

# 6

## Security Analysis

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### Question 1

*Explain the Efficient Market Theory in and what are major misconceptions about this theory?*

### Answer

In 1953, Maurice Kendall a distinguished statistician of the Royal Statistical Society, London examined the behaviour of the stock and commodity prices in search of regular cycles instead of discovering any regular price cycle. He found each series to be “wandering one, almost as if once a week, the Demon of Chance drew a random number and added it to the current price to determine next week’s price”.

Prices appeared to follow a random walk implying that successive price changes are independent of one another. In 1959 two interesting papers supporting the Random Walk Theory were published. Harry Roberts showed that a series obtained by cumulating random numbers bore resemblance to a time series of stock prices. In the second, Osborne, an eminent physicist, examined that the stock price behavior was similar to the movements of very small particles suspended in a liquid medium. Such movement is referred to as the Brownian motion He found a remarkable similarity between stock price movements and the Brownian motion.

Inspired by the works of Kendall, Roberts & Osborne, a number of researchers employed indigenous tests of randomness on stock price behaviour. By and large, these tests have indicated the Random Walk hypothesis.

**Search for Theory:** When empirical evidence in favour of Random walk hypothesis seemed overwhelming, researchers wanted to know about the Economic processes that produced a Random walk. They concluded that randomness of stock price was a result of efficient market that led to the following view points:

- Information is freely and instantaneously available to all market participants.
- Keen competition among the market participants more or less ensures that market will reflect intrinsic values. This means that they will fully impound all available information.
- Price change only response to new information that is unrelated to previous information and therefore unpredictable.

**Misconception about Efficient Market Theory:** Though the Efficient Market Theory implies that market has perfect forecasting abilities, in fact, it merely signifies that prices impound all available information and as such does not mean that market possesses perfect forecasting abilities.

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Although price tends to fluctuate they cannot reflect fair value. This is because the feature is uncertain and the market springs surprises continually as price reflects the surprises they fluctuate.

Inability of institutional portfolio managers to achieve superior investment performance implies that they lack competence in an efficient market. It is not possible to achieve superior investment performance since market efficiency exists due to portfolio managers doing this job well in a competitive setting.

The random movement of stock prices suggests that stock market is irrational. Randomness and irrational are two different things, if investors are rational and competitive, price changes are bound to be random.

### Question 2

*Explain the different levels or forms of Efficient Market Theory in and what are various empirical evidence for these forms?*

### Answer

That price reflects all available information, the highest order of market efficiency. According to FAMA, there exist three levels of market efficiency:-

- (i) *Weak form efficiency* – Price reflect all information found in the record of past prices and volumes.
- (ii) *Semi – Strong efficiency* – Price reflect not only all information found in the record of past prices and volumes but also all other publicly available information.
- (iii) *Strong form efficiency* – Price reflect all available information public as well as private.

**Empirical Evidence on Weak form Efficient Market Theory:** According to the Weak form Efficient Market Theory current price of a stock reflect all information found in the record of past prices and volumes. This means that there is no relationship between the past and future price movements.

Three types of tests have been employed to empirically verify the weak form of Efficient Market Theory- Serial Correlation Test, Run Test and Filter Rule Test.

- (a) *Serial Correlation Test:* To test for randomness in stock price changes, one has to look at serial correlation. For this purpose, price change in one period has to be correlated with price change in some other period. Price changes are considered to be serially independent. Serial correlation studies employing different stocks, different time lags and different time period have been conducted to detect serial correlation but no significant serial correlation could be discovered. These studies were carried on short term trends viz. daily, weekly, fortnightly and monthly and not in long term trends in stock prices as in such cases. Stock prices tend to move upwards.
- (b) *Run Test:* Given a series of stock price changes each price change is designated + if it represents an increase and – if it represents a decrease. The resulting series may be -

, +, -, -, -, +, +.

A run occurs when there is no difference between the sign of two changes. When the sign of change differs, the run ends and new run begins.

$$\frac{++}{1} / \frac{---}{2} / \frac{+-}{3} / \frac{-+}{4} / \frac{--}{5} / \frac{++}{6} \quad \frac{++}{1} / \frac{---}{2} / \frac{+-}{3} / \frac{-+}{4} / \frac{--}{5} / \frac{--}{6}$$

To test a series of price change for independence, the number of runs in that series is compared with a number of runs in a purely random series of the size and in the process determines whether it is statistically different. By and large, the result of these studies strongly supports the Random Walk Model.

- (c) *Filter Rules Test:* If the price of stock increases by at least N% buy and hold it until its price decreases by at least N% from a subsequent high. When the price decreases at least N% or more, sell it. If the behaviour of stock price changes is random, filter rules should not apply in such a buy and hold strategy. By and large, studies suggest that filter rules do not out perform a single buy and hold strategy particular after considering commission on transaction.

**Empirical Evidence on Semi-strong Efficient Market Theory:** Semi-strong form efficient market theory holds that stock prices adjust rapidly to all publicly available information. By using publicly available information, investors will not be able to earn above normal rates of return after considering the risk factor. To test semi-strong form efficient market theory, a number of studies was conducted which lead to the following queries: Whether it was possible to earn on the above normal rate of return after adjustment for risk, using only publicly available information and how rapidly prices adjust to public announcement with regard to earnings, dividends, mergers, acquisitions, stocksplits?

Several studies support the Semi-strong form Efficient Market Theory. Fama, Fisher, Jensen and Roll in their adjustment of stock prices to new information examined the effect of stock split on return of 940 stock splits in New York Stock Exchange during the period 1957-1959 They found that prior to the split, stock earns higher returns than predicted by any market model.

Boll and Bound in an empirical evaluation of accounting income numbers studied the effect of annual earnings announcements. They divided the firms into two groups. First group consisted of firms whose earnings increased in relation to the average corporate earnings while second group consists of firms whose earnings decreased in relation to the average corporate earnings. They found that before the announcement of earnings, stock in the first group earned positive abnormal returns while stock in the second group earned negative abnormal returns after the announcement of earnings. Stock in both the groups earned normal returns.

There have been studies which have been empirically documented showing the following inefficiencies and anomalies:

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- Stock price adjust gradually not rapidly to announcements of unanticipated changes in quarterly earnings.
- Small firms' portfolio seemed to outperform large firms' portfolio.
- Low price earning multiple stock tend to outperform large price earning multiple stock.
- Monday's return is lower than return for the other days of the week.

**Empirical Evidence on Strong form Efficient Market Theory:** According to the Efficient Market Theory, all available information, public or private, is reflected in the stock prices. This represents an extreme hypothesis.

To test this theory, the researcher analysed returns earned by certain groups viz. corporate insiders, specialists on stock exchanges, mutual fund managers who have access to internal information (not publicly available), or posses greater resource or ability to intensively analyse information in the public domain. They suggested that corporate insiders (having access to internal information) and stock exchange specialists (having monopolistic exposure) earn superior rate of return after adjustment of risk.

Mutual Fund managers do not on an average earn a superior rate of return. No scientific evidence has been formulated to indicate that investment performance of professionally managed portfolios as a group has been any better than that of randomly selected portfolios. This was the finding of Burton Malkiel in his *Random Walk Down Wall Street*, New York.

### Question 3

*Explain in detail the Dow Jones Theory?*

#### Answer

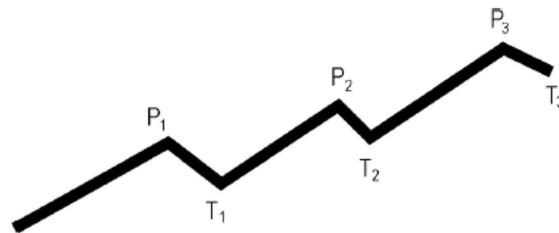
Dow Jones Theory is probably the most popular theory regarding the behaviour of stock market prices. The theory derives its name from Charles H. Dow, who established the Dow Jones & Co., and was the first editor of the *Wall Street Journal* – a leading publication on financial and economic matters in the U.S.A. Although Dow never gave a proper shape to the theory, ideas have been expanded and articulated by many of his successors.

The Dow Jones theory classifies the movements of the prices on the share market into three major categories:

- Primary movements,
  - Secondary movements, and
  - Daily fluctuations.
- (i) **Primary Movements:** They reflect the trend of the stock market and last from one year to three years, or sometimes even more.

If the long range behaviour of market prices is seen, it will be observed that the share markets go through definite phases where the prices are consistently rising or falling.

These phases are known as bull and bear phases.

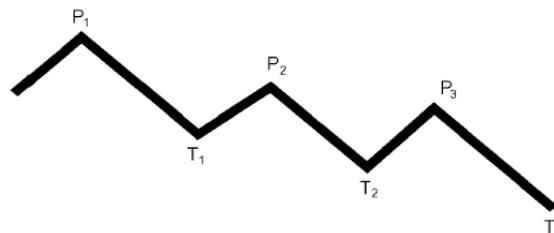


**Graph 1**

During a bull phase, the basic trend is that of rise in prices. Graph 1 above shows the behaviour of stock market prices in bull phase.

Students would notice from the graph that although the prices fall after each rise, the basic trend is that of rising prices, as can be seen from the graph that each trough prices reach, is at a higher level than the earlier one. Similarly, each peak that the prices reach is on a higher level than the earlier one. Thus P2 is higher than P1 and T2 is higher than T1. This means that prices do not rise consistently even in a bull phase. They rise for some time and after each rise, they fall. However, the falls are of a lower magnitude than earlier. As a result, prices reach higher levels with each rise.

Once the prices have risen very high, the bear phase is bound to start, i.e., price will start falling. Graph 2 shows the typical behaviour of prices on the stock exchange in the case of a bear phase. It would be seen that prices are not falling consistently and, after each fall, there is a rise in prices. However, the rise is not much as to take the prices higher than the previous peak. It means that each peak and trough is now lower than the previous peak and trough.



**Graph 2**

The theory argues that primary movements indicate basic trends in the market. It states that if cyclical swings of stock market price indices are successively higher, the market trend is up and there is a bull market. On the contrary, if successive highs and lows are successively lower, the market is on a downward trend and we are in a bear market. This theory thus relies upon the behaviour of the indices of share market prices in perceiving the trend in the market.

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According to this theory, when the lines joining the first two troughs and the lines joining the corresponding two peaks are convergent, there is a rising trend and when both the lines are divergent, it is a declining trend.

- (ii) **Secondary Movements:** We have seen that even when the primary trend is upward, there are also downward movements of prices. Similarly, even where the primary trend is downward, there is an upward movement of prices also. These movements are known as secondary movements and are shorter in duration and are opposite in direction to the primary movements. These movements normally last from three weeks to three months and retrace 1/3 to 2/3 of the previous advance in a bull market or previous fall in the bear market.
- (iii) **Daily Movements:** There are irregular fluctuations which occur every day in the market. These fluctuations are without any definite trend. Thus if the daily share market price index for a few months is plotted on the graph it will show both upward and downward fluctuations. These fluctuations are the result of speculative factors. An investment manager really is not interested in the short run fluctuations in share prices since he is not a speculator. It may be reiterated that any one who tries to gain from short run fluctuations in the stock market, can make money only by sheer chance. The investment manager should scrupulously keep away from the daily fluctuations of the market. He is not a speculator and should always resist the temptation of speculating.

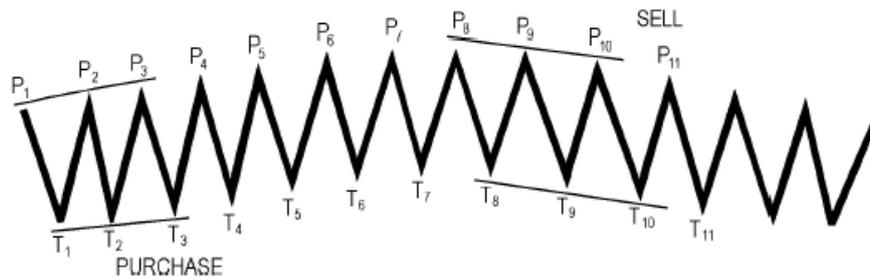
Such a temptation is always very attractive but must always be resisted. Speculation is beyond the scope of the job of an investment manager.

**Timing of Investment Decisions on the Basis of Dow Jones Theory:** Ideally speaking, the investment manager would like to purchase shares at a time when they have reached the lowest trough and sell them at a time when they reach the highest peak.

However, in practice, this seldom happens. Even the most astute investment manager can never know when the highest peak or the lowest trough has been reached. Therefore, he has to time his decision in such a manner that he buys the shares when they are on the rise and sells them when they are on the fall. It means that he should be able to identify exactly when the falling or the rising trend has begun.

This is technically known as identification of the turn in the share market prices. Identification of this turn is difficult in practice because of the fact that, even in a rising market, prices keep on falling as a part of the secondary movement. Similarly even in a falling market prices keep on rising temporarily. How to be certain that the rise in prices or fall in the same is due to a real turn in prices from a bullish to a bearish phase or *vice versa* or that it is due only to short-run speculative trends?

Dow Jones theory identifies the turn in the market prices by seeing whether the successive peaks and troughs are higher or lower than earlier. Consider the following graph:



Graph 3

According to the theory, the investment manager should purchase investments when the prices are at T1. At this point, he can ascertain that the bull trend has started, since T2 is higher than T1 and P2 is higher than P1.

Similarly, when prices reach P7 he should make sales. At this point he can ascertain that the bearish trend has started, since P9 is lower than P8 and T8 is lower than T7.

#### Question 4

*Explain the Elliot Wave Theory of technical analysis?*

#### Answer

Inspired by the Dow Theory and by observations found throughout nature, Ralph Elliot formulated Elliot Wave Theory in 1934. This theory was based on analysis of 75 years stock price movements and charts. From his studies, he defined price movements in terms of waves. Accordingly, this theory was named Elliot Wave Theory. Elliot found that the markets exhibited certain repeated patterns or waves. As per this theory wave is a movement of the market price from one change in the direction to the next change in the same direction. These waves are resulted from buying and selling impulses emerging from the demand and supply pressures on the market. Depending on the demand and supply pressures, waves are generated in the prices.

As per this theory, waves can be classified into two parts:-

- Impulsive patterns
- Corrective patterns

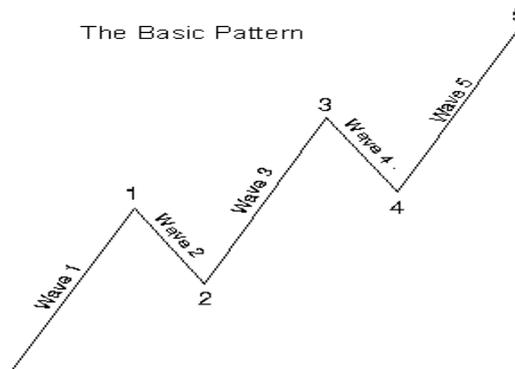
Let us discuss each of these patterns.

- (a) **Impulsive Patterns-(Basic Waves)** - In this pattern there will be 3 or 5 waves in a given direction (going upward or downward). These waves shall move in the direction of the basic movement. This movement can indicate bull phase or bear phase.
- (b) **Corrective Patterns- (Reaction Waves)** - These 3 waves are against the basic direction of the basic movement. Correction involves correcting the earlier rise in case of bull market and fall in case of bear market.

As shown in the following diagram waves 1, 3 and 5 are directional movements, which

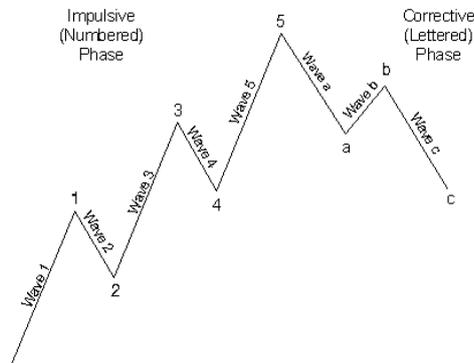
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are separated or corrected by wave 2 & 4, termed as corrective movements.



Source: <http://elliottwave.net/>

**Complete Cycle** - As shown in following figure five-wave impulses is followed by a three-wave correction (a, b & c) to form a complete cycle of eight waves.



Source: <http://elliottwave.net/>

One complete cycle consists of waves made up of two distinct phases, bullish and bearish. On completion of full one cycle i.e. termination of 8 waves movement, the fresh cycle starts with similar impulses arising out of market trading.

### Question 5

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

### Answer

Duration is nothing but the average time taken by an investor to collect his/her investment. If an investor receives a part of his/her investment over the time on specific intervals before maturity, the

investment will offer him the duration which would be lesser than the maturity of the instrument. Higher the coupon rate, lesser would be the duration.

### Question 6

*Mention the various techniques used in economic analysis.*

### Answer

Some of the techniques used for economic analysis are:

- (a) **Anticipatory Surveys:** They help investors to form an opinion about the future state of the economy. It incorporates expert opinion on construction activities, expenditure on plant and machinery, levels of inventory – all having a definite bearing on economic activities. Also future spending habits of consumers are taken into account.
- (b) **Barometer/Indicator Approach:** Various indicators are used to find out how the economy shall perform in the future. The indicators have been classified as under:
  - (1) *Leading Indicators:* They lead the economic activity in terms of their outcome. They relate to the time series data of the variables that reach high/low points in advance of economic activity.
  - (2) *Roughly Coincidental Indicators:* They reach their peaks and troughs at approximately the same in the economy.
  - (3) *Lagging Indicators:* They are time series data of variables that lag behind in their consequences vis-a-vis the economy. They reach their turning points after the economy has reached its own already.All these approaches suggest direction of change in the aggregate economic activity but nothing about its magnitude.
- (c) **Economic Model Building Approach:** In this approach, a precise and clear relationship between dependent and independent variables is determined. GNP model building or sectoral analysis is used in practice through the use of national accounting framework.

### Question 7

*Write short notes on Zero coupon bonds.*

### Answer

As name indicates these bonds do not pay interest during the life of the bonds. Instead, zero coupon bonds 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 zero coupon bond 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 zero coupon bonds are usually long term. These maturity dates allow an investor for a long range planning. Zero coupon bonds 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

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of the issuer and longer maturity period, but they also provide an opportunity to achieve a higher return.

### Question 8

*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%, what is the price of the share today? [adopt the perpetual growth model to arrive at your solution].*

### Answer

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

$$\text{EPS} = ₹ 137.8 \times 0.15 = ₹ 20.67$$

$$\text{Dividend} = 0.40 \times 20.67 = ₹ 8.27$$

The growth in dividend would be:

$$g = 0.6 \times 0.15 = 0.09$$

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

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

$$P_0 = ₹ 91.89$$

### Alternative Solution:

However, in case a student follows Walter's approach as against continuous growth model given in previous solution the answer of the question works out to be different. This can be shown as follow:

### Given data:

$$\text{Book value per share} = ₹ 137.80$$

$$\text{Return on equity} = 15\%$$

$$\text{Dividend Payout} = 40\%$$

$$\text{Cost of capital} = 18\%$$

$$\therefore \text{EPS} = ₹ 137.80 \times 15\%$$

$$= ₹ 20.67$$

$$\therefore \text{Dividend} = ₹ 20.67 \times 40\% = ₹ 8.27$$

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,

$$\begin{aligned} V_c &= \frac{8.27 + \frac{.15}{.18} (20.67 - 8.27)}{.18} \\ &= \frac{18.60}{.18} \\ &= ₹ 103.35 \end{aligned}$$

### Question 9

*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 change from (i) to (ii)? How does right issue increases shareholders' wealth?*

### Answer

- (i) Number of shares to be issued : 5,00,000

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

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

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Or Value of Right = ₹ 10 – ₹ 4 = ₹ 6

$$= \frac{₹ 10 - ₹ 4}{2} = 3$$

(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 Right = ₹ 12 – ₹ 8 = ₹ 4

$$\text{or } \frac{₹ 12 - ₹ 8}{4} = 1$$

(iii) Calculation of effect of right issue on wealth of Shareholder's wealth who is holding, say 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 (50 X ₹4)	<u>₹ 200</u>
	<u>₹1,300</u>

(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 (25 X ₹8)	<u>₹ 200</u>
	<u>₹1,300</u>

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

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

### Question 10

Pragya Limited has issued 75,000 equity shares of ₹ 10 each. The current market price per share is ₹ 24. The company has a plan to make a rights issue of one new equity share at a price of ₹ 16 for every four share held.

You are required to:

- Calculate the theoretical post-rights price per share;
- Calculate the theoretical value of the right alone;
- Show the effect of the rights issue on the wealth of a shareholder, who has 1,000 shares assuming he sells the entire rights; and
- Show the effect, if the same shareholder does not take any action and ignores the issue.

**Answer**

(i) Calculation of theoretical Post-rights (ex-right) price per share:

$$\text{Ex-right value} = \left[ \frac{MN + SR}{N + R} \right]$$

Where,

M = Market price,

N = Number of old shares for a right share

S = Subscription price

R = Right share offer

$$= \left[ \frac{(\text{₹ } 24 \times 4) + (\text{₹ } 16 \times 1)}{4 + 1} \right] = \text{₹ } 22.40$$

(ii) Calculation of theoretical value of the rights alone:

= Ex-right price – Cost of rights share

= ₹ 22.40 – ₹ 16 = ₹ 6.40

Or  $= \frac{\text{₹ } 22.40 - \text{₹ } 16}{4} = \text{₹ } 1.60$

(iii) Calculation of effect of the rights issue on the wealth of a shareholder who has 1,000 shares assuming he sells the entire rights:

		₹
(a)	Value of shares before right issue (1,000 shares × ₹ 24)	24,000
(b)	Value of shares after right issue (1,000 shares × ₹ 22.40)	22,400
	Add: Sale proceeds of rights renunciation (250 shares × ₹ 6.40)	<u>1,600</u>
		<u>24,000</u>

There is no change in the wealth of the shareholder even if he sells his right.

(iv) Calculation of effect if the shareholder does not take any action and ignores the issue:

	₹
Value of shares before right issue (1,000 shares × ₹ 24)	24,000
Less: Value of shares after right issue (1,000 shares × ₹ 22.40)	22,400
Loss of wealth to shareholders, if rights ignored	<u>1,600</u>

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### Question 11

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

### Answer

$$D_0 = ₹ 4$$

$$D_1 = ₹ 4 (1.20) = ₹ 4.80$$

$$D_2 = ₹ 4 (1.20)^2 = ₹ 5.76$$

$$D_3 = ₹ 4 (1.20)^2 (1.10) = ₹ 6.336$$

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

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

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

$$= 4.80 \times 0.8696 + 5.76 \times 0.7561 + 126.72 \times 0.7561 = 104.34$$

### Question 12

On the basis of the following information:

$$\text{Current dividend (Do)} = ₹ 2.50$$

$$\text{Discount rate (k)} = 10.5\%$$

$$\text{Growth rate (g)} = 2\%$$

- (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.

**Answer**

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

$$V_0 = \frac{2.50(1.02)}{0.105 - 0.02} = ₹30/-.$$

(ii) **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.

(iii) **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 $[EPS \times (1+g)] / (K_e - g)$ = ₹ 2.25 × 1.02/0.07	₹ 32.79

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

**Question 13**

Given the following information:

Current Dividend	₹5.00
Discount Rate	10%
Growth rate	2%

- (i) Calculate the present value of the stock.
- (ii) Is the stock over valued if the price is ₹40, ROE = 8% and EPS = ₹ 3.00. Show your calculations under the PE Multiple approach and Earnings Growth model.

**Answer****(i) Present Value of the stock:-**

$$V_0 = \frac{5.00(1.02)}{0.10 - 0.02} = ₹63.75/-.$$

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

Particulars	
Actual Stock Price	₹ 40.00
Return on equity	8%
EPS	₹ 3.00
PE Multiple (1/Return on Equity) = 1/8%	12.50
Market Price per Share	₹ 37.50

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

**(iii) Value of the Stock under the Earnings Growth Model**

Particulars	
Actual Stock Price	₹ 40.00
Return on equity	8%
EPS	₹ 3.00
Growth Rate	2%
Market Price per Share $[EPS \times (1+g)] / (K_e - g)$ = ₹ 3.00 × 1.02/0.06	₹ 51.00

Since, Actual Stock Price is lower, hence it is undervalued.

**Question 14**

*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

**Answer**

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

$$\text{Year 1 (D}_1\text{)} \quad ₹ 14.00 (1.09) = ₹ 15.26$$

$$\text{Year 2 (D}_2\text{)} \quad ₹ 14.00 (1.09)^2 = ₹ 16.63$$

$$\text{Year 3 (D}_3\text{)} \quad ₹ 14.00 (1.09)^3 = ₹ 18.13$$

Required rate of return = 13% (Ke)

Market price of share after 3 years = (P<sub>3</sub>) = ₹ 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

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

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

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

**Question 15**

*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?*

**Answer**

**(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

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

$$\text{Or, } K_e = ₹ 17.6\%$$

**(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:

$$P_0 = \sum_{t=1}^n \frac{\text{Div}_0 (1+g_s)^t}{(1+K_e)^t} + \frac{\text{Div}_{n+1}}{K_e - g_n} \times \frac{1}{(1+K_e)^n}$$

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,

$$g_s = 20\% \text{ for 5 years, } g_n = 10\%$$

Therefore,

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

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

or  $P_0 = ₹ 1.20 (PVF_1, K_e) + ₹ 1.44 (PVF_2, K_e) + ₹ 1.73 (PVF_3, K_e) + ₹ 2.07$

$$(PVF_4, K_e) + ₹ 2.49 (PVF_5, K_e) + \frac{Rs. 2.74 (PVF_5, K_e)}{K_e - 0.10}$$

By trial and error we are required to find out  $K_e$

Now, assume  $K_e = 18\%$  then we will have

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

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

$$= ₹ 20.23$$

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

Now, assume  $K_e = 19\%$  we will have

$$\begin{aligned}
 P_0 &= ₹ 1.20 (0.8403) + ₹ 1.44 (0.7061) + ₹ 1.73 (0.5934) + ₹ 2.07 (0.4986) + ₹ 2.49 \\
 &\quad (0.4190) + ₹ 2.74 (0.4190) \times \frac{1}{0.19-0.10} \\
 &= ₹ 1.008 + ₹ 1.017 + ₹ 1.026 + ₹ 1.032 + ₹ 1.043 + ₹ 12.76 \\
 &= ₹ 17.89
 \end{aligned}$$

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:

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

Where,

LR = Lower Rate

NPV at LR = Present value of share at LR

NPV at HR = Present value of share at Higher Rate

$\Delta r$  = Difference in rates

$$\begin{aligned}
 K &= 18\% + \frac{(\text{₹ } 20.23 - \text{₹ } 20)}{\text{₹ } 20.23 - \text{₹ } 17.89} \times 1\% \\
 &= 18\% + \frac{\text{₹ } 0.23}{\text{₹ } 2.34} \times 1\% \\
 &= 18\% + 0.10\% = 18.10\%
 \end{aligned}$$

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.

### Question 16

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

	(₹ in lakhs)
Equity share capital	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.

**Answer**

**(a) Calculation of Profit after tax (PAT)**

	₹
Profit before interest and tax (PBIT)	32,00,000
Less: Debenture interest (₹ 64,00,000 × 12/100)	<u>7,68,000</u>
Profit before tax (PBT)	24,32,000
Less: Tax @ 35%	<u>8,51,200</u>
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)	<u>6,40,000</u>
Retained earnings (Undistributed profit)	<u>6,20,800</u>

**Calculation of Interest and Fixed Dividend Coverage**

$$= \frac{\text{PAT} + \text{Debenture interest}}{\text{Debenture interest} + \text{Preference dividend}}$$

$$= \frac{15,80,800 + 7,68,000}{7,68,000 + 3,20,000} = \frac{23,48,800}{10,88,000} = 2.16 \text{ times}$$

**(b) Calculation of Capital Gearing Ratio**

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

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

### (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)	<u>31,040</u>
Yield on equity shares	<u>3,51,040</u>

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. Hence,

$$\text{Risk Premium} = 3.00 - 2.16 (1\%) = 0.84 (1\%) = 0.84\%$$

- (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. Hence,

$$\begin{aligned} \text{Risk Premium} &= (0.75 - 0.93) (2\%) \\ &= 0.18 (2\%) = 0.36\% \end{aligned}$$

	(%)
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	<u>0.36</u>
	<u>10.80</u>

### Value of Equity Share

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

**Question 17**

*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.*

**Answer**

CAPM formula for calculation of Expected Rate of Return is :

$$\begin{aligned} ER &= R_f + \beta (R_m - R_f) \\ &= 8 + 1.5 (12 - 8) \\ &= 8 + 1.5 (4) \\ &= 8 + 6 \\ &= 14\% \text{ or } 0.14 \end{aligned}$$

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

$$\begin{aligned} ER &= \frac{D_1}{P_0} + g \\ 0.14 &= \frac{3(1.10)}{P_0} + 0.10 \\ 0.14 - 0.10 &= \frac{3.30}{P_0} \\ 0.04 P_0 &= 3.30 \\ P_0 &= \frac{3.30}{0.04} = ₹ 82.50 \end{aligned}$$

Per share equilibrium price will be ₹ 82.50.

**Question 18**

*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.*

**Answer**

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:

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

Where,

$K_e$  = Cost of equity

$R_f$  = Risk free rate of return

$\beta$  = Portfolio Beta i.e. market sensitivity index

$K_m$  = Expected return on market portfolio

By substituting the figures, we get

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

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

$D_1$  = Dividend at the end of the year 1

$K_e$  = 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 ( $\beta$ ) factor is likely to increase to 1.75 therefore,  $K_e$  would be

$$\begin{aligned} K_e &= R_f + \beta (K_m - R_f) \\ &= 0.09 + 1.75 (0.13 - 0.09) = 0.16 \text{ or } 16\% \end{aligned}$$

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:

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

**Question 19**

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

**Answer**

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

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

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

$$\text{FCFE} = \text{Net income} - [(1-b) (\text{capex} - \text{dep}) + (1-b) (\Delta \text{WC})]$$

$$\begin{aligned} \text{FCFE} &= 8.923 - [(1-0.27) (47-39) + (1-0.27) (3.45)] \\ &= 8.923 - [5.84 + 2.5185] = 0.5645 \end{aligned}$$

$$\begin{aligned} \text{Cost of Equity} &= R_f + \beta (R_m - R_f) \\ &= 8.7 + 0.1 (10.3 - 8.7) = 8.86\% \end{aligned}$$

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$$P_0 = \frac{FCFE(1+g)}{K_e - g} = \frac{0.5645(1.08)}{0.0886 - .08} = \frac{0.60966}{0.0086} = ₹ 70.89$$

### Question 20

XYZ company has current earnings of ₹ 3 per share with 5,00,000 shares outstanding. The company plans to issue 40,000, 7% convertible preference shares of ₹ 50 each at par. The preference shares are convertible into 2 shares for each preference shares held. The equity share has a current market price of ₹ 21 per share.

- (i) What is preference share's conversion value?
- (ii) What is conversion premium?
- (iii) Assuming that total earnings remain the same, calculate the effect of the issue on the basic earning per share (a) before conversion (b) after conversion.
- (iv) If profits after tax increases by ₹ 1 million what will be the basic EPS (a) before conversion and (b) on a fully diluted basis?

### Answer

#### (i) Conversion value of preference share

Conversion Ratio x Market Price

$$2 \times ₹ 21 = ₹ 42$$

#### (ii) Conversion Premium

$$(₹ 50 / ₹ 42) - 1 = 19.05\%$$

#### (iii) Effect of the issue on basic EPS

	₹
<i>Before Conversion</i>	
Total (after tax) earnings ₹ 3 × 5,00,000	15,00,000
Dividend on Preference shares	<u>1,40,000</u>
Earnings available to equity holders	<u>13,60,000</u>
No. of shares	5,00,000
EPS	2.72
<i>On Diluted Basis</i>	
Earnings	15,00,000
No of shares ( 5,00,000 + 80,000)	5,80,000
EPS	2.59

**(iv) EPS with increase in Profit**

	₹
<i>Before Conversion</i>	
Earnings	25,00,000
Dividend on Pref. shares	<u>1,40,000</u>
Earning for equity shareholders	<u>23,60,000</u>
No. of equity shares	5,00,000
EPS	4.72
<i>On Diluted Basis</i>	
Earnings	25,00,000
No. of shows	5,80,000
EPS	4.31

**Question 21**

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

You are required to compute

- (1) The cost of equity to the company if the market expects a growth rate of 15% p.a.
- (2) If the anticipated growth rate is 16% per annum, calculate the indicative market price with the same cost of capital.
- (3) 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.

**Answer**

**(1) 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	

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

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$$(2) \text{ Market Price} = \left( \frac{\text{Dividend}}{\text{Cost of Capital}(\%) - \text{Growth Rate}(\%)} \right)$$
$$= \frac{\text{₹ 6.11}}{(21.87-16)\%} = \text{₹ 104.08 per share}$$

$$(3) \text{ Market Price} = \frac{\text{₹ 6.11}}{(20-19)\%} = \text{₹ 611.00 per share}$$

### Alternative Solution

As in the question the sentence "The company retains 45% of its earnings which are ₹ 5 per share" amenable to two interpretations i.e. one is ₹ 5 as retained earnings (45%) and another is ₹ 5 is EPS (100%). Alternative solution is as follows:

#### (1) Cost of capital

EPS (100%)	₹ 5 per share
Retained earnings (45%)	₹ 2.25 per share
Dividend (55%)	₹ 2.75 per share
P/E Ratio	8 times
Market Price	₹ 5 × 8 = ₹ 40

Cost of equity capital

$$= \left( \frac{\text{Div}}{\text{Price}} \times 100 \right) + \text{Growth \%} = \frac{\text{₹ 2.75}}{\text{₹ 40.00}} \times 100 + 15\% = 21.87\%$$

$$(2) \text{ Market Price} = \left( \frac{\text{Dividend}}{\text{Cost of Capital}(\%) - \text{Growth Rate}(\%)} \right) = \frac{\text{₹ 2.75}}{(21.87 - 16)\%}$$
$$= \text{₹ 46.85 per share}$$

$$(3) \text{ Market Price} = \frac{\text{₹ 2.75}}{(20 - 19)\%} = \text{₹ 275.00 per share}$$

### Question 22

A share of Tension-free Economy Ltd. is currently quoted at, a price earnings ratio of 7.5 times. The retained earnings per share being 37.5% is ₹ 3 per share. Compute:

- (1) The company's cost of equity, if investors expect annual growth rate of 12%.
- (2) If anticipated growth rate is 13% p.a., calculate the indicated market price, with same cost of capital.
- (3) If the company's cost of capital is 18% and anticipated growth rate is 15% p.a., calculate the market price per share, assuming other conditions remain the same.

**Answer**

**1. Calculation of cost of capital**

Retained earnings	37.5%	₹ 3 per share
Dividend*	62.5%	₹ 5 per share
EPS	100.0%	₹ 8 per share

P/E ratio 7.5 times

Market price is ₹ 7.5 × 8 = ₹ 60 per share

Cost of equity capital = (Dividend/price × 100) + growth %  
 = (5/60 × 100) + 12% = 20.33%.

$$* \left( \frac{₹ 3}{37.5} \times 62.5 = ₹ 5 \right)$$

- Market price = Dividend/(cost of equity capital % – growth rate %) = 5/(20.33% – 13%) = 5/7.33% = ₹ 68.21 per share.
- Market price = Dividend/(cost of equity capital % – growth rate %) = 5/(18% – 15%) = 5/3% = ₹ 166.66 per share.

**Question 23**

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:

- Draw income statement for the year

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- (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?

#### Answer

#### Workings:

Asset turnover ratio	= 1.1
Total Assets	= ₹ 600
Turnover ₹ 600 lakhs × 11	= ₹ 660 lakhs
Effective interest rate	= $\frac{\text{Interest}}{\text{Liabilities}} = 8\%$
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	<u>594</u>
EBIT	66
Interest	<u>14</u>
EBT	52
Tax @ 40%	<u>20.80</u>
EAT	31.20
Dividend @ 16.67%	<u>5.20</u>
Retained Earnings	<u>26.00</u>

#### (ii) SGR = ROE (1-b)

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

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

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

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

$$P_0 = \frac{D_0(1+g)}{k_e - g}$$

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

Growth Rate = 6.5% or 6.95%

$$\text{Hence } P_0 = \frac{\text{₹ 0.52}(1+0.065)}{0.15-0.065} = \frac{\text{₹ 0.5538}}{0.085} = \text{₹ 6.51} \text{ or } \frac{0.52(1+0.0695)}{0.15-0.0695}$$

$$= \frac{0.5561}{0.0805} = \text{₹ 6.91}$$

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

**Question 24**

*M/s X Ltd. has paid a dividend of ₹ 2.5 per share on a face value of ₹ 10 in the financial year ending on 31<sup>st</sup> March, 2009. The details are as follows:*

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

*Calculate the intrinsic value of the share.*

**Answer**

$$\text{Intrinsic Value } P_0 = \frac{D_1}{k - g}$$

Using CAPM

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

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$R_f$  = Risk Free Rate

$\beta$  = Beta of Security

$R_m$  = Market Return

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

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

#### Question 25

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.

#### Answer

##### 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	<u>463.75</u>
			₹ 563.68
	Less : - Cost of Share (₹ 500 x 1.05)		<u>₹ 525.00</u>
	Net gain		<u>₹ 38.68</u>

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

**Question 26**

The risk free rate of return  $R_f$  is 9 percent. The expected rate of return on the market portfolio  $R_m$  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?

**Answer**

- (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:

$$= 11\% + 1.3(15\% - 8\%)$$

$$= 11\% + 5.2\% = 16.20\%$$

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

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

- (i) Inflation Premium increase by 3%. This raises  $R_x$  to 15.80%. Hence, new equilibrium price will be:

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

### 6.34 Strategic Financial Management

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

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

(iii) Beta decreases 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:

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

#### Question 27

Seawell Corporation, a manufacturer of do-it-yourself hardware and housewares, reported earnings per share of € 2.10 in 2003, on which it paid dividends per share of €0.69. Earnings are expected to grow 15% a year from 2004 to 2008, during this period the dividend payout ratio is expected to remain unchanged. After 2008, the earnings growth rate is expected to drop to a stable rate of 6%, and the payout ratio is expected to increase to 65% of earnings. The firm has a beta of 1.40 currently, and is expected to have a beta of 1.10 after 2008. The market risk premium is 5.5%. The Treasury bond rate is 6.25%.

- What is the expected price of the stock at the end of 2008?
- What is the value of the stock, using the two-stage dividend discount model?

#### Answer

The expected rate of return on equity after 2008 = 0.0625 + 1.10(0.055) = 12.3%

The dividends from 2003 onwards can be estimated as:

Year	2003	2004	2005	2006	2007	2008	2009
Earnings Per Share (€)	2.1	2.415	2.78	3.19	3.67	4.22	4.48
Dividends Per Share (€)	0.69	0.794	0.913	1.048	1.206	1.387	2.91

- The price as of 2008 = €2.91/(0.123- 0.06) = €46.19
- The required rate of return upto 2008 = 0.0625 + 1.4(0.055) = 13.95%. The dividends upto 2008 are discounted using this rate as follow:

Year	PV of Dividend
2004	0.794/1.1395 = 0.70
2005	0.913/(1.1395) <sup>2</sup> = 0.70

2006	$1.048/(1.1395)^3 = 0.70$
2007	$1.206/(1.1395)^4 = 0.72$
2008	$1.387/(1.1395)^5 = 0.72$
Total	3.54

The current price = €3.54 + €46.19/(1.1395)<sup>5</sup> = €27.58.

\* Values have been rounded off.

**Question 28**

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 4<sup>th</sup> 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 atleast ₹ 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%.

**Answer**

$$\begin{aligned} \text{Value of share at present} &= \frac{D_1}{k_e - g} \\ &= \frac{2(1.06)}{0.08 - 0.06} = ₹ 106 \end{aligned}$$

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
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### 6.36 Strategic Financial Management

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 ₹ 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 3<sup>rd</sup> 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.

#### Question 29

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.

#### Answer

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

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

$$\begin{aligned}\text{Expected Return} &= R_f + \beta(R_m - R_f) \\ &= 11\% + 1.25(18\% - 11\%) \\ &= 11\% + 8.75\% = 19.75\%\end{aligned}$$

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

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

$$\text{Intrinsic Value} = ₹ 16.36 + ₹ 105.77 = ₹ 122.13$$

**Question 30**

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%.

**Answer**

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

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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

#### Question 31

*Pet feed plc has outstanding, a high yield Bond with following features:*

<i>Face Value</i>	<i>£ 10,000</i>
<i>Coupon</i>	<i>10%</i>
<i>Maturity Period</i>	<i>6 Years</i>
<i>Special Feature</i>	<i>Company can extend the life of Bond to 12 years.</i>

*Presently the interest rate on equivalent Bond is 8%.*

- (a) *If an investor expects that interest will be 8%, six years from now then how much he should pay for this bond now.*
- (b) *Now suppose, on the basis of that expectation, he invests in the Bond, but interest rate turns out to be 12%, six years from now, then what will be his potential loss/ gain if the company extends the life of Bond for another 6 years.*

#### Answer

- (a) If the current interest rate is 8%, the company will not extend the duration of Bond and the maximum amount the investor would be ready to pay will be:
- $$\begin{aligned} &= \text{£}1,000 \text{ PVIAF} (8\%, 6) + \text{£}10,000 \text{ PVIF} (8\%, 6) \\ &= \text{£}1,000 \times 4.623 + \text{£}10,000 \times 0.630 \\ &= \text{£}4,623 + \text{£} 6,300 \\ &= \text{£} 10,923 \end{aligned}$$

(b) If the current interest rate is 12%, the company will extend the duration of Bond. After six years the value of Bond will be

$$\begin{aligned}
 &= \text{£}1,000 \text{ PVIAF } (12\%, 6) + \text{£}10,000 \text{ PVIF } (12\%, 6) \\
 &= \text{£}1,000 \times 4.111 + \text{£}10,000 \times 0.507 \\
 &= \text{£}4,111 + \text{£}5,070 \\
 &= \text{£}9,181
 \end{aligned}$$

Thus, potential loss will be  $\text{£}9,181 - \text{£}10,923 = \text{£}1,742$

**Question 32**

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?

**Answer**

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

Conversion Value  $14 \times ₹ 80 = ₹ 1120$

Market price of bond = ₹ 1475

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

**Question 33**

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

**Answer**

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

	PVF @ 8 %	₹
Interest - ₹ 12 for 5 years	3.993	47.916
Redemption - ₹ 100 in 5 <sup>th</sup> year	0.681	<u>68.100</u>
		<b><u>116.016</u></b>

## 6.40 Strategic Financial Management

### 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.

### Question 34

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:

- Stock value of bond.
- The percentage of downside risk.
- The conversion premium
- The conversion parity price of the stock.

### Answer

- (i) **Stock value or conversion value of bond**

$$12 \times 20 = ₹ 240$$

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

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

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

- (iii) **Conversion Premium**

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

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

**(iv) Conversion Parity Price**

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

$$\frac{\text{₹ } 265}{20} = \text{₹ } 13.25$$

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.

**Question 35**

*Pineapple Ltd has issued fully convertible 12 percent debentures of ₹ 5,000 face value, convertible into 10 equity shares. The current market price of the debentures is ₹ 5,400. The present market price of equity shares is ₹ 430.*

*Calculate:*

- (i) *the conversion percentage premium, and*
- (ii) *the conversion value*

**Answer**

- (i) As per the conversion terms 1 Debenture = 10 equity share and since face value of one debenture is ₹ 5000 the value of equity share becomes ₹ 500 (5000/10).

The conversion terms can also be expressed as: 1 Debenture of ₹ 500 = 1 equity share.

The cost of buying ₹ 500 debenture (one equity share) is:

$$\text{₹ } 500 \times \frac{5400}{5000} = \text{₹ } 540$$

Market Price of share is ₹ 430. Hence conversion premium in percentage is:

$$\frac{540 - 430}{430} \times 100 = 25.58\%$$

- (ii) The *conversion value* can be calculated as follows:

$$\begin{aligned} \text{Conversion value} &= \text{Conversion ratio} \times \text{Market Price of Equity Shares} \\ &= 10 \times \text{₹ } 430 = \text{₹ } 4300 \end{aligned}$$

## 6.42 Strategic Financial Management

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### Question 36

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.

### Answer

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

Market Capitalisation after Buyback

1.1P (Original Shares – Shares Bought Back)

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

$$= 11 \text{ lakhs} \times P - 27 \text{ lakhs} \times 1.1 = 11 \text{ lakhs } P - 29.7 \text{ lakhs}$$

Again, 11 lakhs P – 29.7 lakhs

or 11 lakhs P = 210 lakhs + 29.7 lakhs

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

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

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

- (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.

**Question 37**

If the market price of the bond is ₹ 95; years to maturity = 6 yrs; coupon rate = 13% p.a (paid annually) and issue price is ₹ 100. What is the yield to maturity?

**Answer**

$$YTM = \frac{C + \frac{(F - P)}{n}}{\frac{F + P}{2}}$$

C= Coupon Rate; F= Face Value (Issue Price) ; P= Market Price of Bond

$$YTM = \frac{13 + \frac{(100 - 95)}{6}}{\frac{100 + 95}{2}} = 0.1418 \text{ or } 14.18\%$$

**Question 38**

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?

**Answer**

**(i) Calculation of Maximum price**

$$B_0 = ₹ 11 \times PVIFA (13\%,3) + ₹ 100 \times PVIF (13\%,3)$$

$$= ₹ 11 \times 2.361 + ₹ 100 \times 0.693 = ₹ 25.97 + ₹ 69.30 = ₹ 95.27$$

**(ii) Calculation of yield**

$$\text{At 12\% the value} = ₹ 11 \times PVIFA (12\%,3) + 100 \times PVIF (12\%,3)$$

$$= ₹ 11 \times 2.402 + ₹ 100 \times 0.712 = ₹ 26.42 + ₹ 71.20 = ₹ 97.62$$

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%.

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Alternatively

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

### Question 39

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.

**Answer**

- (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

### Question 40

Find the current market price of a bond having face value ₹ 1,00,000 redeemable after 6 year maturity with YTM at 16% payable annually and duration 4.3202 years. Given  $1.16^6 = 2.4364$ .

**Answer**

The formula for the duration of a coupon bond is as follows:

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

Where YTM = Yield to Maturity

c = Coupon Rate

t = Years to Maturity

Accordingly, since YTM = 0.16 and t = 6

$$4.3202 = \frac{1.16}{0.16} - \frac{1.16 + 6(c - 0.16)}{c[(1.16)^6 - 1] + 0.16}$$

$$4.3202 = 7.25 - \frac{1.16 + (6c - 0.96)}{1.4364c + 0.16}$$

$$\frac{1.16 + 6c - 0.96}{1.4364c + 0.16} = 2.9298$$

$$0.2 + 6c = 4.20836472c + 0.468768$$

$$1.79163528c = 0.268768$$

$$C = 0.150012674$$

$$\therefore c = 0.15$$

Where c = Coupon rate

Therefore, current price = ₹(1,00,000/- x 0.15 x 3.685 + 1,00,000/- x 0.410) = ₹96,275/-.

*Alternatively, it can also be calculated as follows:*

Let x be annual coupon payment. Accordingly, the duration (D) of the Bond shall be

Year	CF	PVIF 16%	PV (CF)
1	x	0.862	0.862x
2	x	0.743	0.743x
3	x	0.641	0.641x
4	x	0.552	0.552x
5	x	0.476	0.476x
6	X + 100000	0.410	0.410x + 41000
			3.684x + 41000

$$D = \frac{0.862x}{3.684x + 41000} \times 1 + \frac{0.743x}{3.684x + 41000} \times 2 + \frac{0.641x}{3.684x + 41000} \times 3$$

$$+ \frac{0.552x}{3.684x + 41000} \times 4 + \frac{0.476x}{3.684x + 41000} \times 5 + \frac{(0.410x + 41000)}{3.684x + 41000} \times 6$$

$$4.3202 = \frac{11.319x + 246000}{3.684x + 41000}$$

$$x = ₹ 14,983 \text{ i.e. } 14.98\% \text{ say } 15\%$$

## 6.46 Strategic Financial Management

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Accordingly, current price of the Bond shall be:

$$\begin{aligned} &= 1,00,000 \times 0.15 \times \text{PVAF} (16\%, 6) + 1,00,000 \times \text{PVF} (16\%, 6) \\ &= 15,000 \times 3.685 + 1,00,000 \times 0.410 = ₹ 96,275 \end{aligned}$$

### Question 41

There is a 9% 5-year bond issue in the market. The issue price is ₹ 90 and the redemption price ₹ 105. For an investor with marginal income tax rate of 30% and capital gains tax rate of 10% (assuming no indexation), what is the post-tax yield to maturity?

### Answer

Calculation of yield to Maturity (YTM)

$$\text{YTM} = \frac{\text{Coupon} + \text{Pr o - rated discount}}{(\text{Re demption price} + \text{Purchase Price})/2}$$

$$\text{After tax coupon} = 9 \times (1 - .30) = 6.3\%$$

$$\text{After tax redemption price} = 105 - (15 \times .10) \text{ or } ₹ 103.5$$

$$\text{After tax capital gain} = 103.50 - 90 = ₹ 13.50$$

$$\text{YTM} = \frac{6.3 + (13.5/5)}{(103.5 + 90)/2} \text{ or } \frac{9.00}{96.75} = 9.30\%$$

### Question 42

ABC Ltd. issued 9%, 5 year bonds of ₹ 1,000/- each having a maturity of 3 years. The present rate of interest is 12% for one year tenure. It is expected that Forward rate of interest for one year tenure is going to fall by 75 basis points and further by 50 basis points for every next year in further for the same tenure. This bond has a beta value of 1.02 and is more popular in the market due to less credit risk.

Calculate

- (i) Intrinsic value of bond
- (ii) Expected price of bond in the market

### Answer

#### (i) Intrinsic value of Bond

PV of Interest + PV of Maturity Value of Bond

Forward rate of interests

1<sup>st</sup> Year 12%

2<sup>nd</sup> Year 11.25%

3<sup>rd</sup> Year 10.75%

$$\text{PV of interest} = \frac{\text{₹ 90}}{(1+0.12)} + \frac{\text{₹ 90}}{(1+0.12)(1+0.1125)} + \frac{\text{₹ 90}}{(1+0.12)(1+0.1125)(1+0.1075)} = \text{₹ 217.81}$$

$$\text{PV of Maturity Value of Bond} = \frac{\text{₹1000}}{(1+0.12)(1+0.1125)(1+0.1075)} = \text{₹ 724.67}$$

Intrinsic value of Bond = ₹ 217.81 + ₹ 724.67 = ₹ 942.48

(ii) Expected Price = Intrinsic Value x Beta Value

$$= \text{₹ 942.48} \times 1.02 = \text{₹ 961.33}$$

### Question 43

MP Ltd. issued a new series of bonds on January 1, 2010. The bonds were sold at par (₹1,000), having a coupon rate 10% p.a. and mature on 31<sup>st</sup> December, 2025. Coupon payments are made semiannually on June 30<sup>th</sup> and December 31<sup>st</sup> each year. Assume that you purchased an outstanding MP Ltd. bond on 1<sup>st</sup> March, 2018 when the going interest rate was 12%.

Required:

- (i) What was the YTM of MP Ltd. bonds as on January 1, 2010?
- (ii) What amount you should pay to complete the transaction? Of that amount how much should be accrued interest and how much would represent bonds basic value.

### Answer

(i) Since the bonds were sold at par, the original YTM was 10%.

$$\text{YTM} = \frac{\text{Interest}}{\text{Principal}} = \frac{\text{₹ 100}}{\text{₹ 1,000}} = 10\%$$

- (ii) Price of the bond as on 1<sup>st</sup> July, 2018
 

= ₹ 50 × 9.712 + ₹ 1,000 × 0.417
= ₹ 485.60 + ₹ 417
= ₹ 902.60
- Total value of the bond on the next
 

= ₹ 902.60 + ₹ 50 interest date = ₹952.60
---
- ∴ Value of bond at purchase date
 

= ₹ 952.60 × $\frac{1}{(1+0.06)^{2/3}}$
= ₹ 952.60 × 0.9620 (by using excel)
= ₹ 916.40†

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The amount to be paid to complete the transaction is ₹916.40. Out of this amount ₹ 48.10 represent accrued interest\* and ₹868.30 represent the bond basic value.

† Alternatively, it can also be calculated as follows:

$$\begin{aligned} &= ₹ 952.60 \times \frac{1}{(1+0.06 \times \frac{2}{3})} \\ &= ₹ 952.60 \times \frac{1}{(1+0.04)} \\ &= ₹ 915.96 \end{aligned}$$

The amount to be paid to complete the transaction is ₹915.96. Out of this amount ₹ 48.08 represent accrued interest\* and ₹867.88 represent the bond basic value.

\*Alternatively, Accrued Interest can also be calculated as follows:

$$\text{Accrued Interest on Bonds} = 1,000 \times \frac{10}{100} \times \frac{2}{12} = 16.67$$

### Question 44

Based on the credit rating of bonds, Mr. Z has decided to apply the following discount rates for valuing bonds:

Credit Rating	Discount Rate
AAA	364 day T bill rate + 3% spread
AA	AAA + 2% spread
A	AAA + 3% spread

He is considering to invest in AA rated, ₹ 1,000 face value bond currently selling at ₹ 1,025.86. The bond has five years to maturity and the coupon rate on the bond is 15% p.a. payable annually. The next interest payment is due one year from today and the bond is redeemable at par. (Assume the 364 day T-bill rate to be 9%).

You are required to calculate the intrinsic value of the bond for Mr. Z. Should he invest in the bond? Also calculate the current yield and the Yield to Maturity (YTM) of the bond.

### Answer

The appropriate discount rate for valuing the bond for Mr. Z is:

$$R = 9\% + 3\% + 2\% = 14\%$$

Time	CF	PVIF 14% PV (CF)	PV (CF)
1	150	0.877	131.55

2	150	0.769	115.35
3	150	0.675	101.25
4	150	0.592	88.80
5	1150	0.519	<u>596.85</u>
$\Sigma$ PV (CF) i.e. $P_0 =$			<u>1033.80</u>

Since, the current market value is less than the intrinsic value; Mr. Z should buy the bond. Current yield = Annual Interest / Price = 150 / 1025.86 = 14.62%

The YTM of the bond is calculated as follows:

@15%

$$P = 150 \times PVIFA_{15\%, 4} + 1150 \times PVIF_{15\%, 5}$$

$$= 150 \times 2.855 + 1150 \times 0.497 = 428.25 + 571.55 = 999.80$$

@14%

As found in sub part (a)  $P_0 = 1033.80$

By interpolation we get,

$$= 14\% + \frac{7.94}{7.94 - (-26.06)} \times (15\% - 14\%) = 14\% + \frac{7.94}{34}\%$$

YTM = 14.23%

#### Question 45

*M/s Agfa Industries is planning to issue a debenture series on the following terms:*

Face value	₹ 100
Term of maturity	10 years
Yearly coupon rate	
Years	
1 – 4	9%
5 – 8	10%
9 – 10	14%

*The current market rate on similar debentures is 15 per cent per annum. The Company proposes to price the issue in such a manner that it can yield 16 per cent compounded rate of return to the investors. The Company also proposes to redeem the debentures at 5 per cent premium on maturity. Determine the issue price of the debentures.*

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### Answer

The issue price of the debentures will be the sum of present value of interest payments during 10 years of its maturity and present value of redemption value of debenture.

Years	Cash out flow (₹)	PVIF @ 16%	PV
1	9	.862	7.758
2	9	.743	6.687
3	9	.641	5.769
4	9	.552	4.968
5	10	.476	4.76
6	10	.410	4.10
7	10	.354	3.54
8	10	.305	3.05
9	14	.263	3.682
10	14 + 105 = 119	.227	<u>3.178 + 23.835</u>
			71.327

Thus the debentures should be priced at ₹ 71.327

### Question 46

On 31<sup>st</sup> March, 2013, the following information about Bonds is available:

Name of Security	Face Value ₹	Maturity Date	Coupon Rate	Coupon Date(s)
Zero coupon	10,000	31 <sup>st</sup> March, 2023	N.A.	N.A.
T-Bill	1,00,000	20 <sup>th</sup> June, 2013	N.A.	N.A.
10.71% GOI 2023	100	31 <sup>st</sup> March, 2023	10.71	31 <sup>st</sup> March
10 % GOI 2018	100	31 <sup>st</sup> March, 2018	10.00	31 <sup>st</sup> March & 30 <sup>th</sup> September

### Calculate:

- If 10 years yield is 7.5% p.a. what price the Zero Coupon Bond would fetch on 31<sup>st</sup> March, 2013?
- What will be the annualized yield if the T-Bill is traded @ 98500?
- If 10.71% GOI 2023 Bond having yield to maturity is 8%, what price would it fetch on April 1, 2013 (after coupon payment on 31<sup>st</sup> March)?

(iv) If 10% GOI 2018 Bond having yield to maturity is 8%, what price would it fetch on April 1, 2013 (after coupon payment on 31<sup>st</sup> March)?

**Answer**

(i) Rate used for discounting shall be yield. Accordingly ZCB shall fetch:

$$= \frac{10000}{(1+0.075)^{10}} = ₹ 4,852$$

(ii) The day count basis is actual number days / 365. Accordingly annualized yield shall be:

$$\text{Yield} = \frac{\text{FV-Price}}{\text{Price}} \times \frac{365}{\text{No. of days}} = \frac{100000-98500}{98500} \times \frac{365}{81} = 6.86\%$$

**Note:** Alternatively, it can also computed on 360 days a year.

(iii) Price GOI 2023 would fetch

$$\begin{aligned} &= ₹ 10.71 \text{ PVAF}(8\%, 10) + ₹ 100 \text{ PVF}(8\%, 10) \\ &= ₹ 10.71 \times 6.71 + ₹ 100 \times 0.4632 \\ &= ₹ 71.86 + ₹ 46.32 = ₹ 118.18 \end{aligned}$$

(iv) Price GOI 2018 Bond would fetch:

$$\begin{aligned} &= ₹ 5 \text{ PVAF}(4\%, 10) + ₹ 100 \text{ PVF}(4\%, 10) \\ &= ₹ 5 \times 8.11 + ₹ 100 \times 0.6756 \\ &= 40.55 + 67.56 = 108.11 \end{aligned}$$

**Question 47**

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.

**Answer**

1. Calculation of initial outlay:-

	₹ (million)
a. Face value	300
Add:-Call premium	<u>12</u>
Cost of calling old bonds	<u>312</u>

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b.	Gross proceed of new issue	300
	Less: Issue costs	<u>6</u>
	Net proceeds of new issue	<u>294</u>
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

### 2. 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]	<u>1.95</u>
Annual net cash saving	<u>4.05</u>
PVIFA (7%, 6 years)	4.766
∴ Present value of net annual cash saving	₹ 19.30 million
Less:- Initial outlay	<u>₹ 11.70 million</u>
Net present value of refunding the bond	<u>₹ 7.60 million</u>

**Decision:** The bonds should be refunded

### Question 48

M/s Transindia Ltd. is contemplating calling ₹ 3 crores of 30 years, ₹ 1,000 bond issued 5 years ago with a coupon interest rate of 14 per cent. The bonds have a call price of ₹ 1,140 and had initially collected proceeds of ₹ 2.91 crores due to a discount of ₹ 30 per bond. The initial floating cost was ₹ 3,60,000. The Company intends to sell ₹ 3 crores of 12 per cent coupon rate, 25 years bonds to raise funds for retiring the old bonds. It proposes to sell the new bonds at their par value of ₹ 1,000. The estimated floatation cost is ₹ 4,00,000. The company is paying 40% tax and its after tax cost of debt is 8 per cent. As the new bonds must first be sold and their proceeds, then used to retire old bonds, the company expects a two months period of overlapping interest during which interest must be paid on both the old and new bonds. What is the feasibility of refunding bonds?

### Answer

#### NPV for bond refunding

	₹
PV of annual cash flow savings (W.N. 2)	
(3,49,600 × PVIFA 8%,25) i.e. 10.675	37,31,980

Less: Initial investment (W.N. 1)	29,20,000
NPV	8,11,980

Recommendation: Refunding of bonds is recommended as NPV is positive.

**Working Notes:**

**(1) Initial investment:**

(a) Call premium		
Before tax $(1,140 - 1,000) \times 30,000$	42,00,000	
Less tax @ 40%	16,80,000	
After tax cost of call prem.		25,20,000
(b) Floatation cost		
		4,00,000
(c) Overlapping interest		
Before tax $(0.14 \times 2/12 \times 3 \text{ crores})$	7,00,000	
Less tax @ 40%	2,80,000	4,20,000
(d) Tax saving on unamortised discount on old bond $25/30 \times 9,00,000 \times 0.4$		
		(3,00,000)
(e) Tax savings from unamortised floatation		
Cost of old bond $25/30 \times 3,60,000 \times 0.4$		(1,20,000)
		29,20,000

**(2) Annual cash flow savings:**

(a) Old bond		
(i) Interest cost $(0.14 \times 3 \text{ crores})$	42,00,000	
Less tax @ 40%	16,80,000	25,20,000
(ii) Tax savings from amortisation of discount $9,00,000/30 \times 0.4$		(12,000)
(iii) Tax savings from amortisation of floatation cost $3,60,000/30 \times 0.4$		(4,800)
Annual after tax cost payment under old Bond (A)		25,03,200
(b) New bond		
(i) Interest cost before tax $(0.12 \times 3 \text{ crores})$	36,00,000	
Less tax @ 40%	14,40,000	

## 6.54 Strategic Financial Management

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After tax interest	21,60,000
(ii) Tax savings from amortisation of floatation cost (0.4 × 4,00,000/25)	<u>(6,400)</u>
Annual after tax payment under new Bond (B)	<u>21,53,600</u>
Annual Cash Flow Saving (A) – (B)	<u>3,49,600</u>

### Question 49

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.

### Answer

#### 1. Calculation of Market price:

$$TM = \frac{\text{Coupon interest} + \left( \frac{\text{Discount or premium}}{\text{Years left}} \right)}{\frac{\text{Face Value} + \text{Market value}}{2}}$$

Discount or premium – YTM is more than coupon rate, market price is less than Face Value i.e. at discount.

Let  $x$  be the market price

$$0.17 = \frac{160 + \left\{ \frac{(1,000 - x)}{6} \right\}}{\frac{1,000 + x}{2}} \quad x = ₹ 960.26$$

Alternatively, the candidate may attempt by

$$\begin{aligned} & 160 (\text{PVIFA } 17\%, 6) + 1,000 (\text{PVIF } 17\%, 6) \\ & = 160 (3.589) + 1,000 (0.390) = 574.24 + 390 = 964.24 \end{aligned}$$

**2. Duration**

Year	Cash flow	P.V. @ 17%		Proportion of bond value	Proportion of bond value x time (years)
1	160	.855	136.80	0.142	0.142
2	160	.731	116.96	0.121	0.246
3	160	.624	99.84	0.103	0.309
4	160	.534	85.44	0.089	0.356
5	160	.456	72.96	0.076	0.380
6	1160	.390	<u>452.40</u>	<u>0.469</u>	<u>2.814</u>
			<u>964.40</u>	<u>1.000</u>	<u>4.247</u>

Duration of the Bond is 4.247 years

Alternatively, as per Short Cut Method

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

Where YTM = Yield to Maturity

c = Coupon Rate

t = Years to Maturity

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

D = 4.24 years

**3. Volatility**

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

**4. The expected market price if increase in required yield is by 75 basis points.**

$$= ₹ 960.26 \times .75 (3.63/100) = ₹ 26.142$$

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

$$= ₹ 964.40 \times .75 (3.63/100) = ₹ 26.26$$

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

## 6.56 Strategic Financial Management

### Question 50

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.

### Answer

#### Duration of Bond X

Year	Cash flow	P.V. @ 10%		Proportion of bond value	Proportion of bond value x time (years)
1	1070	.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	.909	72.72	0.077	0.077
2	80	.826	66.08	0.071	0.142
3	80	.751	60.08	0.064	0.192
4	1080	.683	<u>737.64</u>	<u>0.788</u>	<u>3.152</u>
			<u>936.52</u>	<u>1.000</u>	<u>3.563</u>

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 year 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

<i>Bond X</i>	<i>Bond Y</i>
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/₹ 972.73 = 51.79 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.

Note: In the above computation, Modified Duration can also be used instead of Duration.

**Question 51**

*XL Ispat Ltd. has made an issue of 14 per cent non-convertible debentures on January 1, 2007. These debentures have a face value of ₹ 100 and is currently traded in the market at a price of ₹ 90.*

*Interest on these NCDs will be paid through post-dated cheques dated June 30 and December 31. Interest payments for the first 3 years will be paid in advance through post-dated cheques while for the last 2 years post-dated cheques will be issued at the third year. The bond is redeemable at par on December 31, 2011 at the end of 5 years.*

*Required :*

- (i) Estimate the current yield and YTM of the bond.*
- (ii) Calculate the duration of the NCD.*
- (iii) Assuming that intermediate coupon payments are, not available for reinvestment calculate the realised yield on the NCD.*

**Answer**

(i) Current yield =  $\frac{₹ 7}{₹ 90} \times \frac{12}{6} = 0.1555$  or 15.55%

YTM can be determined from the following equation

$$7 \times \text{PVIFA}(\text{YTM}, 10) + 100 \times \text{PVIF}(\text{YTM}, 10) = 90$$

Let us discount the cash flows using two discount rates 7.50% and 9% as follows:

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Year	Cash Flows	PVF@7.50%	PV@7.50%	PVF@9%	PV@9%
0	-90	1	-90	1	-90
1	7	0.930	6.51	0.917	6.419
2	7	0.865	6.055	0.842	5.894
3	7	0.805	5.635	0.772	5.404
4	7	0.749	5.243	0.708	4.956
5	7	0.697	4.879	0.650	4.550
6	7	0.648	4.536	0.596	4.172
7	7	0.603	4.221	0.547	3.829
8	7	0.561	3.927	0.502	3.514
9	7	0.522	3.654	0.460	3.220
10	107	0.485	51.90	0.422	45.154
			6.560		-2.888

Now we use interpolation formula

$$7.50\% + \frac{6.560}{6.560 - (-2.888)} \times 1.50\%$$

$$7.50\% + \frac{6.560}{9.448} \times 1.50\% = 7.50\% + 1.041\%$$

YTM = 8.541% say 8.54%

Note: Students can also compute the YTM using rates other than 15% and 18%.

(ii) The duration can be calculated as follows:

Year	Cash Flow	PVF@ 8.54%	PV @ 8.54%	Proportion of NCD value	Proportion of NCD value × time
1	7	0.921	6.447	0.0717	0.0717
2	7	0.849	5.943	0.0661	0.1322
3	7	0.782	5.474	0.0608	0.1824
4	7	0.721	5.047	0.0561	0.2244
5	7	0.664	4.648	0.0517	0.2585
6	7	0.612	4.284	0.0476	0.2856
7	7	0.563	3.941	0.0438	0.3066

8	7	0.519	3.633	0.0404	0.3232
9	7	0.478	3.346	0.0372	0.3348
10	107	0.441	47.187	0.5246	5.2460
			89.95		7.3654

Duration = 7.3654 half years i.e. 3.683 years.

(iii) Realized Yield can be calculated as follows:

$$\frac{(7 \times 10) + 100}{(1+R)^{10}} = 90$$

$$(1 + R)^{10} = \frac{170}{90}$$

$$R = \left(\frac{170}{90}\right)^{1/10} - 1 = 0.06380 \text{ or } 6.380\% \text{ for half yearly and } 12.76\% \text{ annually.}$$

**Question 52**

Mr. A is planning for making investment in bonds of one of the two companies X Ltd. and Y Ltd. The detail of these bonds is as follows:

Company	Face Value	Coupon Rate	Maturity Period
X Ltd.	₹ 10,000	6%	5 Years
Y Ltd.	₹ 0,000	4%	5 Years

The current market price of X Ltd.'s bond is ₹ 10,796.80 and both bonds have same Yield To Maturity (YTM). Since Mr. A considers duration of bonds as the basis of decision making, you are required to calculate the duration of each bond and you decision.

**Answer**

To calculate duration of bond we need YTM, which shall be calculated as follows:

Let us try NPV of Bond @ 5%

$$= \frac{600}{(1.05)^1} + \frac{600}{(1.05)^2} + \frac{600}{(1.05)^3} + \frac{600}{(1.05)^4} + \frac{10,600}{(1.05)^5} - 10,796.80$$

$$= ₹ 571.43 + ₹ 544.22 + ₹ 518.30 + ₹ 493.62 + ₹ 8,305.38 - ₹ 10,796.80 = - ₹ 363.85$$

Let us now try NPV @ 4%

$$= \frac{600}{(1.04)^1} + \frac{600}{(1.04)^2} + \frac{600}{(1.04)^3} + \frac{600}{(1.04)^4} + \frac{10,600}{(1.04)^5} - 10,796.80$$

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$$= ₹ 576.92 + ₹ 554.73 + ₹ 533.40 + ₹ 512.88 + ₹ 712.43 - ₹ 10,796.80 = ₹ 93.56$$

Let us now interpolation formula

$$= 4\% + \frac{93.56}{93.56 - (-363.85)} \times (5\% - 4\%)$$

$$= 4\% + \frac{93.56}{93.56 + 363.85}$$

$$= 4\% + \frac{93.56}{457.41} = 4.20\%$$

### Duration of X Ltd.'s Bond

Year	Cash flow	P.V. @ 4.2%		Proportion of bond value	Proportion of bond value x time (years)
1	600	0.9597	575.82	0.0533	0.0533
2	600	0.9210	552.60	0.0512	0.1024
3	600	0.8839	530.34	0.0491	0.1473
4	600	0.8483	508.98	0.0472	0.1888
5	10600	0.8141	<u>8,629.46</u>	<u>0.7992</u>	<u>3.9960</u>
			<u>10,797.20</u>	<u>1.0000</u>	<u>4.4878</u>

Duration of the Bond is 4.4878 years say 4.49 years.

### Duration of Y Ltd.'s Bond

Year	Cash flow	P.V. @ 4.2%		Proportion of bond value	Proportion of bond value x time (years)
1	400	0.9597	383.88	0.0387	0.0387
2	400	0.9210	368.40	0.0372	0.0744
3	400	0.8839	353.56	0.0357	0.1071
4	400	0.8483	339.32	0.0342	0.1368
5	10400	0.8141	<u>8,466.64</u>	<u>0.8542</u>	<u>4.2710</u>
			<u>9,911.80</u>	<u>1.0000</u>	<u>4.6280</u>

Duration of the Bond is 4.6280 years say 4.63 years.

**Decision:** Since the duration of Bond of X Ltd. is lower and also carrying higher interest rate hence it should be preferred.

**Question 53**

The following data is available for a bond:

Face Value	₹ 1,000
Coupon Rate	11%
Years to Maturity	6
Redemption Value	₹ 1,000
Yield to Maturity	15%

(Round-off your answers to 3 decimals)

Calculate the following in respect of the bond:

- (i) Current Market Price.
- (ii) Duration of the Bond.
- (iii) Volatility of the Bond.
- (iv) Expected market price if increase in required yield is by 100 basis points.
- (v) Expected market price if decrease in required yield is by 75 basis points.

**Answer**

(i) **Calculation of Market price:**

$$TM = \frac{\text{Coupon interest} + \left( \frac{\text{Discount or premium}}{\text{Years left}} \right)}{\frac{\text{Face Value} + \text{Market value}}{2}}$$

Discount or premium – YTM is more than coupon rate, market price is less than Face Value i.e. at discount.

Let x be the market price

$$0.15 = \frac{110 + \left\{ \frac{(1,000 - x)}{6} \right\}}{\frac{1,000 + x}{2}}$$

$$x = ₹ 834.48$$

Alternatively, it can also be calculated using Tabular Method.

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### (ii) Duration

Year	Cash flow	P.V. @ 15%		Proportion of bond value	Proportion of bond value x time (years)
1	110	.870	95.70	0.113	0.113
2	110	.756	83.16	0.098	0.196
3	110	.658	72.38	0.085	0.255
4	110	.572	62.92	0.074	0.296
5	110	.497	54.67	0.064	0.320
6	1110	.432	<u>479.52</u>	<u>0.565</u>	<u>3.39</u>
			<u>848.35</u>	<u>1.000</u>	<u>4.570</u>

Duration of the Bond is 4.570 years

### (iii) Volatility

$$\text{Volatility of the bond} = \frac{\text{Duration}}{(1 + \text{yields})} = \frac{4.570}{1.15} = 3.974$$

(iv) The expected market price if increase in required yield is by 100 basis points.

$$= ₹ 834.48 \times 1.00 (3.974/100) = ₹ 33.162$$

Hence expected market price is ₹ 834.48 – ₹ 33.162 = ₹ 801.318

Alternatively, this can also be calculated as follows:

$$₹ 848.35 \times 100 (3.794/100) = 33.71$$

Hence, expected market price is 848.48 – 33.71 = 814.77

Thus, the market price will decrease.

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

$$= ₹ 834.48 \times 0.75 (3.974/100) = ₹ 24.87$$

Hence expected market price is ₹ 834.48 + ₹ 24.87 = ₹ 859.35

Alternatively, this can also be calculated as follows:

$$848.35 \times 0.75 (3.974/100) = 25.29$$

Hence, expected market price = 848.35 – 25.29 = ₹ 823.06

Thus, the market price will increase.

### Question 54

GHI Ltd., AAA rated company has issued, fully convertible bonds on the following terms, a year ago:

Face value of bond	₹ 1000
Coupon (interest rate)	8.5%
Time to Maturity (remaining)	3 years
Interest Payment	Annual, at the end of year
Principal Repayment	At the end of bond maturity
Conversion ratio (Number of shares per bond)	25
Current market price per share	₹ 45
Market price of convertible bond	₹ 1175

AAA rated company can issue plain vanilla bonds without conversion option at an interest rate of 9.5%.

Required: Calculate as of today:

- (i) Straight Value of bond.
- (ii) Conversion Value of the bond.
- (iii) Conversion Premium.
- (iv) Percentage of downside risk.
- (v) Conversion Parity Price.

<i>t</i>	1	2	3
$PVIF_{0.095, t}$	0.9132	0.8340	0.7617

**Answer**

- (i) Straight Value of Bond

$$₹ 85 \times 0.9132 + ₹ 85 \times 0.8340 + ₹ 1085 \times 0.7617 = ₹ 974.96$$

- (ii) Conversion Value

$$\begin{aligned} &\text{Conversion Ratio} \times \text{Market Price of Equity Share} \\ &= ₹ 45 \times 25 = ₹ 1,125 \end{aligned}$$

- (iii) Conversion Premium

$$\text{Conversion Premium} = \text{Market Conversion Price} - \text{Market Price of Equity Share}$$

$$= \frac{₹ 1,175}{25} - ₹ 45 = ₹ 2$$

$$\text{or } = ₹ 1,175 - ₹ 45 \times 25 = ₹ 50$$

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$$\text{or } \frac{\text{₹ } 1,175 - \text{₹ } 1,125}{\text{₹ } 1,125} = 4.47\%$$

(iv) Percentage of Downside Risk

$$= \frac{\text{₹ } 1,175 - \text{₹ } 974.96}{\text{₹ } 974.96} \times 100 = 20.52\% \quad \text{or} \quad \frac{\text{₹ } 1,175 - \text{₹ } 974.96}{\text{₹ } 1,175} = 17.02$$

(v) Conversion Parity Price

$$\frac{\text{Bond Price}}{\text{No. of Share on Conversion}} \\ = \frac{\text{₹ } 1,175}{25} = \text{₹ } 47$$

### Question 55

The following data is related to 8.5% Fully Convertible (into Equity shares) Debentures issued by JAC Ltd. at ₹ 1000.

Market Price of Debenture	₹ 900
Conversion Ratio	30
Straight Value of Debenture	₹ 700
Market Price of Equity share on the date of Conversion	₹ 25
Expected Dividend Per Share	₹ 1

You are required to calculate:

- Conversion Value of Debenture
- Market Conversion Price
- Conversion Premium per share
- Ratio of Conversion Premium
- Premium over Straight Value of Debenture
- Favourable income differential per share
- Premium pay back period

**Answer**

- (a) Conversion Value of Debenture  
 = Market Price of one Equity Share X Conversion Ratio  
 = ₹ 25 X 30 = ₹ 750
- (b) Market Conversion Price  
 =  $\frac{\text{Market Price of Convertible Debenture}}{\text{Conversion Ratio}}$   
 =  $\frac{₹ 900}{30} = ₹ 30$
- (c) Conversion Premium per share  
 Market Conversion Price – Market Price of Equity Share  
 = ₹ 30 – ₹ 25 = ₹ 5
- (d) Ratio of Conversion Premium  
 $\frac{\text{Conversion premium per share}}{\text{Market Price of Equity Share}} = \frac{₹ 5}{₹ 25} = 20\%$
- (e) Premium over Straight Value of Debenture  
 $\frac{\text{Market Price of Convertible Bond}}{\text{Straight Value of Bond}} - 1 = \frac{₹ 900}{₹ 700} - 1 = 28.6\%$
- (f) Favourable income differential per share  
 $\frac{\text{Coupon Interest from Debenture} - \text{Conversion Ratio} \times \text{Dividend Per Share}}{\text{Conversion Ratio}}$   
 $\frac{₹ 85 - 30 \times ₹ 1}{30} = ₹ 1.833$
- (g) Premium pay back period  
 $\frac{\text{Conversion premium per share}}{\text{Favourable Income Differential Per Share}} = \frac{₹ 5}{₹ 1.833} = 2.73 \text{ years}$

**Question 56**

*A Ltd. has issued convertible bonds, which carries a coupon rate of 14%. Each bond is convertible into 20 equity shares of the company A Ltd. The prevailing interest rate for similar credit rating bond is 8%. The convertible bond has 5 years maturity. It is redeemable at par at ₹100. The relevant present value table is as follows.*

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Present values	$t_1$	$t_2$	$t_3$	$t_4$	$t_5$
$PVIF_{0.14, t}$	0.877	0.769	0.675	0.592	0.519
$PVIF_{0.08, t}$	0.926	0.857	0.794	0.735	0.681

You are required to estimate:

(Calculations be made upto 3 decimal places)

- current market price of the bond, assuming it being equal to its fundamental value,
- minimum market price of equity share at which bond holder should exercise conversion option; and
- duration of the bond.

**Answer**

### (i) Current Market Price of Bond

Time	CF	PVIF 8% PV (CF)	PV (CF)
1	14	0.926	12.964
2	14	0.857	11.998
3	14	0.794	11.116
4	14	0.735	10.290
5	114	0.681	<u>77.634</u>
		$\Sigma PV (CF) \text{ i.e. } P_0 =$	<u>124.002</u>

Say

₹ 124.00

- Minimum Market Price of Equity Shares at which Bondholder should exercise conversion option:

$$\frac{124.00}{20.00} = \text{Rs. } 6.20$$

- Duration of the Bond

Year	Cash flow	P.V. @ 8%		Proportion of bond value	Proportion of bond value x time (years)
1	14	0.926	12.964	0.105	0.105
2	14	0.857	11.998	0.097	0.194
3	14	0.794	11.116	0.089	0.267
4	14	0.735	10.290	0.083	0.332
5	114	0.681	<u>77.634</u>	<u>0.626</u>	<u>3.130</u>
			<u>124.002</u>	<u>1.000</u>	<u>4.028</u>

**Question 57**

- (a) Consider two bonds, one with 5 years to maturity and the other with 20 years to maturity. Both the bonds have a face value of ₹ 1,000 and coupon rate of 8% (with annual interest payments) and both are selling at par. Assume that the yields of both the bonds fall to 6%, whether the price of bond will increase or decrease? What percentage of this increase/decrease comes from a change in the present value of bond's principal amount and what percentage of this increase/decrease comes from a change in the present value of bond's interest payments?
- (b) Consider a bond selling at its par value of ₹ 1,000, with 6 years to maturity and a 7% coupon rate (with annual interest payment), what is bond's duration?
- (c) If the YTM of the bond in (b) above increases to 10%, how it affects the bond's duration? And why?

**Answer**

- (a) If the yield of the bond falls the price will always increase. This can be shown by following calculation.

IF YIELD FALLS TO 6%

Price of 5yr. bond

$$₹ 80 (\text{PVIFA } 6\%, 5\text{yrs.}) + ₹ 1000 (\text{PVIF } 6\%, 5\text{yrs.})$$

$$₹ 80 (4.212) + ₹ 1000 (0.747)$$

$$₹ 336.96 + ₹ 747.00 = ₹ 1,083.96$$

Increase in 5 year's bond price = ₹ 83.96

Current price of 20 year bond

$$₹ 80 (\text{PVIFA } 6\%, 20) + ₹ 1,000 (\text{PVIF } 6\%, 20)$$

$$₹ 80 (11.47) + ₹ 1,000 (0.312)$$

$$₹ 917.60 + ₹ 312.00 = ₹ 1229.60$$

So increase in bond price is ₹ 229.60

PRICE INCREASE DUE TO CHANGE IN PV OF PRINCIPAL5 yrs. Bond

$$₹ 1,000 (\text{PVIF } 6\%, 5) - ₹ 1,000 (\text{PVIF } 8\%, 5)$$

$$₹ 1,000 (0.747) - ₹ 1,000 (0.681)$$

$$₹ 747.00 - ₹ 681.00 = ₹ 66.00$$

& change in price due to change in PV of Principal

$$(₹ 66 / ₹ 83.96) \times 100 = 78.6\%$$

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### 20 yrs. Bond

₹ 1,000 (PVIF 6%, 20) – ₹ 1,000 (PVIF 8%, 20)

₹ 1,000 (0.312) – ₹ 1,000 (0.214)

₹ 312.00 – ₹ 214.00 = ₹ 98.00

& change in price due to change in PV of Principal

(₹ 98/ ₹ 229.60) x 100 = 42.68%

### PRICE CHANGE DUE TO CHANGE IN PV OF INTEREST

### 5 yrs. Bond

₹ 80 (PVIFA 6%, 5) – ₹ 80 (PVIFA 8%, 5)

₹ 80 (4.212) – ₹ 80 (3.993)

₹ 336.96 – ₹ 319.44 = ₹ 17.52

% change in price  $\frac{₹ 17.52}{₹ 83.96} \times 100 = 20.86\%$

### 20 yrs. Bond

₹ 80 (PVIFA 6%, 20) – ₹ 80 (PVIFA 8%, 20)

₹ 80 (11.47) – ₹ 80 (9.82)

₹ 917.60 – ₹ 785.60 = ₹ 132

& change in price =  $\frac{₹ 132}{₹ 229.60} \times 100 = 57.49\%$

(b) Duration in the average time taken to recollect back the investment

Years (A)	Coupon Payments (₹)	Redemption (₹)	Total (₹) (B)	PVIF @ 7% (₹) (C)	(A)x(B)x (C) (₹)
1	70	-	70	0.935	65.45
2	70	-	70	0.873	122.22
3	70	-	70	0.816	171.36
4	70	-	70	0.763	213.64
5	70	-	70	0.713	249.55
6	70	1000	1070	0.666	<u>4,275.72</u>
				Σ ABC	<u>5,097.94</u>

Duration =  $\frac{\Sigma ABC}{\text{Purchase Price}} = \frac{₹ 5097.94}{₹ 1000} = 5.098 \text{ years}$

(c) If YTM goes up to 10%, current price of the bond will decrease to

$$₹ 70 \times PVIFA (10\%,6) + ₹ 1000 PVIF (10\%,6)$$

$$₹ 304.85 + ₹ 564.00 = ₹ 868.85$$

Year (A)	Inflow (₹) (B)	PVIF @ 10% (C)	(A)x(B)x (C) (₹)
1	70	0.909	63.63
2	70	0.826	115.64
3	70	0.751	157.71
4	70	0.683	191.24
5	70	0.621	217.35
6	1070	0.564	<u>3,620.88</u>
		Σ ABC	<u>4,366.45</u>

New Duration ₹ 4,366.45/ ₹ 868.85 = 5.025 years

The duration of bond decreases, reason being the receipt of slightly higher portion of one's investment on the same intervals.

**Question 58**

Closing values of BSE Sensex from 6th to 17th day of the month of January of the year 200X were as follows:

Days	Date	Day	Sensex
1	6	THU	14522
2	7	FRI	14925
3	8	SAT	No Trading
4	9	SUN	No Trading
5	10	MON	15222
6	11	TUE	16000
7	12	WED	16400
8	13	THU	17000
9	14	FRI	No Trading
10	15	SAT	No Trading
11	16	SUN	No Trading
12	17	MON	18000

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Calculate Exponential Moving Average (EMA) of Sensex during the above period. The 31 days simple moving average of Sensex can be assumed as 15,000. The value of exponent for 31 days EMA is 0.062.

Give detailed analysis on the basis of your calculations.

### Answer

Date	1 Sensex	2 EMA for Previous day	3 1-2	4 3×0.062	5 EMA 2 + 4
6	14522	15000	(478)	(29.636)	14970.364
7	14925	14970.364	(45.364)	(2.812)	14967.55
10	15222	14967.55	254.45	15.776	14983.32
11	16000	14983.32	1016.68	63.034	15046.354
12	16400	15046.354	1353.646	83.926	15130.28
13	17000	15130.28	1869.72	115.922	15246.202
17	18000	15246.202	2753.798	170.735	15416.937

**Conclusion** – The market is bullish. The market is likely to remain bullish for short term to medium term if other factors remain the same. On the basis of this indicator (EMA) the investors/brokers can take long position.

### Question 59

The closing value of Sensex for the month of October, 2007 is given below:

Date Closing	Sensex Value
1.10.07	2800
3.10.07	2780
4.10.07	2795
5.10.07	2830
8.10.07	2760
9.10.07	2790
10.10.07	2880
11.10.07	2960
12.10.07	2990
15.10.07	3200
16.10.07	3300
17.10.07	3450

19.10.07	3360
22.10.07	3290
23.10.07	3360
24.10.07	3340
25.10.07	3290
29.10.07	3240
30.10.07	3140
31.10.07	3260

You are required to test the weak form of efficient market hypothesis by applying the run test at 5% and 10% level of significance.

Following value can be used :

Value of  $t$  at 5% is 2.101 at 18 degrees of freedom

Value of  $t$  at 10% is 1.734 at 18 degrees of freedom

**Answer**

Date	Closing Sensex	Sign of Price Charge
1.10.07	2800	
3.10.07	2780	-
4.10.07	2795	+
5.10.07	2830	+
8.10.07	2760	-
9.10.07	2790	+
10.10.07	2880	+
11.10.07	2960	+
12.10.07	2990	+
15.10.07	3200	+
16.10.07	3300	+
17.10.07	3450	+
19.10.07	3360	-
22.10.07	3290	-
23.10.07	3360	+
24.10.07	3340	-
25.10.07	3290	-

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29.10.07	3240	-
30.10.07	3140	-
31.10.07	3260	+

Total of sign of price changes ( $r$ ) = 8

No of Positive changes =  $n_1 = 11$

No. of Negative changes =  $n_2 = 8$

$$\mu_r = \frac{2n_1n_2}{n_1+n_2} + 1$$

$$\mu = \frac{2 \times 11 \times 8}{11+8} + 1 = 176/19 + 1 = 10.26$$

$$\hat{\sigma}_r = \sqrt{\frac{2n_1n_2(2n_1n_2 - n_1 - n_2)}{(n_1+n_2)^2(n_1+n_2-1)}}$$

$$\hat{\sigma}_r = \sqrt{\frac{(2 \times 11 \times 8)(2 \times 11 \times 8 - 11 - 8)}{(11+8)^2(11+8-1)}} = \sqrt{\frac{176 \times 157}{(19)^2(18)}} = \sqrt{4.252} = 2.06$$

Since too few runs in the case would indicate that the movement of prices is not random. We employ a two- tailed test the randomness of prices.

Test at 5% level of significance at 18 degrees of freedom using t- table

The lower limit

$$= \mu - t \times \hat{\sigma}_r = 10.26 - 2.101 \times 2.06 = 5.932$$

Upper limit

$$= \mu + t \times \hat{\sigma}_r = 10.26 + 2.101 \times 2.06 = 14.588$$

At 10% level of significance at 18 degrees of freedom

Lower limit

$$= 10.26 - 1.734 \times 2.06 = 6.688$$

Upper limit

$$= 10.26 + 1.734 \times 2.06 = 13.832$$

As seen  $r$  lies between these limits. Hence, the market exhibits weak form of efficiency.

\*For a sample of size  $n$ , the  $t$  distribution will have  $n-1$  degrees of freedom.

**Question 60**

Tiger Ltd. is presently working with an Earning Before Interest and Taxes (EBIT) of ₹ 90 lakhs. Its present borrowings are as follows:

	₹ In lakhs
12% term loan	300
Working capital borrowings:	
From Bank at 15%	200
Public Deposit at 11%	100

The sales of the company are growing and to support this, the company proposes to obtain additional borrowing of ₹ 100 lakhs expected to cost 16%. The increase in EBIT is expected to be 15%.

Calculate the change in interest coverage ratio after the additional borrowing is effected and comment on the arrangement made.

**Answer**

Calculation of Present Interest Coverage Ratio

Present EBIT = ₹ 90 lakhs

Interest charges (Present)	₹ lakhs
Term loan @ 12%	36.00
Bank Borrowings @ 15%	30.00
Public Deposit @ 11%	<u>11.00</u>
	<u>77.00</u>

$$\begin{aligned} \text{Present Interest Coverage Ratio} &= \frac{\text{EBIT}}{\text{Interest Charges}} \\ &= \frac{\text{₹ 90 lakhs}}{\text{₹ 77 lakhs}} = 1.169 \end{aligned}$$

Calculation of Revised Interest Coverage Ratio

Revised EBIT (115% of ₹ 90 lakhs)	₹103.50 lakhs
Proposed interest charges	
Existing charges	₹ 77.00 lakhs
Add: Additional charges (16% of additional Borrowings i.e. ₹100 lakhs)	<u>₹ 16.00 lakhs</u>
Total	<u>₹ 93.00 lakhs</u>

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$$\text{Revised Interest Coverage Ratio} = \frac{\text{₹ 103.50 lakhs}}{\text{₹ 93.00 lakhs}} = 1.113$$

**Analysis:** With the proposed increase in the sales the burden of interest on additional borrowings of ₹100 lakhs will adversely affect the interest coverage ratio which has been reduced. (i.e. from 1.169 to 1.113).

### Question 61

John inherited the following securities on his uncle's death:

Types of Security	Nos.	Annual Coupon %	Maturity Years	Yield %
Bond A (₹ 1,000)	10	9	3	12
Bond B (₹ 1,000)	10	10	5	12
Preference shares C (₹ 100)	100	11	*	13*
Preference shares D (₹ 100)	100	12	*	13*

\*likelihood of being called at a premium over par.

Compute the current value of his uncle's portfolio.

### Answer

#### Computation of current value of John's portfolio

(i) 10 Nos. Bond A, ₹ 1,000 par value, 9% Bonds maturity 3 years:

Current value of interest on bond A

1-3 years: ₹ 900 × Cumulative P.V. @ 12% (1-3 years)

= ₹ 900 × 2.402 2,162

Add: Current value of amount received on maturity of Bond A

End of 3rd year: ₹ 1,000 × 10 × P.V. @ 12% (3rd year)

= ₹ 10,000 × 0.712 7,120 9,282

(ii) 10 Nos. Bond B, ₹ 1,000 par value, 10% Bonds maturity 5 years:

Current value of interest on bond B

1-5 years: ₹ 1,000 × Cumulative P.V. @ 12% (1-5 years)

= ₹ 1,000 × 3.605 3,605

Add: Current value of amount received on maturity of Bond B

End of 5th year: ₹ 1,000 × 10 × P.V. @ 12% (5<sup>th</sup> year)

= ₹ 10,000 × 0.567 5,670 9,275

<p>(iii) 100 Preference shares C, ₹100 par value, 11% coupon</p> $\frac{11\% \times 100 \text{ Nos.} \times ₹ 100}{13\%} = \frac{1,100}{0.13}$	<p>8,462</p>
<p>(iv) 100 Preference shares D, ₹100 par value, 12% coupon</p> $\frac{12\% \times 100 \text{ Nos.} \times ₹ 100}{13\%} = \frac{1,200}{0.13}$	<p><u>9,231</u>    <u>17,693</u></p>
<p>Total current value of his portfolio [(i) + (ii) + (iii) + (iv)]</p>	<p><u>36,250</u></p>