + 14 \times 0.17 + 6 \times 0.27 + 18 \times 0.21 + 4.5 \times 0.07$$

$$WACC = 5.04 + 2.38 + 1.62 + 3.78 + 0.315$$

$$WACC = \boxed{13.135\%}$$

★ ~~WACC~~ ^{WACC} Marginal cost of capital :-
↓

(WACC) for Additional finance.

Refer Illustration 28 of ICMAI Module syllabus 2022.
(Page no. 270).