# 3. COST OF CAPITAL

**NO. OF PROBLEMS IN 41E OF CA INTER: CLASSROOM - 28, ASSIGNMENT - 32**
**NO. OF PROBLEMS IN 42E OF CA INTER: CLASSROOM - 26, ASSIGNMENT - 36**
**NO. OF PROBLEMS IN 43E OF CA INTER: CLASSROOM - 27 ASSIGNMENT - 27**

## MODEL - WISE ANALYSIS OF PREVIOUS EXAMINATIONS OF IPCC AND CA INTER

| Model No. | M-11 | N-11 | M-12 | N-12 | M-13 TO N-13 | M-14 | N-14 | M-15 | N-15 | M-16 | N-16 | M-17 | N-17 | M-18(O) | M-18(N) | N-18(O) | N-18(N) | M-19(O) | M-19(N) | N-19(O) | N-19(N) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 1.2 | - | - | - | - | - | - | - | - | | | | - | - | - | - | - | - | - | - | - | - |
| 1.3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 2.1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 2.2 | - | - | - | - | 5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 3 | - | - | - | - | - | - | - | - | - | - | | - | - | - | - | - | - | - | - | - | - |
| 3.1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 3.2 | - | - | - | - | - | - | - | - | - | - | | | - | - | - | - | - | - | - | - | - |
| 3.3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 5 | - | - | - |
| 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 5 | 5 |
| 5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 5.1 | - | - | - | - | - | 5 | | | - | - | 4 | - | - | - | - | - | - | - | - | - | - |
| 5.2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 8 | - | - | - | - | - |
| 6 | - | - | - | - | - | - | - | 8 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 7 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |



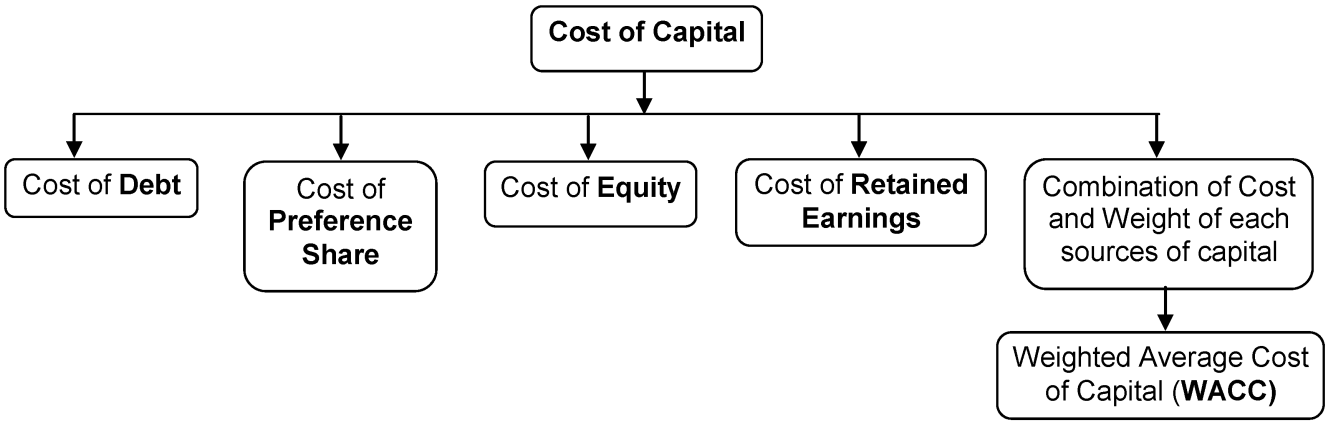
## SIGNIFICANCE OF EACH PROBLEM COVERED IN THIS MATERIAL

| Problem No. in this material | Problem No. in NEW SM | Problem No. in OLD SM | Problem No. in OLD PM | RTP | MTP | Previous Exams | Remarks |
|---|---|---|---|---|---|---|---|
| CR 1 | ILL-1(80%) ILL-3(80%) | ILL-1(90%) | Q.No.1 (80%) | - | - | - | TN |
| CR 2 | ILL-2(80%) | - | - | - | - | - | |
| CR 3 | - | - | - | - | - | - | |
| CR 4 | ILL-4(80%) | - | - | N-16 | - | - | |
| CR 5 | ILL-5 | ILL-4 | - | - | - | - | |
| CR 6 | ILL-6 | ILL-2(70%) ILL-3(70%) | - | - | - | - | |
| CR 7 | ILL-8(80%) | ILU-7(80%) | - | - | - | - | TN |
| CR 8 | ILL-8 | - | - | - | - | - | |
| CR 9 | ILL-7(80%) | ILL-5 | - | - | - | - | |
| CR 10 | - | - | - | - | - | - | |
| CR 11 | - | - | - | - | - | - | |
| CR 12 | ILL-9 | ILL-14 | - | - | - | - | |
| CR 13 | ILL-11(80%) | - | - | - | - | - | |
| CR 14 | ILL14(80%) | - | - | M-17 | - | - | |
| CR 15 | - | - | - | - | - | - | |
| CR 16 | - | - | - | - | - | - | TN |
| CR 17 | - | - | - | - | - | - | |
| CR 18 | - | - | - | - | - | - | |
| CR 19 | ILL-10 | ILL-9 | - | - | | - | |
| CR 20 | ILL-12(80%) ILL-15(80%) | ILL-12,10(80%) | - | - | - | - | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CR 21** | ILL-13 | - | Q.No.2 | - | - | - | **TN** |
| **CR 22** | ILL-14(80%) | - | - | - | - | - | |
| **CR 23** | - | - | Q.No.7 | - | N18(N) | - | |
| **CR 24** | ILL-16(80%) | - | Q.No.8 | - | N18(O) | N18(O) | |
| **CR 25** | ILL-17 | ILL-13 | Q.No.10,15(90%) | M19 (N&O) | - | - | |
| **CR 26** | P.Q-3 | - | - | M15,N15,N17 | N16 | M15, N19 (N&O) | |
| **CR 27** | ILL-18 | ILL-15 | Q.No.9 (90%) | - | - | - | |
| **ASG 1** | - | - | - | - | - | - | |
| **ASG 2** | - | - | - | - | - | - | |
| **ASG 3** | - | - | - | - | - | - | |
| **ASG-4** | - | - | - | - | - | - | |
| **ASG 5** | - | - | - | - | - | - | **TN** |
| **ASG 6** | - | - | - | - | - | - | **RG** |
| **ASG 7** | - | - | - | - | - | - | |
| **ASG 8** | ILL-8 | - | - | - | - | - | |
| **ASG 9** | - | - | Q.N-4 | - | - | M13 | **TN** |
| **ASG 10** | - | - | - | - | - | - | |
| **ASG 11** | P.Q-2 | - | - | - | - | - | |
| **ASG 12** | ILL-9 | - | - | - | - | - | |
| **ASG 13** | - | - | - | - | - | - | |
| **ASG 14** | - | - | - | - | - | - | **RK** |
| **ASG 15** | - | - | - | - | - | - | **TN** |
| **ASG 16** | - | - | - | - | - | - | |
| **ASG 17** | - | - | - | - | - | - | |
| **ASG 18** | - | - | - | - | - | - | **AL AG** |
| **ASG 19** | - | - | - | - | - | - | |
| **ASG 20** | ILL-12 | - | - | - | - | - | |
| **ASG 21** | ILL-13 | - | - | - | - | M18(O) | **TN** |
| **ASG 22** | - | - | Q.N-5 | - | - | - | |
| **ASG 23** | - | - | Q.N-12(80%)( | N-19(O,N) | - | - | **PN** |
| **ASG 24** | P.Q-4(80%) | - | - | - | - | M19(N&O) (90%) | |
| **ASG 25** | - | - | Q.N-11 | - | - | - | **RK** |
| **ASG 26** | - | - | Q.N-14 | - | - | - | **RK** |
| **ASG 27** | | - | - | - | N19(O,N) (90%) | - | |



## CHAPTER OVER VIEW:




## MEANING:

- Cost of capital is the <u>return expected by the providers of capital</u> (i.e. shareholders, lenders and the debt- holders) to the business as <u>a compensation for their contribution to the total</u> <u>capital.</u> In other words, it is the minimum rate of return expected by the providers of finance.

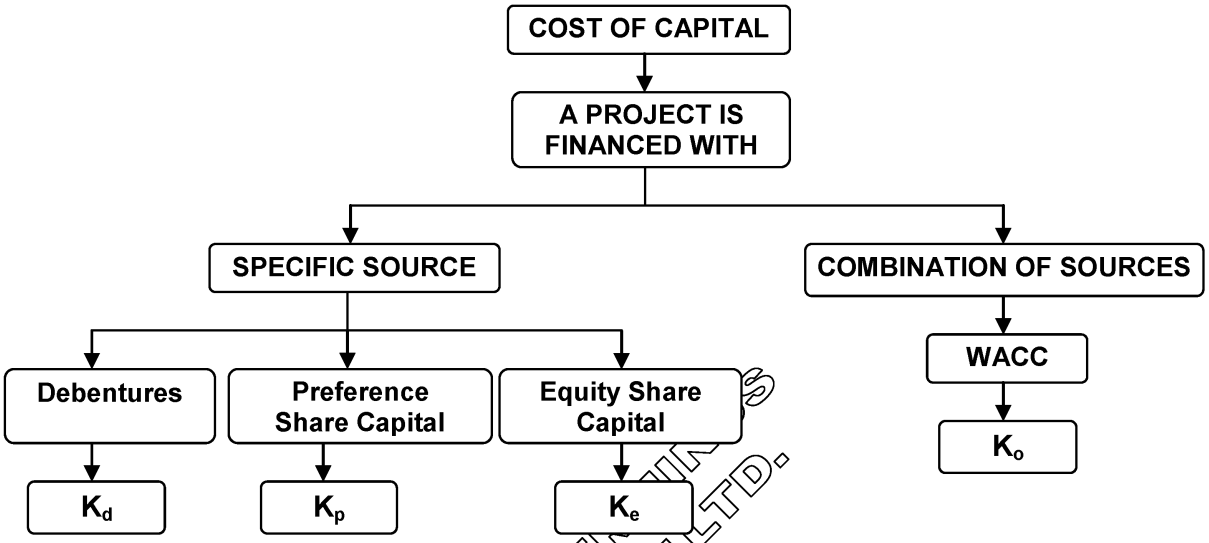
- It is expressed as a rate and used to discount/ compound the cash flow or stream of cash flows.
- Cost of capital is also known as 'cut-off' rate, 'hurdle rate', 'minimum rate of return' etc.

**SIGNIFICANCE OF COST OF CAPITAL:**

The cost of capital is important to arrive at correct amount and helps the management or an investor to take an appropriate decision. The correct cost of capital helps decision making in the following ways:

- Evaluation of investment options
- Performance Appraisal
- Designing of optimum credit policy

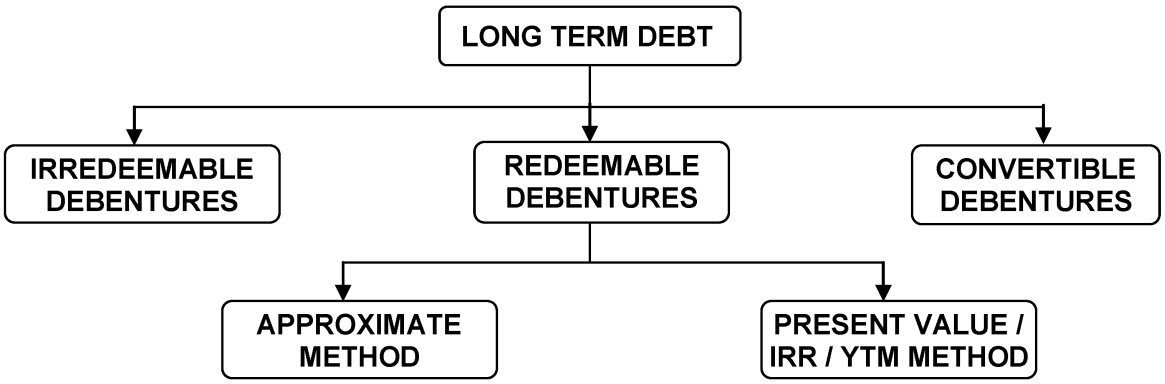
**DETERMINATION OF THE COST OF CAPITAL**




**FLOTATION COST:** The new issue of a security (debt or equity) involves some expenditure in the form of underwriting or brokerage fees, legal and administrative charges, registration fees, printing expenses etc. The sum of all these costs is known as floatation cost. This expenditure is incurred to make the securities available to the investors. Floatation cost is adjusted to arrive at net proceeds for the calculation of cost of capital.

## MODEL 1: COST OF LONG-TERM DEBT

- Long term debt includes long term loans from financial institutions, capital from issuing debentures or bonds etc.
- External borrowings or debt instruments do not confer ownership to the providers of finance. The providers of debt fund do not participate in the affairs of the company but enjoys the charge on the profit before taxes.



## MODEL 1.1: COST OF IRREDEEMABLE DEBENTURES:

The cost of debentures which are not redeemed by the issuer of the debenture is known as irredeemable debentures. Cost of debentures not redeemable during the life time of the company is calculated as below:

$$\text{Cost of Irredeemable Debenture } (K_d) = \frac{I(1-t)}{NP}$$

Where,

$K_d$ = Cost of debt after tax

I = Annual interest payment

NP = Net proceeds of debentures or current market price

t = Tax rate

**PROBLEM NO 1:** XYZ Ltd. Issued Rs.100 Lakhs 12% Debentures of Rs.100 each. Calculate the cost of debt in each of the following cases. (**Assume corporate tax being 40%).**

Case (a) If Debentures are issued at par with no floatation cost.

Case (b) If Debentures are issued at par with floatation cost are 5% of issue price.

Case (c) If Debentures are issued at 10% premium with floatation cost are 5% of issue price.

Case (d) If Debentures are issued at 10% discount with floatation cost are 5% of issue price.

***(A) (TN) (ANS: (A) 7.20%, (B) 7.58%, (C) 6.89%, (D) 8.42%) (SOLVE PROBLEM NO. 1 OF ASSIGNMENT PROBLEMS AS REWORK)***

**CONCEPT QUESTIONS:**

1. What would be the impact of flotation cost on cost of debt?
2. What would be the impact of premium and discount on cost of debt?

**Note:**



## MODEL 1.2: COST OF REDEEMABLE DEBENTURES:

The cost of debentures which are redeemed by the issuer of the debenture is known as redeemable debentures. Redemption may be done either in lump sum or in instalments.

The Cost of Redeemable debts can be ascertained under the following methods

**a)** Approximate Method.

**b)** Present value method / Internal Rate of Return (IRR) / Yield to Maturity (YTM).

**a) APPROXIMATE METHOD:**

**Conditions:** This model is subject to following assumptions:

- The principal amount must be repaid at the time of maturity.
- No change in interest rate during the term of Debenture / Bond.

If **any one of the above conditions is not satisfied**, then cost of redeemable debt should be ascertained by present value method / IRR / YTM.

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

Where,

I = Interest payment

NP = Net proceeds from debentures in case of new issue of debt or Current Market price in case of existing debt.

RV = Redemption value of debentures

T = Tax rate applicable to the company

n = Life of debentures.

**PROBLEM NO 2:** Calculate the explicit cost of debt for each of the following situations:

**a)** Debentures are sold at par and flotation costs are 5%.

**b)** Debentures are sold at a premium of 10% and floatation costs are 5% of issue price.

**c)** Debentures are sold at a discount of 5% and flotation costs are 5% of issue price.

**Assume:** (i) Coupon rate of interest on debentures is 15% (ii) Face value of debentures is Rs. 100; (iii) Maturity period is 10 years (iv) Tax rate is 35%. ***(A) (ANS.: A. 10.51%, B. 9.10%, C. 11.27%)***

***(SOLVE PROBLEM NO. 2 OF ASSIGNMENT PROBLEMS AS REWORK)***

**CONCEPT QUESTIONS:**

1. What would be the impact of coupon rate on cost of debt?
2. What would be the impact of tenure on the cost of debt?

**Note:**_____

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**PROBLEM NO 3:**

**a)** A company's debentures of the face value of Rs 100 bear 8% coupon rate. Debentures of this type currently yield 10% (**investor expected rate of return**). What is the market price of debentures of the company?

**b)** What would happen to the market price of debentures if interest rate on debentures rises to (i) 16% & (ii) drops to 12% and assuming no change in current yield?

**c)** What would be the market price of debentures in situation (a) if it is assumed that debentures were originally having 15 year maturity period & maturity period is 4 years away from now?

**d)** Would you pay Rs.90 to purchase debentures specified in situation (c)? Explain.

***(A) (ANS.: A. 80, B. 160,120, C. 93.33, D. ADVISABLE TO PURCHASE THE GIVEN DEBENTURES)***

***(SOLVE PROBLEM NO. 3 OF ASSIGNMENT PROBLEMS AS REWORK)***

**CONCEPT QUESTIONS**:

1. What would be the impact on market price of debentures if yield on debentures increases or decreases by 1%?
2. When do you buy a debenture at current market price and sell at current market price?

**Note:**_____

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**PRESENT VALUE METHOD / INTERNAL RATE OF RETURN (IRR) / YIELD TO MATURITY (YTM):**

- The cost of redeemable debt ($K_d$) is also calculated by discounting the relevant cash flows using Internal rate of return (IRR) (The concept of IRR is discussed in the Chapter- Investment Decisions).
- Here YTM is the annual return of an investment from the current date till maturity date. So, YTM is the internal rate of return at which current price of a debt equals to the present value of all cash flows.
- **The relevant cash flows are as follows:**

| Year | Cash flows |
|---|---|
| 0 | Net proceeds in case of new issue/ Current market price in case of existing debt (NP or $P_0$) |

| | |
|---|---|
| 1 to n | Interest net of tax [I(1-t)] |
| n | Redemption value (RV) |

**Steps to calculate relevant cash flows:**

**Step 1:** Identify the cash flows

**Step 2:** Calculate NPVs of cash flows as identified above using two discount rates (guessing).

**Step 3:** Calculate IRR

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

Where,

L = Lower

H = Higher

**PROBLEM NO 4: (PRINTED SOLUTION AVILABLE):** A company has issued 15% debentures aggregating Rs.1,00,000. The flotation cost is 15%. The company has agreed to repay the debentures at par in 5 equal annual installments starting at the end of year 1. The rate of tax is 35%. Find cost of debt?

| Present value factor | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 15% | 0.870 | 0.756 | 0.658 | 0.572 | 0.497 |
| 18% | 0.847 | 0.718 | 0.609 | 0.516 | 0.437 |

*(A)(RTP N16) (ANS.: 10.9%) (SOLVE PROBLEM NO. 4 OF ASSIGNMENT PROBLEMS AS REWORK)*



**CONCEPT QUESTIONS:**

1. What would be the impact on cost of debt if tax rate increases or decreases by 5% (if all variables are remains constant)?
2. What would be the impact on cost of debt if debentures are redeemed at 10 annual installments?

**Note:**_____

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**AMORTISATION OF BOND:**

- A bond may be amortised every year i.e. principal is repaid every year rather than at maturity.
- In such a situation, the principal will go down with annual payments and interest will be computed on the outstanding amount.
- The cash flows of the bonds will be uneven.

**PROBLEM NO 5:** Reserve Bank of India is proposing to sell a 10-year bond of Rs.10,000 at 8 percent rate of interest p.a. The bond amount will be amortized equally over its life. What is the bond's present value for an investor if he expects minimum rate of return of 6 percent?

*(B)(NEW SM, OLD SM) (ANS.: RS. 10,524.16) (SOLVE PROBLEM NO. 5 OF ASSIGNMENT PROBLEMS AS REWORK)*

**CONCEPT QUESTIONS:**

1. What would be the impact on market price of a bond if investor expected rate of return is equal to 8%?
2. What would be the impact on market price of a bond, if coupon rate increases or decreases by 1% (if all variables are remains constant)?

**Note:**_____

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## MODEL 1.3: COST OF CONVERTIBLE DEBENTURE

- Holders of convertible debentures have the option to either get the debentures redeemed into cash or get specified number of company's shares in lieu of cash.
- The calculation of cost of convertible debentures is very much similar to that of redeemable debentures.
- While determining the redeemable value of the debentures, it is assumed that all the debenture holders will choose the option which has the higher value and accordingly it is considered to calculate cost of debt.

**PROBLEM NO 6:** A company issued 10,000, 15% Convertible debentures of Rs.100 each with a maturity period of 5 years. At maturity the debenture holders will have the option to convert the debentures into equity shares of the company in the ratio of 1:10 (10 shares for each debenture). The current market price of the equity shares is Rs.12 each and historically the growth rate of the shares are 5% per annum. Compute the cost of debentures assuming 35% tax rate. ***(B) (NEW SM, OLD SM)***

***(ANS: USING APPROXIMATE METHOD 16.09%) (SOLVE PROBLEM NO. 6 OF ASSIGNMENT PROBLEMS AS REWORK)***

**CONCEPT QUESTIONS:**

1. What would be the Redemption value if conversion ratio is given as 1:6?
2. When do you take conversion value as redemption value?

**Note:**_____

## MODEL 1.4: DEEP DISCOUNT BOND

**PROBLEM NO 7: (PRINTED SOLUTION AVILABLE):** Institutional development bank (IDB) issued zero interest deep discount bonds of face value of Rs. 1,00,000 each issued at 2500 & repayable after 25 years. Compute the cost of Debt if there is no corporate tax.

FVF=15%, 25 years = 32.919; FVF = 16%, 25years = 40.874

***(NEW SM) (ANS.: 15.89%) (SOLVE PROBLEM NO. 7 OF ASSIGNMENT PROBLEMS AS REWORK)***



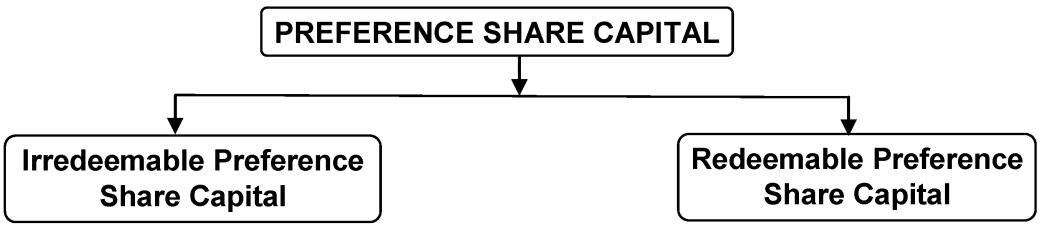
**CONCEPT QUESTIONS:**

1. What is the Difference between deep discount bond and zero coupon bond?
2. What would be the impact on cost of deep discount bond if maturity period increases or decreases by 5 years?

**Note:**_____

## MODEL 2: COST OF PREFERENCE SHARE CAPITAL

- The Preference share capital is paid dividend at a specified rate on face value of preference shares.
- Payment of dividend to the preference shareholders are not mandatory but are given priority over the equity shareholder.
- The payment of dividend to the preference shareholders is not charged as expenses but treated as appropriation of after-tax profit. Hence, dividend paid to preference shareholders does not reduce the tax liability to the company.



## MODEL 2.1: COST OF IRREDEEMABLE PREFERENCE SHARES

- The cost of irredeemable preference shares is like calculation of perpetuity.
- The cost is calculated by dividing the preference dividend with the current market price or net proceeds from the issue.
- The cost of irredeemable preference share is as below:

$$\text{Cost of Irredeemable Preference Share } (K_P) = \frac{PD}{P_0}$$

Where,

PD = Annual preference dividend

$P_0$ = Net proceeds in issue of preference shares

**PROBLEM NO 8:** A Ltd Issued Rs.100 Lakhs 12% Preference shares of Rs. 100 each. Calculate the cost of preference share in each of the following cases. (**Assume dividend tax rate being 20%).**

Case (a) If Preference shares are issued at par with no floatation cost.

Case (b) If Preference shares are issued at par with 5% floatation cost.

Case (c) If Preference shares are issued at 10% premium with 5% floatation cost.

Case (d) If Preference shares are issued at 10% discount with 5% floatation cost. ***(A) (TN)***

***(ANS: A) 14.40%, B) 15.16%, C) 13.78%, D) 16.84%) (SOLVE PROBLEM NO.8 OF ASSIGNMENT PROBLEMS AS REWORK)***

**CONCEPT QUESTIONS:**

1. What would be the impact of dividend distribution tax on cost of preference shares?
2. What would be the impact on cost of preference share if face value of Rs.1000 is taken instead of Rs.100?

**Note:**



## MODEL 2.2: COST OF REDEEMABLE PREFERENCE CAPITAL:

- Preference shares issued by a company which are redeemed on its maturity is called redeemable preference shares.
- Cost of redeemable preference share is like the cost of redeemable debentures with the exception that the dividends paid to the preference shareholders are not tax deductible.

The Cost of Redeemable debts can be ascertained under the following methods

- Approximate Method.
- Present value method / Internal Rate of Return (IRR) / Yield to Maturity (YTM).

### A. APPROXIMATE METHOD:

**Conditions:** This model is subject to following assumptions:

- The principal amount must be repaid at the time of maturity.
- No change in interest rate during the term of Debenture / Bond.

If **any one of the above conditions is not satisfied**, then cost of redeemable debt should be ascertained by present value method / IRR / YTM.

- Cost of preference capital is calculated as follows:

$$\text{Cost of Redeemable Preference Share } (K_p) = \frac{PD + \frac{RV - NP}{n}}{\frac{RV + NP}{2}}$$

Where,

PD = Annual preference dividend

RV = Redemption value of preference shares

NP = Net proceeds on issue of preference shares

n = Life of preference shares.

**PROBLEM NO 9:** XYZ Ltd. issues 2,000 10% preference shares of Rs.100 each at Rs. 95 each. The company proposes to redeem the preference shares at the end of 10th year from the date of issue. Calculate the cost of preference share? ***(A) (NEW SM, OLD SM) (ANS.: 10.77%)***

***(SOLVE PROBLEM NO. 9OF ASSIGNMENT PROBLEMS AS REWORK)***

**CONCEPT QUESTIONS:**

1. What would be the impact on cost of preference shares if current market price increases by Rs. 5/10?
2. What would be the cost of preference shares, if issued at Rs.100 instead of Rs.95?

**Note:**_____

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**PRESENT VALUE METHOD / INTERNAL RATE OF RETURN (IRR) / YIELD TO MATURITY (YTM)**
**(Already Discussed in Previous topic)**

**PROBLEM NO 10: (PRINTED SOLUTION AVILABLE):** Superior Cement Company issues Rs.100 face value preference stock which carries 12% dividend. The preference capital is repayable in two equal installments at the end of tenth and eleventh years, respectively. The net amount realized per preference share is Rs.95. What is the cost of preference capital?

| Present value factor | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 12% | 0.893 | 0.797 | 0.712 | 0.636 | 0.567 | 0.507 | 0.452 | 0.404 | 0.361 | 0.322 | 0.287 |
| 13% | 0.885 | 0.783 | 0.693 | 0.613 | 0.543 | 0.480 | 0.425 | 0.376 | 0.333 | 0.295 | 0.261 |



***(B) (ANS.: 12.92%) (SOLVE PROBLEM NO. 10 OF ASSIGNMENT PROBLEMS AS REWORK)***

**CONCEPT QUESTIONS:**

1. What would be the impact on cost of preference shares if dividend rate increases or decreases by 1%?
2. What would be the impact on cost of preference shares if it is issued at Rs110 instead of Rs.95?

**Note:**_____

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## MODEL 3: COST OF EQUITY SHARE CAPITAL

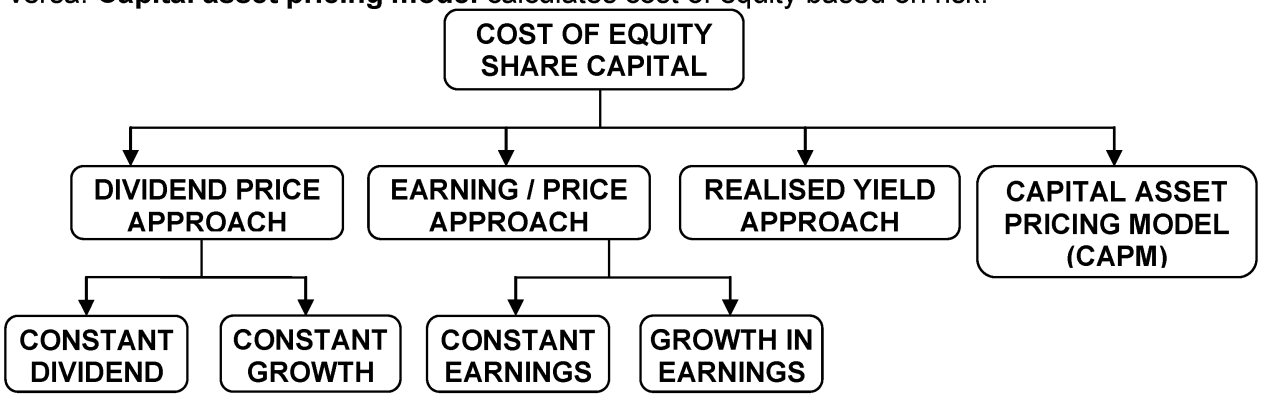
Just like any other source of finance, cost of equity is expectation of equity shareholders. We know that value is performance divided by expectations. If we know value and performance, then we can calculate expectation as a balancing figure.

Here performance means the amount paid by the company to investors, like interest, dividend, redemption price etc. In case of debentures and preference shares amount of interest or dividend is fixed but in case of equity shares it is uncertain.

Therefore, there is no single method for calculation of cost of equity.

1. If dividend is expected to be constant then **dividend price approach** should be used.
2. If earning per share is expected to be constant then **earning price approach** should be used.

3. If dividend and earning are expected to grow at a constant rate then **growth approach**, which is also named as **Gordon's model** should be used.
4. If it is difficult to forecast future then **realised yield approach** should be used, which looks into past.
5. All above methods calculate cost of equity as a balancing figure. While the cost of equity or expectation of investors is dependent on risk. Higher the risk higher the expectations and vice versa. **Capital asset pricing model** calculates cost of equity based on risk.




## MODEL 3.1: DIVIDEND PRICE APPROACH:

This is also known as Dividend Valuation Model. This model makes an assumption that the dividend per share is expected to remain constant forever.

Here, cost of equity capital is computed by dividing the expected dividend by market price per share as follows:

$$\text{Cost of Equity } (K_e) = \frac{D}{P_0}$$

Where,

$K_e$ = Cost of equity

D = Expected dividend

$P_0$ = Market price of equity (ex- dividend)



**PROBLEM NO 11:** Mahindra is a shareholder in the Central India Ltd. Although earnings for Central have varied considerably, Mahindra has determined that the long run average dividends for the firm have been Rs.2 per share. He expects a similar pattern to prevail in the future. Given the volatility of Central's dividends, Mahindra has decided that a minimum rate of 20% should be earned on this share. What price would Mahindra be willing to pay for Central's Shares? *(A) (ANS.: RS.10)*

*(SOLVE PROBLEM NO. 11 OF ASSIGNMENT PROBLEMS AS REWORK)*

**CONCEPT QUESTIONS:**

1. What is the interlink between value of share and investor expected rate of return.
2. What would be the impact on share if expected dividend is increases or decreases by Rs.2

**Note:**

## MODEL 3.1.2: DIVIDEND PRICE APPROACH WITH CONSTANT GROWTH:

As per this approach the rate of dividend growth remains constant. Where earnings, dividends and equity share price all grow at the same rate, the cost of equity capital may be computed as follows:

$$\text{Cost of Equity } (K_e) = \frac{D_1}{P_0} + g$$

Where,

$D_1$ = $[D_0 (1+ g)]$ i.e. next expected dividend

$P_0$ = Current Market price per share

g = Constant Growth Rate of Dividend.

In case of newly issued equity shares where floatation cost is incurred, the cost of equity share with an estimation of constant dividend growth is calculated as below:

$$\text{Cost of Equity } (K_e) = \frac{D_1}{P_0 - F} + g$$

Where, F = Flotation cost per share

**PROBLEM NO 12:** Investors require 12% rate of return on equity shares of company Y. What would be the market price of the share if the previous dividend (Do) was Rs.2 and investors expect dividends to grow at a constant rate of (a) 4% (b) 0% (c) - 4% (d) 11%.

***(B) (ANS: (A) RS. 26, (B) RS. 16.66, (C) RS.12 (D) RS. 222)***

***(SOLVE PROBLEM NO 12 OF ASSIGNMENT PROBLEMS AS REWORK)***

**CONCEPT QUESTIONS:**

1. What is the interlink between growth rate and retention ratio?
2. What would be the impact on share price, if growth rate is taken as 14% instead of above rates?

**Note:**_____

_____

**PROBLEM NO 13:**

From the under mentioned facts determine the cost of equity shares of company X:

**a)** Current market price of a share = Rs.150.

**b)** Cost of flotation per share on new shares Rs.3.

**c)** Dividend paid on the outstanding shares over the past five years:

| Year | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Dividend Per Share | 10.50 | 11.02 | 11.58 | 12.16 | 12.76 | 13.40 |

**d)** Assume a fixed dividend payout ratio.

**e)** Expected dividend on the new shares at the end of the current year is Rs.14.10 per share.

***(A) (ANS.: 14.6%) (SOLVE PROBLEM NO 13 OF ASSIGNMENT PROBLEMS AS REWORK)***

**CONCEPT QUESTIONS:**

1. What is the significance of growth rate while estimating the cost of equity?
2. When does the growth rate remains constant?

**Note:**_____

_____

**PROBLEM NO 14:** XYZ Ltd. is currently earning a profit after tax of Rs.25,00,000 and its shares are quoted in the market at Rs.450 per share. The company has 1,00,000 shares outstanding and has no debt in its capital structure. It is expected that the same level of earnings will be maintained for future years also. The company has 100 per cent pay-out policy.

**Required:**

**a)** Calculated the Cost of equity

**b)** If the company's pay-out ratio is assumed to be 70% and it earns 20% rate of return on its investment, then what would be the firm's cost of equity? ***(A) (RTP M17)***

***(ANS.: (A) 0.055 OR 5.55% (B) 0.0988 OR 9.89%) (SOLVE PROBLEM NO. 14 OF ASSIGNMENT PROBLEMS AS REWORK)***

**CONCEPT QUESTIONS:**

1. What is the interlink between dividend payout ratio and growth rate?
2. What would be the impact on cost of equity if share price quoted at Rs 500 instead of Rs 450?

**PROBLEM NO 15:** An investor is contemplating the purchase of equity shares of a company which had paid a dividend of Rs.5 per share last year. The dividends are expected to grow at 6% forever. The required rate of return on the shares of this company in the capital market is 12%. What will be the maximum price you will recommend the investor pay for one equity share of the company? Will your answer be different if he wants to hold the equity share for 3 years and 6 years?

***(A) (ANS.: RS.88.33, FOR 3 YEARS RS.105.21, FOR 6 YEARS RS.125.30)***

***(SOLVE PROBLEM NO 15 OF ASSIGNMENT PROBLEMS AS REWORK)***

**CONCEPT QUESTIONS:**

1. What would be the impact on value of share (if in the above case) investor expected return is considered as 15% instead of 12%?
2. What would be the impact on value of share (Ke remains constant) the shares are held for 5years and 10 years?

**Note:**_____



## MODEL 3.2: EARNING / PRICE APPROACH:

- The advocates of this approach co-relate the earnings of the company with the market price of its share.
- Accordingly, the cost of equity share capital would be based upon the expected rate of earnings of a company.
- The argument is that each investor expects a certain amount of earnings, whether distributed or not from the company in whose shares he invests.

## MODEL 3.2.1: EARNINGS / PRICE APPROACH WITH CONSTANT EARNINGS:

$$\text{Cost of Equity } (K_e) = \frac{E}{P}$$

Where,

E = Current earnings per share

P = Market share price

Since practically earnings do not remain constant and the price of equity shares is also directly influenced by the growth rate in earnings. The above formula needs to be modified to reflect the growth element.

**PROBLEM NO 16:** The Xavier Corporation, a dynamic growth firm, anticipates long-run level of future earning of Rs.7 per share. The current price of Xavier's shares is Rs. 55.45, floatation costs for the sale of equity shares would average about 10% of the price of the shares. What is the cost of new equity capital to Xavier? ***(B) (ANS.: 14.02%) (SOLVE PROBLEM NO 16 OF ASSIGNMENT PROBLEMS AS REWORK)***

**CONCEPT QUESTIONS:**

1. What would be the impact on cost of equity if expected EPS increases or decreases by Rs.1?
2. What would be the impact on cost of equity if no flotation expenses on issue?

**Note:**_____

## MODEL 3.2.2 EARNINGS / PRICE APPROACH WITH GROWTH IN EARNINGS:

$$\text{Cost of Equity } (K_e) = \frac{E}{P} + g$$

Where,

E = Current earnings per share

P = Market price per share

g = Annual growth rate of earnings.

The Earning Price Approach is similar to the dividend price approach; only it seeks to nullify the effect of changes in the dividend policy.

**PROBLEM NO 17:** From the following information, calculate cost of equity ($K_e$) according to (a) Earning Price ratio approach (b) Earning price plus growth approach.

1. Current Market Price of an Equity share : Rs.100
2. Expected Earnings per Share at the end of year: Rs. 10
3. Growth Rate: 6%. *(C) (TN) (ANS: A) 10%, B) 16%) (SOLVE PROBLEM NO. 17 OF ASSIGNMENT PROBLEMS AS REWORK)*

**CONCEPT QUESTIONS:**

1. What is the interlink between cost of equity and growth rate.?
2. What would be the impact on cost of equity if expected EPS is taken as Rs.15 instead of Rs.10?

**Note:**_____

_____

## MODEL 3.3: REALIZED YIELD APPROACH



- According to this approach, the average rate of return realized in the past few years is historically regarded as 'expected return' in the future.
- It computes cost of equity based on the past records of dividends actually realized by the equity shareholders.
- Though, this approach provides a single mechanism of calculating cost of equity, it has unrealistic assumptions like risks faced by the company remain same; the shareholders continue to expect the same rate of return; and the reinvestment opportunity cost (rate) of the shareholders is same as the realized yield. If the earnings do not remain stable, this method is not practical.

**PROBLEM NO 18:** A share is selling for Rs.50 on which a dividend of Rs.3 per share is expected at the end of the year. The expected market price after the dividend declaration is Rs.60. Compute (i) the return on investment (i) in shares, (ii) dividend yield and (iii) capital gain yield.

*(C) (ANS.: (I) 26% (II) 6% (III) 20%) (SOLVE PROBLEM NO 18 OF ASSIGNMENT PROBLEMS AS REWORK)*

**CONCEPT QUESTIONS:**

1. When does the dividend yield will increase?
2. When does the capital gain yield increase?

**Note:**_____

_____

**PROBLEM NO 19:** Mr. Mehra had purchased a share of Alpha Limited for Rs.100. 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 Rs.112.8. You are required to compute the cost of equity as per realized yield approach. (Assume Face Value of Share = Rs.100).

| Year | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| PVF @ 12% | 0.893 | 0.797 | 0.712 | 0.636 | 0.567 |

*(A) (NEW SM, OLD SM) (ANS.: 12%) (SOLVE PROBLEM NO 19 OF ASSIGNMENT PROBLEMS AS REWORK)*

**CONCEPT QUESTIONS**:

1. What would be the impact on realized yield if dividend rate increases by 1%?
2. What would be the impact on realized yield if dividend rate decreases by 1%?

**Note:**_____

## MODEL 3.4: CAPITAL ASSET PRICING MODEL (CAPM) APPROACH:

CAPM model describes the risk-return trade-off for securities. It describes the linear relationship between risk and return for securities.

The risks, to which a security is exposed, can be classified into two groups:

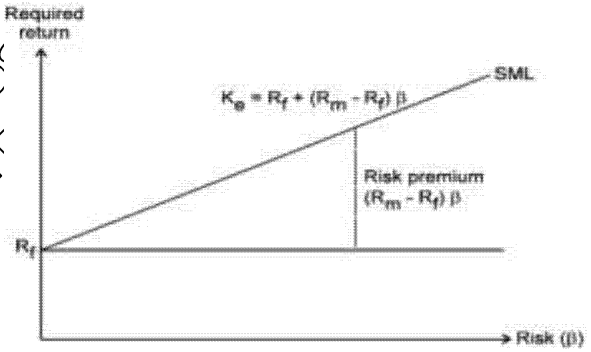
i) **Unsystematic Risk:** This is also called company specific risk as the risk is related with the company's performance. This type of risk can be reduced or eliminated by diversification of the securities portfolio. This is also known as diversifiable risk.

ii) **Systematic Risk:** It is the macro-economic or market specific risk under which a company operates. This type of risk cannot be eliminated by diversification. Hence, it is non-diversifiable. The examples are inflation, Government policy, interest rate etc.

Cost of Equity ($K_e$) = $R_f$ + ß ($R_m$ - $R_f$)

Where,

| | | |
|---|---|---|
| $K_e$ | = | Cost of equity capital |
| $R_f$ | = | Risk free rate of return |
| ß | = | Beta coefficient |
| $R_m$ | = | Rate of return on market portfolio |
| ($R_m$ - $R_f$) | = | Market premium |






**PROBLEM NO 20:** The beta coefficient of Target Ltd is 1.4. The company has been maintaining 8% rate of growth in dividends and earnings. The last dividend paid was Rs.4 per share. The return on government securities is 10 per cent while the return on market portfolio is 15 per cent. The current market price of one share of Target Ltd. is Rs.36.

**a)** What will be the equilibrium price per share of Target Ltd?

**b)** Would you advise purchasing the share? ***(A) (ANS.: A. RS.48, B. YES)***

***(SOLVE PROBLEM NO 20 OF ASSIGNMENT PROBLEMS AS REWORK)***

**CONCEPT QUESTIONS:**

1. When does the fair value of share is equal to its current market price?
2. When does the fair value differs from actual price?

**Note:**_____

## MODEL 4: COST OF RETAINED EARNINGS

- Like any other source of fund, retained earnings involve cost. It is the opportunity cost of dividends foregone by shareholders.
- A company can either keep or reinvest cash or return it to the shareholders as dividends. If the cash is reinvested, the opportunity cost is the expected rate of return that shareholders could have obtained by investing in financial assets.
- The cost of retained earnings is often used interchangeably with the cost of equity, as cost of retained earnings is nothing but the expected return of the shareholders from the investment in shares of the company.

- However, sometime cost of retained earnings remains below the cost of equity due to saving in floatation cost and existence of personal tax.

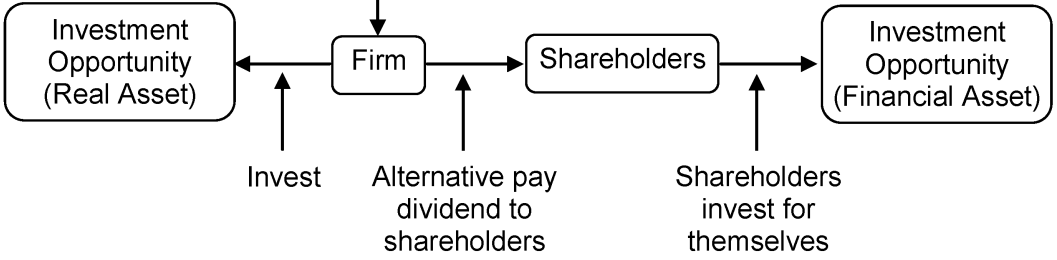
  The Cost of Retained Earnings ($K_s$) is calculated as below:

  In absence of any information on personal tax ($t_p$):

  Cost of Retained Earnings ($K_s$) = Cost of Equity Shares ($K_e$)

  If there is any information on personal tax ($t_p$):

$$K_s = K_e - t_p$$




Formulas used for calculation of cost of retained earnings are same as formulas used for calculation of cost equity:

1. Dividend Price Method: $K_r = \frac{D}{P}$
2. Earnings Price Method: $K_r = \frac{EPS}{P}$
3. Growth Method: $K_r = \frac{D_1}{P_0} + g$

   **Note:** But for the purpose of calculation of $K_e$ : P = net proceeds realized = Issue price less floatation cost. And for the purpose of calculation of $K_r$ : P = current market price.
4. If personal tax is also considered then a shortcut formula may be as follows:

   $K_r = K_e (1 - t_p) (1 - f)$

   Here $t_p$ is rate of personal tax on dividend and "f" is rate of flotation cost.



**PROBLEM NO 21:** Y Ltd. retains Rs.7,50,000 out of its current earnings. The expected rate of return to the shareholders, if they had invested the funds elsewhere is 10%. The brokerage is 3% and the shareholders come in 30% tax bracket. Calculate the cost of retained earnings. *(B) (OLD PM) (ANS.: 6.79%)*

*(SOLVE PROBLEM NO 21 OF ASSIGNMENT PROBLEMS AS REWORK)*

**CONCEPT QUESTIONS:**

1. What would be the impact on cost of retained earnings if brokerage increases by 1%?
2. What would be the impact on cost of retained earnings if brokerage decreases by 1%?

**Note:**_____

**PROBLEM NO 22:** An Equity share of a company is presently selling at Rs. 125 per share. The earnings per share is Rs. 20 of which 60% is paid as dividend. The shareholders expect the company to earn a constant after tax rate of 10% on its investment of retained earnings. The flotation cost of new shares is expected to be 4% of issue price. Calculate the cost of equity before and after issue. Assuming company's re-investment rate @ 10%) *(A) (TN) (ANS: BEFORE ISSUE 13.984%, AFTER ISSUE 14.4%)*

*(SOLVE PROBLEM NO 22 OF ASSIGNMENT PROBLEMS AS REWORK)*

**CONCEPT QUESTIONS:**

1. What would be the impact on cost of equity if return on retained earnings increases by 1%.
2. What would be the impact on cost of equity if return on retained earnings decreases by 1%.

**Note:**_____

## MODEL 5: WEIGHTED AVERAGE COST OF CAPITAL (WACC)

- WACC is also known as overall cost of capital of having capitals from the different sources
- WACC of a company depends on the capital structure of a company.
- It weighs the cost of capital of a particular source of capital with its proportion to the total capital.
- Thus, weighted average cost of capital is the weighted average after tax cost of individual components of firm's capital structure.

**The steps to calculate WACC is as follows:**

**Step 1:** Calculate the total capital from all the sources.

(i.e. Long term debt capital + Pref. Share Capital + Equity Share Capital + Retained Earnings)

**Step 2:** Calculate the proportion (or %) of each source of capital to the total capital.

$$\left(\text{i.e.}\ \frac{\text{Eqity share capital (for example)}}{\text{Total capital as calculated in step 1 above)}}\right)$$

**Step 3:** Multiply the proportion as calculated in Step 2 above with the respective cost of capital.

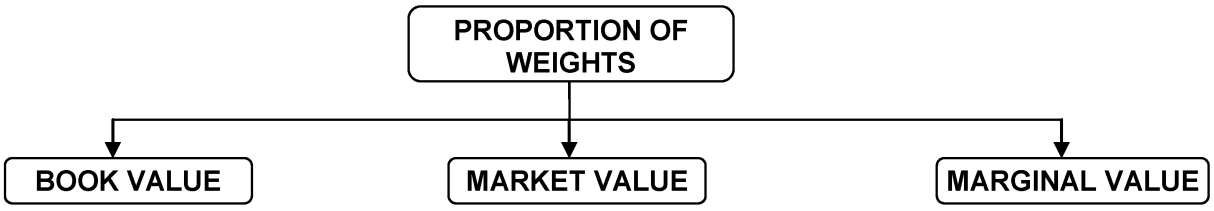
(i.e. $K_e$ × Proportion (%) of equity share capital (for example) calculated in Step 2 above)

**Step 4:** Aggregate the cost of capital as calculated in Step 3 above. This is the WACC.

(i.e. $K_e + K_d + K_p$ + Ks as calculated in Step 3 above)



**CHOICE OF WEIGHTS:** The weights of different sources can be ascertained using book value approach and market value approach.




## MODEL 5.1: BOOK VALUE (BV):

**Book value weights are operationally easy and convenient.**

- While using BV, reserves such as share premium and retained profits are included in the BV of equity, in addition to the nominal value of share capital.
- Here the value of equity will generally not reflect historic asset values, as well as the future prospects of an organisation.

**PROBLEM NO 23:** TA Ltd has the following capital structure:

| Particulars | Amount (Rs.) |
|---|---|
| Equity (2,00,000 shares) | 40,00,000 |
| 10% preference shares | 10,00,000 |
| 14% Debentures | 30,00,000 |
| | 80,00,000 |

The share of the company sells for Rs.20. It is expected that the company will pay next year a dividend of Rs.2 per share which will grow at 7% forever. Assume a 50% tax rate.

**a)** Compute the WACC based on existing capital structure.

**b)** Compute the new WACC if the company raises an additional Rs. 20,00,000 debt by issuing 15% debentures. This would result in increasing the expected dividend to Rs.3 and leave the growth rate unchanged, but the price of the share will fall to Rs.15 per share.

**c)** Recomputed WACC if growth rate increases to 10%. ***(A) (OLD PM, SIMILAR: MTP N18)***

***(ANS: A. 12.375%, B. 15.4%, C.16.6%) (SOLVE PROBLEM NO 23 OF ASSIGNMENT PROBLEMS AS REWORK)***

**CONCEPT QUESTIONS**:

**1.** What would be the impact on cost of equity if expected dividend increases by Rs. 1?

**2.** What would be the impact on cost of equity if growth rate falls to 5% instead of 10%?

**Note:**_____

## MODEL 5.2: MARKET VALUE (MV)

- Market value weight is more correct and represents a firm's capital structure.
- It is preferable to use MV weights for the equity. While using MV, reserves such as share premium and retained profits are ignored as they are in effect incorporated into the value of equity.
- There is no separate market value for retained earnings. Market value of equity share represents both paid up equity capital and retained earnings.
- But cost of equity is not same as cost of retained earnings. Hence to give market value weights, market value equity shares should be apportioned in the ratio of book value of paid up equity capital and book value of retained earnings.



**PROBLEM NO 24: (PRINTED SOLUTION AVILABLE):** ABC Limited has the following book value capital structure:

| | |
|---|---|
| Equity Share Capital (150 million shares, Rs.10 par) | Rs. 1,500 million |
| Reserves and Surplus | Rs. 2,250 million |
| 10.5% Preference Share Capital (1 million shares, Rs.100 par) | Rs. 100 million |
| 9.5% Debentures (1.5 million debentures, Rs.1,000 par) | Rs. 1,500 million |
| 8.5% Term Loans from Financial Institutions | Rs. 500 million |

- The debentures of ABC Limited are redeemable after three years and are quoted at Rs. 981.05 per debenture.
- The current market price per equity share is Rs.60. The prevailing default-risk free interest rate on 10-year GOI Treasury Bonds is 5.5%. The average market risk premium is 8%. The beta of the company is 1.1875.
- The preferred stock of the company is redeemable after 5 years is currently selling at Rs. 98.15 per preference share

The applicable income tax rate for the company is 35%.

Required:

**i)** Calculate weighted average cost of capital of the company using market value weights.

**ii)** What would be the marginal cost of capital for ABC Ltd. if it raises Rs.750 million for a new project. The firm plans to have a debt of 20% of the newly raised capital. The beta of new project is 1.4375. The debt capital will be raised through term loans, it will carry interest rate of 9.5% for the first Rs.100 million and 10% for the next Rs. 50 million. ***(A) (MTP N18 (O), SIMILAR: N18(O) - 5M)***

***(ANS: (i) 13.455%; (ii)14.8%) (SOLVE PROBLEM NO 24 OF ASSIGNMENT PROBLEMS AS REWORK)***

**CONCEPT QUESTIONS:**

1. What would be the impact on cost of equity, if market risk premium increases by 1%.
2. What would be the impact on cost of equity, if β is taken as 2?

**Note:**_____

_____

**PROBLEM NO 25:** 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:**

| | Rs. |
|---|---|
| Debentures (Rs. 100 per debenture) | 5,00,000 |
| Preference shares (Rs. 100 per share) | 5,00,000 |
| Equity shares (Rs. 10 per share) | 10,00,000 |
| | 20,00,000 |

**The market prices of these securities are:**

| | |
|---|---|
| Debenture | Rs. 105 per debenture |
| Preference | Rs. 110 per preference share |
| Equity | Rs. 24 each. |



**Additional information:**

**a)** Rs. 100 per debenture redeemable at par, 10% coupon rate, 4% floatation costs, 10-year maturity.

**b)** Rs. 100 per preference share redeemable at par, 5% coupon rate, 2% floatation cost and 10-year maturity.

**c)** Equity shares have Rs.4 floatation cost and market price Rs. 24 per share.

The next year expected dividend is Rs. 1 with annual growth of 5%. The firm has practice of paying all earnings in the form of dividend. Corporate tax rate is 50%.

***(A) (NEW SM, OLD SM, RTP M19 (N&O)) (ANS.: A. 7.5%, B. 8.57%)***

***(SOLVE PROBLEM NO 25 OF ASSIGNMENT PROBLEMS AS REWORK)***

**CONCEPT QUESTIONS:**

1. What would be the impact on WACC (computed based on market value mix), if retained earnings is given as Rs. 2,50,000?
2. What would be the impact on WACC, If tax rate is taken as 40% instead of 50%?

**Note:**_____

_____

## MODEL 6: MARGINAL COST OF CAPITAL

- The marginal cost of capital may be defined as the cost of raising an additional rupee of capital. Since the capital is raised in substantial amount in practice, marginal cost is referred to as cost incurred in raising new funds.
- Marginal cost of capital is derived, when the average cost of capital is calculated using the marginal weights.
- The marginal weights represent the proportion of funds the firm intends to employ. Thus, the problem of choosing between the book value weights and market value weights does not arise in the case of marginal cost of capital computation.

- To calculate the marginal cost of capital, the intended financing proportion should be applied as weights to marginal component costs. Therefore, the marginal cost of capital should be calculated in the composite sense.

**PROBLEM NO 26:** Aries Limited wishes to raise additional finance of Rs.10 lakhs for meeting its investment plans. It has Rs.2,10,000 in the form of retained earnings available for investment purposes. Following are further details:

| | |
|---|---|
| Debt/equity mix | 30% - 70% |
| **Cost of Debt:** | |
| Up to Rs. 1,80,000 | 10% [before tax] |
| Beyond Rs. 1,80,000 | 16% [before tax] |
| Earnings per share | Rs. 4 |
| Dividend pay out | 50% of earnings |
| Expected growth rate in dividend | 10% |
| Current market price per share | Rs. 44 |
| Tax rate | 50% |

**You are required:**

**a)** To determine the pattern for raising the additional finance.

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

**c)** To determine the cost of retained earnings and cost of equity, and

**d)** Compute the overall weighted average after tax cost of additional Finance.

***(A) (NEW SM, OLD SM, RTP: M15, N17, N15, MTP: N16, M15 - 8M, SIMILAR: N19 (N&O) - 5M)***

***(ANS: A. EQUITY 7,00,000 DEBT : 3,00,000 B. 6.2%, C.15%, D. 12.36%)***

***(SOLVE PROBLEM NO.26 OF ASSIGNMENT PROBLEMS AS REWORK)***



**CONCEPT QUESTIONS:**

1. What would be the impact on cost of equity if floatation expenses are given as Rs. 5 per share?
2. What would be the impact on cost of equity if tax rate is given as 60% ?

**Note:**_____

**PROBLEM NO 27: (PRINTED SOLUTION AVAILABLE)** ABC Ltd. has the following capital structure which is considered to be optimum as on 31st March, 2017.

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

The company share has a market price of Rs 23.60. Next year dividend per share is 50% of year 2017 EPS. The following is the trend of EPS for the preceding 10 years which is expected to continue in future.

| Year | EPS (Rs.) | Year | EPS (Rs.) |
|---|---|---|---|
| 2008 | 1.00 | 2013 | 1.61 |
| 2009 | 1.10 | 2014 | 1.77 |
| 2010 | 1.21 | 2015 | 1.95 |
| 2011 | 1.33 | 2016 | 2.15 |
| 2012 | 1.46 | 2017 | 2.36 |

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

Preference share Rs 9.20 (with annual dividend of Rs 1.1 per share) was 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)** New equity share (consuming new equity from retained earnings)

**B.** Calculate marginal cost of capital when no new shares are issued.

**C.** How much can be spent for capital investment before new ordinary shares must be sold. Assuming that retained earnings for next year's investment are 50 percent of 2017.

**D.** What will the marginal cost of capital when the funds exceed the amount calculated in (C), assuming new equity is issued at Rs 20 per share? ***(A) (NEW SM, OLD SM)***

***(ANS.: A) 1) 0.0833; 2) 0.12; 3) 1.18 B) 0.1385; C) RS. 14,750; D) 0.1457)***

***(SOLVE PROBLEM NO. 27 OF ASSIGNMENT PROBLEMS AS REWORK)***

**CONCEPT QUESTIONS:**

**1.** Why does the cost of equity is varying in point (a) & Point (d)?

**2.** What would be the impact on WACC if annual preference dividend is given as Rs. 1.25?

**Note:**_____

_____



## PRINTED SOLUTIONS TO SOME SELECTIVE PROBLEMS

**PROBLEM NUMBERS TO WHICH SOLUTIONS ARE PROVIDED: 4, 7, 10, 24, 27**

## PROBLEM NO. 4

**1. Net proceeds:**

| S. No. | Particulars | Amt. |
|---|---|---|
| 1. | Face value | 1,00,000 |
| 2. | Premium/(discount) | nil |
| | Issue price | 1,00,000 |
| 3. | Flotation cost @ 15% | (15,000) |
| | | 85,000 |

**2. Annual Cash Outflows:**

| | Particulars | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | TOTAL |
|---|---|---|---|---|---|---|---|
| 1 | Principal | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | |
| 2 | Interest | 15,000 | 12,000 | 9,000 | 6,000 | 3,000 | |
| 3 | I (1-t) | 9,750 | 7,800 | 5,850 | 3,900 | 1,950 | |
| 4 | P + I (1-t) | 29,750 | 27,800 | 25,850 | 23,900 | 21,950 | |
| 5 | PVF @ 15% | 0.870 | 0.756 | 0.657 | 0.572 | 0.497 | |
| 6 | Value @15% | 25,853 | 21,017 | 16,983 | 13,671 | 10,909 | 88,463 |
| 7 | PVF @ 20% | 0.833 | 0.694 | 0.579 | 0.482 | 0.402 | |
| 8 | Value @20% | 24,782 | 21,017 | 16,983 | 13,671 | 10,909 | 79,360 |

**Calculation of NPV:**

| Particulars | @15% | @20% |
|---|---|---|
| P.V of cash in flow | 88,463 | 79,360 |
| P.V of cash out flow | (85,000) | (85,000) |
| NPV | | (5,640) |

$$IRR = L_1 + \frac{NPV@L1}{NPV@L1 - NPV@L2} XL2 - L1 = 15\% + \frac{3463}{9103} X5 = 16.9\%$$

## PROBLEM NO. 7

Here,

Redemption Value (RV)= 1,00,000

Net Proceeds (NP) = Rs.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 x (1+r)n

1,00,000 = 2,500 x (1+r)25

40 = (1+r) 25

Trial 1: r = 15%, (1.15)25 = 32.919

Trial 2: r = 16%, (1.16)25 = 40.874

Here:

L = 15%, H = 16%

Required change = 32.919-40 = -7.081

Actual change(for 1%) = 32.919-40.874= -7.955

$$IRR = L_1 + \frac{NPV@L_1}{NPV@L_1 - NPV@L_2}(L_2 - L_1)$$

$$= 15\% + \frac{-7.081}{-7.955}(0.16 - 0.15). = 15.89\%$$



## PROBLEM NO. 10

| Year | Current face value | PVAF @ 12% | value | PVAF @ 14% | value |
|---|---|---|---|---|---|
| $Y_1$-$Y_{10}$ | 12 | 5.650 | 67.8 | 5.216 | 62.592 |
| $Y_{10}$ | 50 | 0.321 | 16.05 | 0.269 | 13.45 |
| $Y_{11}$ | 56 (50+6) | 0.284 | 15.904 | 0.236 | 13.216 |
| | | | 100 | | 89.25 |
| investment | | | (95) | | (95) |
| NPV | | | 5 | | (5.75) |

At IRR, P.V of cash inflows = P.V of cash outflows

$$IRR = L_1 + \frac{NPV@L_1}{NPV@L_1 - NPV@L_2}(L_2 - L_1)$$

$$= 12\% + \frac{5}{5 - (5.75)}(0.14 - 0.12) = 12.92\%.$$

# PROBLEM NO.24

**Working Notes:**

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

$$K_d = \frac{\text{interest}(1-t) + \frac{RV - NP}{3 \text{ years}}}{\frac{RV + NP}{2}} = \frac{Rs.95(1-0.35) + \frac{Rs.1000 - Rs.981.05}{3 years}}{\frac{Rs.1000 + Rs.981.05}{2}}$$

$$= \frac{Rs.67.15 + \frac{Rs.18.95}{3 years}}{\frac{Rs.1981.05}{2}}$$

= 0.0687 or 6.87%

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

= r (1-t)

= 0.085 (1- 0.35) = 0.05525 or 5.525%

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

$$K_p = \frac{\text{preferencedividend} + \frac{RV - NP}{n}}{\frac{RV + NP}{2}}$$

$$= \frac{10.5 + \frac{100 - 98.15}{5}}{\frac{100 + 98.15}{2}}$$



= 0.1097 =10.97%

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

= Rf + ß (Rm – Rf)

Or,

= Risk free rate + (Beta × Risk premium)

= 0.055 + (1.1875* 0.08) = 0.15 or 15%

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

| Source of Capital | Market value of capital structure (Rs. in millions) | Weights | After tax cost of capital (%) | WACC (%) |
|---|---|---|---|---|
| Equity share capital (150 million shares x Rs. 60) | 9,000 | 0.813 | 15.000 | 12.195 |
| 10.5% Preference share capital (1 million shares x Rs.98.15) | 98.15 | 0.0089 | 10.970 | 0.098 |
| 9.5 % Debentures (1.5 million Deb. x Rs.981.05) | 1,471.575 | 0.1329 | 6.872 | 0.913 |
| 8.5% Term loans | 500 | 0.0452 | 5.525 | 0.249 |
| | 11,069.725 | 1.000 | | 13.455% |

**ii) Marginal cost of capital (MCC):**

New capital of Rs.750 million will be raised in proportion of 20% Debt and 80% equity share capital i.e. Rs.150 million debt and Rs.600 million equity.

Cost of equity shares ($K_e$) = Risk free rate + (Beta × Risk premium)

= 0.055 + (1.4375 × 0.08) = 0.17 or 17%

Cost of Debt ($K_d$):

For first Rs.100 million = 9.5% x (1 - 0.35) = 6.175%

For next Rs.50 million = 10% x (1 - 0.35) = 6.5%

Marginal Cost of Capital $= 0.17x\frac{Rs.600m}{Rs.750m} + \left(0.06175x\frac{Rs100m}{Rs750m} + 0.065x\frac{Rs50m}{Rs750m}\right)$

= 0.136 + (0.008 + 0.004) = 0.148 or 14.8%

## PROBLEM NO.27

**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 (Kp) $= \frac{PD}{P_0} = \frac{1.1}{9.2} = 0.12$

**iii)** Cost of new equity shares (Ke) $= \frac{D}{P_0} + g = \frac{1.18}{23.60} + 0.10 = 0.05 + 0.10 = 0.15$

Calculation of $D_1$:

$D_1$ = 50% of 2013; EPS = 50% of 2.36 = Rs. 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 | 0.12 | 0.0060 |
| Equity Share | 0.80 | 0.15 | 0.1200 |
| Marginal cost of capital | | | 0.1385 |



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

Retained earnings = (0.50) (2.36 × 10,000) = Rs. 11,800

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

11,800 = 80% of Total Capital

Capital investment before issuing equity $= \frac{11,800}{0.80}$ = Rs. 14,750

**D.** If the company spends in excess of Rs. 14,750 it will have to issue new shares.

Capital investment before issuing equity = $\frac{1.18}{20} + 0.10 = 0.159$

The marginal cost of capital will be:

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

# ASSIGNMENT PROBLEMS

## MODEL 1.1: COST OF IRREDEEMABLE DEBENTURES

**PROBLEM NO 1:**

**i)** XYZ Ltd. Issued Rs.10 Lakhs 15% Debentures of Rs.100 each. Calculate the cost of debt in each of the following cases. (Assume corporate tax being 30%).

Case (a) If Debentures are issued at par with no floatation cost.

Case (b) If Debentures are issued at par with floatation cost are 5% of issue price.

Case (c) If Debentures are issued at 10% premium with floatation cost are 5% of issue price.

Case (d) If Debentures are issued at 10% discount with floatation cost are 5% of issue price.

***(A) (ANS: (A) 10.5%, (B) 11.05%, (C) 10.05%, (D) 12.28%)***

**ii)** Five years ago, Sona Limited issued 12 per cent irredeemable debentures at 103, at 3 premium to their par value of Rs. 100. The current market price of these debentures is Rs. 94. If the company pays corporate tax at a rate of 35 per cent CALCULATE its current cost of debenture capital? ***(B) (NEW SM) (ANS: 8.30%)***

## MODEL 1.2: COST OF REDEEMABLE DEBT



**PROBLEM NO 2:**

**i)** Calculate the explicit cost of debt for each of the following situations:

**a)** Company issued 10,000, 10% debentures of Rs. 100 each at a premium of 10% on 1.4.2017 to be matured on 1.4.2022. The debentures will be redeemed on maturity. COMPUTE the cost of debentures assuming 35% as tax rate. par and flotation costs are 5%.

**b)** Debentures are sold at a premium of 10% and floatation costs are 5% of issue price.

**c)** Debentures are sold at a discount of 5% and flotation costs are 5% of issue price.

**Assume:** (i) Coupon rate of interest on debentures is 12% (ii) Face value of debentures is Rs. 100; (iii) Maturity period is 10 years (iv) Tax rate is 40%. ***(A) (ANS.: A. 7.89%, B. 6.60%, C. 8.59%)***

**ii)** A company issued 10,000, 10% debentures of Rs. 100 each at a premium of 10% on 1.4.2017 to be matured on 1.4.2022. The debentures will be redeemed on maturity. COMPUTE the cost of debentures assuming 35% as tax rate. ***(B) (NEW SM) (ANS: 4.28%)***

**PROBLEM NO 3:**

**a)** A company's debentures of the face value of Rs.100 bear 15% coupon rate. Debentures of this type currently yield 12%. What is the market price of debentures of the company?

**b)** What would happen to the market price of debentures if interest rate on debentures rises to (i) 18% & (ii) drops to 12% and assuming no change in current yield?

**c)** What would be the market price of debentures in situation (a) if it is assumed that debentures were originally having 10 year maturity period & maturity period is 5 years away from now?

**d)** Would you pay Rs.90 to purchase debentures specified in situation (c)? Explain.

***(A) (ANS.: A. 125; B. 150, 100; C. 104.58; D. ADVISABLE TO PURCHASE THE GIVEN DEBENTURES)***

**PROBLEM NO 4:**

**a)** ABC Ltd. issues 15% debentures of face value of Rs.1000 each at a flotation cost of Rs.100 per debenture. Find out the cost of capital of the debenture which is to be redeemed in 5 annual installments of Rs.200 each starting from the end of year 1. The tax rate is 50%.

| Year | 10% | 12% |
|---|---|---|
| 1 | 0.909 | 0.893 |
| 2 | 0.826 | 0.797 |
| 3 | 0.751 | 0.712 |
| 4 | 0.683 | 0.636 |
| 5 | 0.621 | 0.567 |
| Total | 3.790 | 3.605 |

*(A) (ANS.: IRR /$K_d$ IS 11.79%)*

**b)** A company issued 10,000, 10% debentures of Rs. 100 each on 1.4.2013 to be matured on 01.04.2018. The company wants to know the current cost of its existing debt and the market price of the debentures is Rs. 80. Compute the cost of existing debentures assuming 35% tax rate.

*(A) (NEW SM) (ANS: 12.21%)*

**PROBLEM NO 5:** Bharat Ltd. issues Rs. 100 lakhs, 12% debentures of Rs. 100 each at par redeemable at par. The floatation cost being 10%. The corporate tax rate is 40%. Calculate the cost of debt if debentures are redeemable in 5 equated annual installments beginning with the end of year 1.

| Year | 1 | 2 | 3 | 4 | 5 | Total |
|---|---|---|---|---|---|---|
| 11% | 0.901 | 0.812 | 0.731 | 0.659 | 0.593 | 3.969 |
| 12% | 0.893 | 0.797 | 0.712 | 0.636 | 0.567 | 3.605 |

*(A) (TN) (ANS.: $K_d$ = 11.175%)*

## MODEL 1.3: COST OF CONVERTIBLE DEBENTURES

**PROBLEM NO 6:** XYZ Ltd. has issued 11% Debentures of Rs. 100 each. These are being traded at Rs. 140 per debenture at present. The debentures are convertible into 5 equity shares per debenture. The present market price of the equity shares is Rs. 22 which is expected to increase @ 5% p.a. over next 5 years. Find out the cost of convertible debentures given the tax rate at 30%. *(B) (RG) (ANS.: $K_p$ = 5.54%)*

## MODEL 1.4: DEEP DISCOUNT BOND

**PROBLEM NO 7:** State bank of India (SBI) issued zero interest deep discount bonds of face value of 1,00,000 each issued at Rs.12,000 & repayable after 20 years. Compute the cost of Debt if there is no corporate tax.

FVF (11%, 20Y) = 8.062; FVF (12%, 20Y) = 9.646 *(B) (ANS.: 11.171%)*

## MODEL 2.1: COST OF IRREDEEMABLE PREFERENCE SHARES

**PROBLEM NO 8:**

**a)** A company issues 14% irredeemable preference shares of the face value of Rs.100 each. Floatation costs are estimated at 5% of the expected sale price. (a) What is $k_p$, if preference shares are issued at (i) Par value, (ii) 10% premium, and (iii) 5% discount?

*(A) (ANS.: (I) 14.73%,(II) 13.39%,(III) 15.51%)*

**b)** If R Energy is issuing preferred stock at Rs.100 per share, with a stated dividend of Rs.12, and a floatation cost of 3% then, CALCULATE the cost of preference share? *(B) (NEW SM) (ANS.: 12.37%)*

## MODEL 2.2: COST REDEEMABLE PREFERENCE SHARES

**PROBLEM NO 9:** XYZ Ltd. has issued 15% preference shares of the face value of Rs.100 each to be redeemed after 10 years. Flotation cost is expected to be 4%. Determine the cost of preferences shares. *(A) (M13 - 5M) (ANS.: 15.71%)*

**PROBLEM NO 10:** Bharat Ltd. issues Rs. 100 lakhs, 12% preference shares of Rs. 100 each at par redeemable at par. The floatation cost being 10%. The dividend tax rate is 20%. Calculate the cost of preference shares if 20% preference shares are redeemable each year beginning with the end of year 1. *(A) (TN) (ANS.: 19.31%)*

## MODEL 3.1.1: DIVIDEND PRICE APPROACH WITH CONSTANT DIVIDEND:

**PROBLEM NO 11:**

**a)** A company which is not subject to growth expects to pay dividend of Rs.12 per share for ever. Calculate the value of a share, assuming 10% as the appropriate discount rate for such a company. *(B) (ANS.: Rs.120)*

**b)** Gamma Limited has in issue 5,00,000 Rs.1 ordinary shares whose current ex-dividend market price is Rs.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? *(NEW SM) (ANS: 18%)*

## MODEL 3.1.2: DIVIDEND PRICE APPROACH WITH CONSTANT GROWTH:

**PROBLEM NO 12:**

**a)** Investors require 15% rate of return on equity shares of company Y. What would be the market price of the share if the previous dividend (Do) was Rs.10 and investors expect dividends to grow at a constant rate of (a) 10% (b) 3% (c) - 10% (d) 14%.

*(B) (ANS: (A) RS. 220, (B) RS. 85.833, (C) RS.36 (D) RS. 1,140)*

**b)** A company has paid dividend of 1 per share (of face value of Rs. 10 each) last year and it is expected to grow @ 10% next year. CALCULATE the cost of equity if the market price of share is Rs. 55. *(NEW SM) (ANS: 12%)*

**PROBLEM NO 13:** The details of dividend paid by Cool Ltd. On its existing equity shares of Rs. 10 each for the past 6 years is given below

| Year | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|---|
| Dividend per share | 1.05 | 1.10 | 1.16 | 1.21 | 1.27 | 1.34 |

The current market price of equity shares is Rs. 40. It is expected to maintain the fixed dividend payout ratio in the future. The company has issued new equity shares at current market price and the cost of its flotation is Rs. 0.50 per share. The expected dividend to be declared for the current year is Rs. 1.40. Using the above information calculate the cost of equity capital. *(A) (RK) (ANS.: $K_e$ = 8.54%)*

**PROBLEM NO 14:** A Company's Share was sold for Rs.146 per share. A Long term earnings Growth rate of 7.5% is anticipated. The Company is expected to pay dividend of Rs.3.36 per share.

**a)** What rate of return an investor can expect to earn assuming that dividends are expected to grow along with earnings at 7.5% per year in perpetuity?

**b)** It is expected that the company will earn about 10% on book equity and shall retain 60% of earnings. In this case whether there would be any change in Growth rate and cost of equity?

*(A) (ANS.: A) 9.8%; B) 9.68%, G = 6%)*

**PROBLEM NO 15:** Delphi products corporation currently pays a dividend of Rs.2 per share and this dividend is expected to grow at a 15% annual rate for 3 years, then at a 10% rate for the next 3 years, after which it is expected to grow at a 5% rate for ever.

**a)** What value would you place on the stock if an 18% rate of return were required?

**b)** Would your valuation change if you expected to hold the stock only 3 years?

*(A) (ANS.: A. 22.65; B. 31.1591; NO NEXUS BETWEEN HP AND VALUE OF STOCK)*

## MODEL 3.2.1: EARNINGS / PRICE APPROACH WITH CONSTANT EARNINGS:

**PROBLEM NO 16:** Prabhat Ltd. has 50000 equity shares of Rs. 10 each and its current market value is Rs. 45 each. The after tax profit of the company for the year ended 31st March, 2002 is Rs. 9,60,000. Calculate the cost of capital based on price / earnings method. *(C) (RK) (ANS: 42.67%)*

## MODEL 3.2.2 EARNINGS / PRICE APPROACH WITH GROWTH IN EARNINGS:

**PROBLEM NO 17:** Expected earnings per share ($E_1$) is Rs. 10 and the current market price of the share ($P_0$) is Rs. 50 and the earning per share is expected to grow (g) at rate of 8% p.a., Calculate Cost of Equity. *(C) (TN) (ANS.: 28%)*

## MODEL 3.3: REALIZED YIELD APPROACH

**PROBLEM NO 18:** ABC Ltd paid a dividend of Rs.2 per share last year ($D_0$), which is expected to grow at 10 per cent. If the current market price is Rs.40 and the required rate of return is 18 per cent, compute the expected dividend yield and capital gains yield next year. *(C) (ANS.: 5.5%, 12.5%)*

**PROBLEM NO 19:** A purchased 10 shares in a company at a cost of Rs. 318 on Jan. 1, 1990. He held them for 4 years and finally sold them in January 1994 for Rs. 400. The amount of dividend received by him in each of these 4 years was:

| Year | 1990 | 1991 | 1992 | 1993 |
|---|---|---|---|---|
| Dividend | 20.00 | 20.00 | 22.00 | 22.25 |

You are required to calculate cost of equity capital using Realised Yield Approach.

| PV factor | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 11% | 0.901 | 0.812 | 0.731 | 0.659 | 0.593 | 0.535 | 0.482 | 0.434 | 0.391 | 0.352 |
| 12% | 0.893 | 0.797 | 0.712 | 0.636 | 0.567 | 0.507 | 0.452 | 0.404 | 0.361 | 0.322 |

*(A) (ANS.: 11.99%)*

## MODEL 3.4: CAPITAL ASSET PRICING MODEL (CAPM) APPROACH:

**PROBLEM NO 20:** The risk free rate of return is 8%. The shares of Eastern Pharmaceuticals Ltd. (EPL) have to a beta of 1.5 and the return on market portfolio is 16%.The company has recently paid a dividend of Rs.3.00 per share and the dividend are expected to grow at the rate of 5%.The current market price of equity share of EPL is Rs.15.75 per share. Assume that CAPM is applicable.

You are required to answer the following questions:

**a)** Is the present market price of share at equilibrium? Would you advise purchasing the share?

**b)** If the market adjusts in such a way that the share is valued at its equilibrium price then what will be the change in the market value of an investment in 1,000 shares of the company.

*(A) (AL AG) (ANS.: PRESENT MARKET RATE: 25%; B) $P_O$ = RS.5250)*



## MODEL 4: COST OF RETAINED EARNINGS

**PROBLEM NO 21:**

**a)** Y Ltd. retains Rs.10,00,000 out of its current earnings. The expected rate of return to the shareholders, if they had invested the funds elsewhere is 12%. The brokerage is 2% and the shareholders come in 25% tax bracket. Calculate the cost of retained earnings.

*(B) (OLD PM) (ANS.: 8.82%)*

**b)** Face value of equity shares of a company is Rs.10, while current market price is Rs.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 Rs.190 per share and floatation cost will be Rs.5 per share. Dividend at the end of first year is expected to be Rs.10 and growth rate will be 5%.

*(NEW SM) (ANS: 10.41%)*

**PROBLEM NO 22:** JC Ltd. is planning an equity issue in current year. It has an Earnings per share (EPS) of Rs. 20 and proposes to pay 60% dividend at the current year end. With a PIE ratio 6.25, it wants to offer the issue at market price. The flotation cost is expected to be 4% of the issue price.

**Required:** Determine the required rate of return for equity share (cost of equity) before the issue and after the issue. *(A) (M18 (O) - 5M) (ANS.: BEFORE ISSUE: 16.61%; AFTER ISSUE; 17.04%)*

## MODEL 5.1: WACC - BOOK VALUE WEIGHTS

**PROBLEM NO 23:** The following is the capital structure of Simons Company Ltd. as on 31.12.1998:

| | Rs. |
|---|---|
| Equity shares: 10,000 shares (of Rs. 100 each) | 10,00,000 |
| 10% Preference Shares (of Rs. 100 each) | 4,00,000 |
| 12% Debentures | 6,00,000 |
| | 20,00,000 |

The market price of the company's share is Rs.110 and it is expected that a dividend of Rs.10 per share would be declared for the year 1998. The dividend growth rate is 6%.

**a)** If the company is in the 50% tax bracket, compute the weighted average cost of capital using Book value weights.

**b)** Assuming that in order to finance an expansion plan, the company intends to borrow a fund of Rs. 10 lakhs bearing 14% rate of interest, what will be the company's revised weighted average cost of capital? This financing decision is expected to increase dividend from Rs. 10 to Rs. 12 per share. However, the market price of equity share is expected to decline from Rs. 110 to Rs. 105 per share. *(A) (OLD PM, RTP N19 (N&O)) (ANS.: A. 11.34%, B. 10.67%)*

## MODEL 5.2: WACC - MARKET VALUE WEIGHTS



**PROBLEM NO 24:**

**a)** The present capital structure of a company is as follows: **(Rs. in million)**

| | |
|---|---|
| Equity shares (face value Rs.10) | 240 |
| Reserves | 360 |
| 11% Preference shares (face value Rs.10) | 120 |
| 12% Debentures | 120 |
| 14% Term loans | 360 |
| | 1,200 |

Additionally, the following information are available:

| | |
|---|---|
| Company's equity beta | 1.06 |
| Yield on long-term treasury bonds | 10% |
| Stock market risk premium | 6% |
| Current ex-dividend equity share price | Rs.15 |
| Current ex-dividend preference share price | Rs.12 |
| Current ex-interest debenture market value | Rs.102.50 per Rs.100 |
| Corporate tax rate | 40% |

The debentures are redeemable after 3 years and interest is paid annually. Ignoring floatation costs, calculate the company's weighted average cost of capita (WACC).

*(A) (SIMILAR: M19 (O) - 8M) (ANS.: WACC 11.58%)*

**b)** XYZ Ltd. issues 2,000 10% preference shares of Rs. 100 each at Rs. 95 each. The company proposes to redeem the preference shares at the end of 10th year from the date of issue. CALCULATE the cost of preference share? *(B) (NEW SM) (ANS.: 10.77%)*

**PROBLEM NO 25:** The Following is the capital structure of a company.

| Sources | Book Value (Rs.) | Market Value (Rs.) |
|---|---|---|
| Equity shares @ Rs.100/- each | 80,00,000 | 1,60,00,000 |
| 9% Cumulative Preference Shares@ 100/- each | 20,00,000 | 24,00,000 |
| 11% Debentures | 60,00,000 | 66,00,000 |
| Retained Earnings | 40,00,000 | - |
| | 2,00,00,000 | 2,50,00,000 |

The current Market price of the company's equity share is Rs.200/-.For the last year the company had paid equity dividend at 25% and its dividend is likely to grow 5% every year. The corporate tax rate is 30% and shareholders personal income tax rate is 20%.

You are required to calculate:

**a)** Cost of capital for each source of capital.

**b)** WACC on the basis of book value weights.

**c)** WACC on the basis of Market value weights.

***(A) (OLD PM) (ANS.: (a) $K_e$ :18.125%,$K_d$:7.7%,$K_r$:14.5%,(b) 13.36% (c) 14.497%)***

## MODEL 6: MARGINAL COST OF CAPITAL

**PROBLEM NO 26:** ABC Ltd. wishes to raise additional finance of Rs. 20 lakhs for meeting its investment plans. The company has Rs. 4,00,000 in the form of retained earnings available for investment purposes. The following are the further details:

- Debt equity ratio 25 : 75.
- Cost of debt at the rate of 10 per cent (before tax) upto Rs. 2,00,000 and 13% (before tax) beyond that.
- Earnings per share Rs. 12
- Dividend payout 50% of earnings
- Expected growth rate in dividend 10%
- Current market price per share Rs. 60
- Company's tax rate is 30% and shareholder's personal tax rate is 20%



**Required:**

**i)** To determine the pattern for raising the additional finance.

**ii)** Calculate the post-tax average cost of additional debt.

**iii)** Calculate the cost of retained earnings and cost of equity.

**iv)** Calculate the overall weighted average (after tax) cost of additional finance.

***(A) (RK) (ANS.: II) 8.26%; III) 20%; IV) 16.27%)***

**PROBLEM NO 27:** The R & G Company has following capital structure at 31st March, 2009, which is considered to be

| Optimum: | (Rs.) |
|---|---|
| 13% Debenture | 3,60,000 |
| 11% Preference share capital | 1,20,000 |
| Equity share capital (2,00,000 shares) | 19,20,000 |

The company's share has a current market price of Rs. 27.75 per share. The expected dividend per share in next year is 50% of the 2009 EPS. The EPS of last 10 years is as follows. The past trends are expected to continue:

| Year | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|---|
| EPS(Rs.) | 1.00 | 1.120 | 1.254 | 1.405 | 1.574 | 1.762 | 1.974 | 2.211 | 2.476 | 2.773 |

The company can issue 14% new debenture. The company's debenture is currently selling at Rs. 98. The new preference issue can be sold at a net price of Rs. 9.80, paying a dividend of Rs. 1.20 per share. The company's marginal tax rate is 50%.

**i)** Calculate the after tax cost (a) of a new debts and new preference share capital, (b) of ordinary equity, assuming new equity comes from retained earnings.

**ii)** Calculate the marginal cost of capital.

**iii)** How much can be spent for capital investment before new ordinary share must be sold? Assuming that retained earnings available for next year's investment are 50% of 2009 earnings.

**iv)** What will be marginal cost of capital (cost of fund raised in excess of the amount calculated in part (iii) if the company can sell new ordinary shares to net Rs. 20 per share? The cost of debt and of preference capital is constant.

***(A) (RK) (SIMILAR: MTP N19 (N&O)) (ANS.: I) 7%, 12%, 17%; II) 15.3%; III) RS. 3,46,625; IV) 16.82%)***

## ADDITIONAL PROBLEMS FOR SELF PRACTICE



**PROBLEM NO 1:** PQR Ltd. has the following capital structure on October 31, 2018:

| Sources of capital | Rs. |
|---|---|
| Equity share capital (2,00,000 shares of Rs. 10 each) | 20,00,000 |
| Reserves & Surplus | 20,00,000 |
| 12% Preference share capital | 10,00,000 |
| 9% debentures | 30,00,000 |
| | 80,00,000 |

The Market price of equity share is Rs.30. It is expected that the company will pay next year a dividend of Rs. 3 per share, which will grow at 7% forever. Assume 40% income tax rate.

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

***(B) (ANS.: 13.02)***

**PROBLEM NO 2:**Annova Ltd is considering raising of funds of about Rs.250 lakhs by any two alternative method, 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 tax rate of 50%. ***(MTP2 M19(N)) (ANS.: 7%, 6.81%)***

**PROBLEM NO 3:** The entire capital employed by a company consists of one lakh equity shares of Rs. 100 each. Its current earnings are Rs.10 lakhs per annum. The company wants to raise additional funds of Rs. 25 lakhs by issuing new shares. You required to calculate the cost of equity capital presuming that the earnings of the company are expected to remain stable over the next few years.

***(C) (MI) (ANS: 10%)***

**PROBLEM NO 4:** X Ltd. issued Rs.100, 12% debentures 5 years ago. Interest rates have been risen since then, so that debentures of the company are now selling at 15 yield basis.

**Case a:** Determine the current expected market price of the debentures. Would you buy the debentures for Rs. 75?

**Case b:** Assuming that the debentures of the company are selling at Rs. 80 and have 5 years to run to maturity, compute the approximate effective yield an investor would earn on his investment.

***(A) (TN) (ANS.: A) RS. 80, INVESTOR SHOULD BUY THESE DEBENTURES; B) 17.77%)***

**PROBLEM NO 5:** ABC company sold Rs.1,000 16% debentures, carrying no maturity date to the public 5 years ago Interest rates since have risen, so that debentures of the quality represented by this company are now selling at 14% yield basis.

**a)** Determine the current indicated market price of debentures. Would you buy the debentures for Rs.1, 200? Explain your answer.

**b)** Assuming that the debentures of the company are selling at Rs.1,040 and if the debentures have 8 years to run to maturity, compute the approximate effective yield an investor would earn on his investment. *(A) (ANS: A) MARKET PRICE: RS.1,143; B) YIELD:15.19%)*

**PROBLEM NO 6:** ABC Ltd. has just declared and paid a dividend at the rate 15% on the equity share of Rs.100 each. The expected future growth rate in dividends is 12%. Find out the cost of capital of equity shares given that the present market value of the share is Rs.168. *(C) (ANS.: 22%)*

**PROBLEM NO 7:** A company is about to pay dividend of Rs.1.40 per share having a market price of Rs.19.50. The expected future growth in dividends is estimated at 12%. Calculate $K_e$. *(C) (ANS.:19.81%)*

**PROBLEM NO 8:** The current market price of shares of A Ltd. is Rs.95. The floatation costs are Rs.5 per share. Dividend per share amounts to Rs.4.50 and is expected to grow at the rate of 7%. You are required to calculate cost of equity share capital. *(C) (ANS.: 12.35%)*

**PROBLEM NO 9:** The following facts are available:

**a)** Risk-free rate, 9 per cent

**b)** Required rate of return, on market portfolio18 per cent

**c)** Beta coefficient of the shares of ABC Ltd, 1.5

**d)** Expected dividend during the next year, Rs.3

**e)** Growth rate in dividends/earnings, 8 per cent

Compute the price at which the shares of ABC Ltd should sell? *(B) (ANS.: Rs.20.68)*



**PROBLEM NO 10:** Three companies A, B & C are in the same type of business and hence have similar operating risks. However, the capital structure of each of them is different and the following are the details:

| | A | B | C |
|---|---|---|---|
| Equity share capital [face value Rs.10/- per share] | Rs.4,00,000 | Rs.2,50,000 | 5,00,000 |
| Market Value per share | 15 | 20 | 12 |
| Dividend per share | 2.70 | 4 | 2.88 |
| Debentures [face value per debenture] | Nil | 1,00,000 | 2,50,000 |
| Market value per debenture | - | 125 | 80 |
| Interest rate | - | 10% | 8% |

Assume that the current levels if dividends are generally expected to continue indefinitely and the income tax rate at 50%.

You are required to compute Weighted Average Cost of Capital. *(B) (ANS: 18%; 16.8%; 19.25%)*

**PROBLEM NO 11:** G Limited has the following capital structure, which it considers to be optimal:

| Capital Structure | Weightage (in %) |
|---|---|
| Debt | 25 |
| Preference Shares | 15 |
| Equity Shares | 60 |
| | 100 |

G Limited's expected net income this year is Rs. 34,285.72, its established dividend payout ratio is 30 per cent, its tax rate is 40 per cent, and investors expect earnings and dividends to grow at a constant rate of 9 per cent in the future. It paid a dividend of Rs. 3.60 per share last year, and its shares currently sells at a price of Rs. 54 per share.

G Limited requires additional funds which it can obtain in the following ways:

- **Preference Shares:** New preference shares with a dividend of Rs. 11 can be sold to the public at a price of Rs.95 per share.
- **Debt:** Debt can be sold at an interest rate of 12 per cent.

You are required to:

**i)** DETERMINE the cost of each capital structure component; and

**ii)** COMPUTE the weighted average cost of capital (WACC) of G Limited.

***(A) (MTP1 M18 (O), SIMILAR: M19 (O) - 5M) (ANS: (i) Ke = 16.27%, Kp = 11.58%, Kd = 7.20% (ii) WACC = 13.30%)***

**PROBLEM NO 12:** Determine the cost of capital of Best Luck Limited using the book value (BV) and market value (MV) weights from the following information:

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



**Additional information:**

**a) Equity:** Equity shares are quoted at Rs. 130 per share and a new issue priced at Rs. 125 per share will be fully subscribed, flotation costs will be Rs. 5 per share.

**b) Dividend:** During the previous 5 years, dividends have steadily increased from Rs. 10.60 to Rs. 14.19 per share. Dividend at the end of the current year is expected to be Rs. 15 per share.

**c) Preference shares:** 15% Preference shares with face value of Rs. 100 would realize Rs. 105 per share.

**d) Debentures:** The Company proposes to issue 11-year 15% debentures but the yield on debentures of similar maturity and risk class is 16%; flotation cost is 2%.

**Tax:** Corporate tax rate is 35%. Ignore dividend tax. ***(A) (OLD SM) (ANS.: 16.84%, 17.28%)***

**PROBLEM NO 13:** The following figures are taken from the current B/S of Delaware & Co.

| Particulars | Amount (Rs.) |
|---|---|
| Capital | 8,00,000 |
| Share Premium | 2,00,000 |
| Reserves | 6,00,000 |
| Shareholder's funds | 16,00,000 |
| 12% Irredeemable debentures | 4,00,000 |

An annual ordinary dividend of Rs.2 per share has just been paid. In the past, ordinary dividends have grown at a rate of 10% per annum and this rate of growth is expected to continue. Annual interest has recently been paid on the debentures. The ordinary shares are currently quoted at Rs.27.5 and the debentures at 80%. Ignore taxation. You are required to estimate the weighted average cost of capital (based on market values) for Weighted Average Cost of Capital Delaware & Co.

***(B) (SIMILAR: MTP2 N18 (N), SIMILAR: M19 (N) - 5M) (ANS.: 17.62%)***

**THE END**