CHAPTER 5

SECURITY VALUATION

LEARNING OUTCOMES

After reading this chapter student shall be able to understand:

- Overview of Valuation
- Return Concepts
- Equity Risk Premium
- Required Return on Equity
- Discount Rate Selection in Relation to Cash Flows
- Valuation of Equity Shares
- Valuation of Preference Shares
- Valuation of Debentures/ Bonds
- Role and Responsibilities of Valuers
- Precautions need to be taken by a Valuer before accepting any valuation assignment.

1. OVERVIEW OF VALUATION

The definition of an Investment is – Investment involves commitment of funds with an objective to obtain a return that would pay off the investor for the time during which the funds are invested or locked, for the expected rate of inflation over the investment horizon, and for the risk involved. Most investments are expected to have future cash flows and a stated market price (e.g., price of a

common stock), and one must estimate a value for the investment to determine if its current market price is consistent with his estimated intrinsic value. Investment returns can take many forms, including earnings, cash flows, dividends, interest payments, interest on interest payments or capital gains (increases in value) during an investment horizon.

Knowing what an asset is worth and what determines its value is a pre-requisite for making intelligent investment decisions while choosing investments for a portfolio or in deciding an appropriate price to pay or receive in a business takeover and in making investment, financing and dividend choices when running a business. We can make reasonable estimates of value for most assets, and that the fundamental principles determining the values of all types of assets whether real or financial, are the same. Some assets may be easier to be valued than others and for different assets the details of valuation and the uncertainty associated with their value estimates may vary. However, the core principles of valuation always remain the same.

2. RETURN CONCEPTS

A sound investment decision depends on the correct use and evaluation of the rate of return. Some of the different concepts of return are given as below:

2.1 Required Rate of Return

Required rate of return is the minimum rate of return that the investor is expected to receive while making an investment in an asset over a specified period of time. This is also called Opportunity Cost or Cost of Capital because it is the highest level of expected return forgone which is available elsewhere from investment of similar risks. Many times required rate of return and expected return are used interchangeably.

2.2 Discount Rate

Discount Rate is the rate used to calculate present value of future cash flows Discount rate depends on the risk-free rate and risk premium of an investment. Actually, each cash flow stream coming from different assets can be discounted at a different discount rate. This is because of variation in risk premium which may be due to expected inflation rate, different maturity levels and probability of defaults. This can be explained with the help of term structure of interest rates. For instance, in upward sloping term structure of interest rates, interest rates increase with the maturity as longer maturity may mean more inflation risk, more liquidity risk or more default risk.

Though future cash flows can be discounted at different discount rate, one may use the same discount rate to get the same present value of a stream of cash flows. When a single discount rate is applied instead of many discount rates, many individual discount rates can be replaced with an equivalent single discount rate which eventually gives the same present value.

Example: Cash flows and discount rates for each year of cash flows at different maturities have been given as below:-

	1st year	2nd year	3rd year	4th year	5th year
Cash flows	₹100	₹200	₹300	₹400	₹500
Discount rates	2.0%	3.2%	3.6%	4.8%	5.0%

The present value of this stream of cash flows, by discounting each cash flow with the respective discount rate, is ₹ 1,278.99.

The single discount rate that approximately equates the present value of the stream of cash flows to ₹1278.99 is 4.4861% (any difference is due to rounding).

2.3 Internal Rate of Return

Internal Rate of Return is defined as that discount rate which equates the present value of future cash flows of a security to its market price. The IRR is viewed as the average annual rate of return that investors earn over their investment time period assuming that the cash flows are reinvested at the IRR. This can be explained with the help of an example as follows:

Example

Suppose you are recommended to invest ₹ 20,000 now in an asset that offers a cash flow ₹ 3,000 one year from now and ₹ 23,000 two years from now. You want to estimate the IRR of the investment. For this purpose you must find the discount rate that equates the present value of cash inflows to ₹ 20,000, the value of the initial investment.

	Time 0	1st year	2nd year
Cash flows	(₹ 20,000)	₹ 3,000	₹ 23,000

We solve the following equation for r which denotes IRR and get 15%.

$20000 = 3000/(1+r) + 23000/(1+r)^2$

$\Rightarrow r = 15\%$

Thus, our IRR is 15%, which implies that we earn on an average 15% on the investment per annum. Now let's assume that when we receive ₹ 3,000, we reinvest it at 10% for one year and after one year we receive total ₹ 26,300, ₹ 3,300 of which is attributable to reinvestment of ₹ 3,000. Since we receive total cash ₹26300 we can estimate the IRR of the investment.

$(26300/20000)^{1/2} - 1 = 0.1467$ or 14.67%

Annual return is now at 14.67% if reinvested at 10%, which is actually less than what was expected to be earned before investment. The reason is that the cash flow was reinvested at a rate (10%) which is less than our expected IRR (15%).

If we had a chance to reinvest ₹ 3,000 at 15%, we would receive ₹ 26,450 at the end of 2nd year, and the IRR of the investment would be equal to exactly 15% as calculated below:

$(26450/20,000)^{1/2} - 1 = 0.15$ or 15%

3. EQUITY RISK PREMIUM

Equity risk premium is the excess return that an investment in equity shares provides over a risk free rate, such as return from tax free government bonds. This excess return compensates investors for taking on the higher risk of investing in equity shares of a company. The size of the premium will change depending upon the level of risk in a particular portfolio and will also change over time as market risk fluctuates. Generally, high-risk investments are compensated with a higher premium.

The equity risk premium is based on the idea of the risk-reward trade-off. However, equity risk premium is a theoretical concept because it is difficult to predict that how a particular stock or the stock market as a whole will perform in the future. It can only be estimated by observing stock market and government bond market over a specified period of time, for instance from 1990 to the present period. Further, estimates may vary depending on the time frame and method of calculation.

3.1 Explanation of Equity Risk Premium

Investment in equity shares of a company is a high risk investment. If an investor is investing in equity shares of a company, he wants some risk premium over the risk-free investment avenues such as government bonds. For example, if an investor could earn a 7% return on a Government Bond (which is generally considered as risk free investment), a company's share should earn 7% return plus an additional return (the equity risk premium) in order to attract the investor.

Equity investors try to achieve a balance between risk and return. If a company wants to pursue investors to put their money into its stock, it must provide a stimulus in the form of a premium to attract the equity investors. If the stock gives a 15% return, in the example mentioned in the previous paragraph, the equity risk premium would be 8% (15% - 7% risk free rate). However, practically, the price of a stock, including the equity risk premium, moves with the market. Therefore, the investors use the equity risk premium to look at historical values, risks, and returns on investments.

3.2 Calculating the Equity Risk Premium

To calculate the equity risk premium, we can use the Capital Asset Pricing Model (CAPM), which is usually written:

$R_x = R_f + \beta_x (R_m - R_f)$

Where:

R_x = expected return on equity investment in "x"(company x)

R_f = risk-free rate of return

β_x = beta of "x"

R_m = expected return of market

Now, if we assume that x is identical to the Market Index, m, then $R_x = R_m$. Beta is a measure of a stock's systematic risk ; and if x = m, then $\beta_x = \beta_m = 1$. Whereas $R_m - R_f$ is known as the Market

Risk Premium; $R_x - R_f$ is the risk premium of a particular stock. If x is an equity investment, then $R_x - R_f$ is the equity risk premium; if x = m, then the market premium and the equity risk premium are the same.

Therefore, the equity risk premium can be calculated as follows:

Equity Risk Premium = $R_x - R_f = \beta_x (R_m - R_f)$

4. REQUIRED RETURN ON EQUITY

If equity risk premium is calculated as indicated above, required rate of return can be easily calculated with the help of Capital Asset Pricing Model (CAPM). The main insight of the model is that the investors evaluate the risk of an asset in terms of the asset's contribution to the systematic risk (cannot be reduced by portfolio diversification) of their total portfolio. CAPM model provides a relatively objective procedure for required return estimation; it has been widely used in valuation.

So, the required return on the share of particular company can be computed as below:

Return on share 'A' = Risk free return + β x Market Risk Premium

Example:

Risk free rate 5%,

β 1.5

and, Market risk premium 4.5%

Calculate Required return on equity.

Solution

Required return on share A = Risk free return + β x Market Risk Premium

= 0.05 + 1.5 (0.045)

= 0.1175 or 11.75%

5. DISCOUNT RATE SELECTION IN RELATION TO CASH FLOWS

Cash flows are discounted at a suitable rate to arrive at the present value of future cash flows. Cash flows are required by any organization to settle their debt claims and taxes. Whatever amount remains are the cash flows available to equity shareholders. When cashflows to be available to equity shareholders are discounted, the required rate of return on equity is an appropriate discount rate. Further, when cash flows are available to meet the claims of all of company's stakeholders, then the cost of capital is the appropriate discount rate.

5.1 Concept of Nominal Cash Flow and Real Cash Flow

Nominal cash flow is the amount of future revenues the company expects to receive and expenses it expects to pay out, without any adjustments for inflation. For instance, a company which wants to invest in a utility plant wants to forecast its future revenues and expenses it has to incur while earning its income (i.e. wages to labour, electricity, water, gas pipeline etc.).

On the other hand, Real cash flow shows a company's cash flow with adjustments for inflation. Since inflation reduces the spending power of money over time, the real cash flow shows the effects of inflation on a company's cash flow.

In the short term and under conditions of low inflation, the nominal and real cash flows are almost same. However, in conditions of high inflation rates, the nominal cash flows will be higher than the real cash flows.

5.2 Discount rate selection in Equity Valuation

From the above discussion, it can be concluded that cash flows can be nominal or real. When cash flows are stated in real terms, then they are adjusted for inflation. However, in case of nominal cash flow, inflation is not adjusted.

For nominal cash flow, nominal rate of discount is used and for real cash flow, real rate of discount is used. While valuing equity shares, only nominal cash flows are considered. Therefore, only nominal discount rate is considered. The reason is that the tax applying to corporate earnings is generally stated in nominal terms. Therefore, using nominal cash flow in equity valuation is the right approach because it reflects taxes accurately.

Moreover, when the cash flows are available to equity shareholders only, nominal discount rate applicable in case of equity is used. And, the nominal after tax weighted average cost of capital is used when the cash flows are available to all the company's capital providers.

6. VALUATION OF EQUITY SHARES

In order to undertake equity valuations, an analyst can use different approaches, some of which are classified as follows:

(1) Dividend Based Models

(2) Earning Based Models

(3) Cash Flows Based Model

6.1 Dividend Based Models

As we know that dividend is the reward for the provider of equity capital, the same can be used to value equity shares. Valuation of equity shares based on dividend are based on the following assumptions:

a. Dividend to be paid annually.

b. Payment of first dividend shall occur at the end of first year.

c. Sale of equity shares occur at the end of a year and that to at ex-dividend price.

The value of any asset depends on the discounted value of cash streams expected from the same asset. Accordingly, the value of equity shares can be determined on the basis of stream of dividend expected at Required Rate of Return or Opportunity Cost i.e. K_e (Cost of Equity).

Value of equity share can be determined based on holding period as follows:

(1) Valuation Based holding period of One Year : If an investor holds the share for one year then the value of equity share is computed as follows:

$$P_0 = \frac{D_1}{(1 + K_e)^1} + \frac{P_1}{(1 + K_e)^1} = \frac{D_1 + P_1}{(1 + K_e)^1}$$

Example: Share of X Ltd. is expected to be sold at ₹ 36 with a dividend of ₹ 6 after one year. If required rate of return is 20% then what will be the share price?

Answer

The expected share price shall be computed as follows:

$$P_0 = \frac{6}{(1+0.20)^1} + \frac{36}{(1+0.20)^1} = ₹\ 35$$

(2) Valuation Based on Multi Holding Period: In this type of holding following three types of dividend pattern can be analyzed.

(i) Zero Growth: Also, called as No Growth Model, as dividend amount remains same over the years infinitely. The value of equity can be found as follows:

$$P_0 = \frac{D}{(K_e)}$$

(ii) Constant Growth: Constant Dividend assumption is quite an unrealistic assumption. Accordingly, one very common model used is based on Constant Growth in dividend for infinitely long period. In such situation, the value of equity shares can be found by using following formula:

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

It is important to observe that the above formula is based on Gordon Growth Model of Calculation of Cost of Equity.

(iii) Variable Growth in Dividend: Just like no growth in dividend assumption, the constant growth assumption also appears to be unrealistic. Accordingly, valuation of equity shares can be done on

the basis of variable growth in dividends. It should however be noted that though we can assume multiple growth rates but one growth rate should be assumed for infinity, only then we can find value of equity shares.

Although stages of Company's growth fall into following categories such as Growth, Transition and Maturity Phase but for Valuation the multiple dividend growth can be divided into following two categories.

(a) Two Stage Dividend Discount Model: While simple two stage model assumes extraordinary growth (or supernormal growth) shall continue for finite number of years, the normal growth shall prevail for infinite period. Accordingly, the formula for computation of Share Price or equity value shall be as follows:

$$P_0 = \left[\frac{D_0(1+g_1)}{(1+K_e)^1} + \frac{D_0(1+g_1)^2}{(1+K_e)^2} \ldots\ldots\ldots + \frac{D_0(1+g_1)^n}{(1+K_e)^n} \right] + \frac{P_n}{(1+K_e)^n}$$

$$P_n = \frac{D_0(1+g_1)^n(1+g_2)}{(K_e - g_2)}$$

Where, D_0 = Dividend Just Paid

g_1 = Finite or Super Growth Rate

g_2 = Normal Growth Rate

K_e = Required Rate of Return on Equity

P_n = Price of share at the end of Super Growth i.e. beginning of Normal Growth Period

(b) Three Stage Dividend Discount Model: As per one version there are three phases for valuations: extraordinary growth period, transition period and stable growth period.

In the initial phase, a firm grows at an extraordinarily high rate, after which its advantage gets depleted due to competition leading to a gradual decline in its growth rate. This phase is the transition phase, which is followed by the phase of a stable growth rate.

Accordingly, the value of equity share shall be computed, as in case of two stage growth model by adding discounted value of Dividends for two growth periods and finally discounted value of share price at the beginning of sustainable or stable growth period.

There is another version of three stage growth model called H Model. In the first stage dividend grows at high growth rate for a constant period, then in second stage it declines for some constant period and finally grow at sustainable growth rate.

H Model is based on the assumption that before extraordinary growth rate reach to normal growth it declines lineally for period 2H.

Though the situation is complex but the formula for calculation of equity share shall be as follows which is sum of value on the normal growth rate and premium due to abnormal growth rate:

$$P_0 = \frac{D_0(1 + g_n)}{r - g_n} + \frac{D_0 H_1 (g_c - g_n)}{r - g_n}$$

Where g_n= Normal Growth Rate Long Run

g_c= Current Growth Rate i.e. initial short term growth rate

H_1= Half of duration of the transition growth period

These variants of models can also be applied to Free Cash Flow to Equity Model discussed later.

6.2 Earning Based Models

Above mentioned models are based on Dividends. However, nowadays an investor might be willing to forego cash dividend in lieu of higher earnings on retained earning ultimately leading to higher growth in dividend.

Hence, these investors may be interested in determination of value of equity share based on Earning rather than Dividend. The different models based on earnings are as follows:

(a) Gordon's Model: This model is based on following broad assumptions:

(i) Return on Retained earnings remains the same.

(ii) Retention Ratio remains the same.

Valuation as per this model shall be

$$\frac{EPS_1(1 - b)}{K_e - br}$$

Where, r = Return on Equity

b = Retention Ratio

(b) Walter's Approach: This approach is based on Walter Model discussed at Intermediated Level in the Financial Management Paper. As per this model, the value of equity share shall be:

$$\frac{D + (E - D)\frac{r}{K_e}}{K_e}$$

(c) Price Earning Ratio or Multiplier Approach: This is one of the common valuation approaches followed. Since, Price Earning (PE) Ration is based on the ratio of Share Price and EPS, with a given PE Ratio and EPS, the share price or value can simply be determined as follows:

Value = EPS X PE Ratio

Now, the question arises how to estimate the PE Ratio. This ratio can be estimated for a similar type of company or of industry after making suitable adjustment in light of specific features pertaining to the company under consideration. It should further be noted that EPS should be of equity shares. Accordingly, it should be computed after payment of preference dividend as follows:

$$EPS = \frac{\text{Profit after tax} - \text{Preference Dividend}}{\text{Number of Equity Shares}}$$

6.3 Cash Flow Based Models

In the case of Dividend Discounting Valuation model (DDM) the cash flows are dividend which are to be distributed among equity shareholders. This cash flow does not take into consideration the cash flows which can be utilised by the business to meet its long-term capital expenditure requirements and short-term working capital requirement. Hence dividend discount model does not reflect the true free cash flow available to a firm or the equity shareholders after adjusting for its capex and working capital requirement.

Free cash flow valuation models discount the cash flows available to a firm and equity shareholders after meeting its long term and short-term capital requirements. Based on the perspective from which valuations are done, the free cash flow valuation models are classified as:

- Free Cash Flow to Firm Model (FCFF)
- Free Cash Flow to Equity Model (FCFE)

In the case of FCFF model, the discounting factor is the cost of capital (K_o) whereas in the case of FCFE model the cost of equity (K_e) is used as the discounting factor.

FCFE along with DDM is used for valuation of the equity whereas FCFF model is used to find out the overall value of the firm.

6.3.1 Calculation of Free Cash Flow to Firm (FCFF): FCFF can be calculated as follows:

(a) Based on its Net Income:

FCFF= Net Income + Interest expense *(1-tax) + Depreciation -/+ Capital Expenditure –/+ Change in Non-Cash Net Working Capital

(b) Based on Operating Income or Earnings Before Interest and Tax (EBIT):

FCFF= EBIT *(1 - tax rate) + Depreciation -/+ Capital Expenditure –/+ Change in Non-Cash Net Working Capital

(c) Based on Earnings before Interest, Tax , Depreciation and Amortisation (EBITDA):

FCFF = EBITDA* (1-Tax) +Depreciation* (Tax Rate) -/+ Capital Expenditure – /+Change in Non-Cash Net Working Capital

(d) Based on Free Cash Flow to Equity (FCFE):

FCFF = FCFE + Interest* (1-t) + Principal Prepaid – New Debt Issued + Preferred Dividend

(e) Based on Cash Flows:

FCFF = Cash Flow from Operations (CFO) + Interest (1-t) -/+ Capital Expenditure

Capital Expenditure or Capex for a single year is calculated as Purchase of Fixed Asset current year - Sale of Fixed Asset current year taken from Cash Flow from Investing Activities.

Change in Non- Cash Working Capital is calculated as:

Step 1: Calculate Working Capital for the current year: Working Capital =Current Asset-Current Liability

Step 2: Calculate Non-Cash Net Working Capital for the current year: Current Assets – Cash and Bank Balance – Current Liabilities

Step 3: In a similar way calculate Working Capital for the previous year

Step 4: Calculate change in Non-Cash Working Capital as: Non-Cash Working Capital for the current year- Non-Cash Working Capital for the previous year

Step 5: If change in Non-Cash Working Capital is positive, it means an increase in the working capital requirement of a firm and hence is reduced to derive at free cash flow to a firm.

Based on the type of model discussed above the value of Firm can be calculated as follows:

(a) For one stage Model: Intrinsic Value = Present Value of Stable Period Free Cash Flows to Firm

(b) For two stage Model: Intrinsic Value = Present value of Explicit Period Free Cash Flows to Firm + Present Value of Stable Period Free Cash Flows to a Firm, or

Intrinsic Value = Present Value of Transition Period Free Cash Flows to Firm + Present Value of Stable Period Free Cash Flows to a Firm

(c) For three stage Model: Intrinsic Value=Present value of Explicit Period Free Cash Flows to Firm + Present Value of Transition Period Free Cash Flows to Firm + Present Value of Stable Period Free Cash Flows to Firm

6.3.2 Calculation of Free Cash Flow to Equity (FCFE): Free Cash flow to equity is used for measuring the intrinsic value of the stock for equity shareholders. The cash that is available for equity shareholders after meeting all operating expenses, interest, net debt obligations and re-investment requirements such as working capital and capital expenditure. It is computed as:

Free Cash Flow to Equity (FCFE) = Net Income - Capital Expenditures + Depreciation -/+ Change in Non-cash Net Working Capital + New Debt Issued - Debt Repayments + Net issue of Preference Shares – Preference Share Dividends

or

FCFE = Net Profit + depreciation - ΔNWC - CAPEX + New Debt - Debt Repayment + Net issue of Preference Shares – Preference Share Dividends

ΔNWC = changes in Net Working Capital.

CAPEX = Addition in fixed assets to sustain the basis.

FCFE can also be used to value share as per Multistage Growth Model approach.

6.4 Dividend Discount Model versus Free Cash Flow to Equity Model

In the dividend discount model the analyst considers the stream of expected dividends to value the company's stock. It is assumed that the company follows a consistent dividend payout ratio which can be less than the actual cash available with the firm.

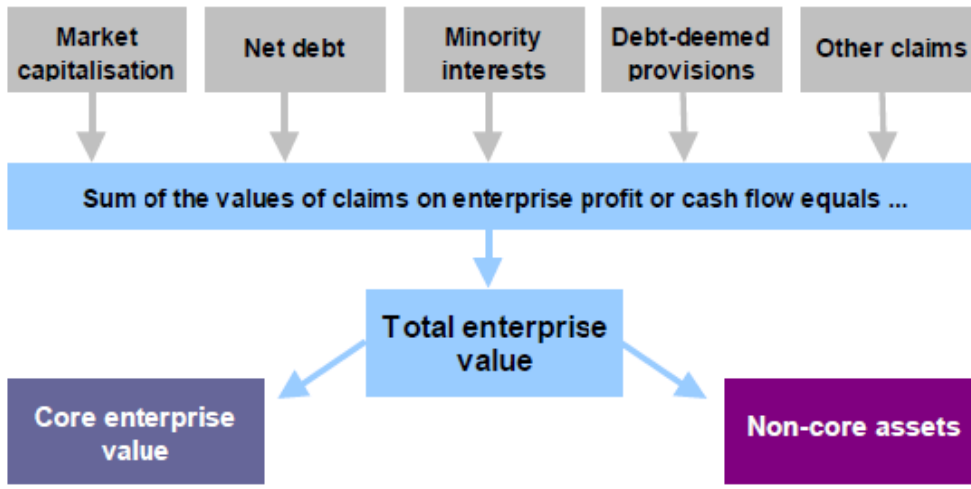
Dividend discount model values a stock based on the cash paid to shareholders as dividend.

A stock's intrinsic value based on the dividend discount model may not represent the fair value for the shareholders because dividends are distributed in the form of cash from profits. In case the company is maintaining healthy cash in its balance sheet then it means that dividend pay-outs is low which could result in undervaluation of the stock.

In the case of free cash flow to equity model a stock is valued on the cash flow available for distribution after all the reinvestment needs of capex and incremental working capital are met. Thus, using the free cash flow to equity model provides a better measure for valuations in comparison to the dividend discount model.

6.5 Enterprise Value

Enterprise Value is the true economic value of a company. It is calculated by adding market capitalization, Long term Debt, Minority Interest minus cash and cash equivalents. (Also Minus like Equity investments like affiliates, investment in any company and also Long term investments.)



Enterprise Value is of three types: Total, Operating and Core EV. Total Enterprise Value is the value of all the business activities; it is the summation of market capitalization, Debt (Interest Bearing), Minority Interest "minus "cash. The operating Enterprise value is the value of all operating activities, and to get this we have to deduct "market value of non- operating assets" which includes Investments and shares (in associates) from the total enterprise value.

Core enterprise value is the value which does not include the value of operations which are not the part of core activities. To get this we deduct the value of non-core assets from the operating enterprise value.

Enterprise value measures the business as a whole and gives its true economic value. It is more comprehensive than equity multiples. Enterprise value considers both equity and debt in its valuation of the firm and is least affected by its capital structure. Enterprise multiples are more reliable than equity multiples because Equity multiples focus only on equity claim.

There are different Enterprise Value multiples which can be calculated as per the requirement (which requirement). If we take the EV as numerator then the denominator must represent the claims of all the claimholders on enterprise cash flow.

6.5.1 Enterprise Value to Sales: This multiple is suitable for the corporates who maintain negative cash flows or negative earnings as cyclical firms. Corporate like technological firms generally use this multiple. Sales are the least manipulative top line for any business and least affected by accounting policies.

6.5.2 Enterprise Value to EBITDA: EBITDA, which is commonly known as the proxy of cash flow, is the amount available to debt and equity holders of a company. This multiple is used for valuing capital intensive companies, which generally have substantial depreciation and amortization expenses. This multiple is used for acquisitions as it incorporates debts as well equity of the business. An analyst prefers this multiple because it is not affected by depreciation policy and changes in capital structure. The inverse of this multiple explains cash return on total investment.

6.6 Valuation of Rights

As we know that company offers right shares to the existing shareholders. Immediately after the right issue, the price of share is called Ex Right Price or Theoretical Ex-Right Price (TERP) which is computed as follows:

$$\frac{nP_0 + S}{n + n_1}$$

n = No. of existing equity shares

P_0 = Price of Share Pre-Right Issue

S = Subscription amount raised from Right Issue

n_1 = No. of new shares offered

However, theoretical value of a right can be calculated as follows:

$$\text{Value of Per Shareholding} = \frac{\text{Ex- Right Price} - \text{Subscription Price}}{\text{Exiting Number of Shares}}$$

7. VALUATION OF PREFERENCE SHARES

Preference shares, like debentures, are usually subject to fixed rate of dividend. In case of non-redeemable preference shares, their valuation is similar to perpetual bonds.

Valuation of Redeemable preference share

The value of redeemable preference share is the present value of all the future expected dividend payments and the maturity value, discounted at the required return on preference shares. Therefore, Value of Redeemable Preference Share shall be:

$$= \frac{\text{Dividend}_1}{(1+r)^1} + \frac{\text{Dividend}_2}{(1+r)^2} + \ldots\ldots\ldots\ldots\ldots + \frac{(\text{Dividend}_n + \text{Maturity value})}{(1+r)^n}$$

and Value of Non-Redeemable Preference Share shall be:

$$\text{Irredeemable Preference share value} = \frac{\text{Dividend}}{\text{Required return on Preference share}}$$

Example

The face value of the preference share is ₹ 10,000 and the stated dividend rate is 10%. The shares are redeemable after 3 years period. Calculate the value of preference shares if the required rate of return is 12%.

Annual dividend = ₹10000 x 10% = ₹1000

Redeemable Preference share value

$$= \frac{1,000}{(1+0.12)} + \frac{1,000}{(1+0.12)^2} + \frac{1,000+10,000}{(1+0.12)^3}$$

$$= \frac{1,000}{(1.12)} + \frac{1,000}{(1.12)^2} + \frac{11,000}{(1.12)^3}$$

= 892.86 + 797.19 + 7829.58

= 9519.63

Solving the above equation, we get the value of the preference shares as ₹ 9519.63

8. VALUATION OF DEBENTURES AND BONDS

8.1 Some Basics of a Bond

(a) **Par Value:** Value stated on the face of the bond of maturity.

(b) **Coupon Rate and Frequency of Payment**: A bond carries a specific interest rate known as the Coupon Rate. The coupon can be paid monthly, quarterly, half-yearly or annually.

(c) **Maturity Period:** Total time till maturity.

(d) **Redemption**: Bullet i.e. one shot repayment of principal at par or premium.

8.2 Bond Valuation Model

The value of a bond is:

$$V = \sum_{t=1}^{n} \frac{I}{(1+k_d)^t} + \frac{F}{(1+k_d)^n}$$

$$V = I\,(PVIFA_{k_d,n}) + F\,(PVIF_{k_d,n})$$

Where,

V = value of the bond

I = annual interest payable on the bond

F = principal amount (par value) of the bond repayable at the time of maturity

n = maturity period of the bond

k_d = Yield to Maturity (YTM) or Required Rate of Return on same type of Bonds.

8.3 Bond Value Theorems

Some basic rules, which should be remembered with regard to bonds, are:

CAUSE	EFFECT
Required rate of return or YTM = coupon rate	Bond sells at par value
Required rate of return or YTM > coupon rate	Bond sells at a discount
Required rate of return or YTM < coupon rate	Bond sells at a premium
Longer the maturity of a bond	Greater the bond price change with a given change in the required rate of return.

8.4 Yield to Maturity (YTM)

The YTM is defined as that discount rate ("k_d") at which the present value of future cash flows from a Bond equals its Market Price.

8.5 Bond Value with Semi-Annual Interest

The basic bond valuation equation thus becomes:

$$V = \sum_{t=1}^{2n} \frac{\frac{I}{2}}{\left(1+\frac{k_d}{2}\right)^t} + \frac{F}{\left(1+\frac{k_d}{2}\right)^{2n}}$$

$$= I/2(PVIFA_{kd/2,2n}) + F(PVIF_{kd/2,2n})$$

Where,

V = Value of the bond

I/2 = Semi-annual interest payment

$K_d/2$ = Discount rate applicable to a half-year period

F = Par value of the bond repayable at maturity

2n = Maturity period expressed in terms of half-yearly periods.

8.6 Price Yield Relationship

A basic property of a bond is that its price varies inversely with yield. The reason is - as the required yield increases, the present value of the cash flow decreases; hence the price decreases and vice versa.

8.7 Relationship between Bond Price and Time

The price of a bond must equal its par value at maturity (assuming that there is no risk of default), because bond prices change with passage of time and they approach to the par value. It means that if a bond is trading at premium, its price will decrease over time and if a bond is trading at a discount, its price will increase over time.

8.8 Duration of Bond

Duration is the weighted average time within which an investor gets back the promised principal and the promised YTM. Investment coupon bearing bond always has a duration which is lesser than its maturity. Higher the coupon rate, lesser would be the duration and higher the yield-to-maturity, lower will be the duration of a bond.

It measures how quickly a bond will repay its true cost. The longer the time it takes the greater exposure the bond has to changes in the interest rate environment and hence, higher interest rate risk. Duration is also a measure of interest rate risk – higher duration implies higher interest rate risk

and lower duration means lower interest rate risk. Following are some of factors that affect bond's duration:

(i) **Time to maturity:** The shorter-maturity bond would have a lower duration and less interest rate risk and vice versa.

(ii) **Coupon rate:** Coupon payment is a key factor in calculation of duration of bonds. The higher the coupon, the lower is the duration and vice versa.

(iii) **Yield-to-Maturity (YTM):** Higher yield-to-maturity means lower duration and hence, lower interest rate risk and vice versa.

Although there are many formulae to calculate the duration. However, following are commonly used methods:

(a) **Macaulay Duration:** This formula measures the number of years required to recover the true cost of a bond, considering the present value of all coupon and principal payments received in the future. The formula for Macaulay duration is as follows:

$$\text{Macaulay Duration} = \frac{\sum_{t=1}^{n} \frac{t*c}{(1+i)^t} + \frac{n*M}{(1+i)^n}}{P}$$

Where,

n = Time to maturity

C = Cash flows (Coupon Amount)

i = Required yield

M = Maturity (par) value

P = Bond price

(b) **Modified Duration:** This is a modified version of Macaulay duration which takes into account the interest rate changes because the changes in interest rates affect duration as the yield gets affected each time the interest rate varies.

The formula for modified duration is as follows:

$$\text{Modified Duration} = \left[\frac{\text{Macaulay Duration in years}}{\left(1 + \frac{\text{YTM}}{n}\right)} \right]$$

Where

n = Number of compounding periods per year

YTM = Yield to Maturity

8.9 Immunization

We know that when interest rate goes up though the reinvestment income improves but the value of bond falls and vice versa. Thus, the interest rate risk of a bond is subject to following two risks:

(a) Price Risk

(b) Reinvestment Risk

Further, with change in interest rates these two risks move in opposite direction. Through the process of immunization, selection of bonds shall be in such a manner that the effect of above two risks shall offset each other. It means that immunization takes place when the changes in the YTM in market has no effect on the promised rate of return on a bond i.e., a portfolio of bond is said to be immunized if the value of the portfolio at the end of a holding period is insensitive to interest rate changes. If the duration of a bond is equal to its holding period, then we ensure immunization of the same and hence, the bond is not having interest rate risk.

8.10 Yield Curve

The term structure of interest rates, also known as Yield Curve, shows how yield to maturity is related to term to maturity for bonds that are similar in all respects, except maturity.

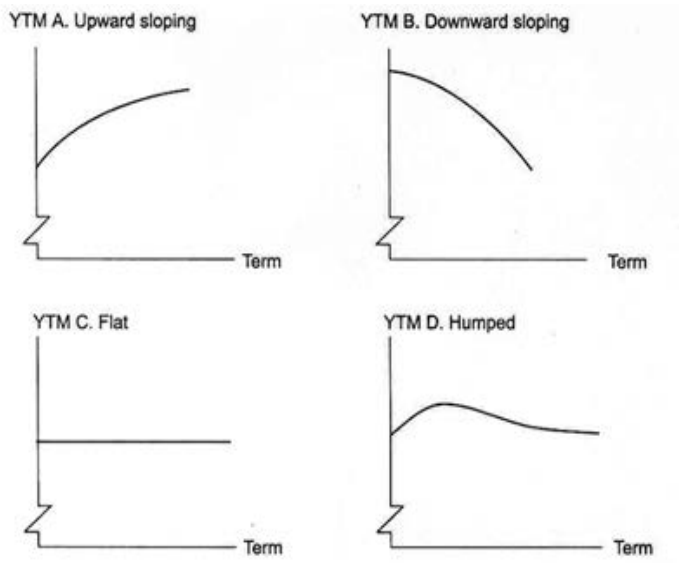
Consider the following data for Government securities:

Face Value	*Coupon Rate (%)*	*Maturity (years)*	*Current Price*	*Yield to Maturity (%)*
10,000	12.40	1	9,987	12.546
10,000	12.75	2	9,937	13.128
10,000	13.50	3	10,035	13.351
10,000	13.50	4	9,971	13.599
10,000	13.75	5	9,948	13.901

The yield curve for the above bonds is shown in the diagram. It slopes upwards indicating that long-term rates are greater than short-term rates.

Yield curves, however, do not have to necessarily slope upwards. They may follow different pattern. Four patterns are depicted in the given diagram:

Types of Yield Curve



Another perspective on the term structure of interest rates is provided by the forward interest rates, viz., the interest rates applicable to bonds in the future.

To get forward interest rates, begin with the one-year Zero Coupon Bond:

$$8,897 = 10,000 / (1 + r_1)$$

Where,

r_1 is the one-year spot rate i.e. the discount rate applicable to a risk less cash flow receivable a year hence.

Solving for r_1, we get $r_1 = 0.124$.

Next, consider the two-year government security and split its benefits into two parts, the interest of ₹ 1,275 receivable at the end of year 1 and ₹ 11,275 (representing the interest and principal repayment) receivable at the end of year 2. The present value of the first part is:

$$\frac{11,275}{(1+r_1)(1+f_2)} = \frac{11,275}{1.124(1+f_2)}$$

To get the present value of the second year's cash flow of ₹ 11,275, discount it twice at r_1 (the discount rate for year 1) and f_2 (the discount rate for year 2) (please use *f* notation for the forward rate so as to make a distinction between the spot rate and forward rate)

$$\frac{1,275}{(1+r_1)(1+f_2)} = \frac{1,275}{1.124(1+f_2)}$$

f_2 is called the 'forward rate' for after one for next one year i.e., the current expected estimate of the next year's one-year spot interest rate. Since r_1, the market price of the bond, and the cash flow associated with the bond are known the following equation can be set up:

$$9{,}937 = \frac{1{,}275}{(1.124)} + \frac{11{,}275}{(1.124)(1+r_2)}$$

$9{,}937(1.124)(1 + r_2) = 1{,}275\ (1 + r_2) + 11{,}275$

$11{,}169 + 11{,}169\ r_2 = 1{,}275 + 1{,}275\ r_2 + 11{,}275$

$11{,}169\ r_2 - 1{,}275\ r_2 = 11{,}275 - 11{,}169 + 1{,}275$

$9{,}894\ r_2 = 1{,}381$

$$r_2 = \frac{1{,}381}{9{,}894} = 0.1396$$

Thus solving this equation we get $r_2 = 0.1396$ say 14%

To get the forward rate for year 3(r_3), set up the equation for the value of the three year bond:

$$10{,}035 = \frac{1{,}350}{(1+r_1)} + \frac{1{,}350}{(1+r_1)(1+r_2)} + \frac{11{,}350}{(1+r_1)(1+r_2)(1+r_3)}$$

$$10{,}035 = \frac{1{,}350}{(1.124)} + \frac{1{,}350}{(1.124)(1.140)} + \frac{11{,}350}{(1.124)(1.140)(1+r_3)}$$

$$10{,}035 = \frac{1{,}350}{1.124} + \frac{1{,}350}{1.28136} + \frac{11{,}350}{1.28136(1+r_3)}$$

$$10{,}035 = 1{,}201 + 1{,}054 + \frac{11{,}350}{1.28136(1+r_3)}$$

$$7780 = \frac{11{,}350}{1.28136(1+r_3)}$$

$1 + r_3 = 1.13853$

$r_3 = 0.13853$

Solving this equation we get r_3=0.13853. This is the forward rate for year three. Continuing in a similar fashion, set up the equation for the value of the four-year bond:

$$9{,}971 = \frac{1{,}350}{(1+r_1)} + \frac{1{,}350}{(1+r_1)(1+r_2)} + \frac{1{,}350}{(1+r_1)(1+r_2)(1+r_3)} + \frac{11{,}350}{(1+r_1)(1+r_2)(1+r_3)(1+r_4)}$$

Solving this equation we get $r_4 = 0.1462$ (approx.). The following diagram plots the one-year spot rate and forward rates f_2, f_3, f_4. It can be noted that while the current spot rate and forward rates are known, the future spot rates are not known – they will be revealed as the future unfolds.

Thus, on the basis of above it can be said that though YTM and Forward Rates are two distinct measures but used equivalent way of evaluating a riskless cash flows.

Discount at the yield to maturity : (R_t) $PV\,[CF(t)] = \frac{CF(t)}{(1+R_t)^t}$

Discount by the product of a spot rate plus the forward rates

$$PV\,[CF(t)] = \frac{CF(t)}{(1+r_1)(1+r_2)\ldots(1+r_t)}$$

8.11 Term Structure Theories

The term structure theories explain the relationship between interest rates or bond yields and different terms or maturities. The different term structures theories are as follows:

(a) Expectation Theory: As per this theory the long-term interest rates can be used to forecast short-term interest rates in the future as long-term interest rates are assumed to unbiased estimator of the short term interest rate in future.

(b) Liquidity Preference Theory: As per this theory investors are risk averse and they want a premium for taking risk. Long-term bonds have higher interest rate risk because of higher maturity, hence, long-term interest rates should have a premium for such a risk. Further, people prefer liquidity and if they are forced to sacrifice the same for a longer period, they need a higher compensation for the same. Hence, as per this theory, the normal shape of a yield curve is Positive sloped one.

(c) Preferred Habitat Theory (Market Segmentation Theory): This theory states that though different investors may be having different preference for shorter and longer maturity periods and therefore, they have their own preferred habitat. Hence, the interest rate structure depends on the

demand and supply of fund for different maturity periods for different market segments. In case there is a mismatch between these forces, the players of a particular segment should be compensated at a higher rate to pull them out from their preferred habitat; hence, that will determine the shape of the yield curve. Accordingly, shape of yield curve will be determined which can be sloping upward, falling or flat.

8.12 Convexity Adjustment

As mentioned above duration is a good approximation of the percentage change in price due to percentage change for a small change in interest rate. However, the change cannot be estimated so accurately due to convexity effect as duration base estimation assumes a linear relationship.

This estimation can be improved by adjustment to the duration formula on account of 'convexity' as follows:

$$C^* \times (\Delta y)^2 \times 100$$

$$C^* = \frac{V_+ + V_- - 2V_0}{2V_0(\Delta y)^2}$$

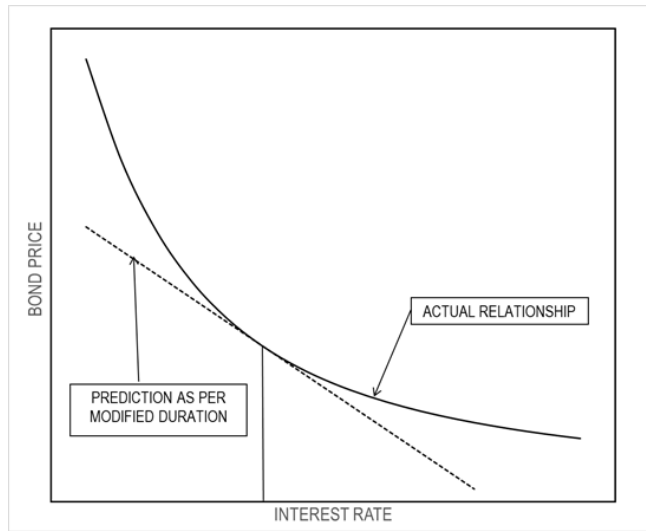
Δy = Change in Yield

V_0 = Initial Price of bond

V_+ = price of Bond if yield increases by Δy

V_- = price of Bond if yield decreases by Δy

The convexity effect has been shown in the following diagram:



8.13 Convertible Debentures

Convertible Debentures are those debentures which are converted in equity shares after certain period of time. The number of equity shares for each convertible debenture are called Conversion Ratio and price paid for the equity share is called 'Conversion Price'.

Further, conversion value of debenture is equal to Price per Equity Share x Converted No. of Shares per Debenture.

8.14 Valuation of Warrants

A warrant is a right that entitles a holder to subscribe equity shares during a specific period at a stated price. These are generally issued to sweeten the debenture issue.

Although both convertible Debentures and Warrants appeared to one and same thing but following are major differences.

(i) In warrant, option of conversion is detachable while in convertible it is not so. Due to this reason, warrants can be separately traded.

(ii) Warrants are exercisable for cash payment while convertible debenture does not involve any such cash payment.

Theoretical value of warrant can be found as follows:

$$(MP - E) \times n$$

MP = Current Market Price of Share

E = Exercise Price of Warrant

n = No. of equity shares convertible with one warrant

8.15 Zero Coupon Bond

As name indicates these bonds do not pay any coupon during the life of the bonds. Instead, Zero Coupon Bonds (ZCBs) are issued at discounted price to their face value, which is the amount a bond will be worth when it matures or comes due. When a ZCB matures, the investor will receive one lump sum (face value) equal to the initial investment plus interest that has been accrued on the investment made. The maturity dates on ZCBs are usually long term. These maturity dates allow an investor for a long-range planning. ZCBs issued by banks, government and private sector companies. However, bonds issued by corporate sector carry a potentially higher degree of risk, depending on the financial strength of the issuer and longer maturity period, but they also provide an opportunity to achieve a higher return.

8.16 Refunding of Bonds

Generally, Bonds issuer may refund bonds prior to its maturity date especially when interest rates are falling. Under this scheme by issuing fresh bonds at lower coupon rates company can refund the

existing bonds issued earlier at higher interest or coupon rate. Therefore, company prefers to issue bonds with call features as it gives them the right or choice to redeem bonds before their due date of maturity especially when market conditions are favourable to them, and new bonds can be issued at lower interest rate. However, this call feature is not free of cost because companies are supposed to repay higher amount than the face value of bonds which is called 'Call Premium'.

It is a type of strategic financial decision, and the Capital Budgeting method is used to evaluate the decision to refund the exiting bonds and issuing new bonds of an equivalent amount. Generally, the Net Present Value (NPV) method is used to evaluate such types of Bond Refunding decisions. If the Present Value of Cash Inflows (in form of net cash saving) exceeds the Present Value of cash outflow (call premium, interest during transition period etc.) then exiting bonds can be refunded and new bonds carrying lower coupon interest rate can be issued resulting in overall saving of cash outflows.

8.17 Money Market Instruments

Similar to Bonds, the money market instruments are important source of finance to industry, trade, commerce and the government sector for meeting their short-term requirement for both national and international trade. These financial instruments also provide an investment opportunity to the banks and others to deploy their surplus funds so as to reduce their cost of liquidity and earn some income.

The instruments of money market are characterised by:

(a) Short duration.

(b) Large volume.

(c) De–regulated interest rates.

(d) The instruments are highly liquid.

(e) They are safe investments owing to issuers inherent financial strength.

The traditional short-term money market instruments consist of mainly call money and notice money with limited players, treasury bills and commercial bills. The new money market instruments were introduced giving a wider choice to short term holders of money to reap yield on funds even for a day to earn a little more by parking funds through instruments for a few days more or until such time till they need it for lending at a higher rate. The various types of instruments of money market are discussed in the following paragraphs:

8.17.1 Call/Notice money: Call money market, or inter-bank call money market, is a segment of the money market where scheduled commercial banks lend or borrow on call (i.e., overnight) or at short notice (i.e., for periods upto 14 days) to manage the day-to-day surpluses and deficits in their cash-flows.

When money is borrowed on overnight basis or for 1 day it is termed as 'Call Money'. However, under notice money market, funds are transacted for a period between two days and fourteen days. These day-to-day surpluses and deficits arise due to the varying nature of their operations and the peculiar nature of the portfolios of their assets and liabilities.

8.17.2 Treasury Bills (TBs): Among money market instruments TBs provide a temporary outlet for short-term surplus as also provide financial instruments of varying short-term maturities to facilitate a dynamic asset-liabilities management. The interest received on them is the discount which is the difference between the price at which they are issued and their redemption value. They have assured yield and negligible risk of default. The TBs are short-term promissory notes issued by Government of India at a discount.

More relevant to the money market is the introduction of 14 days, 28 days, 91 days and 364 days TBs on auction basis.

However, at present, the RBI issues Treasury Bills of three maturities i.e. 91 days, 182 days and 364 days.

TBs are issued at discount and their yields can be calculated with the help of the following formula:

$$Y = \left[\frac{F-P}{P}\right] \times \frac{365}{M} \times 100$$

where Y = Yield,

F = Face Value,

P = Issue Price/Purchase Price,

M = Actual days to Maturity.

8.17.3 Commercial Bills: A commercial bill is one which arises out of a genuine trade transaction, i.e. credit transaction. As soon as goods are sold on credit, the seller draws a bill on the buyer for the amount due. The buyer accepts it immediately agreeing to pay amount mentioned therein after a certain specified date. Thus, a bill of exchange contains a written order from the creditor to the debtor, to pay a certain sum, to a certain person, after a creation period. A bill of exchange is a 'self-liquidating' paper and negotiable; it is drawn always for a short period ranging between 3 months and 6 months.

Bill financing is the core component of meeting working capital needs of corporates in developed countries. Such a mode of financing facilitates an efficient payment system. The commercial bill is instrument drawn by a seller of goods on a buyer of goods. RBI has pioneered its efforts in developing bill culture in India, keeping in mind the distinct advantages of commercial bills, like, self-liquidating in nature, recourse to two parties, knowing exact date transactions, transparency of transactions etc.

Example

If a bank re-discounted a commercial bill with a face value of ₹ 100/- @ 15% for 2 months will fetch ₹ 97.50, on the basis of the following calculation.

$$\text{Discount} = 100 \times \frac{15}{100} \times \frac{2}{12} = ₹\ 2.50$$

However, as the discount amount is paid at front-end.

Example

The yield to the investor or cost to the borrower will be higher than the discount rate in view of the fact that the discounter can deploy the amount of discount received for earning further income. This can be calculated with the following formula:

$$D = \frac{FV - SV}{SV} \times \frac{\text{Days or months in a year}}{M} \times 100$$

where

D = Effective Discounting Rate

FV = Face Value

SV = Sale Value

M = Period of Discount

Accordingly, the Yield as per the data given in the example will be:

$$\frac{100 - 97.50}{97.50} \times \frac{12}{2} \times 100 = 15.385\%$$

8.17.4 Certificate of Deposit: The Certificate of Deposits (CDs) are negotiable term-deposits accepted by commercial bank from bulk depositors at market related rates. CDs are usually issued in Demat form or as a Usance Promissory Note.

Just like Commercial Bills, Certificate of Deposit (CD) is a front–ended negotiable instrument, issued at a discount and the face value is payable at maturity by the issuing bank.

Example

Amount of Issue – ₹ 100

Period - 6 months

Rate of discount – 20%

$$\text{Discount} = 100 \times \frac{20}{100} \times \frac{6}{12} = ₹\ 10.00$$

Hence CD will be issued for ₹ 100 – 10 = ₹ 90.00. The effective rate to the bank will, however, be calculated on the basis of the following formula:

$$E = \frac{FV - SV}{SV} \times \frac{\text{Days or months in a year}}{M} \times 100$$

where

E = Effective Yield

FV = Face Value

SV = Sale Value

M = Period of Discount

Accordingly, the Yield as per the data given in the example will be:

$$\frac{100-90}{90}\times\frac{12}{6}\times 100 = 22.22\%$$

8.17.5 Commercial Paper: Commercial Paper (CP) has its origin in the financial markets of America and Europe. The concept of CPs was originated in USA in early 19th century when commercial banks monopolised and charged high rate of interest on loans and advances. In India, the CP was introduced in January 1990 on the recommendation of Vaghul Committee subject to various conditions. When the process of financial dis-intermediation started in India in 1990, RBI allowed issue of two instruments, viz., the Commercial Paper (CP) and the Certificate of Deposit (CD) as a part of reform in the financial sector. A notable feature of RBI Credit Policy announced on 16.10.1993 was the liberalisation of terms of issue of CP. At present it provides cheap source of funds for corporate sector and has caught the fancy of corporate sector and banks. Its market has picked up considerably in India due to interest rate differentials in the inter-bank and commercial lending rates.

CPs are unsecured and negotiable promissory notes issued by high rated corporate entities to raise short-term funds for meeting working capital requirements directly from the market instead of borrowing from banks. Its period ranges from 7 days to 1 year. CP is issued at discount to face value The issue of CP seeks to by-pass the intermediary role of the banking system through the process of securitisation.

It partly replaces the working capital limits enjoyed by companies with the commercial banks and there will be no net increase in their borrowing by issue of CP. Generally, CP has to be issued at a discount to face value. Yield on CP is freely determined by the market.

The yield on CP can be calculated as follows:

$$Y = \frac{FV-SV}{SV}\times\frac{\text{Days or months in a year}}{M}\times 100$$

where

Y = Yield

FV = Face Value

SV = Sale Value

M = Period of Discount

8.17.6 Repurchase Options (Repo.) and Reverse Repurchase Agreement (Reverse Repo): The term Repurchase Agreement (Repo) and Reverse Repurchase Agreement (Reverse Repo) refer to a type of transaction in which money market participant raises funds by selling securities and simultaneously agreeing to repurchase the same after a specified time generally at a specified price, which typically includes interest at an agreed upon rate. Sometimes it is also called *Ready Forward Contract* as it involves funding by selling securities (held on Spot i.e. Ready Basis) and repurchasing them on a forward basis.

Following are major differences between Repo and Reverse Repo:

(a) Repo rate is the rate at which Reserve Bank of India (RBI) lends to Commercial Banks for a short period of time against Government Securities. On the other hand, Reverse Repo is the rate at which Commercial Banks lend to RBI.

(b) A transaction is called a Repo when viewed from the perspective of the seller of securities (the party acquiring funds) and Reverse Repo when described from the point of view of the supplier of funds. Thus, whether a given agreement is termed a Repo or a Reverse Repo depends largely on which party initiated the transaction.

(c) The purpose of Repo is to fulfill the deficiency of funds. While the purpose of Reverse repo is to reduce excess liquidity in the economy.

(d) The Repo rate is comparatively high in comparison to Reverse Repo rate.

(e) The Repo rate strives to contain inflation in the economy. The Reverse repo aims to control money supply in the economy.

9. ROLE AND RESPONSIBILITIES OF VALUERS

9.1 Role of Valuers

The role of Valuers has increased a lot due to increased statutory and information requirements. The valuations made by a Valuers are required statutorily for the following purposes: -

(a) Mergers/Acquisitions/ De-Mergers/Takeovers: Valuation is mandated in cases of Mergers/ Acquisitions/ De-Mergers/ Takeovers by the Income Tax Act, 1961 for the purpose of determining the tax (if any) payable in such cases.

(b) Slump Sale/ Asset Sale/ IPR Sale: Valuation is required by Insolvency and Bankruptcy Code, 2016 in case of liquidation of company and sale of assets of corporate debtor for the purpose of ascertaining fair value or liquidation value.

(c) Conversion of Debt/ Security: Valuation is a necessitated by RBI for Inbound Foreign Investment, Outbound Foreign Investment and other business transactions.

(d) Capital Reduction: SEBI regulations such as ICDR/ LODR/ Preferential Allotment etc. also require valuations to be made for listed securities for various purposes on a period basis.

(e) Strategic Financial Restructuring: Various statutes such as Companies Act, 2013, SARFAESI Act, 2002, Arbitration and Conciliation Act 1996 etc., warrant valuations to be made for meeting various statutory requirements. Valuation is also made for fulfilling IND AS purposes and may also be made on Court Orders.

9.2 Responsibilities of Valuers

Under Rule 12(e) of the Companies (Registered Valuers and Valuation) Rules, 2017 the Model Code of Conduct for Registered Valuers is as follows:

Integrity and Fairness

1. A valuer should in the conduct of his/its business follow high standards of integrity and fairness in all his/its dealings with his/its clients and other valuers.

2. A valuer should maintain integrity by being honest, straightforward, and forthright in all professional relationships.

3. A valuer should endeavour to ensure that he/it provides true and adequate information and shall not misrepresent any facts or situations.

4. A valuer should refrain from being involved in any action that would bring disrepute to the profession.

Professional Competence and Due Care

5. A valuer should render at all times high standards of service, exercise, due diligence, ensure proper care and exercise independent professional judgment.

6. A valuer should carry out professional services in accordance with the relevant technical and professional standards that may be specified from time to time

7. A valuer should continuously maintain professional knowledge and skill to provide competent professional service based on up-to-date developments in practice, prevailing regulations/guidelines and techniques.

8. In the preparation of a valuation report, the valuer should not disclaim liability for his/its expertise or deny his/its duty of care, except to the extent that the assumptions are statements of fact provided by the company and not generated by the valuer.

9. A valuer should have a duty to carry out with care and skill, the instructions of the client insofar as they are compatible with the requirements of integrity, objectivity and independence.

Independence and Disclosure of Interest

10. A valuer should act with objectivity in his/its professional dealings by ensuring that his/its decisions are made without the presence of any bias, conflict of interest, coercion, or undue influence of any party, whether directly connected to the valuation assignment or not.

11. A valuer should not take up an assignment under the Act/Rules if he/it or any of his/its relatives or associates is not independent in relation to the company and assets being valued.

12. A valuer should maintain complete independence in his/its professional relationships and shall conduct the valuation independent of external influences.

13. A valuer should wherever necessary disclose to the clients, possible sources of conflicts of duties and interests, while providing unbiased services.

14. A valuer should not deal in securities of any subject company after any time when he/it first becomes aware of the possibility of his/its association with the valuation, and in accordance with the SEBI (Prohibition of Insider Trading) Regulations, 2015.

15. A valuer should not indulge in "mandate snatching" or "convenience valuations" in order to cater to the company's needs or client needs. A valuer should communicate in writing with a prior valuer if there is knowledge of any prior valuer having been appointed before accepting the assignment.

16. As an independent valuer, the valuer should not charge success fee.

17. In any fairness opinion or independent expert opinion submitted by a valuer, if there has been a prior engagement in an unconnected transaction, the valuer should declare the past association with the company.

Confidentiality

18. A valuer should not use or divulge to other clients or any other party any confidential information about the subject company, which has come to his/its knowledge without proper and specific authority or unless there is a legal or professional right or duty to disclose.

Information Management

19. A valuer should ensure that he/ it maintains written contemporaneous records for any decision taken, the reasons for taking the decision, and the information and evidence in support of such decision. This should be maintained so as to sufficiently enable a reasonable person to take a view on the appropriateness of his/its decisions and actions.

20. A valuer should appear, co-operate and be available for inspections and investigations carried out by the Registration Authority, any person authorised by the Registration Authority, the Valuation Professional Organisation with which he/it is registered or any other statutory regulatory body.

21. A valuer should provide all information and records as may be required by the Registration Authority, the Tribunal, Appellate Tribunal, the Valuation Professional Organisation with which he/it is registered, or any other statutory regulatory body.

22. A valuer while respecting the confidentiality of information acquired during the course of performing professional services, should maintain proper working papers for a period of three years, for production before a regulatory authority or for a peer review. In the event of a pending case before the Tribunal or Appellate Tribunal, the record should be maintained till the disposal of the case.

Gifts and hospitality

23. A valuer, or his/its relative should not accept gifts or hospitality which undermines or affects his independence as a valuer.

24. A valuer should not offer gifts or hospitality or a financial or any other advantage to a public servant or any other person, intending to obtain or retain work for himself/ itself, or to obtain or retain an advantage in the conduct of profession for himself/ itself.

Remuneration and Costs

25. A valuer should provide services for remuneration which is charged in a transparent manner, is a reasonable reflection of the work necessarily and properly undertaken and is not inconsistent with the applicable rules.

26. A valuer should not accept any fees or charges other than those which are disclosed to and approved by the persons fixing his/ its remuneration.

Occupation, employability and restrictions

27. A valuer should refrain from accepting too many assignments, if he/it is unlikely to be able to devote adequate time to each of his/ its assignments.

28. A valuer should not engage in any employment, except when he has temporarily surrendered his certificate of membership with the Valuation professional Organisation with which he is registered.

29. A valuer should not conduct business which in the opinion of the Registration Authority is inconsistent with the reputation of the profession.

10. PRECAUTIONS NEED TO BE TAKEN BY A VALUER BEFORE ACCEPTING ANY VALUATION ASSIGNMENT

It should be evidently clear to the valuation professional as well as to the end consumer that a good valuation is much more than just numbers. While it is critical to get the maths and application right- however it is equally important to have a comprehensive understanding of the narrative behind the valuation. Attention should be given to the following points while making a valuation:

1. A good valuation does not provide a precise estimate of value. A valuation by necessity involves many assumptions and is a professional estimate of value. The quality and veracity of a good valuation model does not depend just on number crunching. The quality of a valuation will be directly proportional to the time spent in collecting the data and in understanding the firm being valued.

2. Valuing a company is much more than evaluating the financial statements of a company and estimating an intrinsic value based on numbers. This concept is getting more and more critical in today's day and age where most emerging business are valued not on their historical performances captured in the financial statement but rather on a narrative driven factors like scalability, ease of replication, growth potential, cross sell opportunities etc.

3. More often than not, investors/users tend to focus on either numbers or the story without attempting to reach a middle ground. In both these cases, investors will fail to capture opportunities that could have been unlocked had they been willing to reach some middle ground between the two concepts.

4. While it is true that a robust intrinsic value calculation using financial statements data and an error-free model makes investing a more technical subject, in reality, emotions play a massive role in moving stocks higher or lower. Not accounting for this fact, therefore, could become an obstacle in consistently getting the valuation right.

TEST YOUR KNOWLEDGE

Theoretical Questions

1. Why should the duration of a coupon carrying bond always be less than the time to its maturity?

2. Write short notes on Zero Coupon Bonds.

Practical Questions

1. A company has a book value per share of ₹ 137.80. Its return on equity is 15% and it follows a policy of retaining 60% of its earnings. If the Opportunity Cost of Capital is 18%, compute is the price of the share today using both Dividend Growth Model and Walter's Model.

2. ABC Limited's shares are currently selling at ₹ 13 per share. There are 10,00,000 shares outstanding. The firm is planning to raise ₹ 20 lakhs to Finance a new project.

   Required:

   What are the ex-right price of shares and the value of a right, if

   (i) The firm offers one right share for every two shares held.

   (ii) The firm offers one right share for every four shares held.

   (iii) How does the shareholders' wealth (holding 100 shares) change from (i) to (ii)? How does right issue increases shareholders' wealth?

3. MNP Ltd. has declared and paid annual dividend of ₹ 4 per share. It is expected to grow @ 20% for the next two years and 10% thereafter. The required rate of return of equity investors is 15%. Compute the current price at which equity shares should sell.

   Note: Present Value Interest Factor (PVIF) @ 15%:

   For year 1 = 0.8696;

   For year 2 = 0.7561

4. On the basis of the following information:

Current dividend (Do)	=	₹ 2.50
Discount rate (k)	=	10.5%
Growth rate (g)	=	2%

(i) Calculate the present value of stock of ABC Ltd.

(ii) Is its stock overvalued if stock price is ₹ 35, ROE = 9% and EPS = ₹ 2.25? Show detailed calculation. Using PE Multiple Approach and Earning Growth Model.

5. X Limited, just declared a dividend of ₹ 14.00 per share. Mr. B is planning to purchase the share of X Limited, anticipating increase in growth rate from 8% to 9%, which will continue for three years. He also expects the market price of this share to be ₹ 360.00 after three years.

You are required to determine:

(i) the maximum amount Mr. B should pay for shares, if he requires a rate of return of 13% per annum.

(ii) the maximum price Mr. B will be willing to pay for share, if he is of the opinion that the 9% growth can be maintained indefinitely and require 13% rate of return per annum.

(iii) the price of share at the end of three years, if 9% growth rate is achieved and assuming other conditions remaining same as in (ii) above.

Calculate rupee amount up to two decimal points.

	Year-1	**Year-2**	**Year-3**
FVIF @ 9%	1.090	1.188	1.295
FVIF @ 13%	1.130	1.277	1.443
PVIF @ 13%	0.885	0.783	0.693

6. Piyush Loonker and Associates presently pay a dividend of Re. 1.00 per share and has a share price of ₹ 20.00.

(i) If this dividend were expected to grow at a rate of 12% per annum forever, what is the firm's expected or required return on equity using a dividend-discount model approach?

(ii) Instead of this situation in part (i), suppose that the dividends were expected to grow at a rate of 20% per annum for 5 years and 10% per year thereafter. Now what is the firm's expected, or required, return on equity?

7. Capital structure of Sun Ltd., as at 31.3.2003 was as under:

	(₹ in lakhs)
Equity share capital (₹ 100 each)	80
8% Preference share capital	40
12% Debentures	64
Reserves	32

Sun Ltd., earns a profit of ₹ 32 lakhs annually on an average before deduction of income-tax, which works out to 35%, and interest on debentures.

Normal return on equity shares of companies similarly placed is 9.6% provided:

(a) Profit after tax covers fixed interest and fixed dividends at least 3 times.

(b) Capital gearing ratio is 0.75.

(c) Yield on share is calculated at 50% of profits distributed and at 5% on undistributed profits.

Sun Ltd., has been regularly paying equity dividend of 8%.

Compute the value per equity share of the company assuming:

(i) 1% for every one time of difference for Interest and Fixed Dividend Coverage.

(ii) 2% for every one time of difference for Capital Gearing Ratio.

8. ABC Ltd. has been maintaining a growth rate of 10 percent in dividends. The company has paid dividend @ ₹ 3 per share. The rate of return on market portfolio is 12 percent and the risk free rate of return in the market has been observed as 8 percent. The Beta co-efficient of company's share is 1.5.

You are required to calculate the expected rate of return on company's shares as per CAPM model and equilibrium price per share by dividend growth model.

9. A Company pays a dividend of ₹ 2.00 per share with a growth rate of 7%. The risk free rate is 9% and the market rate of return is 13%. The Company has a beta factor of 1.50. However, due to a decision of the Finance Manager, beta is likely to increase to 1.75. Find out the present as well as the likely value of the share after the decision.

10. Calculate the value of share from the following information:

Profit after tax of the company	₹ 290 crores
Equity capital of company	₹ 1,300 crores
Par value of share	₹ 40 each

Debt ratio of company (Debt/ Debt + Equity)	27%
Long run growth rate of the company	8%
Beta 0.1; risk free interest rate	8.7%
Market returns	10.3%
Capital expenditure per share	₹ 47
Depreciation per share	₹ 39
Change in Working capital	₹ 3.45 per share

11. Shares of Voyage Ltd. are being quoted at a price-earning ratio of 8 times. The company retains ₹ 5 per share which is 45% of its Earning Per Share.

You are required to compute

(i) The cost of equity to the company if the market expects a growth rate of 15% p.a.

(ii) If the anticipated growth rate is 16% per annum, calculate the indicative market price with the same cost of capital.

(iii) If the company's cost of capital is 20% p.a. & the anticipated growth rate is 19% p.a., calculate the market price per share.

12. Following Financial data are available for PQR Ltd. for the year 2008:

	(₹ in lakh)
8% debentures	125
10% bonds (2007)	50
Equity shares (₹ 10 each)	100
Reserves and Surplus	300
Total Assets	600
Assets Turnovers ratio	1.1
Effective interest rate	8%
Effective tax rate	40%
Operating margin	10%
Dividend payout ratio	16.67%
Current market Price of Share	₹ 14
Required rate of return of investors	15%

You are required to:

(i) Draw income statement for the year

(ii) Calculate its sustainable growth rate of earnings

(iii) Calculate the fair price of the Company's share using dividend discount model, and

(iv) What is your opinion on investment in the company's share at current price?

13. M/s X Ltd. has paid a dividend of ₹ 2.50 per share on a face value of ₹ 10 in the financial year ending on 31st March, 2009. The details are as follows:

Current market price of share	₹ 60
Growth rate of earnings and dividends	10%
Beta of share	0.75
Average market return	15%
Risk free rate of return	9%

Calculate the intrinsic value of the share.

14. Mr. A is thinking of buying shares at ₹ 500 each having face value of ₹ 100. He is expecting a bonus at the ratio of 1: 5 during the fourth year. Annual expected dividend is 20% and the same rate is expected to be maintained on the expanded capital base. He intends to sell the shares at the end of seventh year at an expected price of ₹ 900 each. Incidental expenses for purchase and sale of shares are estimated to be 5% of the market price. He expects a minimum return of 12% per annum.

Should Mr. A buy the share? If so, what maximum price should he pay for each share? Assume no tax on dividend income and capital gain.

15. The risk free rate of return Rf is 9 percent. The expected rate of return on the market portfolio Rm is 13 percent. The expected rate of growth for the dividend of Platinum Ltd. is 7 percent. The last dividend paid on the equity stock of firm A was ₹ 2.00. The beta of Platinum Ltd. equity stock is 1.2.

(i) What is the equilibrium price of the equity stock of Platinum Ltd.?

(ii) How would the equilibrium price change when

- The inflation premium increases by 2 percent?
- The expected growth rate increases by 3 percent?
- The beta of Platinum Ltd. equity rises to 1.3?

16. SAM Ltd. has just paid a dividend of ₹ 2 per share and it is expected to grow @ 6% p.a. After paying dividend, the Board declared to take up a project by retaining the next three annual

dividends. It is expected that this project is of same risk as the existing projects. The results of this project will start coming from the 4th year onward from now. The dividends will then be ₹ 2.50 per share and will grow @ 7% p.a.

An investor has 1,000 shares in SAM Ltd. and wants a receipt of at least ₹ 2,000 p.a. from this investment.

Show that the market value of the share is affected by the decision of the Board. Also show as to how the investor can maintain his target receipt from the investment for first 3 years and improved income thereafter, given that the cost of capital of the firm is 8%.

17. XYZ Ltd. paid a dividend of ₹ 2 for the current year. The dividend is expected to grow at 40% for the next 5 years and at 15% per annum thereafter. The return on 182 days T-bills is 11% per annum and the market return is expected to be around 18% with a variance of 24%.

The co-variance of XYZ's return with that of the market is 30%. You are required to calculate the required rate of return and intrinsic value of the stock.

18. Rahul Ltd. has surplus cash of ₹ 100 lakhs and wants to distribute 27% of it to the shareholders. The company decides to buy back shares. The Finance Manager of the company estimates that its share price after re-purchase is likely to be 10% above the buyback price-if the buyback route is taken. The number of shares outstanding at present is 10 lakhs and the current EPS is ₹ 3.

You are required to determine:

(i) The price at which the shares can be re-purchased, if the market capitalization of the company should be ₹ 210 lakhs after buyback,

(ii) The number of shares that can be re-purchased, and

(iii) The impact of share re-purchase on the EPS, assuming that net *income is the same.*

19. Nominal value of 10% bonds issued by a company is ₹100. The bonds are redeemable at ₹ 110 at the end of year 5. Determine the value of the bond if required yield is (i) 5%, (ii) 5.1%, (iii) 10% and (iv) 10.1%.

20. An investor is considering the purchase of the following Bond:

Face value	₹ 100
Coupon rate	11%
Maturity	3 years

(i) If he wants a yield of 13% what is the maximum price, he should be ready to pay for?

(ii) If the Bond is selling for ₹ 97.60, what would be his yield?

21. Calculate Market Price of:

(i) 10% Government of India security currently quoted at ₹ 110, but yield is expected to go up by 1%.

(ii) A bond with 7.5% coupon interest, Face Value ₹ 10,000 & term to maturity of 2 years, presently yielding 6%. Interest payable half yearly.

22. A convertible bond with a face value of ₹ 1,000 is issued at ₹ 1,350 with a coupon rate of 10.5%. The conversion rate is 14 shares per bond. The current market price of bond and share is ₹ 1,475 and ₹ 80 respectively. What is the premium over conversion value?

23. Saranam Ltd. has issued convertible debentures with coupon rate 12%. Each debenture has an option to convert to 20 equity shares at any time until the date of maturity. Debentures will be redeemed at ₹ 100 on maturity of 5 years. An investor generally requires a rate of return of 8% p.a. on a 5-year security. As an investor when will you exercise conversion for given market prices of the equity share of (i) ₹ 4, (ii) ₹ 5 and (iii) ₹ 6.

Cumulative PV factor for 8% for 5 years	:	3.993
PV factor for 8% for year 5	:	0.681

24. The data given below relates to a convertible bond :

Face value	₹ 250
Coupon rate	12%
No. of shares per bond	20
Market price of share	₹ 12
Straight value of bond	₹ 235
Market price of convertible bond	₹ 265

Calculate:

(i) Stock value of bond.

(ii) The percentage of downside risk.

(iii) The conversion premium

(iv) The conversion parity price of the stock.

25. ABC Ltd. has ₹ 300 million, 12 per cent bonds outstanding with six years remaining to maturity. Since interest rates are falling, ABC Ltd. is contemplating of refunding these bonds with a ₹ 300 million issue of 6 year bonds carrying a coupon rate of 10 per cent. Issue cost of the new bond will be ₹ 6 million and the call premium is 4 per cent. ₹ 9 million being the unamortized portion of issue cost of old bonds can be written off no sooner the old bonds are

called off. Marginal tax rate of ABC Ltd. is 30 per cent. You are required to analyse the bond refunding decision.

26. The following data are available for a bond

Face value	₹ 1,000
Coupon Rate	16%
Years to Maturity	6
Redemption value	₹ 1,000
Yield to maturity	17%

What is the current market price, duration and volatility of this bond? Calculate the expected market price, if increase in required yield is by 75 basis points.

27. Mr. A will need ₹ 1,00,000 after two years for which he wants to make one time necessary investment now. He has a choice of two types of bonds. Their details are as below:

	Bond X	Bond Y
Face value	₹ 1,000	₹ 1,000
Coupon	7% payable annually	8% payable annually
Years to maturity	1	4
Current price	₹ 972.73	₹ 936.52
Current yield	10%	10%

Advice Mr. A whether he should invest all his money in one type of bond or he should buy both the bonds and, if so, in which quantity? Assume that there will not be any call risk or default risk.

28. RBI sold a 91-day T-bill of face value of ₹ 100 at an yield of 6%. What was the issue price?

29. Wonderland Limited has excess cash of ₹ 20 lakhs, which it wants to invest in short term marketable securities. Expenses relating to investment will be ₹ 50,000.

The securities invested will have an annual yield of 9%.

The company seeks your advice

(i) as to the period of investment so as to earn a pre-tax income of 5%. (discuss)

(ii) the minimum period for the company to breakeven its investment expenditure overtime value of money.

30. Z Co. Ltd. issued commercial paper worth ₹10 crores as per following details:

Date of issue : 16th January, 2019

Date of maturity:	17th April, 2019
No. of days:	91
Interest rate:	12.04% p.a.

What was the net amount received by the company on issue of CP? (Charges of intermediary may be ignored)

31. Bank A enter into a Repo for 14 days with Bank B in 10% Government of India Bonds 2028 @ 5.65% for ₹ 8 crore. Assuming that clean price (the price that does not have accrued interest) be ₹ 99.42 and initial Margin be 2% and days of accrued interest be 262 days. You are required to determine

(i) Dirty Price

(ii) Repayment at maturity. (Consider 360 days in a year)

ANSWERS/SOLUTIONS

Answers to Theoretical Questions

1. Please refer paragraph 8.8.

2. Please refer paragraph 8.15.

Answers to the Practical Questions

1. The company earnings and dividend per share after a year are expected to be:

EPS = ₹ 137.8 × 0.15 = ₹ 20.67

Dividend = 0.40 × 20.67 = ₹ 8.27

The growth in dividend would be:

g = 0.6 × 0.15 = 0.09

(a) As per Dividend Growth Model

$$\text{Perpetual growth model Formula}: P_0 = \frac{\text{Dividend}}{K_e - g}$$

$$P_0 = \frac{8.27}{0.18 - 0.09}$$

$$P_0 = ₹\ 91.89$$

(b) Walter's approach showing relationship between dividend and share price can be expressed by the following formula

$$V_c = \frac{D + \frac{R_a}{R_c}(E - D)}{R_c}$$

Where,

V_c = Market Price of the ordinary share of the company.

R_a = Return on internal retention i.e. the rate company earns on retained profits.

R_c = Capitalisation rate i.e. the rate expected by investors by way of return from particular category of shares.

E = Earnings per share.

D = Dividend per share.

Hence,

$$V_c = \frac{8.27 + \frac{0.15}{0.18}(20.67 - 8.27)}{0.18} = \frac{18.60}{0.18}$$

= ₹ 103.35

2. **(i)** Number of shares to be issued : 5,00,000

Subscription price ₹ 20,00,000 / 5,00,000 = ₹ 4

$$\text{Ex-right Price} = \frac{₹\ 1,30,00,000 + ₹\ 20,00,000}{15,00,000} = ₹\ 10$$

Value of a Right = ₹ 10 – ₹ 4 = ₹ 6

$$\text{Value of a Right Per Share Basis} = \frac{₹10 - ₹4}{2} = ₹3$$

(ii) Subscription price ₹ 20,00,000 / 2,50,000 = ₹ 8

$$\text{Ex-right Price} = \frac{₹\ 1,30,00,000 + ₹\ 20,00,000}{12,50,000} = ₹\ 12$$

Value of a Right = ₹ 12 – ₹ 8 = ₹ 4

$$\text{Value of a Right Per Share} = \frac{₹12 - ₹8}{4} = ₹1$$

(iii) Calculation of effect of right issue on wealth of Shareholder's wealth who is holding 100 shares.

(a) When firm offers one share for two shares held.

Value of Shares after right issue (150 X ₹ 10)	₹ 1,500
Less: Amount paid to acquire right shares (50X₹4)	₹ 200
	₹ 1,300

(b) When firm offers one share for every four shares held.

Value of Shares after right issue (125 X ₹ 12)	₹ 1,500
Less: Amount paid to acquire right shares (25X₹8)	₹ 200
	₹ 1,300

(c) Wealth of Shareholders before Right Issue ₹ 1,300

Thus, there will be no change in the wealth of shareholders from (i) and (ii).

3. D_0 = ₹ 4

D_1 = ₹ 4 (1.20) = ₹ 4.80

D_2 = ₹ 4 $(1.20)^2$ = ₹ 5.76

D_3 = ₹ 4 $(1.20)^2$ (1.10) = ₹ 6.336

$$P = \frac{D_1}{(1+k_e)} + \frac{D_2}{(1+k_e)^2} + \frac{TV}{(1+k_e)^2}$$

$$TV = \frac{D_3}{k_e - g} = \frac{6.336}{0.15 - 0.10} = 126.72$$

$$P = \frac{4.80}{(1+0.15)} + \frac{5.76}{(1+0.15)^2} + \frac{126.72}{(1+0.15)^2}$$

= 4.80 x 0.8696 + 5.76 x 0.7561 + 126.72 x 0.7561 = 104.34

4. (i) Present Value of the stock of ABC Ltd. Is:-

$$Vo = \frac{2.50(1.02)}{0.105 - 0.02} = ₹30/-.$$

(ii) (A) Value of stock under the PE Multiple Approach

Particulars	
Actual Stock Price	₹ 35.00
Return on equity	9%
EPS	₹ 2.25
PE Multiple (1/Return on Equity) = 1/9%	11.11
Market Price per Share	₹ 25.00

Since, Actual Stock Price is higher, hence it is overvalued.

(B) Value of the Stock under the Earnings Growth Model

Particulars	
Actual Stock Price	₹ 35.00
Return on equity	9%
EPS	₹ 2.25
Growth Rate	2%
Market Price per Share [EPS ×(1+g)]/(K_e – g) = ₹ 2.25 × 1.02/0.07	₹ 32.79

Since, Actual Stock Price is higher, hence it is overvalued.

5. (i) Expected dividend for next 3 years.

Year 1 (D_1) ₹ 14.00 (1.09) = ₹ 15.26

Year 2 (D_2) ₹ 14.00 $(1.09)^2$ = ₹ 16.63

Year 3 (D_3) ₹ 14.00 $(1.09)^3$ = ₹ 18.13

Required rate of return = 13% (Ke)

Market price of share after 3 years = (P_3) = ₹ 360

The present value of share

$$P_0 = \frac{D_1}{(1+ke)} + \frac{D_2}{(1+ke)^2} + \frac{D_3}{(1+ke)^3} + \frac{P_3}{(1+ke)^3}$$

$$P_0 = \frac{15.26}{(1+0.13)} + \frac{16.63}{(1+0.13)^2} + \frac{18.13}{(1+0.13)^3} + \frac{360}{(1+0.13)^3}$$

P_0 = 15.26(0.885) + 16.63(0.783) +18.13(0.693)+360(0.693)

P_0 = 13.50 + 13.02 + 12.56 + 249.48

P_0 = ₹ 288.56

(ii) If growth rate 9% is achieved for indefinite period, then maximum price of share should Mr. A willing be to pay is

$$P_0 = \frac{D_1}{(ke-g)} = \frac{₹\ 15.26}{0.13\text{-}0.09} = \frac{₹15.26}{0.04} = ₹\ 381.50$$

(iii) Assuming that conditions mentioned above remain same, the price expected after 3 years will be:

$$P_3 = \frac{D_4}{k_e - g} = \frac{D_3(1.09)}{0.13 - 0.09} = \frac{18.13 \times 1.09}{0.04} = \frac{19.76}{0.04} = ₹\ 494$$

6. (i) Firm's Expected or Required Return on Equity

(Using a dividend discount model approach)

According to Dividend discount model approach the firm's expected or required return on equity is computed as follows:

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

Where,

K_e = Cost of equity share capital or (Firm's expected or required return on equity share capital)

D_1 = Expected dividend at the end of year 1

P_0 = Current market price of the share.

g = Expected growth rate of dividend.

Now, $D_1 = D_0 (1 + g)$ or ₹ 1 (1 + 0.12) or ₹ 1.12, P_0 = ₹ 20 and g = 12% per annum

$$\text{Therefore, } K_e = \frac{₹\ 1.12}{₹\ 20} + 12\%$$

Or, K_e = ₹ 17.6%

(ii) Firm's Expected or Required Return on Equity

(If dividends were expected to grow at a rate of 20% per annum for 5 years and 10% per year thereafter)

Since in this situation if dividends are expected to grow at a super normal growth rate g_s, for n years and thereafter, at a normal, perpetual growth rate of g_n beginning in the year n + 1, then the cost of equity can be determined by using the following formula:

$$P_0 = \sum_{t=1}^{n} \frac{Div_0 (1+g_s)^t}{(1+K_e)^t} + \frac{Div_{n+1}}{K_e - g_n}$$

Where,

g_s = Rate of growth in earlier years.

g_n = Rate of constant growth in later years.

P_0 = Discounted value of dividend stream.

K_e = Firm's expected, required return on equity (cost of equity capital).

Now,

g_s = 20% for 5 years, g_n = 10%

Therefore,

$$P_0 = \sum_{t=1}^{n} \frac{D_0 (1+0.20)^t}{(1+K_e)^t} + \frac{Div_{5+1}}{K_e - 0.10} \times \frac{1}{(1+K_e)^t}$$

$$P_0 = \frac{1.20}{(1+k_e)^1} + \frac{1.44}{(1+k_e)^2} + \frac{1.73}{(1+k_e)^3} + \frac{2.07}{(1+k_e)^4} + \frac{2.49}{(1+k_e)^5} + \frac{2.49(1+0.10)}{k_e - 0.10} \times \frac{1}{(1+k_e)^5}$$

or P_0 = ₹ 1.20 (PVF_1, K_e) + ₹ 1.44 (PVF_2, K_e) + ₹ 1.73 (PVF_3, K_e) + ₹ 2.07 (PVF_4, K_e) + ₹ 2.49 (PVF_5, K_e) + $\frac{\text{Rs. } 2.74\,(PVF_5, K_e)}{K_e - 0.10}$

By trial and error we are required to find out K_e

Now, assume K_e = 18% then we will have

P_0 = ₹ 1.20 (0.8475) + ₹ 1.44 (0.7182) + ₹ 1.73 (0.6086) + ₹ 2.07 (0.5158) + ₹ 2.49 (0.4371) + ₹ 2.74 (0.4371) $\times \frac{1}{0.18 - 0.10}$

= ₹ 1.017 + ₹ 1.034 + ₹ 1.053 + ₹ 1.068 + ₹ 1.09 + ₹ 14.97= ₹ 20.23

Since the present value of dividend stream is more than required it indicates that Ke is greater than 18%.

Now, assume K_e = 19% we will have

P_0 = ₹ 1.20 (0.8403) + ₹ 1.44 (0.7061) + ₹ 1.73 (0.5934) + ₹ 2.07 (0.4986) + ₹ 2.49 (0.4190) + ₹ 2.74 (0.4190) $\times \frac{1}{0.19 - 0.10}$

= ₹ 1.008 + ₹ 1.017 + ₹ 1.026+ ₹ 1.032 + ₹ 1.043 + ₹ 12.76

= ₹ 17.89

Since the market price of share (expected value of dividend stream) is ₹ 20. Therefore, the discount rate is closer to 18% than it is to 19%, we can get the exact rate by interpolation by using the following formula:

$$K_e = LR + \frac{\text{NPV at LR}}{\text{NPV at LR} - \text{NPV at HR}} \times \Delta r$$

Where,

LR = Lower Rate

NPV at LR = Present value of share at LR

NPV at HR = Present value of share at Higher Rate

Δr = Difference in rates

$$K = 18\% + \frac{(₹\ 20.23 - ₹\ 20)}{₹\ 20.23 - ₹\ 17.89} \times 1\%$$

$$= 18\% + \frac{₹\ 0.23}{₹ 2.34} \times 1\%$$

= 18% + 0.10% = 18.10%

Therefore, the firm's expected, or required, return on equity is 18.10%. At this rate the present discounted value of dividend stream is equal to the market price of the share.

7. (a) Calculation of Profit after tax (PAT)

		₹
Profit before interest and tax (PBIT)		32,00,000
Less: Debenture interest (₹ 64,00,000 × 12/100)		7,68,000
Profit before tax (PBT)		24,32,000
Less: Tax @ 35%		8,51,200
Profit after tax (PAT)		15,80,800
Less: Preference Dividend		
(₹ 40,00,000 × 8/100)	3,20,000	
Equity Dividend (₹ 80,00,000 × 8/100)	6,40,000	9,60,000
Retained earnings (Undistributed profit)		6,20,800

Calculation of Interest and Fixed Dividend Coverage

$$= \frac{\text{PAT + Debenture interest}}{\text{Debenture interest + Preference dividend}} \text{ or } \frac{\text{PAT + Debenture Interest Net of Tax}}{\text{Debenture interest + Preference dividend}}$$

$$= \frac{15,80,800 + 7,68,000}{7,68,000 + 3,20,000} \text{ or } \frac{15,80,800 + 4,99,200}{7,68,000 + 3,20,000}$$

$$= \frac{23,48,800}{10,88,000} \text{ or } \frac{20,80,000}{10,88,000} = 2.16 \text{ times or } 1.91 \text{ times}$$

(b) Calculation of Capital Gearing Ratio

$$\text{Capital Gearing Ratio} = \frac{\text{Fixed interest bearing funds}}{\text{Equity shareholders' funds}}$$

$$= \frac{\text{Preference Share Capital + Debentures}}{\text{Equity Share Capital + Reserves}} = \frac{40,00,000 + 64,00,000}{80,00,000 + 32,00,000} = \frac{1,04,00,000}{1,12,00,000} = 0.93$$

(c) Calculation of Yield on Equity Shares:

Yield on equity shares is calculated at 50% of profits distributed and 5% on undistributed profits:

	(₹)
50% on distributed profits (₹ 6,40,000 × 50/100)	3,20,000
5% on undistributed profits (₹ 6,20,800 × 5/100)	31,040
Yield on equity shares	3,51,040

$$\text{Yield on equity shares \%} = \frac{\text{Yield on shares}}{\text{Equity share capital}} \times 100$$

$$= \frac{3,51,040}{80,00,000} \times 100 = 4.39\% \text{ or, } 4.388\%.$$

Calculation of Expected Yield on Equity shares

(a) Interest and fixed dividend coverage of Sun Ltd. is 2.16 times but the industry average is 3 times. Therefore, risk premium is added to Sun Ltd. Shares @ 1% for every 1 time of difference.

Risk Premium = 3.00 – 2.16 (1%) = 0.84 (1%) = 0.84%

(b) Capital Gearing ratio of Sun Ltd. is 0.93 but the industry average is 0.75 times. Therefore, risk premium is added to Sun Ltd. shares @ 2% for every 1 time of difference.

Risk Premium = (0.75 – 0.93) (2%) = 0.18 (2%) = 0.36%

	(%)
Normal return expected	9.60
Add: Risk premium for low interest and fixed dividend coverage	0.84
Add: Risk premium for high interest gearing ratio	0.36
	10.80

Value of Equity Share

$$= \frac{\text{Actual yield}}{\text{Expected yield}} \times \text{Paid-up value of share} = \frac{4.39}{10.80} \times 100 = ₹\ 40.65$$

8. CAPM formula for calculation of Expected Rate of Return is :

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

$= 8 + 1.5 (12 - 8)$

= 8 + 1.5 (4)

= 8 + 6

=14% or 0.14

Applying Dividend Growth Model for the calculation of per share equilibrium price:

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

$$0.14 = \frac{3(1.10)}{P_0} + 0.10$$

$$0.14 - 0.10 = \frac{3.30}{P_0}$$

$$0.04\ P_0 = 3.30$$

$$P_0 = \frac{3.30}{0.04} = ₹\ 82.50$$

Per share equilibrium price will be ₹ 82.50.

9. In order to find out the value of a share with constant growth model, the value of K_e should be ascertained with the help of 'CAPM' model as follows:

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

Where,

K_e = Cost of equity

R_f = Risk free rate of return

β = Portfolio Beta i.e. market sensitivity index

K_m = Expected return on market portfolio

By substituting the figures, we get

$K_e = 0.09 + 1.5\ (0.13 - 0.09) = 0.15$ or 15%

and the value of the share as per constant growth model is

$$P_0 = \frac{D_1}{(k_e - g)}$$

Where,

P_0 = Price of a share

D1 = Dividend at the end of the year 1

Ke = Cost of equity

g = growth

$$P_0 = \frac{2.00}{(k_e - g)}$$

$$P_0 = \frac{2.00}{0.15 - 0.07} = ₹\ 25.00$$

Alternatively, it can also be found as follows:

$$\frac{2.00\ (1.07)}{0.15 - 0.07} = ₹\ 26.75$$

However, if the decision of finance manager is implemented, the beta (β) factor is likely to increase to 1.75 therefore, K_e would be

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

$= 0.09 + 1.75\ (0.13 - 0.09) = 0.16$ or 16%

The value of share is

$$P_0 = \frac{D_1}{(k_e - g)}$$

$$P_0 = \frac{2.00}{0.16 - 0.07} = ₹\ 22.22$$

Alternatively, it can also be found as follows:

$$\frac{2.00\ (1.07)}{0.16 - 0.07} = ₹\ 23.78$$

10. No. of Shares = $\frac{₹\ 1,300\ \text{crores}}{₹\ 40}$ = 32.5 Crores

$$EPS = \frac{PAT}{\text{No.of shares}}$$

$$EPS = \frac{₹\ 290\ \text{crores}}{32.5\ \text{crores}} = ₹\ 8.923$$

FCFE = Net income – [(1-b) (capex – dep) + (1-b) (ΔWC)]

FCFE = 8.923 – [(1-0.27) (47-39) + (1-0.27) (3.45)]

= 8.923 – [5.84 + 2.5185] = 0.5645

Cost of Equity = R_f + ß (R_m – R_f)

= 8.7 + 0.1 (10.3 – 8.7) = 8.86%

$$Po = \frac{FCFE(1+g)}{K_e - g} = \frac{0.5645(1.08)}{0.0886 - .08} = \frac{0.60966}{0.0086} = ₹\ 70.89$$

11. (i) Cost of Capital

Retained earnings (45%)	₹ 5 per share
Dividend (55%)	₹ 6.11 per share
EPS (100%)	₹ 11.11 per share
P/E Ratio	8 times
Market price	₹ 11.11 × 8 = ₹ 88.88

Cost of equity capital

$$= \left(\frac{Div}{Price} \times 100\right) + Growth\ \% = \frac{₹\ 6.11}{₹\ 88.88} \times 100 + 15\% = 21.87\%$$

(ii) Market Price $= \left(\frac{Dividend}{Cost\ of\ Capital(\%) - Growth\ Rate(\%)}\right)$

$$= \frac{₹\ 6.11}{(21.87\text{-}16)\%} = ₹\ 104.08 \text{ per share}$$

(iii) Market Price $= \frac{₹ 6.11}{(20\text{-}19)\%} = ₹\ 611.00$ per share

12. Workings:

Asset turnover ratio	= 1.1
Total Assets	= ₹ 600
Turnover ₹ 600 lakhs × 1.1	= ₹ 660 lakhs
Effective interest rate	$= \frac{Interest}{Libilities} = 8\%$
Liabilities	= ₹ 125 lakhs + 50 lakhs = 175 lakh
Interest	= ₹ 175 lakhs × 0.08 = ₹ 14 lakh
Operating Margin	= 10%
Hence operating cost	= (1 - 0.10) ₹ 660 lakhs = ₹ 594 lakh
Dividend Payout	= 16.67%
Tax rate	= 40%

(i) Income statement

	(₹ Lakhs)
Sale	660
Operating Exp	594
EBIT	66
Interest	14
EBT	52
Tax @ 40%	20.80
EAT	31.20
Dividend @ 16.67%	5.20
Retained Earnings	26.00

(ii) SGR = ROE (1-b)

$$ROE = \frac{PAT}{NW} \text{ and } NW = ₹\,100\,lakh + ₹\,300\,lakh = 400\,lakh$$

$$ROE = \frac{₹\,31.2\,lakhs}{₹\,400\,lakhs} \times 100 = 7.8\%$$

$$SGR = 0.078(1 - 0.1667) = 6.5\% \text{ or } \frac{0.078 \times 0.8333}{1-0.078 \times 0.8333} = 6.95\%$$

(iii) Calculation of fair price of share using dividend discount model

$$P_o = \frac{D_0(1+g)}{k_e - g}$$

$$\text{Dividends} = \frac{₹\,5.2\,lakhs}{₹\,10\,lakhs} = ₹\,0.52$$

Growth Rate = 6.5% or 6.95%

$$\text{Hence } P_o = \frac{₹\,0.52(1+0.065)}{0.15-0.065} = \frac{₹\,0.5538}{0.085} = ₹\,6.51 \text{ or } \frac{0.52(1+0.0695)}{0.15-0.0695}$$

$$= \frac{0.5561}{0.0805} = ₹\,6.91$$

(iv) Since the current market price of share is ₹ 14, the share is overvalued. Hence the investor should not invest in the company.

13. Intrinsic Value $P_0 = \frac{D1}{k - g}$

Using CAPM

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

R_f = Risk Free Rate

β = Beta of Security

R_m = Market Return

= 9% + 0.75 (15% - 9%) = 13.5%

$P = \frac{2.5 \times 1.1}{0.135 - 0.10} = \frac{2.75}{0.035}$ = ₹ 78.57

14. **P.V. of dividend stream and sales proceeds**

Year	Divd. /Sale	PVF (12%)	PV (₹)
1	₹ 20/-	0.893	17.86
2	₹ 20/-	0.797	15.94
3	₹ 20/-	0.712	14.24
4	₹ 24/-	0.636	15.26
5	₹ 24/	0.567	13.61
6	₹ 24/	0.507	12.17
7	₹ 24/	0.452	10.85
7	₹ 1026/- (₹ 900 x 1.2 x 0.95)	0.452	463.75
			₹ 563.68
	Less : - Cost of Share (₹ 500 x 1.05)		₹ 525.00
	Net gain		₹ 38.68

Since Mr. A is gaining ₹ 38.68 per share, he should buy the share.

Maximum price Mr. A should be ready to pay is ₹ 563.68 which will include incidental expenses. So the maximum price should be ₹ 563.68 x 100/105 = ₹ 536.84

15. **(i)** Equilibrium price of Equity using CAPM

= 9% + 1.2(13% - 9%)

= 9% + 4.8%= 13.8%

$P = \frac{D_1}{k_e - g} = \frac{2.00(1.07)}{0.138 - 0.07} = \frac{2.14}{0.068}$ = ₹ 31.47

(ii) New Equilibrium price of Equity using CAPM

= 9.18% + 1.3(13% - 9.18%)

= 9.18% + 4.966% = 14.146%

$$P=\frac{D_1}{k_e-g}=\frac{2.00(1.10)}{0.14146-0.10}=\frac{2.20}{0.04146}=₹\,53.06$$

Alternatively, it can also be computed as follows:

= 11% + 1.3(15% - 11%)

= 11% + 5.2%= 16.20%

$$P=\frac{D_1}{k_e-g}=\frac{2.00(1.10)}{0.162-0.10}=₹\,35.48$$

Alternatively, if all the factors are taken separately then solution will be as follows:

(i) Inflation Premium increase by 2%. This raises R_X to 15.80%. Hence, new equilibrium price will be:

$$=\frac{2.00(1.07)}{0.158-0.07}=₹\,24.32$$

(ii) Expected Growth rate increases by 3%. Hence, revised growth rate stands at 10%:

$$=\frac{2.00(1.10)}{0.138-0.10}=₹\,57.89$$

(iii) Beta rises to 1.3. Hence, revised cost of equity shall be:

= 9% + 1.3(13% - 9%)

= 9% + 5.2%= 14.2%

As a result, New Equilibrium price shall be:

$$P=\frac{D_1}{k_e-g}=\frac{2.00(1.07)}{0.142-0.07}=₹\,29.72$$

16. Value of share at present $=\frac{D_1}{k_e-g}$

$$=\frac{2(1.06)}{0.08-0.06}=₹\,106$$

However, if the Board implement its decision, no dividend would be payable for 3 years and the dividend for year 4 would be ₹ 2.50 and growing at 7% p.a. The price of the share, in this case, now would be:

$$P_0 = \frac{2.50}{0.08-0.07} \times \frac{1}{(1+0.08)^3} = ₹\ 198.46$$

So, the price of the share is expected to increase from ₹ 106 to ₹ 198.45 after the announcement of the project. The investor can take up this situation as follows:

Expected market price after 3 years $= \frac{2.50}{0.08-0.07}$ = ₹ 250.00

Expected market price after 2 years $= \frac{2.50}{0.08-0.07} \times \frac{1}{(1+0.08)}$ = ₹ 231.48

Expected market price after 1 years $= \frac{2.50}{0.08-0.07} \times \frac{1}{(1+0.08)^2}$ = ₹ 214.33

In order to maintain his receipt at least ₹ 2,000 for first 3 year, he would sell

10 shares in first year @ ₹ 214.33 for	₹ 2,143.30
9 shares in second year @ ₹ 231.48 for	₹ 2,083.32
8 shares in third year @ ₹ 250 for	₹ 2,000.00

At the end of 3rd year, he would be having 973 shares valued @ ₹ 250 each i.e. ₹ 2,43,250. On these 973 shares, his dividend income for year 4 would be @ ₹ 2.50 i.e. ₹ 2,432.50.

So, if the project is taken up by the company, the investor would be able to maintain his receipt of at least ₹ 2,000 for first three years and would be getting increased income thereafter.

17. $\beta = \frac{\text{Covariance of Market Return and Security Return}}{\text{Variance of Market Return}}$

$\beta = \frac{30\%}{24\%} = 1.25$

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

= 11% + 1.25(18% - 11%) = 11% + 8.75% = 19.75%

Intrinsic Value

Year	Dividend (₹)	PVF (19.75%,n)	Present Value (₹)
1	2.80	0.835	2.34
2	3.92	0.697	2.73
3	5.49	0.582	3.19
4	7.68	0.486	3.73
5	10.76	0.406	4.37
			16.36

PV of Terminal Value = = $\frac{10.76(1.15)}{0.1975-0.15} \times 0.406$ = ₹ 105.77

Intrinsic Value = ₹ 16.36 + ₹ 105.77 = ₹ 122.13

18. (i) Let P be the buyback price decided by Rahul Ltd.

Market Capitalisation after Buyback

1.1P (Original Shares – Shares Bought Back)

$= 1.1P \left(10 \text{ lakhs} - \frac{27\% \text{ of } 100 \text{ lakhs}}{P}\right)$

= 11 lakhs × P – 27 lakhs × 1.1 = 11 lakhs P – 29.7 lakhs

Again, 11 lakhs P – 29.7 lakhs

or 11 lakhs P = 210 lakhs + 29.7 lakhs

or P = $\frac{239.7}{11}$ = ₹ 21.79 per share

(ii) Number of Shares to be Bought Back :-

$\frac{₹ \text{ 27 lakhs}}{₹ \text{ 21.79}}$ = 1.24 lakhs (Approx.) or 123910 share

(iii) New Equity Shares:-

10 lakhs – 1.24 lakhs = 8.76 lakhs or 1000000 – 123910 = 876090 shares

$\therefore \text{EPS} = \frac{3 \times 10 \text{ lakhs}}{8.76 \text{ lakhs}}$ = ₹ 3.43

Thus, EPS of Rahul Ltd., increases to ₹ 3.43.

19. Case (i) Required yield rate = 5%

Year	Cash Flow ₹	DF (5%)	Present Value ₹
1-5	10	4.3295	43.295
5	110	0.7835	86.185
Value of bond			129.48

Case (ii) Required yield rate = 5.1%

Year	Cash Flow ₹	DF (5.1%)	Present Value ₹
1-5	10	4.3175	43.175
5	110	0.7798	85.778
Value of bond			128.953

Case (iii) Required yield rate = 10%

Year	Cash Flow ₹	DF (10%)	Present Value ₹
1-5	10	3.7908	37.908
5	110	0.6209	68.299
Value of bond			106.207

Case (iv) Required yield rate = 10.1%

Year	Cash Flow ₹	DF (10.1%)	Present Value ₹
1-5	10	3.7811	37.811
5	110	0.6181	67.991
Value of bond			105.802

20. (i) Calculation of Maximum price

B_o = ₹ 11 × PVIFA (13%,3) + ₹ 100 × PVIF (13%,3)

= ₹ 11 × 2.361 + ₹ 100 × 0.693 = ₹ 25.97 + ₹ 69.30 = ₹ 95.27

(ii) Calculation of yield

At 12% the value = ₹ 11 × PVIFA (12%,3) + 100 × PVIF (12%,3)

= ₹ 11×2.402 + ₹ 100×0.712 = ₹ 26.42 + ₹ 71.20 = ₹ 97.62

It the bond is selling at ₹ 97.60 which is more than the fair value, the YTM of the bond would be less than 13%. This value is almost equal to the amount price of ₹ 97.60. Therefore, the YTM of the bond would be 12%.

Alternatively

$$YTM = \frac{₹\ 11 + \frac{(₹\ 100 - ₹\ 97.60)}{3}}{\frac{(₹\ 100 + ₹\ 97.60)}{2}} = 0.1194 \text{ or } 11.94\% \text{ say } 12\%$$

21. **(i)** Current yield = (Coupon Interest / Market Price) X 100

(10/110) X 100 = 9.09%

If current yield go up by 1% i.e. 10.09 the market price would be

10.09 = 10 / Market Price X 100

Market Price = ₹ 99.11

(ii) Market Price of Bond = P.V. of Interest + P.V. of Principal

= ₹ 1,394 + ₹ 8,885 = ₹ 10,279

22. Conversion rate is 14 shares per bond. Market price of share ₹ 80

Conversion Value 14 x ₹ 80 = ₹ 1120

Market price of bond = ₹ 1475

Premium over Conversion Value (₹ 1475- ₹ 1120) = $\frac{355}{1120}$ x 100 = 31.7%

23. **If Debentures are not converted its value is as under: -**

	PVF @ 8 %	₹
Interest - ₹ 12 for 5 years	3.993	47.916
Redemption - ₹ 100 in 5th year	0.681	68.100
		116.016

Value of equity shares:-

Market Price	No.	Total
₹ 4	20	₹ 80
₹ 5	20	₹ 100
₹ 6	20	₹ 120

Hence, unless the market price is ₹ 6 conversion should not be exercised.

24. **(i)** **Stock value or conversion value of bond**

12 × 20 = ₹ 240

(ii) **Percentage of the downside risk**

$\frac{₹\ 265 - ₹\ 235}{₹\ 235}$ = 0.1277 or 12.77% or $\frac{₹\ 265 - ₹\ 235}{₹\ 265}$ = 0.1132 or 11.32%

This ratio gives the percentage price decline experienced by the bond if the stock becomes worthless.

(iii) Conversion Premium

$$\frac{\text{Market Price} - \text{Conversion Value}}{\text{Conversion Value}} \times 100$$

$$\frac{₹\,265 - ₹\,240}{₹\,240} \times 100 = 10.42\%$$

(iv) Conversion Parity Price

$$\frac{\text{Bond Price}}{\text{No. of Shares on Conversion}}$$

$$\frac{₹\,265}{20} = ₹\,13.25$$

This indicates that if the price of shares rises to ₹ 13.25 from ₹ 12 the investor will neither gain nor lose on buying the bond and exercising it. Observe that ₹ 1.25 (₹ 13.25 – ₹ 12.00) is 10.42% of ₹ 12, the Conversion Premium.

25. (i) Calculation of initial outlay:-

		₹ (million)
a.	Face value	300
	Add:-Call premium	12
	Cost of calling old bonds	312
b.	Gross proceed of new issue	300
	Less: Issue costs	6
	Net proceeds of new issue	294
c.	Tax savings on call premium and unamortized cost 0.30 (12 + 9)	6.3

∴ Initial outlay = ₹ 312 million – ₹ 294 million – ₹ 6.3 million = ₹ 11.7 million

(ii) Calculation of net present value of refunding the bond:-

Saving in annual interest expenses	₹ (million)
[300 x (0.12 – 0.10)]	6.00
Less:- Tax saving on interest and amortization	
0.30 x [6 + (9-6)/6]	1.95
Annual net cash saving	4.05

PVIFA (7%, 6 years)	4.766
∴ Present value of net annual cash saving	₹ 19.30 million
Less:- Initial outlay	₹ 11.70 million
Net present value of refunding the bond	₹ 7.60 million

Decision: The bonds should be refunded

26. (a) Calculation of Market price:

= 160 (PVIAF 17%,6) + 1,000 (PVIF 17%,6)

= 160 (3.589) + 1,000 (0.390) = 574.24 + 390 = 964.24

(b) Duration

Year	*Cash flow*	*P.V. @ 17%*		*Proportion of bond value*	*Proportion of bond value x time (years)*
1	160	0.855	136.80	0.142	0.142
2	160	0.731	116.96	0.121	0.246
3	160	0.624	99.84	0.103	0.309
4	160	0.534	85.44	0.089	0.356
5	160	0.456	72.96	0.076	0.380
6	1160	0.390	452.40	0.469	2.814
			964.40	1.000	4.247

Duration of the Bond is 4.247 years

Alternatively, it can also be calculated as follows:

Year	*Cash flow*	*P.V. @ 17%*		*P.V. x Year*
1	160	0.855	136.80	136.80
2	160	0.731	116.96	233.92
3	160	0.624	99.84	299.52
4	160	0.534	85.44	341.76
5	160	0.456	72.96	364.80
6	1160	0.390	452.40	2714.40
			964.40	4091.20

$$D = \frac{\sum_{t=1}^{n} t \times PV \text{ of } CF_t}{P_0}$$

$$D = \frac{4091.20}{964.40} = 4.242 \text{ years}$$

Alternatively, as per Short Cut Method

$$D = \frac{1+YTM}{YTM} - \frac{(1+YTM)+t(c-YTM)}{c\left[(1+YTM)^t - 1\right]+YTM}$$

Where YTM = Yield to Maturity

c = Coupon Rate

t = Years to Maturity

$$= \frac{1.17}{0.17} - \frac{1.17+6(0.16-0.17)}{0.16\left[(1.17)^6 - 1\right]+0.17}$$

D = 4.24 years

(c) Volatility

$$\text{Volatility of the bonds} = \frac{\text{Duration}}{(1+\text{yields})} = \frac{4.247}{1.17} = 3.63 \text{ Or } = \frac{4.2422}{1.17} = 3.6258$$

(d) The expected market price if increase in required yield is by 75 basis points.

= ₹ 960.26 × .75 (3.63/100) = ₹ 26.142

Hence expected market price is ₹ 960.26 – ₹ 26.142 = ₹ 934.118

Hence, the market price will decrease

This portion can also be alternatively done as follows

= ₹ 964.40 × .75 (3.63/100) = ₹ 26.26

then the market price will be = ₹ 964.40 – 26.26 = ₹ 938.14

27. Duration of Bond X

Year	*Cash flow*	*P.V. @ 10%*		*Proportion of bond value*	*Proportion of bond value x time (years)*
1	1070	0.909	972.63	1.000	1.000

Duration of the Bond is 1 year

Duration of Bond Y

Year	*Cash flow*	*P.V. @ 10%*		*Proportion of bond value*	*Proportion of bond value x time (years)*
1	80	0.909	72.72	0.077	0.077
2	80	0.826	66.08	0.071	0.142
3	80	0.751	60.08	0.064	0.192
4	1080	0.683	737.64	0.788	3.152
			936.52	1.000	3.563

Duration of the Bond is 3.563 years

Let x_1 be the investment in Bond X and therefore investment in Bond Y shall be $(1 - x_1)$. Since the required duration is 2 years the proportion of investment in each of these two securities shall be computed as follows:

$2 = x_1 + (1 - x_1)\ 3.563$

$x_1 = 0.61$

Accordingly, the proportion of investment shall be 61% in Bond X and 39% in Bond Y respectively.

Amount of investment

Bond X	*Bond Y*
PV of ₹ 1,00,000 for 2 years @ 10% x 61%	PV of ₹ 1,00,000 for 2 years @ 10% x 39%
= ₹ 1,00,000 (0.826) x 61%	= ₹ 1,00,000 (0.826) x 39%
= ₹ 50,386	= ₹ 32,214
No. of Bonds to be purchased	No. of Bonds to be purchased
= ₹ 50,386/₹ 972.63 = 51.80 i.e. approx. 52 bonds	= ₹ 32,214/₹ 936.52 = 34.40 i.e. approx. 34 bonds

Note: The investor has to keep the money invested for two years. Therefore, the investor can invest in both the bonds with the assumption that Bond X will be reinvested for another one year on same returns.

Further, in the above computation, Modified Duration can also be used instead of Duration.

28. Let the issue price be X

By the terms of the issue of the T-bills:

$$6\% = \frac{100 - x}{x} \times \frac{365}{91} \times 100$$

$$\frac{6 \times 91 \times x}{36,500} = (100 - x)$$

$0.01496 x = 100 – x$

$$x = \frac{100}{1.01496} = ₹\ 98.53$$

29. **(i)** Pre-tax Income required on investment of ₹ 20,00,000

Let the period of Investment be 'P' and return required on investment ₹ 1,00,000 (₹ 20,00,000 x 5%)

Accordingly,

$$(₹\ 20,00,000 \times \frac{9}{100} \times \frac{P}{12}) – ₹\ 50,000 = ₹\ 1,00,000$$

P = 10 months

(ii) Break-Even its investment expenditure

$$(₹\ 20,00,000 \times \frac{9}{100} \times \frac{P}{12}) – ₹\ 50,000 = 0$$

P = 3.33 months

30. The company had issued commercial paper worth ₹10 crores

No. of days Involves = 91 days

Interest rate applicable = 12.04 % p.a.

Interest for 91 days $= 12.04\% \times \frac{91\ Days}{365\ Days} = 3.002\%$

$= \text{or } ₹\ 10 \text{ crores} \times \frac{3.002}{100 + 3.002} = ₹\ 29,14,507$

= or ₹ 29.14507 Lakhs

∴ Net amount received at the time of issue:- ₹ 10.00 Crores – ₹ 0.29151 Crores = ₹ 9.70849 Crores

Alternatively, it can also be computed as follows:

$$\text{Price} = \frac{₹\ 10\ \text{Crores}}{\left(1+ 12.04\% \times \frac{91\ \text{Days}}{365\ \text{Days}}\right)} = ₹\ 9.70855\ \text{Crores}$$

31. **(i)** Dirty Price

= Clean Price + Interest Accrued

$$= 99.42 + 100 \times \frac{10}{100} \times \frac{262}{360} = 106.70$$

(ii) First Leg (Start Proceed)

$$= \text{Nominal Value x } \frac{\text{Dirty Price}}{100} \times \frac{100 - \text{Initial Margin}}{100}$$

$$= ₹8,00,00,000 \text{ x } \frac{106.70}{100} \times \frac{100-2}{100} = ₹8,36,52,800$$

$$\text{Second Leg (Repayment at Maturity)} = \text{Start Proceed x } \left(1+ \text{Repo rate} \times \frac{\text{No. of days}}{360}\right)$$

$$= ₹\ 8,36,52,800 \text{ x } \left(1+ 0.0565 \times \frac{14}{360}\right) = ₹\ 8,38,36,604$$