Q.1 Navya Limited wishes to raise additional capital of ₹10 lakhs for meeting its modernisation plan. It has ₹ 3,00,000 in the form of retained earnings available for investments purposes. The following are the further details:

Debt/ equity mix	40%/60%
Cost of debt (before tax)	
Upto ₹ 1,80,000	10%
Beyond ₹ 1,80,000	16%
Earnings per share	₹ 4
Dividend pay out	₹ 2
Expected growth rate in dividend	10%
Current market price per share	₹ 44
Tax rate	50%

Required:

(i) To DETERMINE the pattern for raising the additional finance.

(ii) To CALCULATE the post-tax average cost of additional debt.

(iii) To CALCULATE the cost of retained earnings and cost of equity, and

(iv) To DETERMINE the overall weighted average cost of capital (after tax).

Ans:

(i) Pattern of Raising Additional Finance

Equity = 10,00,000 × 60/100 = ₹ 6,00,000

Debt = 10,00,000 × 40/100 = ₹ 4,00,000

Capital structure after Raising Additional Finance

Sources of fund	Amount (₹)
Shareholder's funds	
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
Total funds	10,00,000

(ii) Post-tax Average Cost of Additional Debt

$K_d = I(1 - t)$, where 'K_d' is cost of debt, 'I' is interest and 't' is tax rate.

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

On ₹ 2,20,000 = 16% (1 – 0.5) = 8% or 0.08

Average Cost of Debt (Post tax) i.e.

$$K_d = \frac{(1,80,000 \times 0.05) + (2,20,000 \times 0.08)}{4,00,000} \times 100 = 6.65\%$$

(iii) Cost of Retained Earnings and Cost of Equity applying Dividend Growth Model

$$K_e = \frac{D_1}{P_0} + g \qquad \frac{D_0(1+\quad}{F_0} + \quad$$

$$\text{Then, } K_e = \frac{2(1.1)}{44} + 0. \quad = \frac{\quad}{\quad} + \quad = \quad 5\%$$

(iv) Overall Weighted Average Cost of Capital (WACC) (After Tax)

Particulars	Amount (₹)	Weights	Cost of Capital	WACC
Equity (including retained earnings)	6,00,000	0.60	15%	9.00
Debt	4,00,000	0.40	6.65%	2.66
Total	10,00,000	1.00		11.66

Q.2 M/s. Navya Corporation has a capital structure of 40% debt and 60% equity. The company is presently considering several alternative investment proposals costing less than ₹ 20 lakhs. The corporation always raises the required funds without disturbing its present debt equity ratio.

The cost of raising the debt and equity are as under:

Project cost	Cost of debt	Cost of equity
Upto ₹ 2 lakhs	10%	12%
Above ₹ 2 lakhs & upto to ₹ 5 lakhs	11%	13%
Above ₹ 5 lakhs & upto ₹10 lakhs	12%	14%
Above ₹10 lakhs & upto ₹ 20 lakhs	13%	14.5%

Assuming the tax rate at 50%, CALCULATE:

(i) Cost of capital of two projects X and Y whose fund requirements are ₹ 6.5 lakhs and ₹ 14 lakhs respectively.

(ii) If a project is expected to give after tax return of 10%, DETERMINE under what conditions it would be acceptable?

Ans:

(i) Statement of Weighted Average Cost of Capital

Project cost	Financing	Proportion of capital Structure	After tax cost (1–Tax 50%)	Weighted average cost (%)
Upto ₹ 2 Lakhs	Debt	0.4	10% (1 – 0.5) = 5%	0.4 × 5 = 2.0
	Equity	0.6	12%	0.6 × 12 = 7.2
				9.2%

Above ₹ 2 lakhs & upto to ₹ 5 Lakhs	Debt	0.4	11% (1 – 0.5) = 5.5%	0.4 × 5.5 = 2.2
	Equity	0.6	13%	0.6 × 13 = 7.8
				10.0%
Above ₹ 5 lakhs & upto ₹ 10 lakhs	Debt	0.4	12% (1 – 0.5) = 6%	0.4 × 6 = 2.4
	Equity	0.6	14%	0.6 × 14 = 8.4
				10.8%
Above ₹ 10 lakhs & upto ₹ 20 lakhs	Debt	0.4	13% (1 – 0.5) = 6.5%	0.4 × 6.5 = 2.6
	Equity	0.6	14.5%	0.6 × 14.5 = 8.7
				11.3%

Project	Fund requirement	Cost of capital
X	₹6.5 lakhs	10.8% (from the above table)
Y	₹14 lakhs	11.3% (from the above table)

(ii) If a Project is expected to give after tax return of 10%, it would be acceptable provided its project cost does not exceed ₹ 5 lakhs or, after tax return should be more than or at least equal to the weighted average cost of capital.

Q.3 As a financial analyst of a large electronics company, you are required to DETERMINE the weighted average cost of capital of the company using (a) book value weights and (b) market value weights. The following information is available for your perusal.

The Company's present book value capital structure is:

	(₹)
Debentures (₹100 per debenture)	8,00,000
Preference shares (₹100 per share)	2,00,000
Equity shares (₹10 per share)	10,00,000
	20,00,000

All these securities are traded in the capital markets. Recent prices are:

Debentures, ₹110 per debenture, Preference shares, ₹120 per share, and Equity shares, ₹ 22 per share

Anticipated external financing opportunities are:

(i) ₹ 100 per debenture redeemable at par; 10 year maturity, 11 per cent coupon rate, 4 per cent flotation costs, sale price, ₹ 100

(ii) ₹ 100 preference share redeemable at par; 10 year maturity, 12 per cent dividend rate, 5 per cent flotation costs, sale price, ₹100.

(iii) Equity shares: ₹ 2 per share flotation costs, sale price = ₹ 22.

In addition, the dividend expected on the equity share at the end of the year is ₹ 2 per share, the anticipated growth rate in dividends is 7 per cent and the firm has the practice of paying all its earnings in the form of dividends. The corporate tax rate is 35 per cent.

Ans:

Determination of specific costs:

(i) Cost Debt $(K_d) = \dfrac{\text{Interest}(1-t)+\dfrac{(RV-NP)}{N}}{\dfrac{(RV+NP)}{2}} = \dfrac{₹11(1-0.35)+\dfrac{(₹100-₹96)}{10\text{ years}}}{\dfrac{(₹100+₹96)}{2}}$

$= \dfrac{₹7.15+₹0.4}{₹98} = 0.077 \text{ or } 7.70\%$

(ii) Cost of Preference Shares $(K_p) = \dfrac{PD+\dfrac{(RV-NP)}{N}}{\dfrac{(RV+NP)}{2}} = \dfrac{₹12+\dfrac{(₹100-₹95)}{10\text{ years}}}{\dfrac{(₹100+₹95)}{2}}$

$= \dfrac{₹12+₹0.5}{₹97.5} = 0.1282 \text{ or } 12.82\%$

(iii) Cost of Equity shares $(K_e) = \dfrac{D_1}{P_0}+G = \dfrac{₹2}{₹22-₹2}+0.07 = 0.17 \text{ or } 17\%$

I – Interest, t – Tax, RV- Redeemable value, NP- Net proceeds, N- No. of years, PD- Preference dividend, D_1- Expected Dividend, P_0- Price of share (net)

Using these specific costs we can calculate WACC on the basis of book value and market value weights as follows:

(a) Weighted Average Cost of Capital (K_0) based on Book value weights

Source of capital	Book value (₹)	Weights	Specific cost (%)	WACC (%)
Debentures	8,00,000	0.40	7.70	3.08
Preferences shares	2,00,000	0.10	12.82	1.28
Equity shares	10,00,000	0.50	17.00	8.50
	20,00,000	1.00		12.86

(b) Weighted Average Cost of Capital (K_0) based on market value weights:

Source of capital	Market value (₹)	Weights	Specific cost (%)	WACC (%)
Debentures $\left(\dfrac{₹8,00,000}{₹100}\times₹110\right)$	8,80,000	0.265	7.70	2.04
Preferences shares $\left(\dfrac{₹2,00,000}{₹100}\times₹120\right)$	2,40,000	0.072	12.82	0.92

Equity shares $\left(\frac{₹10,00,000}{₹10} \times ₹22\right)$	22,00,000	0.663	17.00	11.27
	33,20,000	1.000		14.23

Q.4 KM Ltd. has the following capital structure on September 30, 2019:

Sources of capital	(₹)
Equity Share Capital (40,00,000 Shares of ₹ 10 each)	4,00,00,000
Reserves & Surplus	4,00,00,000
12% Preference Shares	2,00,00,000
9% Debentures	6,00,00,000
	16,00,00,000

The market price of equity share is ₹60. It is expected that the company will pay next year a dividend of ₹6 per share, which will grow at 10% forever. Assume 40% income tax rate.

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

Ans: **Workings:**

(i) Cost of Equity (K_e) = $\frac{D_1}{P_0} + g = \frac{₹6}{₹60} + 0.10 = 0.20 = 20\%$

(ii) Cost of Debentures (K_d) = I (1 - t) = 0.09 (1 - 0.4) = 0.054 or 5.4%

Computation of Weighted Average Cost of Capital (WACC using market value weights)

Source of capital	Market Value of capital (₹)	Weight	Cost of capital (%)	WACC (%)
9% Debentures	6,00,00,000	0.1875	5.40	1.01
12% Preference Shares	2,00,00,000	0.0625	12.00	0.75
Equity Share Capital (₹60 × 40,00,000 shares)	24,00,00,000	0.7500	20.00	15.00
Total	32,00,00,000	1.00		16.76

Q.5 **Cost of Capital**

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	(₹)
Debentures (₹ 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:

Debentures	₹ 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 debentures and preference shares.

Ans:

(i) Cost of Equity (K_e)

$$= \frac{D1}{P0-F} + g = \frac{₹ 1}{₹ 24 - ₹ 4} + 0.05 = 0.1 \text{ or } 10\%$$

(ii) Cost of Debt (K_d)

Current market price (P_0) – floatation cost = I(1-t) × PVAF(r,10) + RV × 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

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

Cost of Debt (K_d) = 6.89%

(iii) Cost of Preference shares (K_p)

Current market price (P_0) – floatation cost = PD × PVAF(r,10) + RV × 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

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

Cost of Preference Shares (K_p) = 4.08%

(a) Calculation of WACC using book value weights

Source of capital	Book Value	Weights	After tax cost of capital	WACC (K_o)
	(₹)	(a)	(b)	(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_o) = 0.07743 or 7.74%

(b) Calculation of WACC using market value weights

Source of capital	Market Value	Weights	After tax cost of capital	WACC (K_o)
	(₹)	(a)	(b)	(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_o) = 0.0859 or 8.59%

Q.6 PK Ltd. has the following book-value capital structure as on March 31, 2020.

	(₹)
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

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.

Required:

(i) COMPUTE weighted average cost of capital (WACC) of the company based on the existing capital structure.

(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.

Ans:

(i) Computation of Weighted Average Cost of Capital based on existing capital structure

Source of Capital	Existing Capital structure (₹)	Weights (a)	After tax cost of capital (%) (b)	WACC (%) (a) × (b)
Equity share capital (W.N.1)	2,00,00,000	0.555	10.00	5.55
11.5% Preference share capital	60,00,000	0.167	11.50	1.92
10% Debentures (W.N.2)	1,00,00,000	0.278	6.50	1.81
	3,60,00,000	1.000		9.28

Working Notes (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 10% Debentures:

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

(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	6.10
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		10.32

Working Notes (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 12% Debentures

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

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

Q.7 Indel Ltd. has the following capital structure, which is considered to be optimum as on 31st March, 2021:

Particulars	(₹)
14% Debentures	60,000
11% Preference shares	20,000
Equity Shares (10,000 shares)	3,20,000
	4,00,000

The company share has a market price of ₹ 47.20. Next year dividend per share is 50% of year 2020 EPS. The following is the uniform trend of EPS for the preceding 10 years which is expected to continue in future.

Year	EPS (₹)	Year	EPS (₹)
2011	2.00	2016	3.22
2012	2.20	2017	3.54
2013	2.42	2018	3.90
2014	2.66	2019	4.29
2015	2.93	2020	4.72

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

Preference shares of ₹ 18.50 (with annual dividend of ₹ 2.22 per share) were also issued. The company is in 30% tax bracket.

(A) CALCULATE after tax:

(i) Cost of new debt

(ii) Cost of new preference shares

(iii) 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 earnings of 2020.

(D) COMPUTE marginal cost of capital when the fund exceeds the amount calculated in (C), assuming new equity is issued at ₹ 40 per share?

Ans: (A) (i) Cost of new debt

$$K_d = \frac{I(1-t)}{P_0}$$

$$= \frac{₹\ 16(1-0.3)}{₹\ 96} = 0.11667$$

(ii) Cost of new preference shares

$$K_p = \frac{₹\ 2.22}{₹\ 18.5} = 0.12$$

(iii) Cost of new equity shares

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

$$= \frac{₹\ 2.36}{₹\ 47.20} + 0.10$$

$$= 0.05 + 0.10 = 0.15$$

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

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

Calculation of D_1

D_1 = 50% of 2020 EPS = 50% of ₹ 4.72 = ₹ 2.36

(B) Calculation of marginal cost of capital

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

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

Retained earnings = 50% of EPS of 2020 × outstanding equity shares

= 50% of ₹ 4.72 × 10,000 shares = ₹ 23,600

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

So, ₹ 23,600 = 80% of Total Capital

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

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

∴ The cost of new issue of equity shares will be:

$$K_e = \frac{D_1}{P_0} + g = \frac{₹\ 2.36}{₹\ 40} + 0.10 = 0.159$$

The marginal cost of capital will be:

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

Q.8 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.:

(i) Before the new Proposal

(ii) After the new Proposal

Ans: **Workings:**

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

$= \frac{₹\ 7,50,000}{0.08} = ₹\ 93,75,000$

(b) Value of equity capital $= \frac{\text{Operating profit - Interest}}{\text{Cost of equity } (K_e)}$

$= \frac{₹\ 34,50,000 - 7,50,000}{0.16} = ₹\ 1,68,75,000$

(c) New Cost of equity (K_e) after proposal

$= \frac{\text{Increased Operating profit - Interest on Increased debt}}{\text{Equity capital}}$

$= \frac{(₹\ 34,50,000 + ₹\ 14,25,000) - (₹\ 7,50,000 + ₹\ 6,00,000)}{₹\ 1,68,75,000}$

$= \frac{₹\ 48,75,000 - ₹\ 13,50,000}{₹\ 1,68,75,000} = \frac{₹\ 35,25,000}{₹\ 1,68,75,000} = 0.209 \text{ or } 20.9\%$

(i) Calculation of Weighted Average Cost of Capital (WACC) before the new proposal

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 %**

(ii) Calculation of Weighted Average Cost of Capital (WACC) after the new proposal

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 %**

Q.9 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:

I. 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.

II. 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.

III. 15% Preference shares with face value of ₹ 100 would realise ₹ 105 per share.

IV. 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.

V. Corporate tax rate is 30%.

You are required to DETERMINE the weighted average cost of capital of Ex Limited using both the weights.

Ans: **(i)** 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

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

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

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

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

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

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

$$= \frac{₹\ 15 \times 0.70 + ₹\ 0.75}{₹\ 95.875} = \frac{₹\ 11.25}{₹\ 95.875} = 0.1173$$

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

Market price of debentures (approximation method)

= ₹ 15 ÷ 0.16 = ₹ 93.75

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

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

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

P_0 = ₹ 15 × 5.0287 + ₹ 100 × 0.1954

P_0 = ₹ 75.4305 + ₹ 19.54 = ₹ 94.9705

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

Accordingly, the cost of debt can be calculated

Total Cost of capital [BV weights and MV weights]

(Amount in (₹) lakh)

Source of capital	Weights		Specific Cost (K)	Total cost	
	BV	MV		(BV × K)	(MV × K)
Equity Shares	240	320**	0.2476	59.4240	79.2320
Retained Earnings	60	80**	0.2363	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):

Using Book Value $= \frac{₹\ 86.0022}{₹\ 390} = 0.2205$ or 22.05%

Using Market Value $= \frac{₹\ 110.2216}{₹\ 488.30} = 0.2257$ or 22.57%

Q.10 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 of interest on bank loan and debentures if tax rate applicable is 25%.

Ans:

Let the rate of Interest on debenture be x

$\therefore$ Rate of Interest on loan = 1.5x

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

$$= \frac{100x(1-0.25)\ \dfrac{100-97}{3}}{\dfrac{100+97}{2}}$$

$$= \frac{75x+1}{98.5}$$

$\therefore$ K_d on bank loan = 1.5x (1 – 0.25) = 1.125x

$$K_e = \frac{EPS}{MPS} = \frac{1}{MPS/EPS} = \frac{1}{P/E} = \frac{1}{5} = 0.2$$

$K_Y = K_e = 0.2$

Computation of WACC

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		$0.1 + 0.225x + \dfrac{22.5x+0.3}{98.5}$

WACC = 15%

$\therefore$ $0.1 + 0.225x + \dfrac{22.5x}{98.5} + \dfrac{0.3}{98.5} = 0.15$

$\therefore$ 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 %

$\therefore$ Rate of interest on debenture = x = 10.36%

Rate of interest on Bank loan = 1.5x = (1.5) (10.36%) = 15.54%.

Q.11 **Amrit Corporation has the following book value capital structure:**

Equity Capital (50 lakh shares of ₹ 10 each).	₹ 5,00,00000
15% Preference share (50,000 shares ₹ 100 each)	₹ 50,00,000
Retained earnings	₹ 4,00,00,000
Debentures 14% (2,50,000 debentures ₹ 100 each)	₹ 2,50,00,000
Term loan 13%	₹ 4,00,00000

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%.

(a) CALCULATE the Weighted Average Cost of Capital (WACC) using market value proportions.

(b) DETERMINE the Marginal Cost of Capital (MACC) if it needs ₹ 5,00,00000 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.

Ans:

(a) Calculation of Cost of Equity

(i) D_0 = ₹ 5x 60%

D_0 = ₹ 3

g = b x r

= (1-0.6) x 10% = 4%

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

= 3 x (1 + 4%)

= 3 x 1.04 = 3.12

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

$Ke = \frac{3.12}{20.8} + 0.04$

Ke = 19%

(ii) Calculation of Cost of Preference Shares

N =10 years

NP = ₹ 90

PD = ₹ 15

RV = ₹ 100

$$Kp = \frac{PD + (RV - NP)/N}{(RV + NP)} x100$$

$$Kp = \frac{15 + (100 - 90)/10}{(100 + 90)/2} x100$$

Kp = 16/95 x 100

Kp= 16.84%

(iii) Calculation of Cost of Debentures

N = 6 years

NP = ₹ 75

Interest = ₹ 14

RV = ₹ 100

T = 40%

$$Kd = \frac{int(1 - t) + (RV - NP)/N}{(RV + NP)/2} x100$$

$$Kd = \frac{14 x (1 - 0.4) + (100 - 75)/6}{(100 + 75)/2} x100$$

$$Kd = \frac{8.4 - 4.17}{87.5} x100$$

Kd=14.37%

(iv) Cost of Term Loan

Kd = Interest rate (1-t)

Kd = 13% (1-40%)

Kd = 7.8%

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

Capital	Cost of Capital	Market Value		Market Value Weights	Product (Cost x weights)
Equity	19.00%	20.8 x 50,00,000	₹10,40,00,000	0.6218	11.81%
Preference Shares	16.84%	90 x 50,000	₹ 45,00,000	0.0269	0.45%
Debentures	14.37%	75 x 2,50,000	₹ 1,87,50,000	0.1121	1.61%
Term Loan	7.80%		₹ 4,00,00,000	0.2392	1.87%
Total			**₹16,72,50,000**	**1**	**15.74%**

WACC= 15.74%

(b) Calculation of Marginal Cost of Capital (MACC)

The required capital of ₹ 50,000,000 will be raised as follows:

Equity = 60% of ₹ 50,000,000 = ₹ 30,000,000

Deby = 20% of ₹ 50,000,000 = ₹10,000,000

Retained Earnings= 20% of ₹ 50,000,000 = ₹ 10,000,000

$$\text{Marginal Cost of Equity} = \frac{3.12}{1.4} + 0.04$$

$$= 26.28\%$$

Marginal Cost of Debt

$$\text{Cost of Debt (before tax)} = \frac{13\% \text{ of } ₹\,40,00,000 + 15\% \text{ of } ₹\,60,00,000}{₹\,1,00,00,000}$$

$$= \frac{₹\,5,20,000 + ₹\,9,00,000}{₹\,1,00,00,000} = 14.2\%$$

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%

Q.12 Jason Limited is planning to raise additional finance of ₹ 20 lakhs for meeting its new project plans. It has ₹ 4,20,000 in the form of retained earnings available for investment purposes. Further details are as following:

Debt / Equity Mix	30 / 70
Cost of Debt	
Upto ₹ 3,60,000	8 % (before tax)
Beyond ₹ 3,60,000	12 % (before tax)
Earnings per share	₹ 4
Dividend pay-out	50% of earnings
Current Market Price per share	₹ 44
Expected Growth rate in Dividend	10 %
Tax	40%

You are required:

(a) To determine the cost of retained earnings and cost of equity.

(b) To determine the post-tax average cost of additional debt.

(c) To determine the pattern for raising the additional finance, and

(d) Compute the overall weighted average after tax cost of additional finance.

Ans:

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

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

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

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

(b) Cost of Debt (Post Tax)

Kd = I (1-t)

Upto 3,60,000 Kd = .08 (1-0.4) = 0.048

Beyond 3,60,000 = .12 (1-0.4) = 0.072

Thus, post-tax cost of additional debt = 0.048 x 3,60,000 / 6,00,000 + 0.072 x 2,40,000/ 6,00,000 = 0.0288 + 0.0288 = 0.0576 or 5.76%

(c) Pattern for Raising Additional Finance

Debt = 20,00,000 x 30% = 6,00,000

Equity = 20,00,000 x 70 % = 14,00,000

Out of this total equity amount of ₹ 14,00,000 -

Equity Shares = 14,00,000 – 4,20,000

= 9,80,000

And Retained Earnings = 4,20,000

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

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

Q.13 BS Ltd. has the following capital structure at book-value as on 31st March, 2024:

Particulars	**(₹)**
Equity share capital (10,00,000 shares)	3,00,00,000
11.5% Preference shares	60,00,000
10% Debentures	1,00,00,000
	4,60,00,000

The equity shares of the company are sold for₹ 300. It is expected that the company will pay next year a dividend of ₹ 15 per equity share, which is expected to grow by 5% p.a. forever. Assume a 35% corporate tax rate.

Required:

(i) COMPUTE weighted average cost of capital (WACC) of the company based on the existing capital structure.

(ii) COMPUTE the new WACC, if the company raises an additional ₹ 50 lakhs debt by issuing 10 years 12% debentures but the yield on debentures of similar maturity and risk class is 13%; flotation cost is 2%. Face value of the debenture ₹ 100. This would result in increasing the expected equity dividend ₹ 20 and leave the growth rate unchanged, but the price of equity share will fall to ₹ 250 per share.

Ans:

5. (i) Computation of Weighted Average Cost of Capital based on existing capital structure

Source of Capital	Existing Capital structure (₹)	Weights (a)	After tax cost of capital (%) (b)	WACC (%) (a) × (b)
Equity share capital (W.N.1)	3,00,00,000	0.652	10.00	6.52
11.5% Preference share capital	60,00,000	0.130	11.50	1.50
10% Debentures (W.N.2)	1,00,00,000	0.218	6.50	1.42
Total	4,60,00,000	1.000		9.44

Working Notes:

1. Cost of Equity Capital:

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

$$= \frac{₹15}{₹300} + 0.05$$

$$= 10\%$$

2. Cost of 10% Debentures

$$K_d = \frac{\text{Interest}(1-t)}{\text{Net proceeds}}$$

$$= \frac{₹10,00,000(1-0.35)}{₹1,00,00,000}$$

$$= 0.065 \text{ or } 6.5\%$$

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

Source of Capital	New Capital structure (₹)	Weights (a)	After tax cost of capital (%) (b)	WACC (%) (a) x (b)
Equity share capital (W.N.3)	3,00,00,000	0.588	13.00	7.64
11.5% Preference share capital	60,00,000	0.118	11.50	1.36
10% Debentures (W.N.2)	1,00,00,000	0.196	6.50	1.27
12% Debentures (W.N.4)	50,00,000	0.098	9.21	0.90
Total	5,10,00,000	1.000		11.17

Working Notes:

3. Cost of Equity Capital:

$$K_e = \frac{₹\,20}{₹\,250} + 0.05$$

$$= 13\%$$

4. Cost of 12% Debentures

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

$$= \frac{₹\,12(1-0.35) + \left(\frac{₹\,100 - ₹90.31^*}{10\,\text{years}}\right)}{\frac{₹\,100 + ₹90.31^*}{2}}$$

$$= \frac{₹\,8.769}{₹\,95.155} = 0.0921$$

*Since yield on similar type of debentures is 13 per cent, the company would be required to offer debentures at discount.

Market price of debentures (approximation method)

= ₹ 12 ÷ 0.13 = ₹ 92.31

Sale proceeds from debentures = ₹ 92.31 – ₹ 2 (i.e., floatation cost) = ₹ 90.31

Q.1 The Capital Structure of Samyaktva Limited is as follows:

	Amount (in ₹)
12% Debentures	3,50,000
14% Pref. Shares	4,50,000
Equity shares (Face value of ₹ 10 each)	8,50,000
	16,50,000

Additional Information:

1. ₹ 100 per debentures redeemable at premium of 6% with floatation cost of 5% & 5 years of maturity. The current market price of the debenture is ₹ 115
2. ₹ 100 per preference shares redeemable at a premium of 10%, issued at discount of 2% with a floatation cost of 5% on the issue price. The current market price per preference share is ₹ 108. It has maturity of 10 years
3. An equity share has a floatation cost of ₹ 5 with a market price per share currently quoted at ₹ 30. Samyaktva Limited paid a last dividend of ₹ 4 and the company is expected to give an annual growth rate of 9% on the dividends. The company has a practice of paying all the earnings in the form of dividends.
4. Corporate Taxation rate is at 25%

CALCULATE WACC using market value weights

Ans:

5. WN 1: Calculation of Cost of Debt

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

RV = 100 + 6% = 106

n = term = 5 years

t = tax = 0.25

NP = Issue Price – Floatation cost

= 115 – 5% (Issue price will be at Market price and no Face Value)

= 109.25

$$Kd = \frac{12(1-0.25)+\frac{(106-109.25)}{5}}{\frac{(106+109.25)}{2}}$$

Therefore **Kd = 7.76%**

WN 2: Calculation of Cost of Preference Shares

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

RV = 100 + 10% = 110

n = term = 10 years

NP = Issue Price – Floatation cost

Issue Price = (108 – 2%) = 105.84

Net Proceeds = 105.84 (-) 5% = 100.55

$$Kp = \frac{14 + \frac{(110 - 100.55)}{10}}{\frac{(110 + 100.55)}{2}}$$

Therefore **Kp = 14.19%**

WN 3: Calculation of Cost of Equity

Since growth rate is given, Ke is to be calculated by using Gordon's formula

As per Gordon,

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

Where, D1 = Expected dividend at the end of Year 1

Po = Current Market Price (–) Floatation cost

G = growth rate in dividends

$$Ke = \frac{4 + 9\% \times 4}{30 - 5} + 0.09$$

Ke = 26.44%

Calculation of WACC using Market Value Weights

Sources	Amount of Capital (₹)	Weights (W)	Cost (K)	W X K
Debentures	4,02,500 (3,500 x 115)	0.1171	7.76 (WN 1)	0.9087
Preference shares	4,86,000 (4,500 x 108)	0.1413	14.19 (WN 2)	2.00
Equity shares	25,50,000 (85,000 x 30)	0.7416	26.44 (WN 3)	19.6079
	34,38,500			Ko = 22.52%