

Question Paper

Security Analysis ñ I (211) : April 2005

Section A : Basic Concepts (30 Marks)

- This section consists of questions with serial number 1 - 30.
- Answer all questions.
- Each question carries one mark.
- Maximum time for answering Section A is 30 Minutes.

1. Consider the following information:

[< Answer >](#)

Stock	Return	Variance	Weight in the portfolio
A	14%	441 (%) ²	0.7
B	11%	256 (%) ²	0.3

If the variance of the portfolio is 122 (%)², the coefficient of correlation between the stocks is

- (a) - 1.86 (b) - 0.83 (c) - 1.20 (d) + 1.20 (e) + 0.83.

2. Which of the following statements is **true**?

[< Answer >](#)

- (a) If market price = face value, then coupon rate > YTM > current yield
 (b) If market price = face value, then coupon rate < current yield < YTM
 (c) If market price < face value, then coupon rate > current yield > YTM
 (d) If market price < face value, then coupon rate = current yield = YTM
 (e) If market price > face value, then coupon rate > current yield > YTM.

3. Which of the following statements is/are **true** of “market extraction method” to derive the capitalization rate of real assets?

[< Answer >](#)

- I. In this method, net operating income is divided by sales price to get the capitalization rate
 II. In this method, the rates on equity as well as debt financing rates are weighted according to their proportions to calculate the capitalization rate.
 III. In this method, the capitalization rate is the sum of the return required on an asset for its being non-liquid, and the risk free rate
 IV. In this method, comparable property is selected to choose a rate which reflects market sentiments.

- (a) Only (I) above (b) Only (II) above
 (c) Only (III) above (d) Only (IV) above
 (e) Both (I) and (IV) above.

4. Consider the following data about two securities A and B:

[< Answer >](#)

Particulars	Security A	Security B
Expected Return (%)	15	18
Standard deviation of returns (%)	18	22
Beta	0.90	1.40

Variance of returns on the market index is 225 (%)². The correlation coefficient between the returns on securities A and B is 0.75.

The systematic risk of a portfolio consisting of these two securities in equal proportions is

- (a) 24.63(%)² (b) 125.78(%)² (c) 297.56(%)² (d) 606.73(%)² (e) 802.40(%)².

5. A support level is the price at which a technical analyst would expect the

[< Answer >](#)

- (a) Supply to be static
 (b) Supply of stock to be more than the demand for stock
 (c) Supply of stock to be equal to the demand for stock
 (d) Supply of stock to be nil below that level of price
 (e) Supply to change more than the demand for the stock.

6. An option writer writes a 6-m naked call option on a stock at a premium of Rs.3 and the strike price of Rs.150. The prevailing market price of the stock is Rs.130. If on the expiration day the price of the stock is Rs.140, then the profit/loss to the option writer will be

[< Answer >](#)

- (a) Rs. -10 (b) Rs. 7 (c) Rs. 3 (d) Rs. 10 (e) Rs.13.
7. Which of the following securities is most liquid? [< Answer >](#)
- (a) Money market instruments (b) Capital market instruments
(c) Gilt-edged securities (d) Index Futures (e) Stock options.
8. Which of the following statements is **not correct** regarding the SML equation $E(R) = R_f + \beta(R_m - R_f)$? [< Answer >](#)
- (a) The risk expressed by the expression $R_f + \beta(R_m - R_f)$ is greater than the risk indicated by the standard deviation of a security
(b) The beta of the security represents its systematic risk
(c) Total risk of an security includes both diversifiable risk and non-diversifiable risk of the security
(d) Required rate of return of a security can be estimated using the above SML equation
(e) All efficiently priced securities rest on SML.
9. Required rate of return on a stock is 15.00% and it has paid a dividend of Rs.2.75 for the year 2004-2005. If the stock is currently available at a price of Rs.52, the implied growth rate in dividends is [< Answer >](#)
- (a) 6.35% (b) 7.85% (c) 9.22% (d) 9.72% (e) 10.05%.
10. Which of the following statement(s) is/are **true** concerning all the three forms of the efficient market hypothesis? [< Answer >](#)
- I. Equilibrium rate of return will prevail
II. Securities of firms sell at their fair value
III. Investors cannot earn a positive return
- (a) Only (I) above (b) Only (II) above
(c) Both (I) and (III) above (d) Both (I) and (II) above
(e) (I), (II) and (III) above.
11. β measures the sensitivity of return of the security vis-à-vis the market return. It is estimated from the following regression specification: [< Answer >](#)

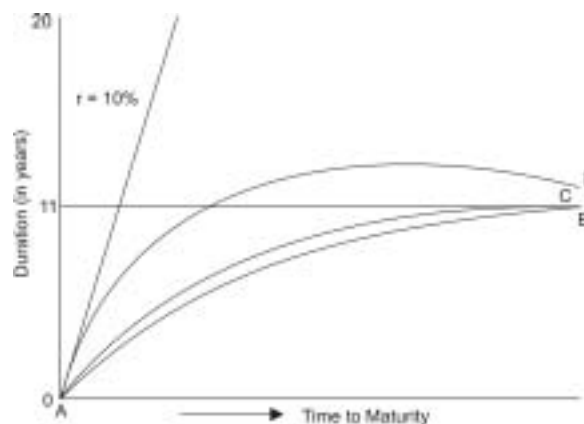
$$r_i = \alpha + \beta r_m + e_i$$

where, the notations are in their standard use.

Which of the following is **not** an assumption in regression analysis regarding error term?

- I. $E(e_i) = 0$
II. $\text{Cov}(e_i, r_m) = 0$
III. $\text{Cov}(e_i, e_j) = 0$
IV. $\text{Var}(e_i) = 0$
- (a) Only (I) above (b) Only (II) above
(c) Only (III) above (d) Only (IV) above
(e) Both (I) and (III) above.
12. Consider the following data for a stock: [< Answer >](#)
- | | |
|------------------------------|-----------|
| Current abnormal growth rate | = 10% |
| Normal growth rate | = 5 % |
| Current dividend per share | = Rs.2.00 |
| Required rate of return | = 12% |
- If the time period during which the current abnormal growth rate will become normal growth rate is 5 years, the premium on the stock due to abnormal growth rate is
- (a) Rs.1.25 (b) Rs.2.15 (c) Rs.3.57
(d) Rs.4.11 (e) Rs.5.27.
13. Which of the following is/are **true**? [< Answer >](#)
- I. The value of the RSI indicator fluctuates between 0 and 100
II. When the RSI indicator crosses the oversold position at 30 from below it is taken as signal to buy
III. When the RSI indicator crosses the overbought position at 70 from above it is a signal to sell
- (a) Only (I) above (b) Only (III) above
(c) Both (I) and (II) above (d) Both (II) and (III) above
(e) (I), (II) and (III) above.

14. In an efficient market the correlation coefficient between stock returns for two non-overlapping time periods should be [< Answer >](#)
- (a) Positive and large (b) Positive and small
(c) Negative and large (d) Negative and small (e) Zero.
15. According to the efficient market hypothesis [< Answer >](#)
- I. Stocks with smaller beta will be consistently overpriced.
II. Stocks with higher beta will be consistently underpriced.
III. Positive alphas on stocks will not remain for a longer period.
- (a) Only (I) above (b) Only (III) above
(c) Both (I) and (II) above (d) Both (II) and (III) above
(e) (I), (II) and (III) above.
16. Which of the following statement(s) is/are **true** in the context of fundamental analysis? [< Answer >](#)
- I. Fundamental analysis is an approach to predict the price of a security
II. Fundamental analysts view investments as short term decisions
III. One of the end objectives of fundamental analysis is to avoid the risk of loss from buying an overpriced security and selling an underpriced security.
- (a) Only (I) above (b) Only (III) above
(c) Both (I) and (II) above (d) Both (II) and (III) above
(e) Both (I) and (III) above.
17. Which of the following statements is/are **true**? [< Answer >](#)
- (a) The slope of SML is beta
(b) The slope of characteristic line is $(R_m - R_f)$
(c) The slope of SML is $(R_m - R_f)$
(d) The characteristic line is used to evaluate performance of individual security
(e) Both (b) and (c) above.
18. Which of the following factors determine the price of a callable convertible bond? [< Answer >](#)
- I. Call premium on the call issuer's stock.
II. Call premium on an equivalent nonconvertible bond.
III. Price of equivalent nonconvertible bond.
- (a) Only (I) above (b) Only (II) above
(c) Both (I) and (II) above (d) Both (II) and (III) above
(e) (I), (II) and (III) above.
19. Using the information provided in the chart given below answer which of the following statements is/are **not true**? [< Answer >](#)



- I. AB denotes a bond selling above its par value.
II. AC denotes a bond selling below its par value.
III. AD denotes a bond selling at its par value.
- (a) Only (I) above (b) Only (II) above
(c) Only (III) above (d) Both (I) and (II) above
(e) Both (II) and (III) above.

20. Which of the following is a property of duration?

[< Answer >](#)

- (a) The duration of a perpetual bond is equal to $r/(1+r)$, where 'r' is the YTM of the bond
- (b) For a zero coupon bond duration is less than its terms to maturity
- (c) Increase in YTM reduces the duration of the bond
- (d) When the market price of the bond is equal to the face value, the duration decreases with increase in term to maturity
- (e) An increase in the frequency of coupon payments increases the duration.

21. The ex-post SML for a pharmaceutical company is given by the equation

[< Answer >](#)

$$N(\bar{r}) = 8 + \beta_i 8$$

If beta of the company's security is 1.5 and actual return on the security is 18%, the security's ex-post alpha (α) is

- (a) -4.0%
- (b) -2.0%
- (c) +1.5%
- (d) +2.0%
- (e) +8.0%

22. The main difference(s) between a futures and a forward contract is/are

[< Answer >](#)

- I. Unlike futures, forward contract is standardized in terms of quality, quantity and terms of delivery.
 - II. Unlike futures, forward contracts are traded in an organized exchange.
 - III. Unlike forwards, futures contracts are cleared by a separate clearing house.
 - IV. Unlike forwards, futures contract is standardized in terms of quantity, quality and terms of delivery.
- (a) Only (I) above
 - (b) Only (II) above
 - (c) Only (III) above
 - (d) Only (IV) above
 - (e) Both (III) and (IV) above.

23. The required rate of return on a stock is 12.5% and it is showing a constant growth rate of 9%. If the stock's retention rate is 70%, its P/E ratio should be

[< Answer >](#)

- (a) 7.32
- (b) 8.57
- (c) 9.34
- (d) 10.25
- (e) 11.25.

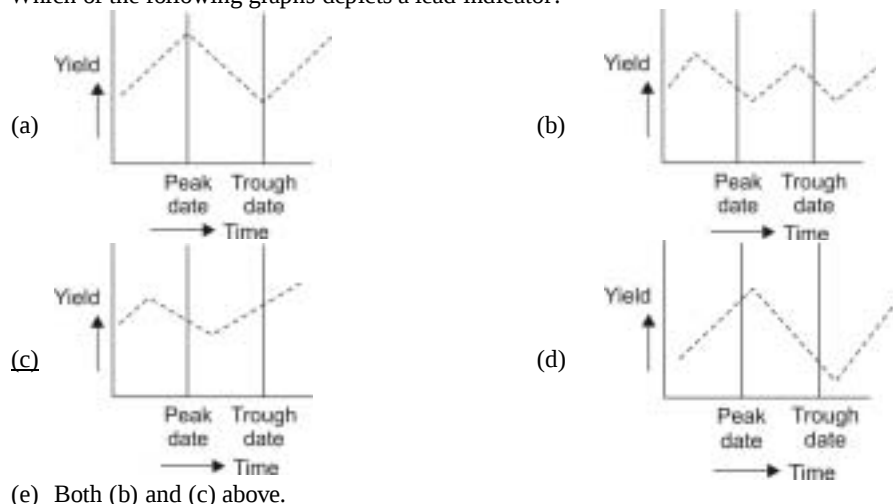
24. What will be the capital gains for a 5 year 7% annual coupon bond of face value Rs.1,000 if interest rates go down from 9% to 7%?

[< Answer >](#)

- (a) Rs.74.21
- (b) Rs.77.79
- (c) Rs.84.22
- (d) Rs.90.16
- (e) Rs.91.16.

25. Which of the following graphs depicts a lead indicator?

[< Answer >](#)



26. Constant-growth dividend discount model would be most suitable for valuing stocks of a

[< Answer >](#)

- (a) New firm which is expected to retain its earnings for several years
- (b) Fast growing company
- (c) Company with valuable assets not yet generating profits
- (d) Moderate-growth, "mature" company
- (e) Company with very less number of assets.

27. M/s Sriram Steel Ltd. has paid a dividend of Rs.2.5 per share on a face value of Rs.10 in the Financial Year ended 31st March, 2002. The relevant data regarding the company and the market are as under: [< Answer >](#)

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

The intrinsic value of the stock is

- (a) Rs. 60.00 (b) Rs. 78.57 (c) Rs. 86.00
(d) Rs. 98.56 (e) Rs.108.35.
28. Which of the following statements is/are **true** about a Point and Figure Chart? [< Answer >](#)
- I. It does not have time dimension.
II. It concerns itself only with the measurement of prices.
III. It measures every movement in prices.
IV. It records changes in prices larger than a specific amount.
- (a) Both (I) and (II) above (b) Both (II) and (III) above
(c) (I), (II) and (III) above (d) (II), (III) and (IV) above
(e) (I), (II) and (IV) above.
29. Mr. Ramesh an employee of ABC Ltd. was not able to earn profit from the information he had about the likely profit figure for the company, even after trying for an extended period of time. This means that the market is exhibiting [< Answer >](#)
- (a) Weak form of market efficiency
(b) Semistrong form of market efficiency
(c) Super strong form of market efficiency
(d) Near strong form of market efficiency
(e) Inefficiency
30. Which of the following statements correctly describes the behavior of yield curve as per the Liquidity Premium hypothesis? [< Answer >](#)
- (a) The yield curve increases at an increasing rate
(b) The yield curve increases at a decreasing rate
(c) The yield curve decreases at an increasing rate
(d) The yield curve first increases at a decreasing rate and then decreases at an increasing rate
(e) The yield curve doesn't change with respect to time.

END OF SECTION A

Section B : Problems (50 Marks)

- This section consists of questions with serial number 1 – 5.
- Answer **all** questions.
- Marks are indicated against each question.
- Detailed workings should form part of your answer.
- Do not spend more than 110 - 120 minutes on Section B.

1. Consider the following prices of the stock of Speed Motors Ltd. and the corresponding value of the Market Index:

End of Month	Speed Motors (Rs.)	Closing Value of Market Index
June 2004	50	1625
July 2004	52	1750
August 2004	57	1825
September 2004	61	1850
October 2004	56	1820
November 2004	63	1975
December 2004	67	2050
January 2005	69	2125
February 2005	62	2025
March 2005	68	2125

You are **required** to calculate:

- The characteristic line for stock of Speed Motors.
- The proportions of systematic risk and unsystematic risk in the total risk of the stock of Speed Motors.

(7 + 4 = 11 marks) [< Answer >](#)

2. Given below is the distribution of conditional returns and explicit probability distribution of stocks of Sparx Ltd. and Deportivo Ltd.

Probability	Conditional Returns	
	Sparx	Deportivo
10%	60%	5%
20%	50%	15%
40%	40%	25%
20%	30%	35%
10%	20%	50%

You are **required** to

- Calculate the expected returns, standard deviations of returns for both the stocks and correlation co-efficient between the stocks.
- Determine the expected rate of return of a zero-risk portfolio consisting of the above stocks.

(6 + 5 = 11 marks) [< Answer >](#)

3. Consider the following daily stock prices of a FMCG company on NSE:

Trading Day	(Rs.)		
	High	Low	Close
1	740	660	686
2	780	690	690
3	770	695	696
4	785	675	679
5	766	684	710
6	727	678	715
7	715	670	714
8	706	664	686
9	702	668	680
10	698	662	676

You are **required** to

- a. Calculate %K stochastics for 5 day periods where $\%K = \frac{C-L}{H-L} \times 100$ and the notations are used in their standard form.
- b. Calculate %D stochastics for 3-day simple moving average of %K stochastics.
- c. Interpret result obtained in (a) and (b) above.

(4 + 1 + 3 = 8 marks) < Answer >

4. Mr. Jaypal works as a middle level manager in a Public Sector Undertaking. His gross total income is Rs.5,00,000 p.a. He wants to avail the benefit of tax rebate (@15 %) under section 88 of the Income Tax Act, by investing Rs.2,00,000 in the Tax Saving Bonds issued by the ICICI Bank. He approaches you for your advice. Options available to Mr. Jaypal in respect of Tax Saving Bonds are:

Option	Issue Price (Rs.)	Face Value (Rs.)	Tenure	Interest (%) (p.a.)	Interest Payable
I	10,000	10,000	4 years	5.65	Annually
II	10,000	10,000	6 years	7.00	Annually
III	10,000	14,750	4 years 9 months	DDB*	DDB*
IV	10,000	17,800	6 years 9 months	DDB*	DDB*

* Deep Discount Bond

The marginal tax rate applicable to Mr. Jaypal is 30 percent.

You are **required** to

- a. Determine the post-tax YTM for the four options available to Mr. Jaypal. Assume that the interest income is tax exempt.
- b. Suggest an option, if
- The yield curve is upward sloping.
 - The yield curve is downward sloping.
 - The yield curve is flat.

(5 + 3 = 8 marks) < Answer >

5. Mr. Reddy is holding two bonds A and B with an annual coupon of 6% and 8% and their terms to maturity are 4 years and 6 years, respectively. The face value and maturity value of the bonds is Rs.100. Spot rates prevailing in the market as indicated by the yield curve are:

Maturity (Years)	Spot rates
1	3.40%
2	3.55%
3	3.80%
4	4.20%
5	4.55%
6	4.80%

- a. Using the duration concept, calculate the expected change in the prices of bonds A and B for a 0.50% change in yield to maturity.
- b. Calculate the one year holding period return on the bonds assuming that spot rates will fall in twelve month's time by 0.25%, across the maturity spectrum.

(10 + 2 = 12 marks) < Answer >

END OF SECTION B

Section C : Applied Theory (20 Marks)

- This section consists of questions with serial number 6 - 7.
- Answer **all** questions.
- Marks are indicated against each question.
- Do not spend more than 25 -30 minutes on section C.

6. Technical analysts always confirm whether the A-D lines has made the final advance by waiting for a downside trendline penetration or a moving average crossover. Breadth of the market is popularly studied using A-D lines. Other techniques are also used along with the A-D lines to measure breadth of the market. Describe briefly the popular methods of measuring the breadth of the market.

(10 marks) [< Answer >](#)

7. Low interest rates and a flat yield curve are both vital to the growth of domestic economy. While the shape of any yield curve is a function of numerous fiscal and monetary factors, perceptions play a very important role in shaping the empirical yield curves. Using pure expectations theory, explain the upward sloping, inverted and flat yield curves.

(10 marks) [< Answer >](#)

END OF SECTION C

END OF QUESTION PAPER

Suggested Answers Security Analysis – I (211) ñ April 2005

Section A : Basic Concepts

1. Answer : (b) [< TOP >](#)

$$\begin{aligned}\text{Reason : } \sigma_p^2 &= W_A^2 \sigma_B^2 + W_B^2 \sigma_A^2 + 2W_A W_B \rho_{AB} \sigma_A \sigma_B \\ 122 &= (0.7)^2 \times 441 + (0.3)^2 \times 256 + 2 \times 0.7 \times 0.3 \times \rho_{AB} \times 21 \times 16 \\ 122 &= 216.09 + 23.04 + 141.12 \rho_{AB} \\ \rho_{AB} &= -0.83\end{aligned}$$

So, the correct answer is (b).

2. Answer : (e) [< TOP >](#)

Reason : If market price is more than face value, the coupon rate will be higher than the discount rate or the YTM. As current yield is coupon income/market value, when market value is more than the face value, the current yield will be lower than the coupon rate. Hence, when $MP > FV$, coupon rate $>$ Current yield $>$ YTM and the answer is (e).

When $MP = FV$, coupon rate should be equal to $YTM = \text{current yield}$. Hence, (a) and (b) are incorrect. When $MP < FV$, coupon rate $<$ Current yield $<$ YTM. Hence, (c) and (d) are also incorrect.

3. Answer : (e) [< TOP >](#)

Reason : Statement II relates to Bond of Investment method. Statement III relates to Built-up method.

4. Answer : (c) [< TOP >](#)

Reason : The beta of the portfolio consisting of two securities given that money is allotted equally between the two assets $= 0.90 \times 0.5 + 1.4 \times 0.5 = 1.15$

The systematic risk of a portfolio = $\beta^2 \sigma_m^2$

Substituting the values, we get

$(1.15)^2 \times 225 = 297.56(\%)^2$. Hence the correct answer is (c).

5. Answer : (d) [< TOP >](#)

Reason : A support level is one below which the price of a stock cannot fall. As soon as the price line reaches this level, it turns around and rallies upwards. This is possible only when the supply of the stock is nil below that price level. Hence the correct answer is (d).

6. Answer : (c) [< TOP >](#)

Reason : An option writer who writes a call option has an obligation to sell whereas the buyer or the holder has the option to buy. A call option will be exercised by the buyer only when the price of the stock on the expiration day is more than the strike price of the call option. In the given case as the price of the stock on the expiration day is less than the strike price, the option holder will not exercise the option and pays the premium of the option to the writer. Hence, the gain to the writer will be premium which in this case is Rs.3.

7. Answer : (c) [< TOP >](#)

Reason : Of the securities given, gilt edged securities are considered as most liquid because they are government bonds and are very safe and have an active secondary market.

8. Answer : (a) [< TOP >](#)

Reason: The risk expressed by the expression $R_F + \beta (R_M - R_F)$ is equal to the risk indicated by the standard deviation of a security. The beta of the security represents its systematic risk, total risk of an security includes both diversifiable risk and non-diversifiable risk of the security, required rate of return of a security can be estimated using SML equation and all efficiently priced securities rest on SML. Clearly all statements except given under (a) is incorrect.

9. Answer : (c) [< TOP >](#)

$$\begin{aligned} \text{Reason : } P_0 &= \frac{D_1}{(k_e - g)} \\ &= \frac{D_0 (1 + g)}{k_e - g} \\ 52 &= \frac{2.75 (1 + g)}{0.15 - g} \\ \frac{52}{2.75} &= \frac{1 + g}{0.15 - g} \\ 18.909 &= \frac{1 + g}{0.15 - g} \\ 2.836 - 18.909g &= 1 + g \\ \frac{1.836}{19.909} &= g \\ g &= 9.22\% \end{aligned}$$

10. Answer : (d) [< TOP >](#)

Reason : As per the efficient market hypothesis the information regarding expected return is discounted in the market and the shares sell at their fair market value and equilibrium rate of return prevail. According to efficient market hypothesis it is not possible for investors to consistently earn supernormal returns with some trading rules. However, it does not say that investors cannot earn positive returns.

11. Answer : (d) [< TOP >](#)

Reason : Variance of error term, $\text{Var}(e_i)$ is not assumed to be zero.

$$\text{Var}(R_i) = \beta_i^2 \text{Var}(R_m) + \text{Var}(e_i)$$

i.e., Total Risk of security i = Systematic Risk + Unsystematic Risk.

12. Answer : (c)

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$$\begin{aligned} \text{Reason : According to H-model } P_0 &= \frac{D_0 [(1 + g_n) + H(g_a - g_n)]}{r - g_n} \\ &= \frac{D_0 (1 + g_n)}{r - g_n} + \frac{D_0 H(g_a - g_n)}{r - g_n} \\ &= \text{Value based on normal growth rate} + \text{Premium due to abnormal growth rate} \\ &= \frac{D_0 H(g_a - g_n)}{r - g_n} = \frac{2.00 \times 2.5 \times (0.10 - 0.05)}{0.12 - 0.05} \\ &= \frac{5 \times 0.05}{0.07} = \text{Rs.3.57.} \end{aligned}$$

13. Answer : (e)

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Reason : The RSI value always fluctuates between 0 – and 100. Hence (I) is correct. When the RSI indicator crosses the oversold position at 30 from below it is considered as buying signal whereas when it crosses from above it is a selling signal. At overbought position, if RSI indicator crosses from above it is considered as selling signal. Hence (II) and (III) are correct.

14. Answer : (e)

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Reason : In an efficient market in weak form which is the first level of efficiency the price movements of stocks follow a random pattern. This implies that the correlation coefficient between stock returns for two non-overlapping periods should be zero.

15. Answer : (b)

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Reason : In an efficient market, no securities are consistently over priced or under priced .While some securities will turn out after any investment period to have provided positive alphas (i.e. risk adjusted abnormal returns) and some negative alphas , these past returns are not predictive of future returns . Hence the option (b) is the correct answer. On contrary it is clear that the other options (a),(c),(d) and (e) are incorrect.

16. Answer : (b)

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Reason : Fundamental analysis determines the intrinsic value of a security, whereas technical analysis with the help of the price charts predicts the price of a security. Hence Statement I is not true. Fundamental analysis view the investments as long term decisions. Hence, statement II is not true. One of the end objectives of fundamental analysis is to avoid the risk of loss from buying an overpriced security and selling an underpriced security. Hence, the statement (III) is true and the answer is (b).

17. Answer : (c)

[< TOP >](#)

Reason : a. is not correct as slope of SML is $(R_m - R_f)$
b. is not correct as slope of characteristic line is β
d. is not correct as it is SML which is used to evaluate the performance of individual security.

18. Answer : (e)

[< TOP >](#)

Reason : Call premium on the call issuer's stock ,call premium on an equivalent nonconvertible bond and price of equivalent nonconvertible bond all combindly determines the value of a callable convertible bond.

19. Answer : (e)

[< TOP >](#)

Reason : As the maturity of a coupon bearing bond is lengthened, the duration also increases although at a slower rate. The duration of a bond selling below par tends to increase with an

increase in the term to maturity. It reaches its highest point before the term to maturity reaches infinity and then recedes to the value $(1+YTM)/YTM$ as bonds selling at or above par. So only statement I is true. Hence, the correct answer is (e).

20. Answer : (c)

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Reason : Duration is the average time at which the present value is received. Duration and YTM are inversely related. Hence, an increase in YTM results in a decrease in the duration of the bond. Hence, (c) is correct.

The duration of a perpetual bond is equal to $(1+r)/r$, where r is the current yield of the bond. Hence, (a) is not correct. For a zero coupon bond, which does not produce any income until redemption the duration is equal to its term to maturity. Hence, (b) is not correct. When the market price of the bond is equal to its face value, the duration increases with the increase in term to maturity. Hence, (d) is not correct. An increase in the frequency of payments increase the value of receipts and hence reduction in the duration of the bond. Hence, (e) is also not correct.

21. Answer : (b)

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Reason : In the ex-post SML, average historical rates of return for securities are plotted against their betas for a particular time period.

Ex-post SML is given by the equation –

$$N(\bar{r}_i) = r_o + r_i \beta_{im}, \text{ where}$$

r_o = intercept of ex-post SML and

r_i = slope of SML

Alpha, α_i , the securities abnormal return, is calculated as

$\alpha_i = \bar{r}_i - N(\bar{r}_i)$, where $\bar{r}_i$ is the actual return and $N(\bar{r}_i)$ is the required return according to SML. In the given case $N(\bar{r}_i) = 8 + 1.5 \times 8 = 20\%$.

As actual return is 18%, alpha α_i is $18\% - 20\% = -2\%$.

22. Answer : (e)

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Reason : Forwards are tailor made contracts which is used for hedging purposes and there are no physical location available for trading in forward contracts. Futures are standardized contracts in terms of quality, quantity and terms of delivery. Forward contracts are not standardized and terms are structured to meet the needs of both the contracting parties. A separate clearinghouse clears futures contracts whereas in forward contracts such facility is not available.

23. Answer : (c)

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$$\begin{aligned} \text{Reason : } P_0 &= \frac{D_1}{k_e - g} = \frac{D_0 (1 + g)}{k_e - g} \\ P_0 &= \frac{E_0 (1 - R.R) (1 + g)}{k_e - g} \\ \frac{P_0}{E_0} &= \frac{(1 - R.R)(1 + g)}{k_e - g} \\ &= \frac{(1 - 0.70)1.09}{0.125 - 0.09} = \frac{0.327}{0.035} = 9.34 \end{aligned}$$

24. Answer : (b)

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Reason : Price of the bond at prevailing interest rate of 9%
 $= 70 \times PVIFA(9\%, 5) + 1000 \times PVIF(9\%, 5)$
 $= 70 \times 3.8897 + 1000 \times 0.6499 = 922.21$

Price of the 7% coupon bond at prevailing interest rate of 7% = Rs.1000.00

⇒ Capital Gains = 1000 – 922.21 = Rs.77.79

25. Answer : (c)

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Reason : A lead indicator is one which peaks out well before the economy peaks and bottoms out well before the economy does. Economists use these indicators for forecasting trends in the economy. Graph C clearly depicts this behavior and hence reflects a lead indicator. Graph B also appears to depict a lead indicator but a closer examination reveals that it is not giving crystal clear signals. Hence the answer is (c).

26. Answer : (d)

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Reason : Constant-growth dividend discount model will be most suitable to value the stock of a firm which is expected to maintain balanced dividend per share. Moderate growth maturity company can provide such dividend and hence most suitable for this model.

27. Answer : (b)

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Reason : Intrinsic Value, $P_0 = \frac{D_1}{k - g}$
Using CAPM

$$K = R_f + \beta(R_m - R_f) = 9 + 0.75(15 - 9) \\ = 13.5\%$$

$$P = \frac{2.5 \times 1.1}{0.135 - 0.1} = 78.57.$$

28. Answer : (e)

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Reason : The Point and Figure Chart (PFC)

- does not have a time dimension
- concerns itself only with the measurement of prices
- **does not** measure every movement in prices
- records changes in prices larger than a specific amount

Hence the option (e) is the correct answer.

Hence the options (a),(b),(c) and (d) are incorrect .

29. Answer : (c)

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Reason : Alternative a) and b) are not correct as only historical and publicly held information are discounted by them respectively.

Alternative d) is not correct as in the near strong form the analysis made by analysts and the experts e.g. mutual funds in the field is discounted by the market.

In only super strong form of market efficiency the insider information is discounted by the market.

30. Answer : (a)

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Reason : According to the liquidity premium theory the investors are risk averse and charge higher rates than the expected future rates, if the maturity increases. Thus, irrespective of the changes in the future interest rates, the liquidity premium will increase at a fast pace along with maturity and the yield curve will be an upward sloping one.

Section B : Problems

1. The returns on Speed Motors and market index are as follows:

Month	Return on the stock of Speed Motors (y) %	$(y - \bar{y})$	$(y - \bar{y})^2$	Return on Market index (x)%	$(x - \bar{x})$	$(x - \bar{x})^2$	xy	x^2
June								
July	4.00	0.243	0.059	7.692	4.589	21.059	30.768	59.167
August	9.62	5.863	34.375	4.288	1.185	1.404	41.251	18.387
September	7.02	3.263	10.647	1.370	-1.733	3.003	9.617	1.877
October	-8.20	-11.957	142.970	-1.622	-4.725	22.326	13.300	2.631
November	12.5	8.743	76.440	8.516	5.413	29.300	106.45	72.522
December	6.35	2.593	6.724	3.797	0.694	0.482	24.111	14.417
Jan	2.98	-0.777	0.604	3.658	0.555	0.308	10.901	13.381
Feb	-10.14	-13.897	193.127	-4.706	-7.809	60.980	47.719	22.146
March	9.68	5.923	35.082	4.938	1.835	3.367	47.80	24.383
	$\bar{y} = 33.81/9 = 3.757$		$\Sigma(y - \bar{y})^2 = 500.028$	$\frac{27.931}{\bar{x} = 3.103}$		$\Sigma(x - \bar{x})^2 = 142.229$	$\Sigma xy = 331.917$	228.911

The regression equation between the two can be determined as follows:

$$\beta = \frac{n \Sigma xy - \Sigma x \Sigma y}{n \Sigma x^2 - (\Sigma x)^2} = \frac{9 \times 331.917 - (33.81)(27.931)}{9 \times 228.911 - (27.931)^2} = 1.596$$

$$\alpha = \frac{\Sigma y - \beta \Sigma x}{n} = \frac{1}{9} [(33.81) - 1.596 \times (27.931)] = -1.196$$

Mean return on market = 3.103

Characteristic line: $R_i = -1.196 + 1.596R_m$

Where R_i is the return on Speed Motors and R_m is the return on the market.

b. Variance of returns from Speed Motors $\sigma_s^2 = \frac{\Sigma(y - \bar{y})^2}{n-1} = \frac{500.028}{8} = 62.503$

Standard deviation of returns on Speed Motors $\sigma_s = \sqrt{\sigma_s^2} = 7.906$

Variance of market return $\sigma_m^2 = \frac{\Sigma(x - \bar{x})^2}{n-1} = \frac{142.229}{8} = 17.779$

Standard deviation of market return $\sigma_m = \sqrt{17.779} = 4.216$

Explained variance $= \beta^2 \sigma_m^2 = 1.596^2 \times 4.216^2 = 45.276$

Proportion of explained variance $= \frac{45.276}{62.503} = 0.610$ i.e. = 72.44%

Unexplained variance $= 1 - 0.7244 = 0.2756$ i.e., 27.56%.

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2. **Sparx Stock**

$R_{(S)}$	P_i	$R_S P_i$	$(R_S - E_{(S)})$	$P_i [(R_S - E_{(S)})]^2$
-----------	-------	-----------	-------------------	---------------------------

60%	0.10	6	20	40
50%	0.20	10	10	20
40%	0.40	16	0	0
30%	0.20	6	- 10	20
20%	0.10	2	- 20	40

$$\Sigma P_i R_S = 40\%$$

$$P_i [(R_S - E(E_S))]^2 = 120\%$$

$$E(S) = 40\%$$

$$\sigma_S = \sqrt{120} = 10.95\%.$$

Deportivo Stock

$R_{(DE)}$	P_i	$R_{(DE)} P_i$	$(R_{DE} - E_{(DE)})$	$P_i (R_{DE} - E_{DE})^2$
5%	0.10	0.50	- 20.5	42.025
15%	0.20	3.0	- 10.5	22.050
25%	0.40	10.0	- 0.50	0.100
35%	0.20	7.0	9.5	18.05
50%	0.10	5.0	24.5	60.025

$$\Sigma P_i R_{(DE)} = 25.5\%$$

$$\Sigma P_i (R_{DE} - E_{DE})^2 = 142.25\%$$

$$E(D_e) = 26.5\%$$

$$\sigma_{DE} = \sqrt{142.25\%}$$

$$= 11.93\%$$

Covariance between two stocks

P_i	$(R_S - E_S)$	$(R_{DE} - E_{DE})$	$P_i (R_S - E_S) \times (R_{DE} - E_{DE})$
0.10	20	-20.5	- 41
0.20	10	- 10.5	- 21
0.40	0	- 0.50	0
0.20	- 10	9.5	- 19.0
0.10	- 20	24.5	- 49

$$\Sigma P_i (R_S - E_S) \times (R_{DE} - E_{DE})$$

$$COV_{(S \& DE)} = -130$$

$$\begin{aligned} \text{Correlation coefficient} &= \frac{COV_{SDE}}{\sigma_S \sigma_{DE}} \\ &= \frac{-130}{10.95 \times 11.93} = -1 \end{aligned}$$

Since the correlation between two stocks is -1. A zero risk portfolio can be constructed using these stocks.

If W_1 and W_2 is proportion of investment in Excel and Delux stocks. The portfolio risk will be

$$b. \quad \sigma_p^2 = W_1^2 \sigma_1^2 + W_2^2 \sigma_2^2 + 2\rho_{12} \sigma_1 \sigma_2 W_1 W_2$$

$$\sigma_p^2 = W_1^2 \sigma_1^2 + W_2^2 \sigma_2^2 + 2(-1) \sigma_1 \sigma_2 W_1 W_2$$

$$\sigma_p = (W_1 \sigma_1 - W_2 \sigma_2)^2$$

$$\sigma_p = W_1 \sigma_1 - W_2 \sigma_2$$

$$0 = W_1 \sigma_1 - W_2 \sigma_2$$

$$W_1 \sigma_1 = W_2 \sigma_2 \quad (i)$$

$$\text{Again } W_1 + W_2 = 1$$

$$\text{or } W_2 = 1 - W_1 \quad (ii)$$

Putting the value of W_2 in equation (i)

$$W_1 \sigma_1 = (1 - W_1) \sigma_2$$

$$W_1 \sigma_S = (1 - W_1) \sigma_{DE}$$

$$10.95 W_1 = (1 - W_1) 11.93$$

$$(10.95 + 11.93) W_1 = 11.93$$

$$W_1 = \frac{11.93}{(10.95+11.93)} = 52.14\%$$

$$W_2 = 1 - 0.5214 = 0.4786 = 47.86\%$$

Expected return of risk free portfolio

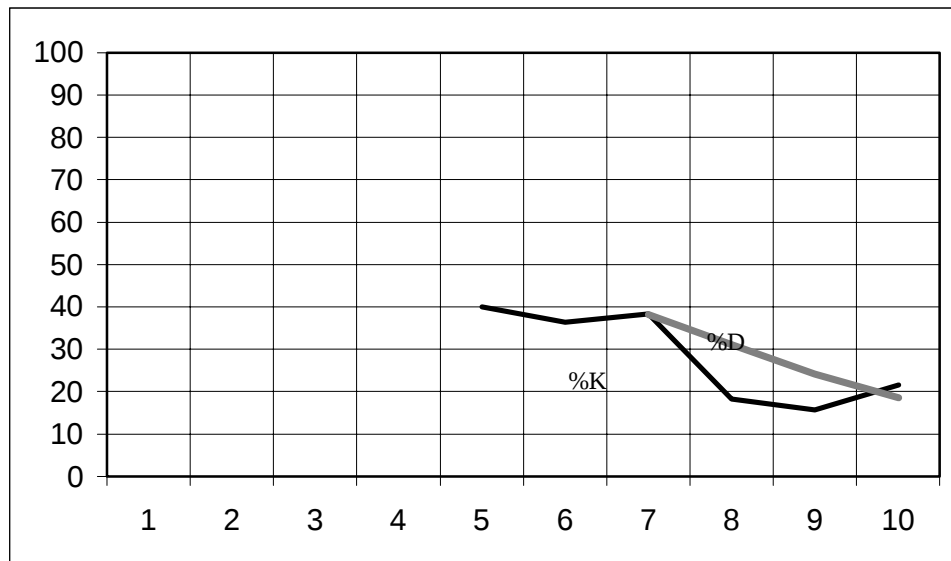
$$= 0.5214 \times 40 + 0.4786 \times 25.5$$

$$= 33.06\%.$$

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3. a. & b.

Day	High	Low	Close	(C – L5)	(H5 – L5)	%K	%D
1	740	660	686				
2	780	690	690				
3	770	695	696				
4	785	675	679				
5	766	684	710	(710 – 660)	(785 – 660)	40.0	
6	727	678	715	(715 – 675)	(785 – 675)	36.4	
7	715	670	714	(714 – 670)	(785 – 670)	38.3	38.2
8	706	664	686	(686 – 664)	(785 – 664)	18.2	31.0
9	702	668	680	(680 – 664)	(766 – 664)	15.7	24.1
10	698	662	676	(676 – 662)	(727 – 662)	21.5	18.5



c. As the formula itself indicates, %K line is a fast moving line and generates faster signals than the %D line. But %D line is more important line as it gives buy and sell signals. As %K and %D are below 30 hence these are in oversold position.

As %K move above the %D line therefore, it is a buy signal at the end of 10th trading day.

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4. **OPTION ñ I**

Intrinsic value or present value of the bond

$$= \text{Coupon amount} \times \text{PVIFA}(i, n) + (\text{Face value of the bond}) \text{PVIF}(i, n)$$

where,

$$\begin{aligned}\text{Coupon amount} &= \text{FV} \times \text{Interest rate} \\ &= 10,000 \times 5.65\% \\ &= \text{Rs.}565\end{aligned}$$

$$i = \text{YTM}$$

$$n = 4 \text{ yrs}$$

$$\begin{aligned}\therefore \text{Net investment in the bond} &= \text{Rs.}10,000 \times 0.85 \text{ (Since 15\% tax rebate is available)} \\ &= \text{Rs. } 8500\end{aligned}$$

Therefore

$$8500 = 565 \times \text{PVIFA}(i, 4) + 10,000 \times \text{PVIF}(i, 4)$$

$$\text{at } i = 10\%$$

$$\text{RHS} = 8621.11$$

$$\text{at } i = 12\%$$

$$\text{RHS} = 8071.30$$

by interpolation

$$\Rightarrow 10\% + (2) \frac{8621.11 - 8500}{8621.11 - 8071.3}$$

$$\Rightarrow 10 + (2) (0.02202)$$

$$= 10 + 0.4406$$

$$= 10.4406\%$$

OPTION- II

Intrinsic value or present value of the bond

$$= \text{Coupon amount} \times \text{PVIFA}(i, n) + (\text{Face value of the bond}) \text{PVIF}(i, n)$$

where,

$$\begin{aligned}\text{Coupon amount} &= \text{FV} \times \text{Interest rate} \\ &= 10,000 \times 7.00\% \\ &= \text{Rs.}700\end{aligned}$$

$$i = \text{YTM}$$

$$n = 6 \text{ yrs}$$

$$\begin{aligned}\therefore \text{Net investment in the bond} &= \text{Rs.}10,000 \times 0.85 \text{ (Since 15 \% deduction)} \\ &= \text{Rs. } 8500\end{aligned}$$

$$\therefore 8500 = 700 \times \text{PVIFA}(i, 6) + 10,000 \text{PVIFA}(i, 6)$$

for a rate of $i = 12\%$

$$\text{RHS} = \text{Rs.}7944.33$$

For a rate of $i = 10\%$

$$\text{RHS} = \text{Rs.}8694.39$$

$\therefore$ By interpolation

$$\begin{aligned}10\% + 2\% \times \frac{8694.39 - 8500}{8694.39 - 7944.33} \\ 10 + 2 \times 0.2592 = 10.5184\%\end{aligned}$$

OPTION ñ III

Net investment in the bond = Coupon amount $\times$ PVIFA (i,n) + Face value $\times$ PVIF(i,n)

$$8500 = 0 \times \text{PVIFA}(i, 4.9 \text{ yrs}) + 13000 \text{PVIFA}(I, 4.75 \text{ yrs})$$

$$8500 = 14750 \times \frac{1}{(1+i)^{4.75 \text{ yrs}}}$$

$$(1+i)^{4.75} = 14750/8500 = 1.7353$$

$$I = 12.3\%$$

OPTION IV

According to the given values

$$8500 = \frac{17800}{(1+i)^{6.75}}$$

$$(1+i)^{6.75} = 17800/8500 = 2.0941$$

$$I = 11.57\%$$

- b. i. When the yield curve is upward sloping, it indicates that the expected interest rates in the future are higher. Hence in such situations it is advisable to invest in short term bonds and reinvest the amount at a higher rate in future.
Hence the bond option I with least maturity of 4 years is suggested.
- ii. When the yield curve is downward sloping, it indicates that the expected interest rates in the future are lower. Hence in such situations it is advisable to invest in long term bonds. Because when the interest rates are expected to decrease it is advisable to lock the investment in long term investments. Hence the bond option IV with highest maturity 6 years 9 months is suggested.
- iii. When the yield curve is flat, it indicates that the interest rates are expected to remain at the same level. Hence in such a situation it is advisable to choose a bond option with highest yield to maturity. Hence the bond option III with highest YTM of 12.3% is to be selected.

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$$\begin{aligned} 5. \quad P &= \frac{6}{(1.0340)} + \frac{6}{(1.0355)^2} + \frac{6}{(1.0380)^3} + \frac{106}{(1.0420)^4} \\ P &= 5.803 + 5.596 + 5.365 + 89.916 \\ &= \text{Rs. } 106.68 \end{aligned}$$

YTM of the bond A

$$106.68 = \frac{6}{(1+k)^1} + \frac{6}{(1+k)^2} + \frac{6}{(1+k)^3} + \frac{106}{(1+k)^4}$$

At K = 4%

LHS = 107.26

Hence YTM is approximately 4%.

Duration of Bond A

Year	C.F	P.v. of C.F at 4%	Year x P.V. of C.F
1	6	5.77	5.77
2	6	5.55	11.10
3	6	5.33	15.99
4	106	90.61	362.44
		107.26	395.30

$$\text{Duration} = \frac{395.3}{107.26} = 3.685 \text{ years}$$

$$\begin{aligned} \text{Modified duration} &= \frac{3.685}{1+0.04} \\ &= 3.54 \text{ years} \end{aligned}$$

For a 0.50% increase in YTM change in the price of the bond A

$$\frac{\Delta P}{P} = -3.54 \times 0.50$$

$$= -1.77\%$$

Price of the bond A will decrease by 1.77%.

Price of the bond B

$$P = \frac{8}{(1.0340)^1} + \frac{8}{(1.0355)^2} + \frac{8}{(1.0380)^3} + \frac{8}{(1.0420)^4} + \frac{8}{(1.0455)^5} + \frac{108}{(1.0480)^6}$$

$$= 7.737 + 7.461 + 7.153 + 6.786 + 6.404 + 81.518 = \text{Rs.} 117.06$$

Yield to maturity of the bond B

$$117.06 = \frac{8}{(1+K)^1} + \frac{8}{(1+K)^2} + \frac{8}{(1+K)^3} + \frac{8}{(1+K)^4} + \frac{8}{(1+K)^5} + \frac{108}{(1+K)^6}$$

Or

$$117.06 = 8 \times \text{PVIFA}(K, 6) + 100 \times \text{PVIF}(K, 6)$$

$$\text{at } K = 5\%$$

$$\text{L.H.S.} = 115.21$$

$$\text{at } K = 4\%$$

$$\text{L.H.S.} = 120.94.$$

$$\text{YTM} = 4\% + \frac{(120.94 - 117.06)}{(120.94 - 115.21)}$$

$$= 4.68\%$$

Duration of the Bond B

Year	C.F	Present value of cash flow at (4.68%)	Year x PVCF
1	8	7.642	7.642
2	8	7.301	14.602
3	8	6.974	20.922
4	8	6.662	26.648
5	8	6.365	31.825
6	108	82.08	492.48
		117.02	594.119

$$\text{Duration} = \frac{594.119}{117.02}$$

$$= 5.077 \text{ years}$$

$$\text{Modified duration} = \frac{5.077}{1 + .0468}$$

$$= 4.850 \text{ years}$$

$$\text{Change in the price of the bond} = -4.850 \times 0.50$$

$$= -2.425\%$$

Therefore, price of the bond B will decline by 2.425%.

b. Price of the bonds after one year

Bond A

$$\frac{6}{(1.0315)^1} + \frac{6}{(1.0330)^2} + \frac{106}{(1.0355)^3}$$

$$= 4.85 + 4.69 + 94.70 = \text{Rs.}106.91$$

$$\text{One year holding period return on bond A} = \frac{106.91 - 106.68 + 6}{106.68} = 5.84\%$$

Bond B

$$\frac{8}{(1.0315)} + \frac{8}{(1.0330)^2} + \frac{8}{(1.0355)^3} + \frac{8}{(1.0395)^4} + \frac{108}{(1.0430)^5}$$

$$= 7.756 + 7.497 + 7.205 + 6.852 + 87.5 = 116.81$$

$$\text{One year holding period return} = \frac{116.81 - 117.06 + 8}{117.06} = 6.62\%$$

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Section C: Applied Theory

6. Breadth of the market is popularly studied using A-D lines. Other techniques are also used along with the A-D lines by technical analysts. The four popular methods are

- i. Stocks in positive trends
- ii. Percentage of stocks over a moving average
- iii. Diffusion indexes
- iv. High-Low statistics

i. **Stocks in Positive Trends**

A stock which rallies after a decline to reach a new high is said to be in an uptrend; a stock that reacts to reach a new low is said to be in a downtrend. The percentage of stock in an uptrend to the total stock traded is computed and plotted on a graph. A rising market is expected to have an increasing percentage of uptrend stock. Reversal is signaled when stock in positive trend begin to diminish.

ii. **Percentage of Stock Over a Moving Average**

A specific moving average for a number of stocks is first computed, and the percentage of the number that is above the average is ascertained. The percentage of stocks over a moving average increases in a bull market, and generally moves along with the positive trend index computed in (i) above. When the percentage of stocks over a moving average reaches an extreme of 90-100 percent or 10-15 percent, it indicates that a substantial proportion of the prevailing move has taken place and that reversal is imminent. When the percentage index reverses direction, the reversal in market trend is almost immediate.

iii. **Diffusion Index**

A diffusion index momentum index is computed by calculating the rate at which a certain group of stocks change price over a given period of time. It is generally calculated on either a wide number of stocks, or a number of industry indexes. Also called the momentum index, a rise in the index signals the onset of a bull market and vice versa.

iv. **High-Low Statistics**

Technical analysts also study the high-low statistics to confirm market trends. A rising market should be accompanied by a healthy number of net new highs. A graph of a net new highs can be plotted to be read along with a market index. If net new highs trace a series of declining peaks while the index continues to rise, a reversal is imminent. Similarly, a graph of net new lows can be expected to signal the end of a bear market, when it does not confirm the new trough reached by the market index. This is because, a declining number of stocks reaching new lows implies that larger number of stocks are resisting the downtrend in the market index, and thus signifies the end of a bear market.

Breadth of the market, thus, is an important indicator of the depth of the prevailing trend, and is of immense utility to the analyst in identifying trend reversals.

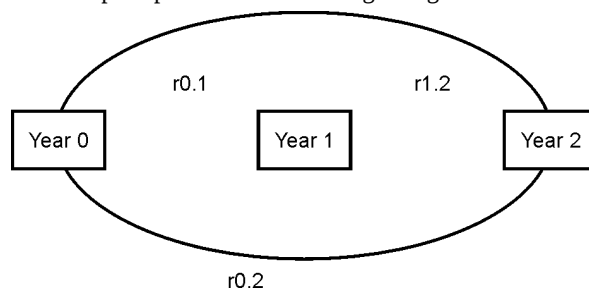
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7. Low interest rates and a flat yield curve both are vital to the growth of domestic economy. While the shape of any yield curve is a function of numerous fiscal and monetary factors. Perceptions play a very important role in shaping the empirical yield curves.

Pure Expectations Theory tries to explain the phenomena regarding the existence of different shapes of yield curves.

According to Pure Expectations Theory, the current term structure of interest rates are determined by the consensus forecast of future interest rates. This can be understood by considering the following hypothesis through

which we can understand how the perceptions of investors regarding the interest rates shape the yield curve.



At time 0 there is short term interest rate $r_{0,1}$ for money borrowed in year 0 and repayable in year 1. There is also a long term interest rate $r_{0,2}$ for money borrowed in year 0 and repayment in year 2. Linking these two rates is an unobservable “forward “ that is expected to prevail in year 1 for money to be borrowed then for repayment in year 2. In terms of this forward rate, one can write the arbitrage condition as

$$(1 + r_{0,2})^2 = (1+r_{0,1}) (1+r_{1,2})$$

This says the total money (principal plus interest) repaid in year 2 should be the same whether the money is borrowed long-term at $r_{0,2}$ or borrowed short-term at $r_{0,1}$ and then “rolled-over” in year 1 at the then prevailing short-term rate $r_{1,2}$. The same condition holds for the investor also. The arbitrage condition says that the investor must be indifferent between these two alternatives.

Here we try to explain the shaping of yield curve with respect to the above theory by considering the following example of three different situations.

If one year interest rate is 15% ($r_{0,1} = 15\%$) but

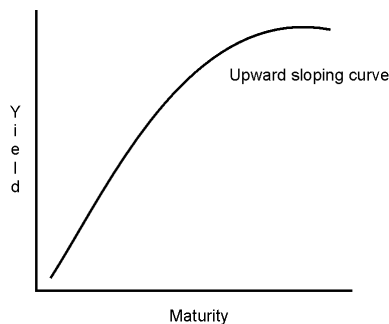
- (i) is expected to go up to 20% ($r_{1,2} = 20\%$) at the end of one year
- (ii) is expected to fall down to ($r_{1,2} = 10\%$)
- (iii) is expected to be the same.

Hence considering the first situation

$$(i) \quad (1+r_{0,2})^2 = (1+0.15)(1+0.20) \rightarrow (r_{0,2}) = 17.5\%$$

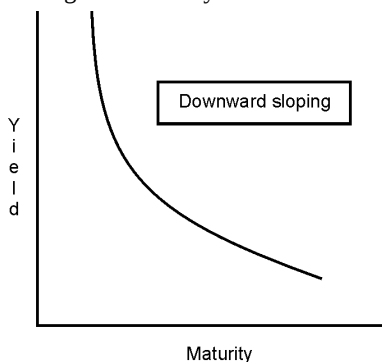
That is, an investor will opt for one year security now only when he is certain that the interest rate after one year is greater than the interest rate on two year security.

An upward sloping Yield curve according to this theory indicates that the investors expects that the interest rates going to rise.

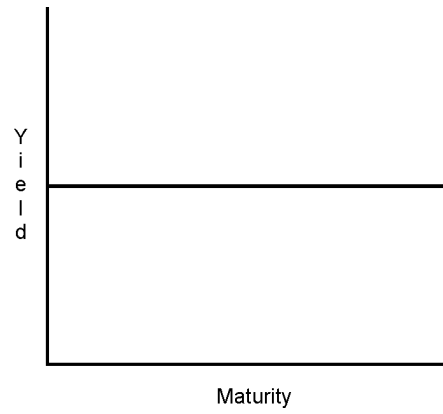


$$(ii) \quad (1+r_{0,2})^2 = (1+0.15)(1+0.10) \rightarrow (r_{0,2}) = 12.5\%$$

When interest rate on one year security is going to decline after one year, he will opt for two year instrument. A downward sloping curve according to this theory indicates that the investors expect a fall in interest rates.



(iii) A flat yield curve indicates that investors expect that the interest rates remain at the same level.



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