

## Cost of Capital

Q. No.	Questions																								
1.	<p>Navya Limited wishes to raise additional capitals of ₹ 10 lakh for meetings its modernization plan. It has ₹ 3,00,000 in the form of retained earnings available for investment purposes. The following are the further details:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">Debt/ Equity mix</td> <td style="text-align: right;">40%/60%</td> </tr> <tr> <td>Cost of debt (before tax)</td> <td></td> </tr> <tr> <td>Upto ₹ 1,80,000</td> <td style="text-align: right;">10%</td> </tr> <tr> <td>Beyond ₹ 1,80,000</td> <td style="text-align: right;">16%</td> </tr> <tr> <td>Earning per share</td> <td style="text-align: right;">₹4</td> </tr> <tr> <td>Dividend pay-out</td> <td style="text-align: right;">₹2</td> </tr> <tr> <td>Expect growth rate in dividend</td> <td style="text-align: right;">10%</td> </tr> <tr> <td>Current market price per share</td> <td style="text-align: right;">44%</td> </tr> <tr> <td>Tax rate</td> <td style="text-align: right;">50%</td> </tr> </table> <p><b>Required:</b></p> <ol style="list-style-type: none"> <li>i) To determine the pattern of raising the additional finance.</li> <li>ii) To calculate the post-tax average cost of additional debt.</li> <li>iii) To calculate the cost of retained earning and cost of equity, and</li> <li>iv) To determine the overall weighted average cost of capital (after tax).</li> </ol> <p style="text-align: center;"><b>(ICAI SM modified/May 2015 modified/ May 2008 modified / November 2019 modified/July 2021 modified/ November 2011 modified/May 2019 modified)</b></p>	Debt/ Equity mix	40%/60%	Cost of debt (before tax)		Upto ₹ 1,80,000	10%	Beyond ₹ 1,80,000	16%	Earning per share	₹4	Dividend pay-out	₹2	Expect growth rate in dividend	10%	Current market price per share	44%	Tax rate	50%						
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Ans.	<p><b>i) Pattern of Raising Additional Finance</b></p> <p>Equity = 10,00,000 × 60/100 = ₹6,00,000  Debt = 10,00,000 × 40/100 = ₹4,00,000</p> <p style="text-align: center;">Capital structure after Raising Additional Finance</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Sources of Fund</th> <th style="text-align: center;">Amount (₹)</th> </tr> </thead> <tbody> <tr> <td>Shareholder's Fund</td> <td></td> </tr> <tr> <td style="padding-left: 20px;">Equity Capital (6,00,000 – 3,00,000)</td> <td style="text-align: right;">3,00,000</td> </tr> <tr> <td style="padding-left: 20px;">Retained earnings</td> <td style="text-align: right;">3,00,000</td> </tr> <tr> <td>Debt at 10% p.a.</td> <td style="text-align: right;">1,80,000</td> </tr> <tr> <td>Debt at 16% p.a. (4,00,000 – 1,80,000)</td> <td style="text-align: right;">2,20,000</td> </tr> <tr> <td><b>Total funds</b></td> <td style="text-align: right;"><b>10,00,000</b></td> </tr> </tbody> </table> <p><b>ii) Post-tax Average Cost of Additional Debt</b></p> <p><math>K_d = l(1 - t)</math>, where 'K<sub>d</sub>' is cost of debt, 'l' is interest and 't' tax rate.</p> <p>On ₹1,80,000 = 10% (1 - 0.5) = 5% or 0.05  On ₹2,20,000 = 16% (1 - 0.5) = 8% or 0.08</p> <p>Average Cost of Debt (Post Tax) i.e.</p> $K_d = \frac{(1,80,000 \times 0.05) + (2,20,000 \times 0.08)}{4,00,000} = 100 = 6.65\%$ <p><b>iii) Cost of Retained Earning and Cost of Equity applying Dividend Growth Model</b></p> $K_e = \frac{1.3865}{20} + g \text{ or } \frac{D_0(1+g)}{P_0} + g$ <p>Then, <math>K_e = \frac{2.2(1.1)}{44} + 0.10 = \frac{2.2}{44} + 0.010 = 0.15 \text{ or } 15\%</math></p> <p><b>iv) Overall Weighted Average Cost of Capital (WACC) (After Tax)</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Particulars</th> <th style="text-align: center;">Amount (₹)</th> <th style="text-align: center;">Weights</th> <th style="text-align: center;">Cost of Capital</th> <th style="text-align: center;">(WACC)</th> </tr> </thead> <tbody> <tr> <td>Equity (including retained earnings)</td> <td style="text-align: center;">6,00,000</td> <td style="text-align: center;">0.6</td> <td style="text-align: center;">15</td> <td style="text-align: center;">9</td> </tr> </tbody> </table>	Sources of Fund	Amount (₹)	Shareholder's Fund		Equity Capital (6,00,000 – 3,00,000)	3,00,000	Retained earnings	3,00,000	Debt at 10% p.a.	1,80,000	Debt at 16% p.a. (4,00,000 – 1,80,000)	2,20,000	<b>Total funds</b>	<b>10,00,000</b>	Particulars	Amount (₹)	Weights	Cost of Capital	(WACC)	Equity (including retained earnings)	6,00,000	0.6	15	9
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	Debt	4,00,000	0.4	6.65	2.66
	<b>Total</b>	<b>10,00,000</b>	<b>1</b>		<b>11.66</b>

2. CALCULATE the WACC using the following data by using:  
a) Book value weights  
b) Market value weights  
The capital structure of the company is as under:

Particulars	(₹)
Debtures (₹ 100 per debenture)	5,00,000
Preference shares (₹ 100 per share)	5,00,000
Equity shares (₹ 10 per share)	10,00,000
	20,00,000

The market prices of these securities are:  
Debtures ₹ 105 per debenture  
Preference shares ₹ 110 per preference share  
Equity shares ₹ 24 each.

**Additional information:**  
i) ₹ 100 per debenture redeemable at par, 10% coupon rate, 4% floatation costs, 10-year maturity.  
ii) ₹ 100 per preference share redeemable at par, 5% coupon rate, 2% floatation cost and 10-year maturity.  
iii) Equity shares has ₹ 4 floatation cost and market price ₹ 24 per share.  
The next year expected dividend is ₹ 1 with annual growth of 5%. The firm has practice of paying all earnings in the form of dividend.  
Corporate tax rate is 30%. Use YTM method to calculate cost of debtures and preference shares.  
**(RTP November 2020/ ICAI SM / MTP March 2021 / January 2021/ May 2009)**

Ans. i) **Cost of Equity ( $K_e$ )**  

$$= \frac{D_1}{P_0 - F} + g$$

$$= \frac{₹1}{₹24 - 4} + 0.05 = 0.1 \text{ or } 10\%$$

ii) **Cost of Debt ( $K_d$ )**  
Current market price ( $P_0$ ) – floatation cost =  $I(1-t) \times PVAF(r,10) + RV \times PVIF(r,10)$   
₹ 105 – 4% of ₹ 105 = ₹ 10 (1-0.3) × PVAF (r,10) + ₹ 100 × PVIF (r,10)  
Calculation of NPV at discount rate of 5% and 7%

Year	Cash flows (₹)	Discount factor @ 5%	Present Value	Discount factor @ 7%	Present Value (₹)
0	100.8	1.000	(100.8)	1.000	(100.8)
1 to 10	7	7.722	54.05	7.024	49.17
10	100	0.614	61.40	0.508	50.80
NPV			+14.65		-0.83

Calculation of IRR  

$$IRR = 5\% + \frac{14.65}{14.65 - (-0.83)} (7\% - 5\%) = 5\% + \frac{14.65}{15.48} (7\% - 5\%) = 6.89\%$$

Cost of Debt ( $K_d$ ) = 6.89%

iii) **Cost of Preference shares ( $K_p$ )**  
Current market price ( $P_0$ ) – floatation cost =  $PD \times PVAF (r,10) + RV \times PVIF(r,10)$   
₹ 110 – 2% of ₹ 110 = ₹ 5 × PVAF (r,10) + ₹ 100 × PVIF (r,10)

Calculation of NPV at discount rate of 3% and 5%

Year	Cash flows (₹)	Discount factor @ 3%	Present Value	Discount factor @ 5%	Present Value (₹)
0	107.8	1.000	(107.8)	1.000	(107.8)
1 to 10	5	8.530	42.65	7.722	38.61
10	100	0.744	74.40	0.614	61.40
NPV			+9.25		-7.79

Calculation of IRR

$$\text{IRR} = 3\% + \frac{9.25}{9.25 - (-7.79)} (5\% - 3\%) = 3\% + \frac{9.25}{17.04} (5\% - 3\%) = 4.08\%$$

Cost of Debt ( $K_p$ ) = 4.08%

a) Calculation of WACC using book value weights

Source of capital	Book Value (₹)	Weights (a)	After tax cost of capital (b)	WACC ( $K_0$ ) (c) = (a) × (b)
10% Debentures	5,00,000	0.25	0.0689	0.01723
5% Preference shares	5,00,000	0.25	0.0408	0.0102
Equity shares	10,00,000	0.50	0.10	0.05000
	20,00,000	1.00		0.07743

WACC ( $K_0$ ) = 0.07743 or 7.74%

b) Calculation of WACC using market value weights

Source of capital	Market Value (₹)	Weights (a)	After tax cost of capital (b)	WACC ( $K_0$ ) (c) = (a) × (b)
10% Debentures (₹ 105 × 5,000)	5,25,000	0.151	0.0689	0.0104
5% Preference shares (₹ 110 × 5,000)	5,50,000	0.158	0.0408	0.0064
Equity shares (₹ 24 × 1,00,000)	24,00,000	0.691	0.10	0.0691
	34,75,000	1.000		0.0859

WACC ( $K_0$ ) = 0.0859 or 8.59%

3. ABC Ltd. Has the following capital structure, which is considered to be optimum as on 31<sup>st</sup> March, 20X10.

	(₹)
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 ₹ 23.60. Next year dividend per share is 50% of year 20X9 EPS. Following is the uniform trend of EPS for the preceding 10 years which is expected to continue in future:

Year	EPS (₹)	Year	EPS (₹)
20X0	1.00	20X5	1.61
20X1	1.10	20X6	1.77

20X2	1.21	20X7	1.95
20X3	1.33	20X8	2.15
20X4	1.46	20X9	2.36

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

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

**A) CALCULATE after tax:**

- i) Cost of new debt
- ii) Cost of new preference shares
- iii) 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 20X9.**

**D) COMPUTE marginal cost of capital when the fund exceeds the amount calculated in ©, assuming new equity is issued at ₹ 20 per share?**

**(ICAI SM modified/May 2016/ RTP May 2021 modified)**

**Ans.**

**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

$$K_d = \frac{PD}{P_0} = \frac{1.1}{9.2} = 0.12$$

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)

$$= \frac{EPS(2013) - EPS(2012)}{EPS(2012)} = \frac{₹ 1.10 - ₹ 1.00}{₹ 1.00} = 0.10 \text{ or } 10\%$$

Calculation of  $D_1$

$$D_1 = 50\% \text{ of } 2021 \text{ EPS} = 50\% \text{ of } 2.36 = ₹ 1.18$$

**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			<b>0.1385</b>

- 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 2021 × 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 So, ₹ 11,800 = 80% of Total Capital  
 $\therefore$  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.  
 $\therefore$  the cost of new issue of equity shares will be  $= \frac{D_1}{P_0} + g = \frac{₹ 1.18}{20} + 0.10 = 0.159$   
 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
			<b>0.1457</b>

4. PQR LTD. has the following capital structure on October 31, 20X1:

Equity share capital (2,00,000 Shares of ₹ 10 each)	20,00,000
Reserves & Surplus	20,00,000
12% preference shares	10,00,000
9% debentures	30,00,000

The market price of equity shares is ₹ 30. It is expected the company will pay next year a dividend of ₹ 3 per share, which will grow at 7% forever. Assumes 40% income tax rate.

You are required to compute weighted average cost of capital using market value weights.

**(November 2010 / November 2016/Dec 2021 Modified)**

**Ans.** COST OF EQUITY  $= \frac{D_1}{P_0} + g$   
 $= \frac{₹ 3}{₹ 30} + 0.07 = 0.1 + 0.07 = 0.17 = 17\%$

COST OF DEBENTURE  $= i(1-T) = 9\% \times (1 - 0.4) = 0.054$  OR 5.4%

COST OF PREFERENCE SHARE = 12% OR .12

**Computation of Weighted Average Cost of Capital (Using Market Value)**

SOURCE OF CAPITAL	MARKET VALUE OF CAPITAL (₹)	WEIGHT	COST OF CAPITAL (%)	WACC (%)
9% Debentures ( $K_d$ )	30,00,000	0.30	5.40	1.62
12% Preference Shares	10,00,000	0.10	12.00	1.2
Equity Capital	60,00,000 (30X200000)	0.60	17.00	10.20
<b>TOTAL</b>	<b>1,00,00,000</b>			<b>13.02</b>

	<b>NOTE:</b> - While using MV, reserve such as share premium and retained earnings are ignored as they incorporated in the value of equity.																																								
<b>5.</b>	<p>Kalyanam Ltd. Has an operating profit of ₹ 34,50,000 and has employed Debt which gives total Interest Charge of ₹ 7,50,000. The firm has an existing Cost of Equity and Cost of Debt as 16% and 8% respectively. The firm has a new proposal before it, which requires funds of ₹ 75 Lakhs and is expected to bring an additional profit of ₹ 14,25,000. To finance the proposal, the firm is expecting to issue an additional debt at 8% and will not be issuing any new equity shares in the market. Assume no tax culture.</p> <p>You are required to CALCULATE the Weighted Average Cost of Capital (WACC) of Kalyanam Ltd.:</p> <p><b>i)</b> Before the new Proposal <b>ii)</b> After the new Proposal</p> <p style="text-align: right;"><b>(RTP November 2021/ ICAI SM)</b></p>																																								
<b>Ans.</b>	<p>a) Value of Debt <math>= \frac{\text{Interest}}{\text{Cost of debt } (K_d)}</math></p> $= \frac{₹7,50,000}{0.08} = ₹93,75,000$ <p>b) Value of equity capital <math>= \frac{\text{Operating profit} - \text{Interest}}{\text{Cost of debt } (K_e)}</math></p> $= \frac{₹34,50,000 - ₹7,50,000}{0.16} = ₹1,68,75,000$ <p>c) New Cost of equity (<math>K_e</math>) after proposal</p> $= \frac{\text{Increased Operating profit} - \text{Interest on Increased debt}}{\text{Equity capital}}$ $= \frac{(₹34,50,000 + ₹14,25,000) - (₹7,50,000 + ₹6,00,000)}{₹1,68,75,000}$ $= \frac{₹48,75,000 - ₹13,50,000}{₹1,68,75,000} = \frac{₹35,25,000}{₹1,68,75,000} = 0.209 \text{ or } 20.9\%$ <p><b>i) Calculation of Weighted Average Cost of Capital (WACC) before the new proposal</b></p> <table border="1"> <thead> <tr> <th>Sources</th> <th>Amount (₹)</th> <th>Weight</th> <th>Cost of Capital</th> <th>WACC</th> </tr> </thead> <tbody> <tr> <td>Equity</td> <td>1,68,75,000</td> <td>0.6429</td> <td>0.160</td> <td>0.1029</td> </tr> <tr> <td>Debt</td> <td>93,75,000</td> <td>0.3571</td> <td>0.080</td> <td>0.0286</td> </tr> <tr> <td>Total</td> <td>2,62,50,000</td> <td>1</td> <td></td> <td>0.1315 or 13.15 %</td> </tr> </tbody> </table> <p><b>ii) Calculation of Weighted Average Cost of Capital (WACC) after the new proposal</b></p> <table border="1"> <thead> <tr> <th>Sources</th> <th>Amount (₹)</th> <th>Weight</th> <th>Cost of Capital</th> <th>WACC</th> </tr> </thead> <tbody> <tr> <td>Equity</td> <td>1,68,75,000</td> <td>0.5000</td> <td>0.209</td> <td>0.1045</td> </tr> <tr> <td>Debt</td> <td>1,68,75,000</td> <td>0.5000</td> <td>0.080</td> <td>0.0400</td> </tr> <tr> <td>Total</td> <td>3,37,50,000</td> <td>1</td> <td></td> <td>0.1445 or 14.45 %</td> </tr> </tbody> </table>	Sources	Amount (₹)	Weight	Cost of Capital	WACC	Equity	1,68,75,000	0.6429	0.160	0.1029	Debt	93,75,000	0.3571	0.080	0.0286	Total	2,62,50,000	1		0.1315 or 13.15 %	Sources	Amount (₹)	Weight	Cost of Capital	WACC	Equity	1,68,75,000	0.5000	0.209	0.1045	Debt	1,68,75,000	0.5000	0.080	0.0400	Total	3,37,50,000	1		0.1445 or 14.45 %
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<b>6.</b>	<p>A company issues:</p> <ul style="list-style-type: none"> <li>✓ 15% convertible debentures of ₹100 each at par with a maturity period of 6 years. On maturity, each debenture will be converted into 2 equity shares of the company. The risk-free rate of return is 10%, market risk premium is 18% and beta of the company is 1.25. The company has paid dividend of ₹12.76 per share. Five year ago, it paid dividend of ₹10 per share. Flotation cost is 5% of issue amount.</li> <li>✓ 5% preference shares of ₹100 each at premium of 10%. These shares are redeemable after 10 years at par. Flotation cost is 6% of issue amount.</li> </ul> <p>Assuming corporate tax rate is 40%.</p> <p><b>i)</b> Calculate the cost of convertible debentures using the approximation method. <b>ii)</b> Use YTM method to calculate cost of preference shares.</p> <table border="1"> <thead> <tr> <th>Year</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> <th>9</th> <th>10</th> </tr> </thead> <tbody> <tr> <td>PVIF<sub>0.03,t</sub></td> <td>0.971</td> <td>0.943</td> <td>0.915</td> <td>0.888</td> <td>0.863</td> <td>0.837</td> <td>0.813</td> <td>0.789</td> <td>0.766</td> <td>0.744</td> </tr> <tr> <td>PVIF<sub>0.05,t</sub></td> <td>0.952</td> <td>0.907</td> <td>0.864</td> <td>0.823</td> <td>0.784</td> <td>0.746</td> <td>0.711</td> <td>0.677</td> <td>0.645</td> <td>0.614</td> </tr> </tbody> </table>	Year	1	2	3	4	5	6	7	8	9	10	PVIF <sub>0.03,t</sub>	0.971	0.943	0.915	0.888	0.863	0.837	0.813	0.789	0.766	0.744	PVIF <sub>0.05,t</sub>	0.952	0.907	0.864	0.823	0.784	0.746	0.711	0.677	0.645	0.614							
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PVIFA <sub>0.03,t</sub>	0.971	1.913	2.829	3.717	4.580	5.417	6.230	7.020	7.786	8.530
PVIFA <sub>0.05,t</sub>	0.952	1.859	2.723	3.546	4.329	5.076	5.786	6.463	7.108	7.722
<b>Interest rate</b>	<b>1%</b>	<b>2%</b>	<b>3%</b>	<b>4%</b>	<b>5%</b>	<b>6%</b>	<b>7%</b>	<b>8%</b>	<b>9%</b>	
FVIF <sub>i,5</sub>	1.051	1.104	1.59	1.217	1.276	1.338	1.403	1.469	1.539	
FVIF <sub>i,6</sub>	1.062	1.126	1.194	1.265	1.340	1.419	1.501	1.587	1.677	
FVIF <sub>i,7</sub>	1.072	1.149	1.230	1.316	1.407	1.504	1.606	1.714	1.828	

**(May 2022/ICAI SM)**

**Ans. i) Calculation of Cost of Convertible Debentures:**

Given that,

$$R_F = 10\%$$

$$R_m - R_f = 18\%$$

$$B = 1.25$$

$$D_0 = 12.76$$

$$D-5 = 10$$

$$\text{Flotation Cost} = 5\%$$

Using CAPM,

$$\begin{aligned} K_e &= R_f + \beta (R_m - R_f) \\ &= 10\% + 1.25 (18\%) \\ &= 32.50\% \end{aligned}$$

**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

$$g = 5\%$$

$$\text{Price of share after 6 years} = \frac{D_7}{K_e - g} = \frac{12.76(1.05)^7}{0.325 - 0.05}$$

$$P_6 = \frac{12.76 \times 1.407}{0.275}$$

$$P_6 = 65.28$$

$$\text{Redemption Value of Debenture (RV)} = 65.28 \times 2 = 130.56 \text{ (RV)}$$

$$N_P = 95$$

$$N = 6$$

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

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

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

$$K_d = 13.24\%$$

**ii) Calculation of Cost of Preference Shares:**

$$\text{Net Proceeds} = 100 (1.1) - 6\% \text{ of } 100 (1.1)$$

$$= 110 - 6.60$$

$$= 103.40$$

$$\text{Redemption Value} = 100$$

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

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

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

$$K_p = 4.6021\%$$

7. The following details are provided are by the GPS Limited:

Equity share capital	65,00,000
12% preference share capital	12,00,000
15% Redeemable Debentures	20,00,000
10% Convertible Debentures	8,00,000

The cost of equity capital for the company is 16.30% and income tax rate for the company is 30%. You are required to calculate the weighted average cost of capital (WACC) of the company.

(May 2014/ICAI SM modified)

Ans. Computation of WACC:

**Statement Showing Weighted Cost & Cost**

Particulars	Cost	Weight	Weighted Cost
Equity Share Capital	65,00,000	16.30%	10,59,500
12% Preference Share Capital	12,00,000	12.00%	1,44,000
15% Redeemable Debentures	20,00,000	(W.N.1)	2,10,000
10% Convertible Debentures	8,00,000	10.50%	56,000
		(W.N.2)	
		7.00%	
		(W.N.3)	
Total	1,05,00,000		14,69,500

$$\begin{aligned} \text{Weighted Average Cost of Capital} &= \frac{\text{Weighted Cost}}{\text{Total Cost}} \\ &= \frac{14,69,500}{1,05,00,000} \\ &= 0.1399 \text{ or} \\ &= 13.99\% \end{aligned}$$

**Working Notes:**

1) Calculation of Cost of Preference Shares:

$$K_p = \frac{D_p}{NP} = \frac{1,44,000}{12,00,000} = 0.12 = 12\%$$

2) Calculation of Cost of 15% Redeemable Debentures:

$$K_d = \frac{l(1-t)}{NP} = \frac{3,00,000(1-0.30)}{20,00,000} = 0.105 = 10.5\%$$

3) Calculation of Cost of 10% Convertible Debentures:

$$K_d = \frac{l(1-t)}{NP} = \frac{80,000(1-0.30)}{20,00,000} = 0.07 = 7\%$$



8.	<p>A company issued 10,000, 10% debentures of ₹ 100 each at par on 1.4.20X1 to be matured on 1.4.20X11. The company wants to know the cost of its existing debt on 1.4.20X17 when the market price of the debentures is ₹ 80. COMPUTE the cost of existing debentures assuming 35% tax rate.</p> <p style="text-align: right;"><b>(May 2015 RTP/ ICAI SM modified)</b></p>
Ans.	<p>Cost of debenture (<math>K_d</math>) = <math>\frac{1(1-t) + \frac{(RV-NP)}{n}}{\frac{(RV+NP)}{2}}</math></p> <p>I = Interest on debenture = 10% of ₹100 = ₹10</p> <p>NP = Net Proceeds = ₹80</p> <p>RV = Redemption value = ₹100</p> <p>n = Period of debenture = 5 years</p> <p>t = Tax rate = 35% or 0.35</p> $K_d = \frac{₹10(1-0.35) + \frac{(₹100-₹80)}{5 \text{ years}}}{\frac{(₹100+₹80)}{2}}$ <p>Or, <math>K_d = \frac{₹10 \times 0.65 + ₹4}{₹90}</math></p> $= \frac{₹10.5}{₹90}$ $= 0.1166 \text{ or } 11.67\%$
9.	<p>ABC Company's equity share is quoted in the market at ₹25 per share currently. The company pays a dividend of ₹ 2 per share and the investors market expects a growth rate of 6% per years. You are required to:</p> <p>i) Calculate the company's cost of equity capital.</p> <p>ii) If the anticipated growth rate is 8% per annum, calculate the indicate market price per share.</p> <p>iii) If the company issues 10% debentures of face value of ₹ 100 and 19 ealizes ₹ 96 per debenture while the debentures are redeemable after years at a premium of 12%, what will be the cost of debenture? Assume tax to be 50%</p> <p style="text-align: right;"><b>(November 2016/ ICAI SM)</b></p>
Ans.	<p><b>i) Calculation of Cost of Equity Capital:</b></p> $K_e = \frac{D_0(1+g)}{P_0} + g$ $= \frac{2 \times 1.06}{25} + 0.06$ $= 0.0848 + 0.06$ $= 0.1448$ $= 14.48\%$ <p><b>ii) Calculation the indicated Market price per share:</b></p> $K_e = \frac{D_1}{P_0} + g$ $\therefore 0.14 = \frac{2}{x} + 0.08$ $\therefore 0.14 - 0.08 = \frac{2}{x}$ $\therefore x(0.06) = 2$ $\therefore x = 33.33.$ <p><b>iii) Calculation of Cost of Debenture:</b></p> $K_d = \frac{I(1-t) + \frac{(RV-NP)}{N}}{\frac{RV+NP}{2}}$ $= \frac{10(1-0.50) + \frac{(112-96)}{12}}{\frac{112+96}{2}}$ $= \frac{5+1.33}{104}$

	$= \frac{6.33}{104}$ $= 0.0608$ $= 6.08\%$
<b>10.</b>	<p>Answer the following: A company issues 25,000, 14% debentures of ₹ 1,000 each. The debentures are redeemable after the expiry period of 5 years. Tax rate application to the company is 35% (include surcharge and education cess). Calculate the cost of debt after tax if debentures are issued at 5% discount with 2% flotation cost. <b>(November 2015)</b></p>
<b>Ans.</b>	<p><b>Calculation of Cost of Debt after Tax:</b> Cost of Debt (<math>K_d</math>)</p> $= \frac{I(1+t) + \left(\frac{RV-NP}{N}\right)}{\frac{RV+NP}{2}}$ <p>Where, I = Interest payment i.e. 14% of ₹1,000 = ₹140 t = Tax rate applicable to the company i.e. 35% RV = Redeemable value of debentures i.e. ₹1,000 NP = Net proceeds per debentures = ₹1,000 × {1 - (0.05 + 0.02)} = ₹1,000 × 0.93 = ₹930 = Redemption period of debentures i.e. 5 years</p> <p>Therefore, <math>K_d = \frac{₹140(1-0.35) + \left[\frac{₹1,000-₹930}{5 \text{ Year}}\right]}{\left[\frac{₹1,000+₹930}{2}\right]} \times 100</math></p> $= \frac{₹91+₹14}{₹965} \times 100 = 10.88\%$ <p><b>The Cost of Debt can also be calculated using the formula, where first Cost of Debt before tax is calculated and then tax adjustment is made.</b> <b>Accordingly: -</b></p> <p>Cost of Debt = <math>\frac{I + \left[\frac{RV-NP}{N}\right]}{\left[\frac{RV+NP}{2}\right]} \times (1-t) \times 100</math></p> $= \frac{₹140+₹14}{₹965} (1-0.35) \times 100$ $= 10.37\%$
<b>11.</b>	<p>Answer the following: A company issued 40,000, 12% redeemable after 10 years at a premium of ₹ 10 each. The flotation cost of each share is ₹ 2. You are required to calculate cost of preference share capital ignoring dividend tax. <b>(May 2013)</b></p>
<b>Ans.</b>	<p><b>Computation of Cost of Preference Shares (<math>K_p</math>)</b></p> <p>Preference Dividend (PD) = 0.12 × 40,000 × 100 = 4,80,000</p> <p>Floataion Cost = 40,000 × 2 = ₹80,000</p> <p>Net Proceeds (NP) = 42,00,000 - 80,000 = 41,20,000</p> <p>Redemption Value (RV) = 40,000 × 110 = 44,00,000</p> <p>Cost of Redeemable Preference Shares = <math>\frac{PD + (RV-NP)/N}{\frac{RV+NP}{2}}</math></p> $K_p = \frac{4,80,000 + (44,00,000 - 41,20,000)/10}{\frac{44,00,000 + 41,20,000}{2}}$ $= \frac{4,80,000 + (2,80,000)/10}{85,20,000/2}$ $= \frac{4,80,000 + 28,000}{42,60,000} = \frac{5,08,000}{42,60,000}$ $= 0.1192$

	$K_p = 11.92\%$																												
	<b>Alternative Treatment:</b> $K_p$ may be computed alternatively by taking the RV and NP for one unit of preference shares. Final figure would remain unchanged.																												
<b>12.</b>	Answer the following: Z ltd.'s operating income (before interest and tax) is ₹ 9,00,000. The firm's cost of debts is 10 % and currently firm employs ₹ 30,00,000 of debts $K_0$ is 12% <b>Required:</b> Calculate cost of equity. <span style="float: right;"><b>(November 2007)</b></span>																												
<b>Ans.</b>	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Total Value of Firm</td> <td style="width: 50%; text-align: right;"><math>= \frac{\text{Operating Income}}{K_0}</math></td> </tr> <tr> <td></td> <td style="text-align: right;"><math>= \frac{₹9,00,000}{0.12}</math></td> </tr> <tr> <td></td> <td style="text-align: right;"><math>= 75,00,000</math></td> </tr> <tr> <td>Debt capital:</td> <td style="text-align: right;"><math>= 30,00,000</math></td> </tr> <tr> <td>Equity capital</td> <td style="text-align: right;"><math>= 45,00,000</math></td> </tr> <tr> <td colspan="2"><math>0.12 = 0.10 \left( \frac{30,00,000}{75,00,000} \right) \times K_e \left( \frac{45,00,000}{75,00,000} \right)</math></td> </tr> <tr> <td colspan="2"><math>0.12 = 0.10 (.4) + K_e (.6)</math></td> </tr> <tr> <td colspan="2"><math>0.12 = .04 + K_e .6</math></td> </tr> <tr> <td colspan="2"><math>0.08 = K_e .6</math></td> </tr> <tr> <td colspan="2"><math>K_e = \frac{.08}{.6}</math></td> </tr> <tr> <td colspan="2"><math>= 0.1333</math></td> </tr> <tr> <td colspan="2"><math>= 13.33\%</math></td> </tr> </table>					Total Value of Firm	$= \frac{\text{Operating Income}}{K_0}$		$= \frac{₹9,00,000}{0.12}$		$= 75,00,000$	Debt capital:	$= 30,00,000$	Equity capital	$= 45,00,000$	$0.12 = 0.10 \left( \frac{30,00,000}{75,00,000} \right) \times K_e \left( \frac{45,00,000}{75,00,000} \right)$		$0.12 = 0.10 (.4) + K_e (.6)$		$0.12 = .04 + K_e .6$		$0.08 = K_e .6$		$K_e = \frac{.08}{.6}$		$= 0.1333$		$= 13.33\%$	
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<b>13.</b>	Y ltd. retains ₹ 7,50,000 out of its current earning. The expected rate of return to the shareholders if they had invested the funds elsewhere is 10%. The brokerage is 3% and the shareholders came in 30% tax bracket. Calculate the cost of retained earning. <span style="float: right;"><b>(November 2009)</b></span>																												
<b>Ans.</b>	<b>Computation of Cost of Retained Earnings (<math>K_r</math>)</b> $K_r = K (1 - T_p) - \text{Brokerage}$ $K_r = 0.10 (1 - 0.30) - 0.03$ $= 0.04$ Or 4% <b>Cost of Retained Earnings = 4%</b>																												
<b>14.</b>	SK limited has obtained funds from the following sources, the specific cost are also given against them:																												
	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 33%;">Source of funds</th> <th style="width: 33%;">Amount</th> <th style="width: 33%;">cost of capital</th> </tr> </thead> <tbody> <tr> <td>Equity shares</td> <td>30,00,000</td> <td>15 percent</td> </tr> <tr> <td>Preference share</td> <td>8,00,000</td> <td>8 percent</td> </tr> <tr> <td>Retained earnings</td> <td>12,00,000</td> <td>11 percent</td> </tr> <tr> <td>Debentures</td> <td>10,00,000</td> <td>9 percent (before tax)</td> </tr> </tbody> </table>					Source of funds	Amount	cost of capital	Equity shares	30,00,000	15 percent	Preference share	8,00,000	8 percent	Retained earnings	12,00,000	11 percent	Debentures	10,00,000	9 percent (before tax)									
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	You are required to calculate weighted to calculate average cost of capital. Assume that corporate tax rate is 30 percent. <span style="float: right;"><b>(May 2010)</b></span>																												
<b>Ans.</b>	<b>Calculation of Weighted Average Cost of Capital (WACC)</b>																												
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Equity Shares	30,00,000	0.500	15	7.50
Preference Shares	8,00,000	0.133	8	1.06
Retained Earnings	12,00,000	0.200	11	2.20
Debentures	10,00,000	0.167	6.3*	1.05
<b>Total</b>	<b>60,00,000</b>			<b>11.81%</b>

Weighted Average Cost of Capital = **11.81%**  
\*Cost of Debentures ( $K_d$ ) (after tax) =  $K_d$  (before tax)  $\times$  (1 - T)  
= 9% (1 - 0.3) = 6.3%

**15.** RST Ltd. is expecting an EBIT of ₹ 4 lakh for F. Y. 20X1-X2. Presently the company is financed entirely by equity share capital of ₹ 20 lakh with equity capitalization rate of 16% The company is contemplating to redeem the part of the capital by introducing debt financing. The company has two options to raise debt to the extent of 30% or 50% of the total fund. It is expected that for debt financing upto 30%, the rate of interest will be 10% and equity capitalization rate will increase to 17%. If the company opts for 50% debt, then the interest rate will be 12% and equity capitalization rate will be 20%. You are required to compute the value of company; it's overall cost of capital under difference option and also state which is the best option. **(November 2015)**

**Ans.** **Value of the Company:**

Market Value of Equity	=	₹25,00,000
(+) Market Value of Debt	=	-
Value of Company		<u>₹25,00,000</u>

**Working Note:**

**1) Calculation of Market Value of Equity:**

$$\text{Equity Capitalisation Rate} = \frac{\text{EBIT}}{\text{Market Value}}$$

$$16\% = \frac{4,00,000}{\text{Market Value}}$$

$$\text{Market Value} = \frac{4,00,000}{0.16} = ₹25,00,000$$

**Computation of Value of the Company and Overall Cost of Capital under the two options:**

Particulars	Option I	Option II
Debt	30%	50%
Equity (existing)	₹20,00,000	₹20,00,000
Debt	₹6,00,000	₹10,00,000
Equity capitalization rate	17%	20%
Interest on Debt	10%	12%
EBIT	₹4,00,000	₹4,00,000
Less: Interest on Debt	₹60,000	₹1,20,000
Earnings to equity share holders	₹3,40,000	₹2,80,000
Market Value of equity	₹20,00,000 $(3,40,000 \times \frac{100}{17})$	₹14,00,000 $(2,80,000 \times \frac{100}{20})$
Value of Debt	₹6,00,000	₹10,00,000
Value of the company (Equity + Debt)	₹26,00,000	₹24,00,000
Overall Cost of Capital	15.38%	16.67%
	$(\frac{₹4,00,000}{₹26,00,000} \times 100)$	$(\frac{₹4,00,000}{₹24,00,000} \times 100)$

Since, in Option I value of the Company is more and overall cost of Capital is less compared to Option II, hence Option I is better.

<b>16.</b>	Five years ago, Sona Limited issued 12 per cent irredeemable debentures at ₹ 103, at ₹ 3 premium to their par value of ₹ 100. The current market price of these debentures is ₹ 94. If the company pays corporate tax at a rate of 35 per cent calculate its current cost of debenture capital? <b>(ICAI SM)</b>
<b>Ans.</b>	Cost of irredeemable debenture: $K_d = \frac{I}{NP} (1 - t)$ $K_d = \frac{₹12}{₹94} (1 - 0.35)$ $= 0.08297 \text{ or } 8.30\%$
<b>17.</b>	Institutional Development Bank (IDB) issued Zero interest deep discount bonds of face value of ₹ 1,00,000 each issued at ₹ 2,500 & repayable after 25 years. COMPUTE the cost of debt if there is no corporate tax. <b>(ICAI SM)</b>
<b>Ans.</b>	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. $FV = PV \times (1+r)^n$ $1,00,000 = 2,500 \times (1+r)^{25}$ $40 = (1+r)^{25}$ Trial 1: $r = 15\%$ , $(1.15)^{25} = 32.919$ Trial 2: $r = 16\%$ , $(1.16)^{25} = 40.874$ Here: $L = 15\%$ , $H = 16\%$ $NPV_L = 32.919 - 40 = -7.081$ $NPV_H = 40.874 - 40 = +0.874$ $IRR = L + \frac{NPV_L}{NPV_L - NPV_H} (H - L)$ $= 15\% + \frac{-7.081}{-7.081 - (0.874)} \times (16\% - 15\%) = 15.89\%$
<b>18.</b>	RBML is proposing to sell a 5-year bond of ₹ 5,000 at 8 per cent rate of interest per annum. The bond amount will be amortised equally over its life. CALCULATE the bond's present value for an investor if he expects a minimum rate of return of 6 per cent? <b>(ICAI SM)</b>
<b>Ans.</b>	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 RBML 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 = ₹1,320; Third year: ₹1,000 + ₹240 = ₹1,240; Fourth year: ₹1,000 + ₹160 = ₹1,160; and Fifth year: ₹1,000 + ₹80 = ₹1,080. The above cash flows of all five years will be discounted with the cost of capital. Here the expected rate i.e. 6% will be used. Value of the bond is calculated as follows:

	$V_B = \frac{₹1,400}{(1.06)^1} + \frac{₹1,320}{(1.06)^2} + \frac{₹1,240}{(1.06)^3} + \frac{₹1,160}{(1.06)^4} + \frac{₹1,080}{(1.06)^5}$ $= \frac{₹1,400}{1.06} + \frac{₹1,320}{1.1236} + \frac{₹1,240}{1.1910} + \frac{₹1,160}{1.2624} + \frac{₹1,080}{1.3382}$ $= ₹1,320.75 + ₹1,174.80 + ₹1,041.14 + ₹918.88 + ₹807.05 = ₹5,262.62$																																								
<b>19.</b>	If R Energy is issuing preferred stock at ₹100 per share, with a stated dividend of ₹12, and a flotation cost of 3% then, CALCULATE the cost of preference share? <b>(ICAI SM)</b>																																								
<b>Ans.</b>	$K_P = \frac{\text{Preferred stock dividend}}{\text{Market price of preferred stock (1-flotation cost)}}$ $= \frac{₹12}{₹100 (1-0.03)}$ $= \frac{₹12}{₹97} = 0.1237 \text{ or } 12.37\%$																																								
<b>20.</b>	XYZ Ltd. Issues 2,000 10% preference shares of ₹ 100 each at ₹ 95 each. The company proposes to redeem the preference shares at the end of 10 <sup>th</sup> year from the date of issue. CALCULATE the cost of preference share? <b>(ICAI SM)</b>																																								
<b>Ans.</b>	$K_P = \frac{PD + \frac{(RV-NP)}{n}}{\frac{(RV+NP)}{2}}$ $K_P = \frac{10 + \frac{(100-95)}{10}}{\frac{(100+95)}{2}}$ $= 0.1077 \text{ (approx.)} = 10.77\%$																																								
<b>21.</b>	Mr. Mehra had purchased a share of Alpha Limited for ₹1,000. He received dividend for a period of five years at the rate of 10 percent. At the end of the fifth year, he sold the share of Alpha Limited for ₹1,128. You are required to COMPUTE the cost of equity as per realised yield approach. <b>(ICAI SM)</b>																																								
<b>Ans.</b>	<p>We know that as per the realised yield approach, cost of equity is equal to the realised rate of return. Therefore, it is important to compute the internal rate of return by trial-and-error method. This realised rate of return is the discount rate which equates the present value of the dividends received in the past five years plus the present value of sale price of ₹ 1,128 to the purchase price of ₹1,000. The discount rate which equalises these two is 12 percent approximately. Let us look at the table given for a better understanding:</p> <table border="1"> <thead> <tr> <th>Year</th> <th>Dividend(₹)</th> <th>Sale Proceeds(₹)</th> <th>Discount Factor @12%</th> <th>Present Value (₹)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>100</td> <td>-</td> <td>0.893</td> <td>89.3</td> </tr> <tr> <td>2</td> <td>100</td> <td>-</td> <td>0.797</td> <td>79.7</td> </tr> <tr> <td>3</td> <td>100</td> <td>-</td> <td>0.712</td> <td>71.2</td> </tr> <tr> <td>4</td> <td>100</td> <td>-</td> <td>0.636</td> <td>63.6</td> </tr> <tr> <td>5</td> <td>100</td> <td>-</td> <td>0.567</td> <td>56.7</td> </tr> <tr> <td>6</td> <td>Beginning</td> <td>1,128</td> <td>0.567</td> <td>639.576</td> </tr> <tr> <td colspan="4"></td> <td>1,000.076</td> </tr> </tbody> </table> <p>We find that the purchase price of Alpha limited's share was ₹ 1,000 and the present value of the past five years of dividends plus the present value of the sale price at the discount rate of 12 per cent is ₹1,000.076. Therefore, the realised rate of return may be taken as 12 percent. This 12 percent is the cost of equity.</p>	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	6	Beginning	1,128	0.567	639.576					1,000.076
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<b>22.</b>	CALCULATE the cost of equity from the following data using realized yield approach:																																								
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<b>Ans.</b>	<p>In this question we will first calculate yield for last 4 years and then calculate it geometric mean as follows:</p> $1 + Y_1 = \frac{D_1 + P_1}{P_0} = \frac{1 + 9.75}{9} = 1.1944$																																								

	$1 + Y_2 = \frac{D_2 + P_2}{P_1} = \frac{1 + 11.50}{9.75} = 1.2821$ $1 + Y_3 = \frac{D_3 + P_3}{P_2} = \frac{1.2 + 11}{11.5} = 1.0609$ $1 + Y_4 = \frac{D_4 + P_4}{P_3} = \frac{1.25 + 10.60}{11} = 1.0772$ <p>Geometric mean:</p> $K_e = [(1 + Y_1) \times (1 + Y_2) \times \dots \times (1 + Y_n)]^{1/n - 1}$ $K_e = [1.1944 \times 1.2821 \times 1.0609 \times 1.0772]^{1/4 - 1} = 0.15 = 15\%$ <p>Note: to calculate power <math>\frac{1}{4}</math> simply press square root switch, two times on your calculator.</p>
<b>23.</b>	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%. <b>(ICAI SM)</b>
<b>Ans.</b>	$K_e = R_f + \beta (R_m - R_f)$ $K_e = 0.10 + 1.75 (0.15 - 0.10)$ $= 0.10 + 1.75 (0.05) = 0.1875 \text{ or } 18.75\%$
<b>24.</b>	Face value of equity shares of a company is ₹ 10, while current market price is ₹ 200 per share. Company is going to start a new project and is planning to finance it partially by new issue and partially by retained earnings. You are required to CALCULATE cost of equity shares as well as cost of retained earnings if issue price will be ₹ 190 per share and floatation cost will be ₹ 5 per share. Dividend at the end of first year is expected to be ₹ 10 and growth rate will be 5%. <b>(ICAI SM)</b>
<b>Ans.</b>	$K_r = \frac{D_1}{P_0} + g$ $= \frac{10}{200} + .05 = 10\%$ $K_e = \frac{D_1}{P_0} + g$ $= \frac{10}{190 - 5} + .05 = 10.41\%$ <p>NOW 10% TAX WILL IMPOSED ON EQUITY SHAREHOLDER U/S 194N FOR THE SAME YOU CAN USE BOTH FORMULA FOR SAFETY</p> $K_r = k_e(1 - t_p) (1 - f)$
<b>25.</b>	ABC Company provides the following details: $D_0 = ₹4.19$ $P_0 = ₹50$ $g = 5\%$ CALCULATE the cost of retained earnings. <b>(ICAI SM)</b>
<b>Ans.</b>	$K_r = \frac{D_1}{P_0} + g = \frac{D_0(1+g)}{P_0} + g$ $= \frac{₹4.19(1+0.05)}{50} + 0.05$ $= 0.088 + 0.05 = 13.8\%$
<b>26.</b>	ABC Company provides the following details: $R_f = 7\%$ $\beta = 1.20$ $R_m - R_f = 6\%$ CALCULATE the cost of retained earnings based on CAPM method. <b>(ICAI SM)</b>
<b>Ans.</b>	$K_r = R_f + \beta (R_m - R_f)$ $= 7\% + 1.20 (6\%) = 7\% + 7.20$ $K_r = 14.2\%$
<b>27.</b>	Cost of equity of a company is 10.41% while cost of retained earnings is 10%. There are 50,000 equity shares of ₹10 each and retained earnings of ₹15,00,000. Market price per equity share is ₹50. Calculate WACC using market value weights if there are no other sources of finance. <b>(ICAI SM)</b>
<b>Ans.</b>	Book value of paid-up equity capital = ₹5,00,000 Book value of retained earnings = ₹15,00,000 Ratio of Paid-up equity capital & retained earnings = 5,00,000:15,00,000 = 1:3

<p>Market value of paid equity capital &amp; retained earnings = ₹ 50,000 × ₹ 50 = ₹25,00,000          Market value of paid-up equity capital = ₹25,00,000 × ¼ = ₹6,25,000          Market value of retained earnings = ₹25,00,000 × ¾ = ₹18,75,000</p> <p><b>Calculation of WACC using market value weights</b></p> <table border="1"> <thead> <tr> <th>Source of capital</th> <th>Market Value (₹)</th> <th>Weights (a)</th> <th>Cost of capital (b)</th> <th>WACC (K<sub>0</sub>) (c) = (a) × (b)</th> </tr> </thead> <tbody> <tr> <td>Equity shares</td> <td>6,25,000</td> <td>0.25</td> <td>0.1041</td> <td>0.0260</td> </tr> <tr> <td>Retained earnings</td> <td>18,75,000</td> <td>0.75</td> <td>0.1000</td> <td>0.0750</td> </tr> <tr> <td></td> <td>25,00,000</td> <td>1.000</td> <td></td> <td>0.1010</td> </tr> </tbody> </table> <p>WACC (K<sub>0</sub>) = 0.1010 or 10.10%.</p>					Source of capital	Market Value (₹)	Weights (a)	Cost of capital (b)	WACC (K <sub>0</sub> ) (c) = (a) × (b)	Equity shares	6,25,000	0.25	0.1041	0.0260	Retained earnings	18,75,000	0.75	0.1000	0.0750		25,00,000	1.000		0.1010																		
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28.	<p>Gamma Limited has in issue 5,00,000 ₹ 1 ordinary shares whose current ex- dividend market price is ₹ 1.50 per share. The company has just paid a dividend of 27 paise per share, and dividends are expected to continue at this level for some time. If the company has no debt capital, COMPUTE the weighted average cost of capital? <b>(ICAI SM)</b></p>																																									
Ans.	<p>Market value of equity, E = 5,00,000 shares × ₹1.50 = ₹7,50,000          Market value of debt, D = Nil          Cost of equity capital, <math>K_e = \frac{D_1}{P_0} \times 100 = \frac{₹0.27}{₹1.50} \times 100 = 0.18</math>          Since there is no debt capital, WACC = <math>K_e = 18</math> per cent.</p>																																									
29.	<p>ABC Company's equity share is quoted in the market at ₹ 25 per share currently. The company pays a dividend of ₹ 2 per share and the investor's market expects a growth rate of 6% per year. You are required to:</p> <p>i) CALCULATE the company's cost of equity capital.          ii) If the company issues 10% debentures of face value of ₹ 100 each and realises ₹ 96 per debenture while the debentures are redeemable after 12 years at a premium of 12%, CALCULATE cost of debenture Using YTM?          Assume Tax Rate to be 50%. <b>(ICAI SM)</b></p>																																									
Ans.	<p><b>i) Cost of Equity Capital (K<sub>e</sub>)</b>  <math display="block">K_e = \frac{\text{Expected dividend per share } (D_1)}{\text{Market price per share } (P_0)}</math> <math display="block">= \frac{₹2 \times 1.06}{25} + 0.06 = 0.1448 \text{ or } 14.48\%</math></p> <p><b>ii) Cost of Debenture (K<sub>d</sub>):</b>          Using Present Value method or (YTM)</p> <p><b>Identification of relevant cash flows</b></p> <table border="1"> <thead> <tr> <th>Year</th> <th>Cash flows</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Current market price (P<sub>0</sub>) = ₹96</td> </tr> <tr> <td>1 to 12</td> <td>Interest net of tax [I(1-t)] = 10% of ₹100 (1 - 0.5) = ₹5</td> </tr> <tr> <td>12</td> <td>Redemption value (RV) = ₹100 (1.12) = ₹112</td> </tr> </tbody> </table> <p><b>Calculation of Net Present Values (NPV) at two discount rates</b></p> <table border="1"> <thead> <tr> <th>Year</th> <th>Cash flows</th> <th>Discount factor @ 5%(L)</th> <th>Present Value</th> <th>Discount factor @10% (H)</th> <th>Present Value</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>(96)</td> <td>1.000</td> <td>(96.00)</td> <td>1.000</td> <td>(96.00)</td> </tr> <tr> <td>1 to 12</td> <td>5</td> <td>8.863</td> <td>44.32</td> <td>6.814</td> <td>34.07</td> </tr> <tr> <td>12</td> <td>112</td> <td>0.557</td> <td>62.38</td> <td>0.319</td> <td>35.73</td> </tr> <tr> <td>NPV</td> <td></td> <td></td> <td>+10.7</td> <td></td> <td>-26.2</td> </tr> </tbody> </table>				Year	Cash flows	0	Current market price (P <sub>0</sub> ) = ₹96	1 to 12	Interest net of tax [I(1-t)] = 10% of ₹100 (1 - 0.5) = ₹5	12	Redemption value (RV) = ₹100 (1.12) = ₹112	Year	Cash flows	Discount factor @ 5%(L)	Present Value	Discount factor @10% (H)	Present Value	0	(96)	1.000	(96.00)	1.000	(96.00)	1 to 12	5	8.863	44.32	6.814	34.07	12	112	0.557	62.38	0.319	35.73	NPV			+10.7		-26.2
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	<p><b>Calculation of IRR</b></p> $IRR = L + \frac{NPV_L}{NPV_L - NPV_H} (H - L)$ $= 5\% \frac{10.7}{10.7 - (-26.2)} (10\% - 5\%) = 5\% + \frac{53.5}{36.9} = 6.45\%$ <p>Therefore, <math>K_d = 6.45\%</math></p>																																								
30.	<p>DETERMINE the cost of capital of Best Luck Limited using the book value(BV) and market value (MV) weights from the following information:</p> <table border="1"> <thead> <tr> <th>Sources</th> <th>Book Value (₹)</th> <th>Market Value (₹)</th> </tr> </thead> <tbody> <tr> <td>Equity shares</td> <td>1,20,00,000</td> <td>2,00,00,000</td> </tr> <tr> <td>Retained earnings</td> <td>30,00,000</td> <td>—</td> </tr> <tr> <td>Preference shares</td> <td>36,00,000</td> <td>33,75,000</td> </tr> <tr> <td>Debentures</td> <td>9,00,000</td> <td>10,40,000</td> </tr> </tbody> </table> <p><b>Additional information:</b></p> <ol style="list-style-type: none"> <li>Equity: Equity shares are quoted at ₹130 per share and a new issue priced at ₹125 per share will be fully subscribed; flotation costs will be ₹5 per share.</li> <li>Dividend: During the previous 5 years, dividends have steadily increased from ₹ 10.60 to ₹ 14.19 per share. Dividend at the end of the current year is expected to be ₹15 per share.</li> <li>Preference shares: 15% Preference shares with face value of ₹100 would realise ₹105 per share.</li> <li>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%.</li> <li>Tax: Corporate tax rate is 35%. Ignore dividend tax. Floatation cost would be calculated on face value.</li> </ol> <p style="text-align: right;"><b>(ICAI SM)</b></p>	Sources	Book Value (₹)	Market Value (₹)	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																									
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Ans.	<p>1) Cost of Equity (<math>K_e</math>) = <math>\frac{D_1}{P_0} + g = \frac{₹15}{₹125 - ₹5} + 0.06</math> (refer to working Note)</p> <p>Market price of debentures (approximation method) = ₹15 ÷ 0.16 = ₹93.75</p> <p>Market value (P<sub>0</sub>) of debentures can also be found out using the present value method:  <math>P_0 = \text{Annual Interest} \times \text{PVIFA} (16\%, 11 \text{ years}) + \text{Redemption value} \times \text{PVIF}(16\%, 11 \text{ years})</math>  <math>P_0 = ₹15 \times 5.029 + ₹100 \times 0.195</math>  <math>P_0 = ₹75.435 + ₹19.5 = ₹94.935</math>  Net Proceeds = ₹94.935 - 2% of ₹100 = ₹92.935  Accordingly, the cost of debt can be calculated</p> <p><b>Cost of capital</b> <span style="float: right;"><b>(Amount in lakh of rupees)</b></span>  [BV weights and MV weights]</p> <table border="1"> <thead> <tr> <th rowspan="2">Source of capital</th> <th colspan="2">Weights</th> <th rowspan="2">Specific Cost (K)</th> <th colspan="2">Total cost</th> </tr> <tr> <th>BV</th> <th>MV</th> <th>(BV × K)</th> <th>(MV × K)</th> </tr> </thead> <tbody> <tr> <td>Equity Shares</td> <td>120</td> <td>160*</td> <td>0.1850</td> <td>22.2</td> <td>29.6</td> </tr> <tr> <td>Retained Earnings</td> <td>30</td> <td>40*</td> <td>0.1800</td> <td>5.4</td> <td>7.2</td> </tr> <tr> <td>Preference Shares</td> <td>36</td> <td>33.75</td> <td>0.1429</td> <td>5.14</td> <td>4.82</td> </tr> <tr> <td>Debentures</td> <td>9</td> <td>10.4</td> <td>0.1095</td> <td>0.986</td> <td>1.139</td> </tr> <tr> <td>Total</td> <td>195</td> <td>244.15</td> <td></td> <td>33.73</td> <td>42.76</td> </tr> </tbody> </table> <p>*Market Value of equity has been apportioned in the ratio of Book Value of equity and retained earnings</p> <p>Weighted Average Cost of Capital (WACC):</p>	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
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	<p>Using Book Value = <math>\frac{₹33.73}{₹195} = 0.1729</math> or 17.29%</p> <p>Using Market Value = <math>\frac{₹42.76}{₹244.15} = 0.1751</math> or 17.51%</p> <p><b>Working Note: Calculation of 'g'</b></p> <p><math>₹10.6 (1 + g)^5 = ₹14.19</math> Or, <math>(1 + g)^5 = \frac{14.19}{10.6} = 1.338</math></p> <p>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.</p> <p>2) Cost of Retained Earnings (<math>K_r</math>) = <math>\frac{D_1}{P_0} + g = \frac{₹15}{₹125} + 0.06 = 0.18</math></p> <p>3) Cost of Preference Shares (<math>K_p</math>) = <math>\frac{PD}{P_0} = \frac{₹15}{₹105} = 0.1429</math></p> <p>4) Cost of Debenture (<math>K_d</math>) = <math>K_p = \frac{I(1-t) + \frac{(RV-NP)}{n}}{\frac{(RV+NP)}{2}}</math></p> $= \frac{₹15(1-0.35) + \frac{(₹100-₹91.75^*)}{11 \text{ years}}}{\frac{(₹100+₹91.75^*)}{2}}$ $= \frac{₹15 \times 0.65 + ₹0.75}{₹95.875} = \frac{₹10.5}{₹95.875} = 0.1095$ <p>*Since yield on similar type of debentures is 16 per cent, the company would be required to offer debentures at discount.</p>																									
31.	<p>PK Ltd. Has the following book-value capital structure as on March 31, 20X1.</p> <table border="1" data-bbox="288 902 1441 1099"> <thead> <tr> <th></th> <th style="text-align: right;">(₹)</th> </tr> </thead> <tbody> <tr> <td>Equity share capital (10,00,000 shares)</td> <td style="text-align: right;">2,00,00,000</td> </tr> <tr> <td>11.5% Preference shares</td> <td style="text-align: right;">60,00,000</td> </tr> <tr> <td>10% Debentures</td> <td style="text-align: right;">1,00,00,000</td> </tr> <tr> <td></td> <td style="text-align: right;">3,60,00,000</td> </tr> </tbody> </table> <p>The equity shares of the company are sold for ₹ 200. It is expected that the company will pay next year a dividend of ₹ 10 per equity share, which is expected to grow by 5% p.a. forever. Assume a 35% corporate tax rate.</p> <p>Required:</p> <p>i) COMPUTE weighted average cost of capital (WACC) of the company based on the existing capital structure.</p> <p>ii) COMPUTE the new WACC, if the company raises an additional ₹50 lakhs debt by issuing 12% debentures. This would result in increasing the expected equity dividend to ₹12.40 and leave the growth rate unchanged, but the price of equity share will fall to ₹ 160 per share.</p> <p style="text-align: right;"><b>(RTP May 2020)</b></p>		(₹)	Equity share capital (10,00,000 shares)	2,00,00,000	11.5% Preference shares	60,00,000	10% Debentures	1,00,00,000		3,60,00,000															
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**Working Note (W. N.):****1) Cost of equity capital:**

$$K_e = \frac{\text{Expected Dividend } (D_1)}{\text{Current Market Price per Share } (P_0)} + \text{Growth } (g)$$

$$= \frac{₹10}{₹200} + 0.05 = 10\%$$

**2) Cost of Debenture:**

$$= \frac{I(1-t)}{NP} = \frac{₹10,00,000(1-0.35)}{₹1,00,00,000} = 0.065 \text{ or } 6.5\%$$

**ii) Computation of Weighted Average Cost of Capital based on new capital structure**

Source of Capital	New Capital structure (₹)	Weights (b)	After tax cost of capital (%) (a)	WACC (%) (a) × (b)
Equity share capital (W.N. 3)	2,00,00,000	0.488	12.75	6.22
Preference share	60,00,000	0.146	11.50	1.68
10% Debentures (W.N. 2)	1,00,00,000	0.244	6.50	1.59
12% Debentures (W.N.4)	50,00,000	0.122	7.80	0.95
	4,10,00,000	1.00		10.44

**Working Note (W. N.):****3) Cost of equity capital:**

$$K_e = \frac{\text{Expected Dividend } (D_1)}{\text{Current Market Price per Share } (P_0)} + \text{Growth } (g)$$

$$= \frac{₹12.4}{₹160} + 0.05 = 0.1275 \text{ or } 12.75\%$$

**4) Cost of Debenture:**

$$= \frac{₹6,00,000(1-0.35)}{₹50,00,000} = 0.078 \text{ or } 7.8\%$$

$$K_d = \frac{₹2,40,000(1-0.35)}{₹20,00,000} = 0.078 \text{ or } 7.8\%$$

32. The information relating to book value (BV) and market value (MV) weights of Ex Limited is given below:

Sources	Book Value (₹)	Market Value (₹)
Equity shares	2,40,00,000	4,00,00,000
Retained earnings	60,00,000	-
Preference shares	72,00,000	67,50,000
Debentures	18,00,000	20,80,000

**Additional information:**

- Equity shares are quoted at ₹130 per share and a new issue priced at ₹125 per share will be fully subscribed; flotation costs will be ₹5 per share on face value.
- During the previous 5 years, dividends have steadily increased from ₹10 to ₹16.105 per share. Dividend at the end of the current year is expected to be ₹17.716 per share.
- 15% Preference shares with face value of ₹100 would realise ₹105 per share.
- 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% on face value.
- Corporate tax rate is 30%.

You are required to DETERMINE the weighted average cost of capital of Ex Limited using both the weights. **(May 2022 RTP)**

**Ans.** 1) Cost of Equity ( $K_e$ ) =  $\frac{D_1}{P_0 - F} + g = \frac{₹17.716}{₹125 - ₹5} + 0.10 *$

$$K_e = 0.2476$$

\* Calculation of g:

$$₹10(1 + g)^5 = ₹16.105$$

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

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.

$$2) \text{ Cost of Retained Earnings } (K_f) = \frac{D_1}{P_0} + g = \frac{₹17.716}{₹130} + 0.10 = 0.2363$$

$$3) \text{ Cost of Preference Shares } (K_p) = \frac{PD}{P_0} = \frac{₹15}{₹105} = 0.1429$$

$$4) \text{ Cost of Debentures } (K_d) = \frac{l(1-t) + \left(\frac{RV-NP}{n}\right)}{\frac{RV+NP}{2}}$$

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

$$= \frac{₹15 \times 0.70 + ₹0.75}{₹95.875} = \frac{₹11.75}{₹95.875} = 0.1173$$

\*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)

$$= ₹ 15 \div 0.16 = ₹ 93.75$$

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

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

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

$$P_0 = ₹ 15 \times 5.0287 + ₹ 100 \times 0.1954$$

$$P_0 = ₹ 75.4305 + ₹ 19.54 = ₹ 94.9705$$

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 $\times$ K)	(MV $\times$ K)
Equity Shares	240	320**	0.2476	59.4240	79.2320
Retained Earnings	60	80**	0.2363	14.1780	18.9040
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		86.0022	110.2216

\*\*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):

$$\text{Using Book Value} = \frac{₹86,0022}{₹390} = 0.2205 \text{ or } 22.05\%$$

$$\text{Using Market Value} = \frac{₹110,2216}{₹488,30} = 0.2257 \text{ or } 22.57\%$$

33. Kalyanam Ltd. has an operating profit of ₹34,50,000 and has employed Debt which gives total Interest Charge of ₹7,50,000. The firm has an existing Cost of Equity and Cost of Debt as 16% and 8% respectively. The firm has a new proposal before it, which requires funds of ₹75 Lakhs and is expected to bring an additional profit of ₹14,25,000. To finance the proposal, the firm is expecting to issue an additional debt at 8% and will not be issuing any new equity shares in the market. Assume no tax culture.

You are required to CALCULATE the Weighted Average Cost of Capital (WACC) of Kalyanam Ltd.:

- 1) Before the new Proposal
- 2) After the new Proposal

(Nov. 2021 RTP)

Ans. a) Value of Debt =  $\frac{\text{Interest}}{\text{Cost of debt } (K_e)}$

	$= \frac{₹7,50,000}{0.08} = ₹93,75,000$ <p><b>b) Value of equity capital</b> = <math>\frac{\text{Operating profit} - \text{Interest}}{\text{Cost of equity } (K_e)}</math></p> $= \frac{₹34,50,000 - ₹7,50,000}{0.16} = ₹1,68,75,000$ <p><b>c) New Cost of equity (<math>K_e</math>) after proposal</b></p> $= \frac{\text{Increased Operating profit} - \text{Interest on Increased deb}}{\text{Equity capital}}$ $= \frac{₹48,75,000 - ₹13,50,000}{₹1,68,75,000} = \frac{₹35,25,000}{₹1,68,75,000} = 0.209 \text{ or } 20.9\%$ <p><b>i) Calculation of Weighted Average Cost of Capital (WACC) before the new proposal</b></p> <table border="1"> <thead> <tr> <th>Sources</th> <th>Amount (₹)</th> <th>Weight</th> <th>Cost of Capital</th> <th>WACC</th> </tr> </thead> <tbody> <tr> <td>Equity</td> <td>1,68,75,000</td> <td>0.6429</td> <td>0.160</td> <td>0.1029</td> </tr> <tr> <td>Debt</td> <td>93,75,000</td> <td>0.3571</td> <td>0.080</td> <td>0.0286</td> </tr> <tr> <td>Total</td> <td>2,62,50,000</td> <td>1</td> <td></td> <td><b>0.1315 or 13.15 %</b></td> </tr> </tbody> </table> <p><b>ii) Calculation of Weighted Average Cost of Capital (WACC) after the new proposal</b></p> <table border="1"> <thead> <tr> <th>Sources</th> <th>Amount (₹)</th> <th>Weight</th> <th>Cost of Capital</th> <th>WACC</th> </tr> </thead> <tbody> <tr> <td>Equity</td> <td>1,68,75,000</td> <td>0.5000</td> <td>0.209</td> <td>0.1045</td> </tr> <tr> <td>Debt</td> <td>1,68,75,000</td> <td>0.5000</td> <td>0.080</td> <td>0.0400</td> </tr> <tr> <td>Total</td> <td>3,37,50,000</td> <td>1</td> <td></td> <td><b>0.1445 or 14.45 %</b></td> </tr> </tbody> </table>	Sources	Amount (₹)	Weight	Cost of Capital	WACC	Equity	1,68,75,000	0.6429	0.160	0.1029	Debt	93,75,000	0.3571	0.080	0.0286	Total	2,62,50,000	1		<b>0.1315 or 13.15 %</b>	Sources	Amount (₹)	Weight	Cost of Capital	WACC	Equity	1,68,75,000	0.5000	0.209	0.1045	Debt	1,68,75,000	0.5000	0.080	0.0400	Total	3,37,50,000	1		<b>0.1445 or 14.45 %</b>
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<b>34.</b>	<p>A company has paid dividend of ₹1 per share (of face value of ₹10 each) last year and it is expected to grow @ 10% every year. CALCULATE the cost of equity if the market price of share is ₹55.</p> <p style="text-align: right;"><b>(ICAI SM)</b></p>																																								
<b>Ans.</b>	$K_e = \frac{D_1}{P_0} + g = \frac{₹1(1+0.1)}{₹55} + 0.1 = 0.12 \text{ or } 12\%$																																								
<b>35.</b>	<p><b>Answer the following:</b></p> <p>The Capital structure of a Company is given below:</p> <table border="1"> <thead> <tr> <th>Source of capital</th> <th>Book Value (₹)</th> </tr> </thead> <tbody> <tr> <td>Equity shares @ ₹100 each</td> <td>24,00,000</td> </tr> <tr> <td>9% Cumulative preference shares @ ₹100 each</td> <td>4,00,000</td> </tr> <tr> <td>11% Debentures</td> <td>12,00,000</td> </tr> <tr> <td></td> <td>40,00,000</td> </tr> </tbody> </table> <p>The company had paid equity dividend @ 25% for the last year which is likely to grow @ 5% every year. The current market price of the company is equity share is ₹200.</p> <p>Considering corporate tax @30%, you are required to CALCULATE:</p> <p><b>i) Cost of capital for each source of capital</b></p> <p><b>ii) Weighted average cost of capital.</b></p> <p style="text-align: right;"><b>(Sept. 2022 MTP)</b></p>	Source of capital	Book Value (₹)	Equity shares @ ₹100 each	24,00,000	9% Cumulative preference shares @ ₹100 each	4,00,000	11% Debentures	12,00,000		40,00,000																														
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<b>Ans.</b>	<p><b>i) Calculation of Cost of Capital for each source of capital:</b></p> <p><b>a) Cost of Equity share capital:</b></p> $K_e = \frac{D_0(1+g)}{\text{Market Price per Share } (P_0)} + g = \frac{25\% \times ₹100(1+0.05)}{₹200} + 0.05$ $= \frac{₹26.25}{₹200} + 0.05 = 0.18125 \text{ or } \mathbf{18.125\%}$ <p><b>b) Cost of Preference share capital (<math>K_p</math>) = 9%</b></p> <p><b>c) Cost of Debentures (<math>K_d</math>) = <math>r(1-t)</math></b></p> $= 11\%(1 - 0.3) = \mathbf{7.7\%}$																																								

ii) Weighted Average Cost of Capital				
Source	Amount (₹)	Weights (a)	After tax Cost of Capital (%) (b)	WACC (%) (c) = (a) × (b)
Equity share	24,00,000	0.60	18.125	10.875
9% Preference share	4,00,000	0.10	9.000	0.900
11% Debentures	12,00,000	0.30	7.700	2.310
	40,00,000	1.00		<b>14.085</b>

**36.** ABC Limited has the following book value capital structure.

Equity Share Capital (1 crore shares @ ₹10 each)	₹1,000 lakh
Reserves Surplus	₹2,250 lakh
9% Preference Share Capital (5 lakh shares @ ₹100 each)	₹500 lakh
8.5% Debenture (1.5 lakh debentures @ ₹1,000 each)	₹1,500 lakh
12% Term Loans from Financial Institutions	₹500 lakh

- ✓ The debentures of ABC Limited are redeemable at par after five years and are quoting at ₹985 per debenture
- ✓ The current market price per equity share is ₹60. The prevailing default-risk free interest rate on 10 year GOI Treasury Bonds is 5.5%. The average market risk premium is 7%. The beta of the company is 1.85
- ✓ The preference shares of the company are redeemable at 10% premium after 5 years is currently selling at ₹102 per share.

The applicable income tax rate for the company is 35%

**Required:**  
CALCULATE weighted average cost of capital of the company using market value weights.  
**(May 2020 MTP)**

**Ans.** **Working Notes:**

**1) Computation of cost of debentures ( $K_d$ ):**

$$K_d = \frac{\text{₹}85(1-0.35) + \frac{(1,000-985)}{5}}{\frac{(1,000+985)}{2}} = \frac{55.25+3}{992.5} = 0.0586 \text{ or } 5.86\%$$

**2) Computation of cost of term loans ( $K_T$ ):**

$$= (1 - t)$$

$$= 0.12(1 - 0.35) = 0.078 \text{ or } 7.8\%$$

**3) Computation of cost of preference capital ( $K_P$ ):**

$$K_P = \frac{\text{Preference Dividend} + (RV - NP)/n}{(RV + NP)/2}$$

$$= \frac{\text{₹}9 + \frac{(110-102)}{5}}{\frac{(110+102)}{2}} = \frac{9+1.6}{106} = 0.1 \text{ or } 10\%$$

**4) Computation of cost of equity ( $K_e$ ):**

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

Or, = Risk free rate + (Beta × Risk Premium)

$$= 0.055 + (1.85 \times 0.07) = 0.1845 \text{ or } 18.45\%$$

**Calculation of Weighted Average cost of capital Using market value weights**

Source of Capital	Market value of capital structure (₹ in lakh)	Weights	After tax cost of capital (%)	WACC (%)
Equity share capital (1 crore shares × ₹ 60)	6,000	0.71	18.45	13.09

9% Preference share capital (5 lakh shares × ₹102)	510	0.06	10.00	0.60
8.5 % Debentures (1.5 lakh × ₹985)	1,477.5	0.17	5.86	0.99
12% Term loans	500	0.06	7.80	0.47
	8,487.50	1.000		15.15

- 37.** Annova Ltd is considering raising of funds of about ₹250 lakhs by any of two alternative methods, viz, 14% institutional term loan and 13% non-convertible debentures. The term loan option would attract no major incidental cost and can be ignored. The debentures would have to be issued at a discount of 2.5% and would involve cost of issue of 2% on face value. ADVISE the company as to the better option based on the effective cost of capital in each case. Assume a tax rate of 50%.

(May 2019 MTP)

**Ans.****Calculation of Effective Cost of Capital**

Particulars	Option 1 14% institutional Term loan (₹ in Lakhs)	Option 2 13% Non- convertible Debentures (₹ in lakhs)
A) Effective capital to be raised Face value	250.00	250.00
Less: Discount	Nil	(6.25)
	250.00	243.75
Less: Cost of issue	Nil	5.00
Effective amount of capital	250.00	238.75
B) Annual interest charges on face value of ₹ 250 lakhs	35.0	32.50
Less: Tax benefit on interest @ 50%	17.5	16.25
	17.5	16.25
C) Effective cost of capital after tax	B x 100 A = 7.0%	16.25 x 100 238.75 = 6.81% (approx)

So, the better option is raising of funds of ₹250 lakhs by issue of 13% Non-convertible Debenture

- 38.** Bounce Ltd. evaluates all its capital projects using discounting rate of 15%, 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 1.5 times that of debenture, remaining tenure of debenture and bank loan is 3 years and 5 years respectively. Book value of equity share capital, retained earnings and bank loan is ₹10,00,000, ₹15,00,000 and ₹10,00,000 respectively. Debentures which are having book value of ₹15,00,000 are currently trading at ₹97 per debenture. The ongoing P/E multiple for the shares of the company stands at 5. You are required to CALCULATE the rate interest on bank loan and debentures if tax rate applicable is 25%.

(Nov. 2022 RTP)

**Ans.**

Let the rate of Interest on debenture be x

∴ Rate of Interest on loan = 1.5x

$$\therefore K_d \text{ on debentures} = \frac{\text{Int} (1-t) + \frac{RV-NP}{n}}{\frac{RV+NP}{2}}$$

	$= \frac{100 \times (1 - 0.25) + \frac{100 - 97}{3}}{\frac{100 + 97}{2}}$ $= \frac{75x + 1}{98.5}$ <p><math>\therefore K_d</math> on bank loan = <math>1.5x (1 - 0.25) = 1.125x</math></p> $K_e = \frac{EPS}{MPS} = \frac{1}{MPS/EPS} = \frac{1}{P/E} = \frac{1}{5} = 0.2$ $K_Y = K_e = 0.2$ <p style="text-align: center;"><b>Computation of WACC</b></p> <table border="1"> <thead> <tr> <th>Capital</th> <th>Amount (₹)</th> <th>Weights</th> <th>Cost</th> <th>Product</th> </tr> </thead> <tbody> <tr> <td>Equity</td> <td>10,00,000</td> <td>0.2</td> <td>0.2</td> <td>0.04</td> </tr> <tr> <td>Reserves</td> <td>15,00,000</td> <td>0.3</td> <td>0.2</td> <td>0.06</td> </tr> <tr> <td>Debentures</td> <td>15,00,000</td> <td>0.3</td> <td><math>(75x+1)/98.5</math></td> <td><math>(22.5x + 0.3)/98.5</math></td> </tr> <tr> <td>Bank Loan</td> <td>10,00,000</td> <td>0.2</td> <td>1.125x</td> <td>0.225x</td> </tr> <tr> <td></td> <td>50,00,000</td> <td>1</td> <td></td> <td><math>\frac{0.1 + 0.225x + 22.5x + 0.3}{98.5}</math></td> </tr> </tbody> </table> <p>WACC = 15%</p> $\therefore 10.1 + 0.225x + \frac{22.5x}{98.5} + \frac{0.3}{98.5} = 0.15$ $\therefore 9.85 + 22.1625x + 22.5x + 0.3 = (0.15) (98.5)$ $\therefore 44.6625x = 14.775 - 9.85 - 0.3$ $\therefore 44.6625x = 4.625$ $\therefore x = \frac{4.625}{44.6625}$ $\therefore x = 10.36\%$ <p><math>\therefore</math> Rate of interest on debentures = <math>x = 10.36\%</math></p> <p>Rate of interest on Bank loan = <math>1.5x = (1.5) (10.36\%) = 15.54\%</math>.</p>	Capital	Amount (₹)	Weights	Cost	Product	Equity	10,00,000	0.2	0.2	0.04	Reserves	15,00,000	0.3	0.2	0.06	Debentures	15,00,000	0.3	$(75x+1)/98.5$	$(22.5x + 0.3)/98.5$	Bank Loan	10,00,000	0.2	1.125x	0.225x		50,00,000	1		$\frac{0.1 + 0.225x + 22.5x + 0.3}{98.5}$
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39.	<p>The following is the extract of the Balance Sheet of M/s KD Ltd.:</p> <table border="1"> <thead> <tr> <th>Particulars</th> <th>Amount (₹)</th> </tr> </thead> <tbody> <tr> <td>Ordinary shares (Face value ₹10/- per share)</td> <td>5,00,000</td> </tr> <tr> <td>Share Premium</td> <td>1,00,000</td> </tr> <tr> <td>Retained Profits</td> <td>6,00,000</td> </tr> <tr> <td>8% Preference Shares (Face Value ₹25/- per share)</td> <td>4,00,000</td> </tr> <tr> <td>12% Debentures (Face value ₹100/- each)</td> <td>6,00,000</td> </tr> <tr> <td></td> <td><b>22,00,000</b></td> </tr> </tbody> </table> <p>The ordinary shares are currently priced at ₹39 ex-dividend and preference share is priced at ₹18 cum-dividend. The debentures are selling at 120 percent ex-interest. The applicable tax rate to D 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.</p> <p style="text-align: right;"><b>(Nov. 2022)</b></p>	Particulars	Amount (₹)	Ordinary shares (Face value ₹10/- per share)	5,00,000	Share Premium	1,00,000	Retained Profits	6,00,000	8% Preference Shares (Face Value ₹25/- per share)	4,00,000	12% Debentures (Face value ₹100/- each)	6,00,000		<b>22,00,000</b>																
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Ans.	<p><b>Computation of WACC on the basis of market value</b></p> <p><b>W.N. 1</b></p> <p>Cum-dividend price of Preference shares = ₹ 18</p> <p>Less: Dividend <math>(8/100) \times 25 = \frac{₹2}{₹16}</math></p> <p><math>\therefore</math> Market Price of Preference shares = ₹ 16</p> <p><math>KP = \frac{2}{16} = 0.125</math> (or) 12.5%</p> <p>No. of Preference shares = <math>\left(\frac{4,00,000}{25}\right) = 16,000</math></p>																														



	<p><b>W.N. 2</b>  Market price of Debentures = <math>\left(\frac{120}{100}\right) \times 100 = ₹120</math>  <math>K_d = \left[\frac{12(1-0.3)}{120}\right] = 0.07</math> (or) 7%  No. of Debentures = <math>\left(\frac{6,00,000}{100}\right) = 6,000</math></p> <p><b>W.N.3</b>  Market Price of Equity shares = ₹39  <math>K_e</math> (given) 19% or 0.19  No. of Equity shares = <math>\frac{5,00,000}{10} = 50,000</math></p> <table border="1" data-bbox="288 568 1458 846"> <thead> <tr> <th>Sources</th> <th>Market Value (₹)</th> <th>Nos.</th> <th>Total Market value (₹)</th> <th>Weight</th> <th>Cost of Capital</th> <th>Product</th> </tr> </thead> <tbody> <tr> <td>Equity Shares</td> <td>39</td> <td>50,000</td> <td>19,50,000</td> <td>0.6664</td> <td>0.19</td> <td>0.1266</td> </tr> <tr> <td>Preference Shares</td> <td>16</td> <td>16,000</td> <td>2,56,000</td> <td>0.0875</td> <td>0.125</td> <td>0.0109</td> </tr> <tr> <td>Debentures</td> <td>120</td> <td>6,000</td> <td>7,20,000</td> <td>0.2461</td> <td>0.07</td> <td>0.0172</td> </tr> <tr> <td colspan="6" style="text-align: right;">WACC =</td> <td>0.1547</td> </tr> </tbody> </table> <p>WACC = 0.1547 or 15.47%</p>	Sources	Market Value (₹)	Nos.	Total Market value (₹)	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
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40.	<p>TT Ltd. issued 20,000, 10% convertible debenture of ₹100 each with a maturity period of 5 years. At maturity the debenture holders will have the option to convert debentures into equity shares of the company in ratio of 1:5 (5 shares for each debenture). The current market price of the equity share is ₹20 each and historically the growth rate of the share is 4% per annum. Assuming tax rate is 25%. Compute the cost of 10% convertible debenture using Approximation Method and Internal Rate of Return Method.</p> <p>PV Factor are as under:</p> <table border="1" data-bbox="288 1182 1442 1305"> <thead> <tr> <th>Year</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> </tr> </thead> <tbody> <tr> <td>PV Factor @ 10%</td> <td>0.909</td> <td>0.826</td> <td>0.751</td> <td>0.683</td> <td>0.621</td> </tr> <tr> <td>PV Factor @ 15%</td> <td>0.870</td> <td>0.756</td> <td>0.658</td> <td>0.572</td> <td>0.497</td> </tr> </tbody> </table> <p style="text-align: right;"><b>(Nov. 2020)</b></p>	Year	1	2	3	4	5	PV Factor @ 10%	0.909	0.826	0.751	0.683	0.621	PV Factor @ 15%	0.870	0.756	0.658	0.572	0.497																	
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Ans.	<p><b>Determination of Redemption value:</b>  Higher of -</p> <p>i) The cash value of debentures = ₹100  ii) Value of equity shares = 5 shares × ₹20 (1+0.04)<sup>5</sup>  = 5 shares × ₹24.333  = ₹121.665 rounded to ₹121.67</p> <p>₹121.67 will be taken as redemption value as it is higher than the cash option and attractive to the investors.</p> <p><b>Calculation of Cost of 10% Convertible debenture</b></p> <p>i) <b>Using Approximation Method:</b></p> $K_d = \frac{I(1-t) + \frac{RV-NP}{n}}{\left(\frac{RV+NP}{2}\right)} + \frac{10(1-0.25) + \frac{(121.67-100)}{5}}{\left(\frac{121.67+100}{2}\right)} = \frac{7.5+4.334}{110.835} = 10.676\%$ <p>ii) <b>Using internal Rate of Return Method</b></p> <table border="1" data-bbox="288 1890 1458 2024"> <thead> <tr> <th>Year</th> <th>Cash flows (₹)</th> <th>Discount factor @10%</th> <th>Present Value</th> <th>Discount factor @15%</th> <th>Present Value (₹)</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>100</td> <td>1,000</td> <td>(100.00)</td> <td>1.000</td> <td>(100.00)</td> </tr> </tbody> </table>	Year	Cash flows (₹)	Discount factor @10%	Present Value	Discount factor @15%	Present Value (₹)	0	100	1,000	(100.00)	1.000	(100.00)																							
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	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			<b>+3.982</b>		<b>-14.382</b>
	$\text{IRR} = L + \frac{\text{NPV}_L}{\text{NPV}_L - \text{NPV}_H} (H-L) = 10\% + \frac{3.982}{3.982 - (-14.382)} (15\% - 10\%)$ $= \mathbf{0.11084 \text{ or } 11.084\% \text{ (approx.)}}$					
<b>41.</b>	Alpha Ltd. has furnished the following information:					
	✓ Earnings Per Share (EPS)					₹4
	✓ Dividend payout ratio					25%
	✓ Market price per share					₹50
	✓ Rate of tax					30%
	✓ Growth rate of dividend					10%
	The company wants to raise additional capital of ₹10 lakhs including debt of ₹4 lakhs. The cost of debt (before tax) is 10% up to ₹2 lakhs and 15% beyond that. Compute the after tax cost of equity and debt and also weighted average cost of capital.					
	<b>(May 2019)</b>					
<b>Ans.</b>	<b>i) Cost of Equity Share Capital (<math>K_e</math>)</b>					
	$K_e = \frac{D_0(1+g)}{P_0} + g = \frac{25\% \text{ of } ₹4(1+0.10)}{₹50} + 0.10 = \frac{₹1.10}{₹50} + 0.10 = \mathbf{0.122 \text{ or } 12.2\%}$					
	<b>ii) Cost of Debt (<math>K_d</math>)</b>					
	$K_d = \frac{\text{Interest}}{\text{Net Proceeds}} \times 100 \times (1 - t)$					
	Interest on first ₹2,00,000 @ 10% = ₹20,000					
	Interest on next ₹2,00,000 @ 15% = ₹30,000					
	$K_d = \frac{50,000}{4,00,000} \times (1 - 0.3) = \mathbf{0.0875 \text{ or } 8.75\%}$					
	<b>iii) Weighted Average Cost of Capital (WACC)</b>					
	<b>Source of capital</b>	<b>Amount (₹)</b>	<b>Weights</b>	<b>Cost of Capital (%)</b>	<b>WACC (%)</b>	
	Equity shares	6,00,000	0.60	12.20	7.32	
	Debt	4,00,000	0.40	8.75	3.50	
	Total	10,00,000	1.00		10.82	
	<b>Alternatively Cost of Equity Share Capital (<math>K_e</math>) can be calculated as</b>					
	$K_e = \frac{D}{P_0} + g = \frac{25\% \text{ of } ₹4}{₹50} + 0.10 = \frac{₹1.00}{₹50} + 0.10 = 0.120 \text{ or } 12.00\%$					
	<b>Accordingly</b>					
	<b>Weighted Average Cost of Capital (WACC)</b>					
	<b>Source of capital</b>	<b>Amount (₹)</b>	<b>Weights</b>	<b>Cost of Capital (%)</b>	<b>WACC (%)</b>	
	Equity shares	6,00,000	0.60	12.00	7.20	
	Debt	4,00,000	0.40	8.75	3.50	
	Total	10,00,000	1.00		10.70	
<b>42.</b>	<b>Amrit Corporation has the following book value capital structure:</b>					
	Equity Capital (50 lakh shares of ₹10 each).					₹5,00,00,000
	15% Preference share (50,000 shares ₹100 each)					₹50,00,000
	Retained earnings					₹4,00,00,000

	<table border="1"> <tr> <td>Debentures 14% (2,50,000 debentures ₹100 each)</td> <td>₹2,50,00,000</td> </tr> <tr> <td>Term loan 13%</td> <td>₹4,00,00,000</td> </tr> </table>	Debentures 14% (2,50,000 debentures ₹100 each)	₹2,50,00,000	Term loan 13%	₹4,00,00,000
Debentures 14% (2,50,000 debentures ₹100 each)	₹2,50,00,000				
Term loan 13%	₹4,00,00,000				
	<p>The companies last year earnings per share was ₹5, and it maintains a dividend pay-out ratio of 60% and returns on equity is 10%. The market price per share is ₹20.8. Preference share redeemable after 10 years is currently selling for ₹90 per share. Debentures redeemable after 6 years are currently selling for ₹75 per debenture. The income tax rate is 40%.</p> <p><b>a) CALCULATE</b> the Weighted Average Cost of Capital (WACC) using market value proportions.</p> <p><b>b) DETERMINE</b> the Marginal Cost of Capital (MACC) if it needs ₹5,00,00,000 next year assuming the amount will be raised by 60% equity, 20% debt and 20% retained earnings. Equity issues will fetch a net price of ₹14 and cost of debt will be 13% before tax up to ₹40,00,000 and beyond ₹40,00,000 it will be 15% before tax.</p> <p style="text-align: right;"><b>(RTP May 2023)</b></p>				
<b>Ans.</b>	<p><b>a) Calculation of Cost of Equity</b></p> <p><b>i)</b> <math>D_0 = ₹5 \times 60\%</math>  <math>D_0 = ₹3</math>  <math>g = b \times r</math>  <math>= (1-0.6) \times 10\% = 4\%</math>  <math>D_1 = D_0 \times (1 + g)</math>  <math>= 3 \times (1 + 4\%)</math>  <math>= 3 \times 1.04 = 3.12</math>  <math>K_e = \frac{D_1}{P_0} + g</math>  <math>K_e = \frac{3.12}{20.8} + 0.04</math>  <b><math>K_e = 19\%</math></b></p> <p><b>ii) Calculation of Cost of Preference Shares</b>  <math>N = 10</math> years  <math>NP = ₹90</math>  <math>PD = ₹15</math>  <math>RV = ₹100</math>  <math>K_p = \frac{PD + (RV - NP)/N}{(RV + NP)} \times 100</math>  <math>K_p = \frac{15 + (100 - 90)/10}{(100 + 90)/2} \times 100</math>  <math>K_p = 16/95 \times 100</math>  <b><math>K_p = 16.84\%</math></b></p> <p><b>iii) Calculation of Cost of Debentures</b>  <math>N = 6</math> years  <math>NP = ₹75</math>  <math>\text{Interest} = ₹14</math>  <math>RV = ₹100</math>  <math>T = 40\%</math>  <math>K_d = \frac{\text{int}(1-t) + (RV - NP)/N}{(RV + NP)/2} \times 100</math>  <math>K_d = \frac{14 \times (1 - 0.4) + (100 - 75)/6}{(100 + 75)/2} \times 100</math>  <math>K_d = \frac{84 - 4.17}{87.5} \times 100</math>  <b><math>K_d = 14.37\%</math></b></p>				

- iv) Cost of Term Loan  
 $K_d = \text{Interest rate} (1-t)$   
 $K_d = 13\% (1-40\%)$   
 $K_d = 7.8\%$

**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

Debt = 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) =  $\frac{13\% \text{ of } ₹40,00,000 + 15\% \text{ of } ₹60,00,000}{₹1,00,00,000}$   
 $= \frac{₹5,20,000 + ₹9,00,000}{₹1,00,00,000} = 14.2\%$

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%**

43. Capital structure of D Ltd. as on 31<sup>st</sup> March, 2023 is given below:

Particulars	₹
Equity share capital (₹10 each)	30,00,000
8% Preference share capital (₹100 each)	10,00,000
12% Debentures (₹100 each)	10,00,000

- i) Current market price of equity share is ₹80 per share. The company has paid dividend of ₹14.07 per share. Seven years ago, it paid dividend of ₹10 per share. Expected dividend is ₹16 per share.

- ii) 8% Preference shares are redeemable at 6% premium after five years. Current market price per preference share is ₹104.
- iii) 12% debentures are redeemable at 20% premium after 10 years. Flotation costs is ₹5 per debenture.
- iv) The company is in 40% tax bracket.
- v) In order to finance an expansion plan, the company intends to borrow 15% Long-term loan of ₹30,00,000 from bank. This financial decision is expected to increase dividend on equity share from ₹16 per share to ₹18 per share. However, the market price of equity share is expected to decline from ₹80 to ₹72 per share, because investors' required rate of return is based on current market conditions.

**Required:**

- i) Determine the existing Weighted Average Cost of Capital (WACC) taking book value weights.
- ii) Compute Weighted Average Cost of Capital (WACC) after the expansion plan taking book value weights.

Interest Rate	1%	2%	3%	4%	5%	6%	7%
FVIF <sub>i,5</sub>	1.051	1.104	1.159	1.217	1.276	1.338	1.403
FVIF <sub>i,6</sub>	1.062	1.126	1.194	1.265	1.340	1.419	1.501
FVIF <sub>i,7</sub>	1.072	1.149	1.230	1.316	1.407	1.504	1.606

(May 2023)

**Ans. Case 1 Existing Capital Structure**

Step 1: Dividend growth rate

$$14.07 = 10(1 + g)^7$$

$$1.407 = (1 + g)^7$$

From the table given, FVIF<sub>i,7</sub> = 1.407 when interest rate is 5%Step 2: Cost of Equity (K<sub>e</sub>)

$$\begin{aligned} K_e &= \frac{D_1}{P_0} + g \\ &= \frac{16}{80} + 0.05 \\ &= 25\% \end{aligned}$$

Step 3: Cost of Redeemable reference shares (K<sub>p</sub>)

$$\begin{aligned} K_p &= \frac{PD + \left[ \frac{RV - NP}{n} \right]}{\left( \frac{RV + NP}{2} \right)} \\ &= \frac{8 + \left( \frac{106 - 104}{5} \right)}{\frac{106 + 104}{2}} = 8\% \end{aligned}$$

Step 4: Cost of Redeemable Debentures (k<sub>d</sub>)

$$\begin{aligned} K_d &= \frac{I(1 - t) + \left( \frac{RV - NP}{n} \right)}{\left( \frac{RV + NP}{2} \right)} \\ &= \frac{12(1 - 0.40) + \left( \frac{120 - 95}{10} \right)}{\left( \frac{120 + 95}{2} \right)} \end{aligned}$$

Step: 5 Calculation of WACC using Book Values.

Particulars	Amount	Weight	Cost	WACC
Equity share capital	30,00,000	30/50 = 0.60	25%	15
Preference share capital	10,00,000	10/50 = 0.20	8%	1.60
Debentures	10,00,000	10/50 = 0.20	9.02%	1.804
	50,00,000	1		18.404%

### Case 2: Revised Capital Structure

Step 1: Revised  $K_e$

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

$$= \frac{18}{72} + 0.05 = 30\%$$

Step 2: Cost of long-term loan ( $K_T$ )

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

$$= 15(1 - 0.40)$$

$$= 9\%$$

Step 3: WACC after expansion plan using book values.

Particulars	Amount	Weight	Cost	WACC
Equity share capital	30,00,000	30/80 = 0.375	25%	11.25
Preference share capital	10,00,000	10/80 = 0.125	8%	1
Debentures	10,00,000	10/80 = 0.125	9.02%	1.1275
Long Term Loan	30,00,000	30/80 = 0.375	9%	3.375
	80,00,000	1		16.75%

Revised WACC = 16.75%

44. Following are the information of TT Ltd.:

Particulars	₹
Earnings per share	₹10
Dividend per share	₹6
Expected growth rate in Dividend	6%
Current market price per share	₹120
Tax Rate	30%
Requirement of Additional Finance	₹30 lakhs
Debt Equity Ratio (For additional finance)	2:1
Cost of Debt	
0-5,00,000	10%
5,00,001 - 10,00,000	9%
Above 10,00,000	8%

Assuming that there is no Reserve and Surplus available in TT Ltd.

You are required to:

- Find the pattern of finance for additional requirement
- Calculate post tax average cost of additional debt
- Calculate cost of equity
- Calculate the overall weighted average after tax cost of additional finance.

(July 2021)

Ans.	a) Pattern of raising additional finance
	Equity      1/3 of ₹30,00,000      = ₹10,00,000
	Debt        2/3 of ₹30,00,000        = ₹20,00,000

**The capital structure after raising additional finance:**

Particulars	(₹)
<b>Shareholder's Funds</b>	
Equity Capital	10,00,000
Debt (Interest at 10% p.a.)	5,00,000
(Interest at 9% p.a.)	5,00,000
(Interest at 8% p.a.) (20,00,000-10,00,000)	10,00,000
<b>Total Funds</b>	<b>30,00,000</b>

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

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

Where,

I = Interest Rate

t = Corporate tax-rate

On First ₹5,00,000 = 10% (1-0.3) = 7% or 0.07

On Next ₹5,00,000 = 9% (1-0.3) = 6.3% or 0.063

On Next ₹10,00,000 = 8% (1-0.3) = 5.6% or 0.056

Average Cost of Debt

$$= \frac{(\₹5,00,000 \times 0.07) + (\₹5,00,000 \times 0.063) + (\₹10,00,000 \times 0.056)}{\₹20,00,000} \times 100 = 6.125\%$$

**c) Determination of cost of equity applying Dividend growth model:**

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

Where,

$K_e$  = Cost of equity

$D_1 = D_0 (1+g)$

$D_0$  = Dividend paid

$g$  = Growth rate = 6%

$P_0$  = Current market price per share = ₹120

$$K_e = \frac{\₹6(1+0.06)}{\₹120} + 0.06 = \frac{\₹6.36}{\₹120} + 0.06 = 0.113 \text{ or } 11.3\%$$

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

Particulars	(₹)	Weights	Cost of funds	Weighted Cost (%)
Equity	10,00,000	1/3	11.3%	3.767
Debt	20,00,000	2/3	6.125%	4.083
WACC	30,00,000			7.85

(Note: In the above solution different interest rate have been considered for different slab of Debt)

**Alternative Solution****a) Pattern of raising additional finance**

Equity	1/3 of ₹30,00,000	= ₹10,00,000
Debt	2/3 of ₹30,00,000	= ₹20,00,000

The capital structure after raising additional finance:

Particulars	(₹)
<b>Shareholders' Fund</b>	
Equity Capital	10,00,000

	Debt (Interest at 8% p.a.)	20,00,000																				
	<b>Total Funds</b>	<b>30,00,000</b>																				
<b>b)</b>	Determination of post-tax average cost of additional debt																					
	$K_d = I (1 - t)$																					
	Where,																					
	I = Interest Rate																					
	t = Corporate tax-rate																					
	$K_d = 8\% (1-0.3) = 5.6\%$																					
<b>c)</b>	Determination of cost of equity applying Dividend growth model:																					
	$K_e = \frac{D_1}{P_0} + g$																					
	Where,																					
	$K_e = \text{Cost of equity}$																					
	$D_1 = D_0 (1+g)$																					
	$D_0 = \text{Dividend paid}$																					
	$g = \text{Growth rate} = 6\%$																					
	$P_0 = \text{Current market price per share} = ₹120$																					
	Then, $K_e = \frac{₹6(1+0.06)}{₹120} + 0.06 = \frac{₹6.36}{₹120} + 0.06 = \mathbf{0.113 \text{ or } 11.3\%}$																					
<b>d)</b>	Computation of overall weighted average after tax cost of additional finance																					
	<table border="1"> <thead> <tr> <th>Particulars</th> <th>(₹)</th> <th>Weights</th> <th>Cost of funds</th> <th>Weighted Cost (%)</th> </tr> </thead> <tbody> <tr> <td>Equity</td> <td>10,00,000</td> <td>1/3</td> <td>11.3%</td> <td>3.767</td> </tr> <tr> <td>Debt</td> <td>20,00,000</td> <td>2/3</td> <td>5.6%</td> <td>3.733</td> </tr> <tr> <td>WACC</td> <td>30,00,000</td> <td></td> <td></td> <td>7.50</td> </tr> </tbody> </table>	Particulars	(₹)	Weights	Cost of funds	Weighted Cost (%)	Equity	10,00,000	1/3	11.3%	3.767	Debt	20,00,000	2/3	5.6%	3.733	WACC	30,00,000			7.50	
Particulars	(₹)	Weights	Cost of funds	Weighted Cost (%)																		
Equity	10,00,000	1/3	11.3%	3.767																		
Debt	20,00,000	2/3	5.6%	3.733																		
WACC	30,00,000			7.50																		
	<b>(Note: In the above solution single internal rate have been considered for Debt)</b>																					
<b>45.</b>	A Company wants to raise additional finance of ₹5 crore in the next year. The company expects to retain ₹1 crore earning next year. Further details are as follows:																					
	<b>i)</b> The amount will be raised by equity and debt in the ratio of 3: 1.																					
	<b>ii)</b> The additional issue of equity shares will result in price per share being fixed at ₹25.																					
	<b>iii)</b> The debt capital raised by way of term loan will cost 10% for the first ₹75 lakh and 12% for the next ₹50 lakh.																					
	<b>iv)</b> The net expected dividend on equity shares is ₹2.00 per share. The dividend is expected to grow at the rate of 5%.																					
	<b>v)</b> Income tax rate is 25%.																					
	<b>You are required:</b>																					
	<b>a)</b> To determine the amount of equity and debt for raising additional finance.																					
	<b>b)</b> To determine the post-tax average cost of additional debt.																					
	<b>c)</b> To determine the cost of retained earnings and cost of equity.																					
	<b>d)</b> To compute the overall weighted average cost of additional finance after tax.																					
	<b>(November 2019)</b>																					
<b>Ans.</b>	<b>a) Determination of the amount of equity and debt for raising additional finance:</b>																					
	<b>Pattern of raising additional finance</b>																					
	Equity	3/4 of ₹5 Crore = ₹3.75 Crore																				
	Debt	1/4 of ₹5 Crore = ₹1.25 Crore																				



**The Capital structure after raising additional finance:**

Particulars	(₹ in crore)
<b>Shareholders' Funds</b>	
Equity Capital (3.75-1.00)	2.75
Retained earnings	1.00
Debt (Interest at 10% p.a.)	0.75
(Interest at 12% p.a.) (1.25 -0.75)	0.50
<b>Total Funds</b>	<b>5.00</b>

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

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

Where,

I = Interest Rate

t = Corporate tax-rate

On ₹75,00,000 = 10%(1-0.25) = 7.5% or 0.075

On ₹50,00,000 = 12% (1-0.25)= 9% or 0.09

**Average Cost of Debt**

$$= \frac{(\text{₹}75,00,000 \times 0.075) + (\text{₹}50,00,000 \times 0.09)}{1,25,00,000} \times 100$$

$$= \frac{\text{₹}5,62,500 + \text{₹}4,50,000}{1,25,00,000} \times 100 = 8.10\%$$

**c) Determination of cost of retained earnings and cost of equity (Applying Dividend growth mode)**

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

Where,

$K_e$  = Cost of equity

$D_1$  =  $D_0 (1+g)$

$D_0$  = Dividend paid (i.e. = ₹2)

g = Growth rate

$P_0$  = Current market price per share

$$\text{Then, } K_e = \frac{\text{₹}2(1.05)}{\text{₹}25} + 0.05 = \frac{\text{₹}2.1}{\text{₹}25} + 0.05 = 0.084 + 0.05 = 0.134 = 13.4\%$$

Cost of retained earnings equals to cost Equity i.e. 13.4%

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

Particular	(₹)	Weights	Cost of funds	Weighted Cost (%)
Equity (including retained earnings)	3,75,00,000	3/4	13.4%	10.05
Debt	1,25,00,000	1/4	8.1%	2.025
<b>WACC</b>	<b>5,00,00,000</b>			<b>12.075</b>

46. Genzy Ltd. is planning to introduce a new product with a project life of 10 years. The initial equipment cost will be ₹ 2.5 crores. At the end of 10 years, the equipment will have a resale value of 50 lakhs. A working capital of ₹ 30,00,000 will be needed and it will be released at the end of the tenth year. The project will be financed with the following capital sources.

Particulars	Amount (₹)	Issue Price (Market price)
Equity Share Capital of Face value ₹ 10 each	1,50,00,000	₹30
Debentures of face value ₹ 100 each with a maturity of 10 years	90,00,000	₹90
Preference shares of ₹ 100 each with a maturity of 10 years	60,00,000	₹96

The existing yield on T-bills is averaging 8% p.a. The systematic risk measure for the proposed project is 1.6. NSE NIFTY is expected to yield 14% p.a. on average for the foreseeable future. Debenture holders have been promised a coupon of 12% and preference shareholders have been committed a dividend of 15%.

The sales volumes over 10 years have been estimated as follows:

Year	1	2	3-5	6-8	9-10
Units per year	70,000	98,000	2,10,000	2,50,000	1,20,000

A sales price of ₹ 300 per unit is expected and variable expenses will amount to 60% of sales revenue. Fixed cash operating costs will amount to ₹ 40,00,000 per year. The loss of any year will be set off from the profits of subsequent years.

The company is subject to a 30 per cent tax rate. The company follows straight line method of depreciation which is to be assumed to be admissible for tax purpose also.

CALCULATE the net present value of the project for the company and advise the management to take appropriate decision.

The PV factors are to be taken as rounded figures upto 2 decimals. Use market value weights to COMPUTE overall cost of capital.

(MTP May 2023 Series I)

Ans.

### Cost of Equity

$$K_e = R_f + \text{Beta} * (R_m - R_f)$$

$$K_e = 8\% + 1.6 * (14\% - 8\%)$$

$$K_e = 8\% + (1.6 * 6\%)$$

$$K_e = 17.6\%$$

### 1) Cost of Redeemable Debentures (Post-Tax)

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

$$K_d = \frac{12,00,000 * (1-30\%) + ((1,00,00,000 - 90,00,000) / 10)}{(1,00,00,000 + 90,00,000) / 2}$$

$$K_d = \frac{8,40,00 + 1,00,000}{95,00,000}$$

$$K_d = 9.89\%$$

### 2) Cost of Redeemable Preference Shares

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

$$K_p = \frac{(62,50,000 * 15\%) + ((62,50,000 - 60,00,000) / 10)}{(62,50,000 + 60,00,000) / 2}$$

$$K_p = \frac{9,37,500 + 25,000}{61,25,000}$$

$$K_p = 15.71\%$$

### 3) Weighted Average Cost of Capital (WACC) - Book Value Method

Source of Capital	Market Value	Weights	After Tax Cost of Capital	WACC
Equity Share Capital	1,50,00,000	0.5	17.6%	0.088
Debentures	90,00,000	0.3	9.89%	0.030
Preference Share Capital	60,00,000	0.2	15.71%	0.031
	<b>3,00,00,000</b>	<b>1.000</b>		<b>0.149</b>

$$\text{WACC} = 14.9\%$$

**4) Computation of CFAT**

		<b>(Year 1 to year 4)</b>				
<b>Sr. No.</b>	<b>Particulars / Year</b>	<b>1</b>	<b>2</b>	<b>3-5</b>	<b>6-8</b>	<b>9-10</b>
A	Sale Price p.u.	300	300	300	300	300
	Sale units	70,000	98,000	2,10,000	2,50,000	1,20,000
C	Sales (A x B)	2,10,00,000	2,94,00,000	6,30,00,000	7,50,00,000	3,60,00,000
D	Variable Cost p.u.	180	180	180	180	180
E	Variable Cost (B x D)	1,26,00,000	1,76,40,000	3,78,00,000	4,50,00,000	2,16,00,000
F	Contribution (C - E)	84,00,000	1,17,60,000	2,52,00,000	3,00,00,000	1,44,00,000
G	Less: Fixed Cost	40,00,000	40,00,000	40,00,000	40,00,000	40,00,000
H	PBDT (F-G)	44,00,000	77,60,000	2,12,00,000	2,60,00,000	1,04,00,000
I	Less: Depreciation (2,50,00,000- 50,00,000) / 10	20,00,000	20,00,000	20,00,000	20,00,000	20,00,000
J	PBT	24,00,000	57,60,000	1,92,00,000	2,40,00,000	84,00,000
K	Less: Taxes @ 30%	7,20,000	17,28,000	57,60,000	72,00,000	25,20,000
L	PAT	16,80,000	40,32,000	1,34,40,000	1,68,00,000	58,80,000
M	Add: Depreciation	20,00,000	20,00,000	20,00,000	20,00,000	20,00,000
N	CFAT	36,80,000	60,32,000	1,54,40,000	1,88,00,000	78,80,000

**5) Computation of NPV**

<b>Sr. No.</b>	<b>Particulars / Year</b>	<b>1</b>	<b>2</b>	<b>3-5</b>	<b>6-8</b>	<b>9-10</b>
I	CFAT	36,80,000	60,32,000	1,54,40,000	1,88,00,000	78,80,000
II	PVAF @ 14.9%	0.87	0.76	(0.66+0.57+ 0.50) = 1.73	(0.43+0.38+0.33) = 1.14	(0.29+0.25) = 0.54
III	PV of CFATs (I x II)	32,01,600	45,84,320	2,67,11,200	2,14,32,000	42,55,200
IV	Salvage + Release of WC					80,00,000
V	PVF @ 14.9%					0.25
VI	PV of Salvage (IV x V)					20,00,000

PV of Inflows = 32,01,600 + 45,84,320 + 2,67,11,200 + 2,14,32,000 + 42,55,200 + 20,00,000

PV of Inflows = 6,21,84,320

PV of Outflows = Investment + Introduction of Working Capital

PV of Outflows = 2,50,00,000 + 30,00,000

PV of Outflows = 2,80,00,000

NPV = PV of Inflows - PV of Outflows

NPV = 6,21,84,320 - 2,80,00,000

**NPV = 3,41,84,320**

**The management should consider taking up the project as the Net Present Value of the Project is Positive.**