

Question Paper

Portfolio Management and Mutual Funds – I (251): January 2006

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. In the next fiscal, it is expected that the market will return 18% and the risk free rate will hover around the 6% mark. The dividend on the market portfolio is expected to be 12%. The long-term capital gains tax is expected to be nil, if proceeds are reinvested in the market. The tax rate on dividend income is 8%. The **tax factor** for the tax adjusted CAPM is

[< Answer >](#)

- (a) 0.45 (b) 0.36 (c) 0.30 (d) 0.25 (e) 0.08.

2. Mr. Surjith Singh is **long** on the following option strategies:

[< Answer >](#)

Particulars	Premium	Contract Size
One January 170 NALCO call	Rs.6.35 per share	1150
One January 105 NTPC put	Rs.1.95 per share	3250

The maximum expected profit for the writer of the above option strategies is

- (a) Rs.0 (b) Rs.1,284.25 (c) Rs.6,337.50
(d) Rs.7,302.50 (e) Rs.13,640.00.

3. Active portfolio management consists of

[< Answer >](#)

- I. Market timing.
II. Indexing.
III. Security Analysis.

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

4. The critical variable in the determination of the success of the active portfolio is

[< Answer >](#)

- (a) Alpha (b) Beta (c) Gamma (d) Correlation
(e) Coefficient of determination.

5. The Portfolio composition of Mr. Prahlad is given below:

[< Answer >](#)

Equity	Rs.420 lakh
Cash / Cash equivalents	Rs.80 lakh
Total	Rs.500 lakh

The beta of the equity portfolio is 0.78. The current NSE index futures value is 2150 with a multiple of 200. For him to achieve an overall portfolio beta of 1.50, the number of futures contract he should go long is

- (a) 15 Contracts (b) 28 Contracts (c) 42 Contracts
(d) 85 Contracts (e) 98 Contracts.

6. Which of the following is generally **not true** with respect to the investment in banks and mutual funds?

[< Answer >](#)

- (a) Liquidity is better in mutual funds than in banks
 (b) Administrative expenses are higher in banks than in mutual funds
 (c) Quality of assets is more transparent in mutual funds than in banks
 (d) Investment options are less in banks than in mutual funds
 (e) Return on investment in equity schemes of mutual funds is lower than that of banks.
7. The correlation coefficient of the returns of a Multi cap Fund and Sensex is 0.93. The expected returns on Multi cap Fund and Sensex are 20% and 17%, respectively. If the risk-free rate of return is 6% and standard deviation of Sensex's return is 35%, the standard deviation of the Multi cap Fund's return is
 (a) 11.3% (b) 34.4% (c) 47.8% (d) 39.7% (e) 41.2%. [< Answer >](#)
8. Which of the following is **not true** with respect to ExMark? [< Answer >](#)
 I. It is a term that defines the relationship between a fund's return and return on market index.
 II. An ExMark below 80% indicates more predictability of relative performance.
 III. Funds with an ExMark of 95% or above provide more opportunity to add value over and above the market's return.
 (a) Only (I) above (b) Only (III) above
 (c) Both (I) and (II) above (d) Both (II) and (III) above
 (e) All (I), (II) and (III) above.
9. An active portfolio manager faces a tradeoff between [< Answer >](#)
 I. Using the Sharpe measure.
 II. Holding too much of the risk-free asset.
 III. Exploiting perceived security mispricings.
 IV. Using mean-variance analysis.
 V. Letting a few stocks dominate the portfolio.
 (a) Both (I) and (II) above (b) Both (II) and (V) above
 (c) Both (III) and (V) above (d) Both (III) and (IV) above
 (e) Both (II) and (III) above.
10. Which of the following statements is/are **true** according to the geometric mean model of the portfolio selection? [< Answer >](#)
 I. The selection of the portfolio can be made only with the proper analysis of the utility function of the investor and the distribution of the stock returns.
 II. The selection of the portfolio is based on the geometric return of the portfolio.
 III. The selection of the portfolio should take place based on beginning wealth rather than on the utility maximization.
 (a) Only (I) above (b) Only (II) above
 (c) Only (III) above (d) Both (I) and (II) above
 (e) Both (II) and (III) above.
11. For a stock, the residual variance of returns is $48(\%)^2$ and its beta is 1.35. If the variance of the market's return is $72(\%)^2$, the coefficient of determination of stock's return is approximately [< Answer >](#)
 (a) 0.53 (b) 0.65 (c) 0.73 (d) 0.78 (e) 1.90.
12. Ex-post SML can be used [< Answer >](#)
 I. For identifying the mispriced securities.
 II. For testing asset-pricing theories.
 III. For testing market efficiency.
 IV. For evaluating stock option performance.
 (a) Both (I) and (II) above (b) Both (II) and (III) above
 (c) Both (III) and (IV) above (d) (I), (II) and (III) above
 (e) (I), (III) and (IV) above.

13. To take advantage of an arbitrage opportunity, an investor would [< Answer >](#)
- Construct a zero investment portfolio that will yield a sure profit.
 - Make simultaneous trades in two markets without any net investment.
 - Construct a zero beta investment portfolio.
- Only (I) above
 - Only (II) above
 - Both (I) and (II) above
 - Both (II) and (III) above
 - All (I), (II) and (III) above.
14. Which of the following is/are included by Geoffrey Moore (1983) in his leading indices of inflation? [< Answer >](#)
- Employment rate of the population.
 - Changes in the import prices excluding oil prices.
 - Debt growth rate of the household sector.
- Only (I) above
 - Only (II) above
 - Both (I) and (II) above
 - Both (I) and (III) above
 - Both (II) and (III) above.
15. Which of the following is/are advantages of futures as a substitute for indexing? [< Answer >](#)
- Periodic rebalancing due to reinvestment of dividend is required.
 - The potential tracking error can be avoided.
 - Futures result in a marginally higher rate of return net of transaction costs.
- Only (I) above
 - Only (II) above
 - Both (I) and (II) above
 - Both (II) and (III) above
 - Both (I) and (III) above.
16. If the correlation coefficient between the returns of the market index and a mutual fund is 0.89 and standard deviation of the mutual fund's return is 25%, the unsystematic risk (variance) of the mutual fund is [< Answer >](#)
- $52.50(\%)^2$
 - $95.04(\%)^2$
 - $129.94(\%)^2$
 - $150.05(\%)^2$
 - $159.40(\%)^2$.
17. The current price of MTNL's stock is Rs.125 and it is expected that price of this stock may go up to Rs.143.75 or it may go down to Rs.106.25. If the strike price of call option on this stock is Rs.120 and risk free rate is 6%, the probability of price decrease is [< Answer >](#)
- 0.20
 - 0.30
 - 0.45
 - 0.70
 - 0.75.
18. Portfolio X has expected return of 10% and standard deviation of 19%. Portfolio Y has expected return of 12% and standard deviation of 17%. Rational investors will [< Answer >](#)
- Borrow at the risk free rate and buy X
 - Sell Y short and buy X
 - Sell X short and buy Y
 - Borrow at the risk free rate and buy Y
 - Lend at the risk free rate and buy Y.
19. The following information is available related to a AAA rated bond: [< Answer >](#)
- | | | |
|-------------|---|---------|
| Face value | — | Rs.100 |
| Coupon rate | — | 12% |
| Maturity | — | 5 Years |

The current market price of the bond is Rs.107.58. If the market interest rate increases by 100 basis points, the change in the price of the bond is

- (a) -2.12% (b) $+2.12\%$ (c) -3.65% (d) $+3.65\%$ (e) $+7.42\%$.

20. Which of the following is/are **not** the assumption(s) of Systematic Asset Allocation? [< Answer >](#)

- I. The markets cannot provide the information regarding the returns available.
- II. The relative returns can reflect the investor's present perceptions.
- III. The measurement of potential returns cannot provide useful clues to those returns that are actually realized.

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

21. Betas of two stocks are 1.28 and 1.34 respectively. If the standard deviation of the market returns is 25.58%, the covariance between the returns of two stocks is [< Answer >](#)

- (a) $1175.20(\%)^2$ (b) $1122.32(\%)^2$ (c) $1288.20(\%)^2$
 (d) $1328.76(\%)^2$ (e) $1345.60(\%)^2$

22. The expected return on a portfolio is 16.25% and standard deviation of its return is 10.75%. If the expected utility of an investor from this portfolio is 4.25%, risk tolerance of the investor is [< Answer >](#)

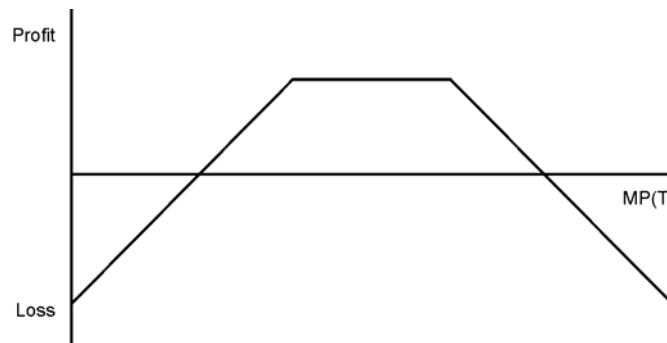
- (a) 1.30% (b) 9.63% (c) 15.27% (d) 20.67% (e) 21.25%.

23. The main difference between the CAPM and the APT is/are [< Answer >](#)

- I. The CAPM depends on the market while the APT depends on interrelationships between securities.
- II. The APT depends on the market while the CAPM depends on the interrelationships between securities.
- III. The CAPM does not specify the cause of the correlations between securities while the APT specifies the impact of the same factors that cause correlation.

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

24. [< Answer >](#)



The pay off diagram shown above is associated with

- (a) Protective put (b) Covered call
 (c) Bullish vertical spread using calls (d) Short straddle (e) Short strangle.

25. The data requirement under Single Index model is less than Markowitz model, only if number of securities in a portfolio is [< Answer >](#)

- (a) Less than 4 (b) Greater than 4
 (c) Less than 8 (d) Greater than 10 (e) Greater than 12.

26. Which of the following is/are **true** with respect to types of equity styles? [< Answer >](#)

- I. Contrarian managers invest in stocks that are selling at low values compared to their book values.

- II. Earnings momentum growth style managers look for low volatility in earnings and an above average rate on the whole.
 - III. Yield managers are those that look for companies with above average dividend yields.
- (a) Only (II) above
 - (b) Only (III) above
 - (c) Both (I) and (II) above
 - (d) Both (I) and (III) above
 - (e) Both (II) and (III) above.

27. Which of the following is/are **not true** with respect to Stress Testing?

[< Answer >](#)

- I. Stress Testing involves comparison of the value of a portfolio of exposures or assets under single market assumption.
 - II. Stress Testing helps in providing additional risk information, which a portfolio manager needs to know.
 - III. Simulated situations developed in stress testing would provide an estimate of the worst possible scenarios, which a portfolio manager is likely to encounter.
- (a) Only (I) above
 - (b) Only (III) above
 - (c) Both (I) and (II) above
 - (d) Both (II) and (III) above
 - (e) All (I),(II) and (III) above.

28. Which of the following statement(s) is/are **true** with respect to active fund management?

[< Answer >](#)

- I. In a declining market scenario, the portfolio manager would adjust the portfolio by increasing the cash percentage of the portfolio or by decreasing the beta of the equity portion of the portfolio.
 - II. In a rising market scenario, the portfolio manager would adjust the portfolio by decreasing the cash percentage of the portfolio or by increasing the beta of the equity portion of the portfolio
 - III. If the portfolio manager did not engage in market timing and concentrated only on stock selection, the beta of the portfolio would be fairly constant and there will be a linear relationship between portfolio's return and market return.
- (a) Only (I) above
 - (b) Only (II) above
 - (c) Both (I) and (II) above
 - (d) Both (I) and (III) above
 - (e) All (I), (II) and (III) above.

29. If coefficient of correlation of the returns between a portfolio and the market is 1, the portfolio's

[< Answer >](#)

- I. Net selectivity is zero.
 - II. Net selectivity will be equal to its total selectivity.
 - III. Unsystematic risk is zero.
 - IV. Net selectivity will be equal to the return from inadequate diversification.
- (a) Both (I) and (II) above
 - (b) Both (II) and (III) above
 - (c) Both (III) and (IV) above
 - (d) (I), (II) and (III) above
 - (e) (I), (III) and (IV) above.

30. Which of the following is/are **not true** with respect to package trades?

[< Answer >](#)

- I. It is an approach of trading index fund.
 - II. It is actually a process of bundling of a number of orders for execution at different times in the market.
 - III. The goal of a fund manager is to get his money invested as quickly as possible with least cost.
- (a) Only (I) above
 - (b) Only (II) above
 - (c) Both (I) and (III) above
 - (d) Both (II) and (III) above
 - (e) All (I), (II) and (III) above.

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. Mr. Pritesh, a passive fund manager of Dipti Financial Services Ltd., (DFSL) who believes in buy and hold strategy has constructed a bond fund, the portfolio of which includes three bonds namely RIL09, KRN11 and UP16 in the proportions of 40%, 30% and 30% respectively. He has collected Rs.10,00,000 through the issue of 1,00,000 units and invested the same in the above mentioned bonds at their face values.

Bond Name	Face value (Rs.)	Remaining years to maturity
6.8% RIL09	1000	3
7.5% KRN11	1000	5
8.7% UP16	1000	10

Presently the pattern of yield curve is as follows:

Years	1	2	3	4	5	6	7	8	9	10
Yield (%)	5.7	6.0	6.4	6.7	7.1	7.5	7.7	7.9	8.2	8.4

It is forecasted that in the near future, there will be an upward movement in the short-term interest rates due to the recent increase in Fed Rate. However, the sentiment in the long-term interest rate is still subdued. Analysts forecast that for the first five years, 1-year forward rates are estimated to increase by 100 basis points from current level, and there after, it increases by only 50 basis points for the consecutive years.

You are **required** to calculate

- a. The net asset value (NAV) of the fund before change in interest rates.
- b. The net asset value (NAV) of the fund after change in interest rates.

(4 + 8 = 12 marks) [< Answer >](#)

2. Suppose that the universe of available risky securities consists of a large number of stocks, identically distributed with $E(r) = 21\%$, $\sigma = 72\%$ and a common correlation coefficient of $\rho = 0.35$.

You are **required** to determine

- a. What is the expected return and standard deviation of an equally weighted risky portfolio of 55 stocks?
- b. What is the smallest number of stocks necessary to generate an efficient portfolio with a standard deviation equal to or smaller than 49%?
- c. What is the systematic risk in this universe?
- d. If T-bills are available and yield 6%, what is the slope of the Capital Allocation Line?

(4 + 2 + 2 + 2 = 10 marks) [< Answer >](#)

3. Mr. Kulkarni is trying to construct an optimal portfolio with least risk and a target return of 18% p.a. from the three stocks namely Nestle, ACC and Pentasoft. The relevant market data is given as under:

		Nestle	ACC	Pentasoft	Market
Nestle	2.5%	256	90	140	260
ACC	3.0%	90	361	195	240
Pentasoft	4.2%	140	195	196	250
Market	-	260	240	250	324

You are **required** to calculate the proportions of funds to be invested in each of the three securities by Mr. Kulkarni so as to generate target return with least possible risk, if the T-Bills are trading at the rate of 6% p.a and the return on market is 18%.

(11 marks) < Answer >

4. Consider the following information relating to National benchmark index, T-bill, three mutual fund schemes based on market capitalization

Date	NAV on Large Cap Fund (Rs.)	NAV on Mid Cap Fund (Rs.)	NAV on Small Cap Fund (Rs.)	National Index	364-Day T-Bill Price (Rs.)
30-09-05	69.00	19.59	10.70	2274.00	97.56
31-08-05	63.53	18.75	10.39	2126.35	98.63
29-07-05	60.76	17.09	10.10	2027.40	97.65
30-06-05	57.34	15.60	10.04	1906.20	98.62
31-05-05	54.93	15.67	10.12	1834.85	97.12
29-04-05	49.93	15.13	10.15	1688.65	98.26
31-03-05	52.31	14.90	10.01	1772.85	97.65
28-02-05	53.21	14.63	10.00	1827.40	98.26
31-01-05	50.42	14.00	10.03	1768.25	97.25
31-12-04	51.52	13.90	10.05	1804.90	98.56

Based on the returns from three aforementioned size-based portfolios, you are **required** to determine the size effect in Indian stock market.

(12 marks) < Answer >

5. The 3-month futures contract on NIFTY maturing in April 2006 is currently trading at 2510. The current value of NIFTY is 2590. The one-year risk free rate is 6% and the year –end dividend yield on the market index is 4%. (All the stocks constituting Nifty pay dividend during the three-month period)

You are **required** to

- Determine by how much is the futures contract mis-priced.
- Formulate a zero-net-investment arbitrage portfolio so that you can lock in risk-free profits equal to the futures mis-pricing. (Assume that no margin is required)

(2 + 3 = 5 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. If one wants to save to build capital for his or her retirement, he/she might want to limit his/her analysis to longer-term bond funds in the hope of earning the relatively higher returns from such investment. Explain the factors that an investor should keep in mind while selecting a bond fund.

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

7. One of the important steps in portfolio management process is to evaluate the performance of portfolios during the time horizon concerned. Performance evaluation of a portfolio is in other words, the evaluation of performance of portfolio manager. Manager universe comparisons are a part of evaluating the performance of a portfolio manager? How do you make manager universe comparisons?

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

END OF SECTION C

END OF QUESTION PAPER

Suggested Answers

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Section A : Basic Concepts

1. Answer : (e)

[TOP](#) [<](#)
[>](#)

Reason : Tax factor is given
$$= \frac{T_d - T_g}{1 - T_g}$$
, Where T_d is tax rate on dividends

$$= \frac{0.08 - 0}{1 - 0} = 0.08$$

T_g is tax rate on long term capital gain

2. Answer : (e)

[TOP](#) [<](#)
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Reason : Maximum Profit for the writer of the option strategy = (Premium received from call option & put option written) x contract size = $(1150 \times 6.35 + 3250 \times 1.95) = \text{Rs.}13,640$

The above maximum profit occurs, if the market prices of the shares remain at their respective strike prices or come down below strike prices for call options and go above strike prices for put options and neither call nor put is exercised.

3. Answer: (d)

[TOP](#) [<](#)
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Reason: Active portfolio management consists of only market timing and security analysis. Indexing is a strategy of passive management.

4. Answer: (a)

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Reason: The critical success factor in determining the success of a portfolio is Alpha. Hence, alternative (a) is answer.

5. Answer : (e)

[TOP](#) [<](#)
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Reason : $F_e \times \beta_e + F_c \times \beta_c + F_f \times \beta_f = F_p \beta_p$

Where F_e , F_c , F_f & F_p are the funds of equity, cash, Index futures and the portfolio respectively.

β_e , β_c , β_f & β_p are beta's of equity cash, Index futures & portfolio respectively.

$420,00,000 \times 0.78 + 80,00,000 \times 0 + 2,150 \times 200 \times \text{Number of futures contracts}$

$$= 1.5 \times 500,00,000$$

Number of futures contracts = 98.23 i.e., 98 futures contract.

6. Answer :

[TOP](#) [<](#)
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Reason : The return in mutual funds is higher than in banks. Hence, alternative (e) is false and is answer. All other alternatives are true.

7. Answer : (c)

[TOP](#) [<](#)
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$$\text{Reason : } 20 = R_F + \beta (R_m - R_F) \quad \geq$$

$$20 = 6 + \beta (17 - 6)$$

$$14 = 11\beta$$

$$\beta = 1.27$$

$$\beta = \rho \frac{\sigma_i}{\sigma_m}$$

$$\sigma_i = \frac{\beta \sigma_m}{\rho_i} = \frac{1.27 \times 35}{0.93} = 47.7957\%.$$

8. Answer :

Reason: ExMark is a term that defines the relationship between a fund's return and market index. An ExMark below 80% indicates less predictability of relative performance.

Funds with an ExMark of 95% or above provide less opportunity to add value over and above the market's return. Since statements (II) and (III) are false, alternative (d) is answer.

9. Answer :

Reason : An active portfolio manager faces a tradeoff between holding too much of the risk-free asset and exploiting perceived security mispricings.

10. Answer : (b)

Reason : (i) Geometric mean model is based on geometric return.

(ii) In Geometric mean model, the portfolio selection can be made without any analysis of the utility functions of the investor and the distribution of the stock's return.

(iii) According to the geometric mean model of portfolio selection, the selection of the portfolio should take place based on the ending wealth rather than on the utility maximization.

11. Answer : (c)

$$\text{Reason : Coefficient of determination} = \frac{\beta^2 \sigma_m^2}{(\beta^2 \sigma_m^2 + \sigma_e^2)}$$

$$= \frac{\text{Explained Variance}}{\text{Total Variance}}$$

$$= \frac{(1.35)^2 \times 72}{(1.35)^2 \times 72 + 48} = \frac{131.22}{179.22} = 0.7321$$

12. Answer : (b)

Reason : Ex-ante SML can be used to identify the mispriced securities. Hence (I) is not correct. Ex-post SML can be used for testing asset pricing theories and testing market efficiency. Hence (II) and (III) are correct. Ex-post SML cannot be used to evaluate the stock option performance. Hence (IV) is wrong. Therefore (b) is the answer.

13. Answer :

Reason : To take advantage of an arbitrage opportunity, an investor would construct a zero investment portfolio that will yield a sure profit by making simultaneous trades in two markets.

[TOP](#) [<](#)
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14. Answer : (c)

Reason : The following are included by Geoffrey Moore (1983) in one of his leading indices of inflation.

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- • Employment rate of the population
- • Debt growth rate for both corporate and consumer
- • Industrial material price changes
- • Changes in the import prices excluding oil prices
- • Survey report of Dun and Bradstreet's for future corporate selling prices.
- • Since statement (III) is false and (I) and (II) are true, alternative (c) is answer.

15. Answer :

Reason : The following are advantages of futures as a substitute for indexing:

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Periodic rebalancing due to reinvestment of dividend is not required. The potential tracking error can be avoided. Futures result in a marginally higher rate of return net of transaction costs.

16. Answer : (c)

Reason : Unsystematic risk of the mutual fund
$$= [(1 - \rho_{im}^2) \sigma_i^2]$$
$$= [(1 - 0.89^2) 25^2]$$
$$= 129.94 (\%)^2$$

[TOP](#) [<](#)
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17. Answer :

Reason : According to the binomial option pricing model, the probability of the price increase

[TOP](#) [<](#)
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$$\frac{R - d}{u - d} = \frac{1.06 - 0.85}{1.15 - 0.85} = 0.70$$

$$\text{Where, } u = \frac{143.75}{125} \quad 143.75/125 = 1.15 \quad d = \frac{106.25}{125} = 0.85$$

$$\therefore \text{The probability of price decrease} = 1 - 0.70 = 0.30.$$

18. Answer :

Reason : Rational investors buy at higher return stock (since it is under priced) with lower standard deviation and sell low return stock (since it is overpriced) with higher standard deviation to make arbitrage profits .

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19. Answer :

Reason : YTM of the bond

[TOP](#) [<](#)
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$$107.58 = 12 \times \text{PVIFA}_{(k, 5)} + 100 \times \text{PVIF}_{(k, 5)}$$

$$K = 10\%$$

If interest rate increases by or 100 basis points or 1%

New price

$$12 \times PVIFA_{(11, 5)} + 100 \times PVIF_{(11, 5)}$$

$$= 44.352 + 59.3$$

$$= 103.65$$

$$\text{Change in the price} = \frac{103.65 - 107.58}{107.58}$$

$$= -3.65\%$$

20. Answer :

[TOP](#)
[>](#)

Reason : The assumptions of Systematic Asset Allocation are as follows:

- I. The markets provide the information regarding the returns available.
- II. The relative returns reflect the investor's present perceptions.
- III. The measurement of potential returns provide useful clues to those returns that are actually realized.

Hence, all the statements mentioned are false and alternative (d) is answer.

21. Answer : (b)

[TOP](#)
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Reason : According to the single index model

$$\begin{aligned} \text{Cov}(R_p R_q) &= \beta_p \beta_q \sigma_m^2 \\ &= 1.28 \times 1.34 \times (25.58)^2 \\ &= 1122.32(\%)^2 \end{aligned}$$

22. Answer : (b)

[TOP](#)
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$$\begin{aligned} \text{Reason : Utility} &= E(r) - \frac{\sigma_i^2}{t_k} \\ &= 16.25 - \frac{(10.75)^2}{t_k} \\ \frac{(10.75)^2}{t_k} &= 16.25 - 4.25 = 12.00 \\ t_k &= \frac{(10.75)^2}{12} \\ t_k &= 9.63\% \end{aligned}$$

23. Answer :

[TOP](#)
[>](#)

Reason : The CAPM does not specify the cause of the correlations between securities while the APT specifies the impact of the same factors that cause correlation. Hence, alternative (c) is answer.

24. Answer : (e)

Reason : The payoff diagram shows that profit is possible from this strategy if market prices is range bound and this profit will fall between two distinct prices. Hence the strategy is short strangle, and the answer is (e).

[TOP](#) [<](#)
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25. Answer : (b)

Reason : Data requirement under single index model = $3n + 2$

[TOP](#) [<](#)
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Data requirement under Markowitz model = $\frac{n(n+3)}{2}$

$$3n + 2 < \frac{n(n+3)}{2}$$

$$6n + 4 < n^2 + 3n$$

$$0 < n^2 - 3n - 4$$

$$n^2 - 3n - 4 > 0$$

$$n(n-4) + 1(n-4) > 0$$

$$(n-4)(n+1) > 0$$

$$n > 4, -1$$

n should be always greater than 4.

26. Answer :

Reason: Contrarian managers invest in stocks that are selling at low values compared to their book values. Earnings momentum growth style managers look for high volatility in earnings and an above average rate on the whole. Yield managers are those that look for companies with above average dividend yields. Since statements (II) is false and (I) and (III) are true, alternative (d) is answer.

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27. Answer :

Reason : Stress Testing involves comparison of the value of a portfolio of exposures or assets under various market assumptions. Stress Testing helps in providing additional risk information, which a portfolio manager needs to know. Simulated situations developed in stress testing would provide an estimate of the worst possible scenarios, which a portfolio manager is likely to encounter. Since, statements (II) and (III) are true and (I) is false, alternative (a) is answer.

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28. Answer :

Reason : If market is showing upward trend a portfolio manager would like to increase the beta of stock portfolio to achieve maximum gain and he will have to decrease the cash percentage to finance additional equity investment. The opposite rule will be applicable in declining market. Therefore (I) and (II) are true. When a portfolio manager concentrates more on stock selection he will be more concerned about under priced/over

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priced stocks and will not pay more attention on beta of the stock. Due to this reason beta will be fairly constant and a linear relationship between portfolio's return and market return can be achieved. Clearly, (III) is also correct and answer is (e).

29. Answer :

Reason : If the coefficient of correlation of a portfolio with market index is 1 then its

unsystematic risk is zero as $\text{unsystematic risk} = (1 - \rho^2) \sigma_i^2$

If unsystematic is Zero, then return due to total selectivity would be equal to its net selectivity and return from in adequate diversification is 0. Hence (II) and (III) are correct. Hence (b) is the answer.

30. Answer :

Reason : Packaged trade is an approach of trading index fund. It is actually a process of bundling of a number of orders for simultaneous execution in the market. The goal of a fund manager is to get his money invested as quickly as possible with least cost. Since statement (II) is false, alternative (b) is answer.

Section B : Problems

1. a. Funds invested in Bond X = 40% of Rs.10,00,000 = Rs.4,00,000
 Funds invested in Bond Y = 30% of Rs.10,00,000 = Rs.3,00,000
 Funds invested in Bond Z = 30% of Rs.10,00,000 = Rs.3,00,000
 Number of bonds purchased X = Rs.4,00,000/Rs.1,000 = 400
 Y = Rs.3,00,000/Rs.1,000 = 300
 Z = Rs.3,00,000/Rs.1,000 = 300

Current market price of Bond X =

$$= 68 \text{ PVIF}(5.7\%, 1) + 68 \text{ PVIF}(6\%, 2) + 1068 \text{ PVIF}(6.4\%, 3) \\ = 64.33 + 60.52 + 886.64 = \text{Rs.}1011.49$$

Current market price of Bond Y =

$$= 75 \text{ PVIF}(5.7\%, 1) + 75 \text{ PVIF}(6\%, 2) + 75 \text{ PVIF}(6.4\%, 3) + 75 \text{ PVIF}(6.7\%, 4) \\ + 1075 \text{ PVIF}(7.1\%, 5) \\ = 70.96 + 66.75 + 62.26 + 57.86 + 762.89 = \text{Rs.}1020.72$$

Current market price of Bond Z =

$$= 87 \text{ PVIF}(5.7\%, 1) + 87 \text{ PVIF}(6\%, 2) + 87 \text{ PVIF}(6.4\%, 3) + 87 \text{ PVIF}(6.7\%, 4) \\ + 87 \text{ PVIF}(7.1\%, 5) + 87 \text{ PVIF}(7.5\%, 6) + 87 \text{ PVIF}(7.7\%, 7) + 87 \text{ PVIF}(7.9\%, 8) \\ + 87 \text{ PVIF}(8.2\%, 9) + 1087 \text{ PVIF}(8.4\%, 10) \\ = 82.31 + 77.43 + 72.23 + 67.12 + 61.74 + 56.37 + 51.76 + 47.35 + 42.8 + 485.22 =$$

Rs.1044.33

Total value of the portfolio = Rs.1011.49 × 400 + Rs.1020.72 × 300 + Rs.1044.33 × 300 = Rs.10,24,111

Net asset value = Total value of the portfolio / Number of units = Rs.10,24,111/1,00,000 = Rs.10.24

- b. Forward rates $r_0 = 0\%$ and $r_1 = 5.7\%$, $r_{01} = 5.7\%$

$$= r_1 = 5.7\% \text{ and } r_2 = 6\%, r_{12} = (1.06^2/1.057) - 1 = 6.3\%$$

$$= r_2 = 6\% \text{ and } r_3 = 6.4\%, r_{23} = (1.064^3/1.06^2) - 1 = 7.2\%$$

$$= r_3 = 6.4\% \text{ and } r_4 = 6.7\%, r_{34} = (1.067^4/1.064^3) - 1 = 7.6\%$$

$$= r_4 = 6.7\% \text{ and } r_5 = 7.1\%, r_{45} = (1.071^5/1.067^4) - 1 = 8.71\%$$

$$= r_5 = 7.1\% \text{ and } r_6 = 7.5\%, r_{56} = (1.075^6/1.071^5) - 1 = 9.52\%$$

$$= r_6 = 7.5\% \text{ and } r_7 = 7.7\%, r_{67} = (1.077^7/1.075^6) - 1 = 8.9\%$$

$$= r_7 = 7.7\% \text{ and } r_8 = 7.9\%, r_{78} = (1.079^8/1.077^7) - 1 = 9.31\%$$

$$= r_8 = 7.9\% \text{ and } r_9 = 8.2\%, r_{89} = (1.082^9/1.079^8) - 1 = 10.63\%$$

$$= r_9 = 8.2\% \text{ and } r_{10} = 8.4\%, r_{910} = (1.084^{10}/1.082^9) - 1 = 10.22\%$$

Since forward rates are estimated to increase by 10 bps for the first four years and decrease by 10 bps thereafter

New forward rates :

$$r_{01} = 5.7\% + 1.0\% = 6.7\%$$

$$r_{12} = 6.3\% + 1.0\% = 7.3\%$$

$$r_{23} = 7.2\% + 1.0\% = 8.2\%$$

$$r_{34} = 7.6\% + 1.0\% = 8.6\%$$

$$r_{45} = 8.71\% + 1.0\% = 9.71\%$$

$$r_{56} = 9.52\% + 0.5\% = 10.02\%$$

$$r_{67} = 8.9\% + 0.5\% = 9.4\%$$

$$r_{78} = 9.31\% + 0.5\% = 9.81\%$$

$$r_{89} = 10.63\% + 0.5\% = 11.13\%$$

$$r_{910} = 10.22\% + 0.5\% = 10.72\%$$

$$(1+r_2)^2 = (1+r_1)(1+r_{12})$$

$$r_1 = 6.7\%$$

$$r_2 = [(1+r_1)(1+r_{12})]^{1/2} - 1 \times 100 = [(1.067 \times 1.073)^{1/2} - 1] \times 100 = 7\%$$

$$r_3 = [(1+r_2)^2(1+r_{23})]^{1/3} - 1 \times 100 = [(1.07^2 \times 1.082)^{1/3} - 1] \times 100 = 7.40\%$$

$$r_4 = [(1+r_3)^3(1+r_{34})]^{1/4} - 1 \times 100 = [(1.074^3 \times 1.086)^{1/4} - 1] \times 100 = 7.70\%$$

$$r_5 = [(1+r_4)^4(1+r_{45})]^{1/5} - 1 \times 100 = [(1.077^4 \times 1.0971)^{1/5} - 1] \times 100 = 8.10\%$$

$$r_6 = [(1+r_5)^5(1+r_{56})]^{1/6} - 1 \times 100 = [(1.081^5 \times 1.1002)^{1/6} - 1] \times 100 = 8.42\%$$

$$r_7 = [(1+r_6)^6(1+r_{67})]^{1/7} - 1 \times 100 = [(1.0842^6 \times 1.094)^{1/7} - 1] \times 100 = 8.56\%$$

$$r_8 = [(1+r_7)^7(1+r_{78})]^{1/8} - 1 \times 100 = [(1.0856^7 \times 1.0981)^{1/8} - 1] \times 100 = 8.72\%$$

$$r_9 = [(1+r_8)^8(1+r_{89})]^{1/9} - 1 \times 100 = [(1.0872^8 \times 1.1113)^{1/9} - 1] \times 100 = 8.99\%$$

$$r_{10} = [(1+r_9)^9(1+r_{910})]^{1/10} - 1 \times 100 = [(1.0899^9 \times 1.1072)^{1/10} - 1] \times 100 = 9.16\%$$

Current market price of Bond X =

$$= 68 \text{ PVIF}(6.7\%, 1) + 68 \text{ PVIF}(7\%, 2) + 1068 \text{ PVIF}(7.4\%, 3)$$

$$= 63.73 + 59.39 + 862.10 = \text{Rs.}985.23$$

Current market price of Bond Y =

$$= 75 \text{ PVIF}(6.7\%, 1) + 75 \text{ PVIF}(7\%, 2) + 75 \text{ PVIF}(7.4\%, 3) + 75 \text{ PVIF}(7.7\%, 4) + 1075 \text{ PVIF}(8.1\%, 5)$$

$$= 70.29 + 65.51 + 60.54 + 55.74 + 728.25 = \text{Rs.}980.33$$

Current market price of Bond Z =

$$= 87 \text{ PVIF}(6.7\%, 1) + 87 \text{ PVIF}(7\%, 2) + 87 \text{ PVIF}(7.4\%, 3) + 87 \text{ PVIF}(7.7\%, 4) + 87 \text{ PVIF}(8.1\%, 5) + 87 \text{ PVIF}(8.42\%, 6) + 87 \text{ PVIF}(8.56\%, 7) + 87 \text{ PVIF}(8.72\%, 8) + 87 \text{ PVIF}(8.99\%, 9) + 1087 \text{ PVIF}(9.16\%, 10)$$

$$= 81.54 + 75.99 + 70.23 + 64.66 + 58.94 + 53.56 + 48.96 + 44.57 + 40.09 + 452.47 =$$

Rs.991.01

$$\text{Total value of the portfolio} = \text{Rs.}985.23 \times 400 + \text{Rs.}980.33 \times 300 + \text{Rs.}991.01 \times 300 = \text{Rs.}9,85,494$$

$$\text{Net asset value} = \text{Total value of the portfolio} / \text{Number of units} = \text{Rs.}9,85,494 / 1,00,000 = \text{Rs.}9.85494$$

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2. The parameters are $E(r) = 21$, $\sigma = 72$ and the correlation between any pair of stocks is $\rho = 0.35$

- a. The portfolio expected return is invariant to the size of the portfolio because all stocks have identical expected returns. Hence, expected return of the portfolio = 21%

The standard deviation of a portfolio with $n=55$ stocks is

$$\begin{aligned} \sigma_p^2 & \text{ Variance of the portfolio with 55 stocks} \\ &= W_1^2 \sigma_1^2 + W_2^2 \sigma_2^2 + \dots + W_n^2 \sigma_n^2 \\ &+ 2 W_1 W_2 \sigma_1 \sigma_2 \rho_{12} + 2 W_2 W_3 \sigma_2 \sigma_3 \rho_{23} \dots + 2 W_{n-1} W_n \sigma_{n-1} \sigma_n \rho_{n-1,n} \end{aligned}$$

When all stocks in a portfolio are equally weighted and the standard deviation of each stock is same, the above formula can be written as

$$\begin{aligned} &= W_1^2 \sigma_1^2 + W_1^2 \sigma_1^2 + \dots + W_1^2 \sigma_1^2 \\ &+ 2 W_1 W_1 \sigma_1 \sigma_1 \rho_{11} + 2 W_1 W_1 \sigma_1 \sigma_1 \rho_{11} \dots + 2 W_1 W_1 \sigma_1 \sigma_1 \rho_{11} \end{aligned}$$

In the above formula, since all stocks are equally weighted, $W_1 = \frac{1}{n}$ or $W_1^2 = \frac{1}{n^2}$

variance term of the formula will become $n \times \frac{1}{n^2} \times \sigma^2$ or $\frac{\sigma^2}{n}$

covariance term of the formula will become $\frac{2}{n^2} \times \frac{n(n-1)}{2} \sigma^2 \rho$ or $\sigma^2(n-1)/n$

$$\therefore \sigma_p^2 = \left[\frac{\sigma^2}{n} + \rho \times \frac{\sigma^2(n-1)}{n} \right] \quad \text{or}$$

$$\begin{aligned} \sigma_p &= \left[\frac{\sigma^2}{n} + \rho \times \frac{\sigma^2(n-1)}{n} \right]^{1/2} \\ &= [72^2/55 + 0.35 \times 72^2 \times 54/55]^{1/2} = 43.31 \end{aligned}$$

- b. Because the stocks are identical, efficient portfolios are equally weighted. To obtain a standard deviation of 49%, we need to solve for n :

$$\begin{aligned} 49^2 &= 72^2/n + 0.35 \times [72^2(n-1)]/n \\ 2,401n &= 5,184 + 1,814.4n - 1,814.4 \\ 586.6n &= 3,369.6 \\ n &= 3,369.6/586.6 = 5.744 \end{aligned}$$

Thus, we need 6 stocks and will come in with volatility slightly under the target.

- c. As n gets very large, the variance of an efficient (equally weighted) portfolio diminishes, leaving only the variance that comes from the covariances among stocks, that is

$$\sigma_p = (\rho \times \sigma^2)^{0.5} = 42.5957 = 42.6$$

Note that with 55 stocks, the nonsystematic risk of a portfolio of 55 stocks is 0.71% (43.31% – 42.6%). With 6 stocks the standard deviation is 49%, of which nonsystematic risk is (49 – 42.6) 6.4%.

- d. If the risk-free is 6%, the risk premium on any size portfolio is 15-6 = 9%. The standard deviation of a well-diversified portfolio is (practically) 42.6%, hence the slope of the CAL is $S=9/42.6 = 0.211$

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3. Expected return on the stocks = $\alpha + [R_f + \beta(R_m - R_f)]$

Nestle:

$$\text{Beta of Nestle } (\beta_N) = \text{Cov}_{NM} / \text{Var}_M = 260/324 = 0.8$$

Expected return on Nestle = $2.5 + [6 + 0.8 (18-6)] = 18.1\%$

ACC:

Beta of ACC (β_A) = $\text{Cov}_{AM}/\text{Var}_M = 240/324 = 0.74$

Expected return on ACC = $3 + [6 + 0.74 (18-6)] = 17.88\%$

Pentsoft:

Beta of Pentsoft (β_P) = $\text{Cov}_{PM}/\text{Var}_M = 250/324 = 0.77$

Expected return on Pentsoft = $4.2 + [6 + 0.77 (18-6)] = 19.44\%$

Assume the proportion invested in Nestle, ACC and Pentsoft are X_A , X_B and X_C respectively.

Minimize (Total risk of portfolio)

$$Z = 256 X_A^2 + 361 X_B^2 + 196 X_C^2 + (2 \times 90 \times X_A X_B) + (2 \times 140 \times X_A X_C) + (2 \times 195 X_C X_B) \quad (I)$$

Subject to:

$$18.1X_A + 17.88X_B + 19.44X_C = 18 \quad (II)$$

$$X_A + X_B + X_C = 1 \quad (III)$$

We have to incorporate the return constraint (2) as part of the objective function (1) using the langrarian constraint λ . For this, first we express X_C in terms of X_A and X_B as $(1 - X_A - X_B)$, using constraint (3) in both the equations (1) and (2) and this replacement will transform the equation (1) into two variable equations.

$$\begin{aligned} Z &= 256 X_A^2 + 361 X_B^2 + 196 (1 - X_A - X_B)^2 + (2 \times 90 \times X_A X_B) + 2 \times 140 X_A \times (1 - X_A - X_B) \\ &\quad + 2 \times 195 X_B (1 - X_A - X_B) \\ &= 256 X_A^2 + 361 X_B^2 + 196 (1 + X_A^2 + X_B^2 + 2X_A X_B - 2X_A - 2X_B) + 280 X_A (1 - X_A - X_B) \\ &\quad + 390 X_B (1 - X_A - X_B) + 180 X_A X_B \\ &= 256 X_A^2 + 361 X_B^2 + 196 + 196 X_A^2 + 196 X_B^2 + 392 X_A X_B - 392 X_A - 392 X_B + 280 X_A \\ &\quad - 280 X_A^2 - 280 X_A X_B + 390 X_B - 390 X_A X_B - 390 X_B^2 + 180 X_A X_B \\ &= 172 X_A^2 + 167 X_B^2 - 98 X_A X_B - 112 X_A - 2 X_B + 196 = 0 \end{aligned}$$

Expressing X_C in terms of X_A and X_B equation 2 above is modified as

$$18.1X_A + 17.88X_B + 19.44 (1 - X_A - X_B) = 18$$

$$18.1X_A + 17.88X_B + 19.44 - 19.44X_A - 19.44X_B = 18$$

$$= 1.34X_A + 1.56X_B = 1.44$$

$$\text{or } 1.34X_A + 1.56X_B - 1.44 = 0 \quad (IV)$$

Using lagrangian multiplier, the revised objective function is

$$\begin{aligned} Z &= 172 X_A^2 + 167 X_B^2 - 98 X_A X_B - 112 X_A - 2 X_B + 196 + \lambda (1.34X_A + 1.56X_B - 1.44) \\ &= 172 X_A^2 + 167 X_B^2 - 98 X_A X_B - 112 X_A - 2 X_B + 196 + 1.34X_A\lambda + 1.56X_B\lambda - 1.44\lambda \end{aligned}$$

Now for optimization setting first derivatives with respect to X_A , X_B & λ equal to zero we get

$$\frac{\partial Z}{\partial X_A} = 344X_A - 98 X_B - 112 + 1.34\lambda = 0 \quad (V)$$

$$\frac{\partial Z}{\partial X_B} = 334 X_B - 98 X_A - 2 + 1.56\lambda = 0 \quad (VI)$$

$$\frac{\partial Z}{\partial \lambda} = 1.34X_A + 1.56X_B - 1.44 = 0 \quad (\text{VII})$$

From (V) $\times 1.56$ we get $536.64X_A - 152.88X_B + 2.0904\lambda = 174.72$

& (VI) $\times 1.34$ we get $-131.32X_A + 447.56X_B - 2.0904\lambda = 2.68$

On subtracting $405.32X_A + 294.68X_B = 177.4 \quad (\text{VIII})$

Taking (VII) and (VIII) we have:

$$\begin{array}{rcl} 1.34X_A + 1.56X_B & = & 1.44 \\ 405.32X_A + 294.68X_B & = & 177.4 \end{array}$$

From (VII) $\times 405.32$ we get

$$543.1288X_A + 632.2992X_B = 583.6608$$

& (VIII) $\times 1.34$ we get

$$543.1288X_A + 394.8712X_B = 237.716$$

On subtracting $237.428X_B = 345.9448$

$$X_B = 1.4571 = 145.7\%$$

$$1.34X_A + 1.56X_B = 1.44$$

$$1.34X_A + 1.56 \times 1.457 = 1.44$$

$$1.34X_A = 1.44 - 1.787$$

$$1.34X_A = -0.8329$$

$$X_A = -0.62 = -62\%$$

$$X_C = 1 - (-0.62 + 1.457)$$

$$= 0.163 = 16.3\%$$

$$R_p = -0.62 \times 18.1 + 1.457 \times 17.88 + 0.163 \times 19.44$$

$$= -11.222 + 26.05116 + 3.16872 = 18\%$$

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4.

Date	R _{LCF} (%)	R _{MCF} (%)	R _{SCF} (%)	R _{NI} (%)	R _{TB} (%)*
31-12-04	-	-	-	-	-
31-01-05	-2.14	0.719	-0.2	-2.03	0.24
28-02-05	5.53	4.5	-0.3	3.35	0.15
31-03-05	-1.69	1.846	0.1	-2.99	0.2
29-04-05	-4.55	1.544	1.399	-4.75	0.15
31-05-05	10.01	3.569	-0.3	8.66	0.25
30-06-05	4.39	-0.45	-0.79	3.89	0.12
29-07-05	5.96	9.551	0.598	6.36	0.2
31-08-05	4.56	9.713	2.871	4.88	0.12
30-09-04	8.61	4.48	2.984	6.94	0.21

* $[(100 - \text{Current Price}) / \text{Current Price}] \times (365/364) \times 100 / 12$

Large Cap Fund:

Date	R _{LCF} (%)	R _{NI} (%)	R _{TB} (%)	(R _{LCF} - R _{TB}) = Y (%)	(R _{NI} - R _{TB}) = X(%)	(R _{LCF} - R _{TB}) $\times$ (R _{NI} - R _{TB}) = XY(%)	(R _{NI} - R _{TB}) ² = X ² (%)	(R _{LCF} - R _{TB}) ² = Y ² (%)
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31-12-04	-	-	-					
31-01-05	-2.14	-2.03	0.24	-2.37	-2.27	5.38	5.14	5.62
28-02-05	5.53	3.35	0.15	5.39	3.2	17.2	10.2	29
31-03-05	-1.69	-2.99	0.2	-1.89	-3.19	6.03	10.2	3.58
29-04-05	-4.55	-4.75	0.15	-4.7	-4.9	23	24	22.1
31-05-05	10.01	8.66	0.25	9.77	8.41	82.1	70.7	95.4
30-06-05	4.39	3.89	0.12	4.27	3.77	16.1	14.2	18.2
29-07-05	5.96	6.36	0.2	5.76	6.16	35.5	37.9	33.2
31-08-05	4.56	4.88	0.12	4.44	4.76	21.2	22.7	19.7
30-09-05	8.61	6.94	0.21	8.4	6.73	56.6	45.4	70.6
Total				29.1	22.7	263	240	297
Average				3.23	2.52			

$$(R_{LCF} - R_{TB}) = \alpha + \beta (R_{NI} - R_{TB})$$

$$\beta = \frac{n \sum XY - (\sum X)(\sum Y)}{n \sum X^2 - (\sum X)^2}$$

$$= \frac{9 \times 263 - (22.7)(29.1)}{9 \times 240 - (22.7)^2} = 1.0375 \approx 1.04.$$

$$\alpha = \bar{Y} - \beta \bar{X}$$

$$\alpha = 3.23 - 1.04 \times 2.52$$

$$\alpha = 0.6092$$

$$R^2 = \frac{\alpha \sum Y + \beta \sum XY - n \bar{Y}^2}{\sum Y^2 - n \bar{Y}^2}$$

$$\frac{0.6092 \times 29.1 + 1.04 \times 263 - 9 \times 3.23^2}{297 - 9 \times 3.23^2}$$

$$0.971678 \approx 0.97$$

Mid Cap Fund:

Date	R _{MCF} (%)	R _{NI} (%)	R _{TB} (%)	(R _{MCF} - R _{TB}) = Y(%)	(R _{NI} - R _{TB}) = X(%)	(R _{MCF} - R _{TB}) × (R _{NI} -R _{TB}) = XY (%)	(R _{NI} - R _{TB}) ² = X ² (%)	(R _{MCF} - R _{TB}) ² = Y ² (%)
31-12-	-	-	-					

04								
31-01-05	0.719	-2.03	0.24	0.48	-2.27	-1.1	5.14	0.23
28-02-05	4.5	3.35	0.15	4.35	3.2	13.9	10.2	18.9
31-03-05	1.846	-2.99	0.2	1.65	-3.19	-5.2	10.2	2.71
29-04-05	1.544	-4.75	0.15	1.39	-4.9	-6.8	24	1.94
31-05-05	3.569	8.66	0.25	3.32	8.41	27.9	70.7	11
30-06-05	-0.45	3.89	0.12	-0.57	3.77	-2.1	14.2	0.32
29-07-05	9.551	6.36	0.2	9.35	6.16	57.6	37.9	87.4
31-08-05	9.713	4.88	0.12	9.59	4.76	45.7	22.7	92
30-09-05	4.48	6.94	0.21	4.27	6.73	28.8	45.4	18.2
Total				33.8	22.7	159	240	233
Average				3.76	2.52			

$$(R_{MCF} - R_{TB}) = \alpha + \beta (R_{NI} - R_{TB})$$

$$\beta = \frac{n \sum XY - (\sum X)(\sum Y)}{n \sum X^2 - (\sum X)^2}$$

$$= \frac{9 \times 159 - (22.7)(33.8)}{9 \times 240 - (22.7)^2} = 0.40356 \approx 0.4$$

$$\alpha = \bar{Y} - \beta \bar{X}$$

$$\alpha = 3.76 - 0.4 \times 2.52$$

$$\alpha = 2.752$$

$$R^2 = \frac{\alpha \sum Y + \beta \sum XY - n \bar{Y}^2}{\sum Y^2 - n \bar{Y}^2}$$

$$= \frac{2.752 \times 33.8 + 0.4 \times 159 - 9 \times 3.76^2}{233 - 9 \times 3.76^2}$$

$$0.277787 \approx 0.28$$

Small Cap Fund:

Date	R _{SCF} (%)	R _{NI} (%)	R _{TB} (%)	(R _{SCF} - R _{TB}) = Y (%)	(R _{NI} - R _{TB}) = X (%)	(R _{SCF} - R _{TB}) × (R _{NI} -R _{TB}) = XY	(R _{NI} - R _{TB}) ² = X ² (%)	(R _{SCF} - R _{TB}) ² = Y ² (%)
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						(%)		
31-12-04	-	-	-					
31-01-05		-	0.24	-2.27			5.14	
	-0.2	2.03		-0.44		1		0.19
28-02-05	-0.3	3.35	0.15	-0.45	3.2	-1.4	10.2	0.2
31-03-05		-	0.2	-3.19			10.2	
	0.1	2.99		-0.1		0.32		0.01
29-04-05		-	0.15	-4.9			24	
	1.399	4.75		1.25		-6.1		1.56
31-05-05	-0.3	8.66	0.25	-0.55	8.41	-4.6	70.7	0.3
30-06-05	-0.79	3.89	0.12	-0.91	3.77	-3.4	14.2	0.83
29-07-05	0.598	6.36	0.2	0.4	6.16	2.45	37.9	0.16
31-08-05	2.871	4.88	0.12	2.75	4.76	13.1	22.7	7.57
30-09-05	2.984	6.94	0.21	2.77	6.73	18.7	45.4	7.69
Total				4.73	22.7	20	240	18.5
Average				0.53	2.52			

$$(R_{SCF} - R_{TB}) = \alpha + \beta (R_{NI} - R_{TB})$$

$$\beta = \frac{n \sum XY - (\sum X)(\sum Y)}{n \sum X^2 - (\sum X)^2}$$

$$= \frac{9 \times 20 - (22.7)(4.73)}{9 \times 240 - (22.7)^2} = 0.04416 \approx 0.04$$

$$\alpha = \bar{Y} - \beta \bar{X}$$

$$\alpha = 0.53 - 0.04 \times 2.52$$

$$\alpha = 0.4292$$

$$R^2 = \frac{\alpha \sum Y + \beta \sum XY - n \bar{Y}^2}{\sum Y^2 - n \bar{Y}^2}$$

$$= \frac{0.4292 \times 4.73 + 0.04 \times 20 - 9 \times 0.53^2}{18.5 - 9 \times 0.53^2}$$

$$0.0189 \approx 0.02$$

	Large Fund	Cap	Mid Fund	Cap	Small Fund	Cap
Alpha	0.6092		2.752		0.4292	
Beta	1.04		0.4		0.04	
R ²	0.97		0.28		0.02	
Correlation Coefficient	0.98		0.53		0.14	

As indicated by its Alpha, Mid Cap Fund performed better than the remaining funds during the period under consideration. Beta values of the funds increase, as the size of the funds increases. Similarly, Coefficient of determination and Correlation coefficient values also increase with the increase in size. From this, it can be interpreted that large cap stocks are more inclined to the market in Indian stock market.

5. a. Annual risk free rate = 6%
 $\therefore$ Quarterly risk free rate = 1.5%
 Fair price of the futures contract
 $= 2590 \times (1 + 0.015) - 2590 \times 0.04$
 $= 2628.85 - 103.6 = 2525.25$.

Actual price of the 3-month futures contract is Rs.2510 and its fair price is 2525.25. So the futures contract is under priced by 15.25.

- b. Buy the relatively cheap futures and sell the relatively expensive index

	Cash Flow Now	Cash Flow after 3 months
Sell Index	+ 2590	$-(S_T + 103.6)$
Buy Futures	0	$S_T - 2510$
Lend Rs.2590@ 6% p.a	-2590	+ 2628.85
for three months	0	15.25

Section C: Applied Theory

6. Management And Performance

Good management is certainly crucial for stock funds, but some people do not think so. Good bond managers can produce incrementally superior results and will keep their funds at the top of the pack. Thus, it is important to know who the manager is, how long that individual has been at the helm, and what philosophy he or she follows. The past performance can be evaluated in terms of variation of returns, which can be measured by standard deviation. By studying the past volatility of a portfolio's total returns one can gain a pretty good feel for its likely future course. Standard deviations can be used to make comparisons with other bond portfolios.

Fund Costs

They are especially important for bond fund investors because fixed-income portfolios generally produce lower long run returns than stock products. The information on fund costs can be obtained from the quarterly or annual reports of the fund. Compare the fees and expenses of several funds having same investment philosophy, examine the portfolio's expense ratio over the past several years and choose that fund having the least cost.

Portfolio Turnover

As with stock funds, higher turnover translates into increased transaction costs, which are shouldered by fund investors. In the case of treasury and high-grade corporate bond products, transaction expenses will tend to be relatively low, even with an actively traded portfolio. But, if the fund holds positions in lower quality debt, high turnover can be a problem.

Fund Size

Generally, it is believed that bigger bond funds are better because they benefit from economies of scale and should have lower expense ratios. In addition, their managers may be able to make better deals since they trade in larger block of funds. This analysis makes sense for highly quality fixed-income portfolios. But smaller or medium sized funds may be suitable when investing in less liquid junkbond securities. The reason being that these portfolios may be able to maneuver more easily. They could take meaningful positions in smaller junk issues without having to worry about affecting prices as such.

Bond Fund Yields

A fund's yield or, more precisely its net income distribution rate is similar to the current yield on a stock or bond. It is based on the interest on interest or dividends paid, expressed as a percent of the net asset value. Capital gains are not included, since they are fare more irregular and unpredictable than income. One can get a good feel for the past range of a fund's yield by looking at several years' worth of information. Since the yields show the kind of return one can expect, it is most important to people looking for a monthly cash flow. These individuals should remember that a mutual fund's yield fluctuates whenever the NAV moves up and down or the income distributions vary.

PORTFOLIO CHARACTERISTICS

Portfolio Composition

Every prospectus mentions the investment objective and the type of securities that will form the portfolio composition of a particular fund. Investors should ensure that the target bond portfolio is being run in accordance with its investment policy, as outlined in the prospectus. To do this, examine the fund's holdings as listed in the annual and quarterly reports. The portfolio composition should be looked in general terms, without trying to analyze each issue's investment potential.

Quality Rating

Besides the portfolio composition, one should also look at the quality of securities constituting a portfolio of the fund. The quality can be determined by looking at the credit rating of individual securities and especially those forming the bulk of the portfolio. In India, credit rating is generally done by CARE, ICRA and CRISIL. The credit rating of the securities should not be less than 'A'. Since each drop in quality entails a commensurate increase in yield, gaining extra yield is relatively easy, but only by assuming higher credit risk. Many bond funds are reaching out for yield, in part to offset their higher expenses. However, when fund expenses and any sales charges are taken into account, purchasing the lower quality portfolio does not always translate into higher income to the investor.

Average Maturity

This is an important indicator of volatility. Funds with the longest maturities have the greatest interest rate risk. They will fall the farthest if rates move upward. Investors should be careful of long maturities during periods of low interest rates. While investigating maturities, it should be found out if the manager hedges with futures or options. This can help lessen the fund's exposure to interest rate risk. Thus, if an investor expects the interest rate to move upwards, he/she should go for that bond fund whose portfolio consists of securities of short maturities. The situation will reverse if the investor expects the interest rate to move downwards.

7. Manager Universe Comparisons

The obvious way of evaluating a portfolio manager's performance is to compare it with other portfolio managers. Portfolios can be classified as style universes with broad strategy guidelines. While making manager universe comparisons, several problems should be addressed. Identifying a suitable universe is the first problem. The analyst should first decide about the fact that the available universe matches the selected universe, provided the basic goal of comparison is to assess the expertise of the investment manager. Bond managers practice a large number of techniques which creates a big problem, because the managers face the fundamental problem of how to narrowly define the styles. Since no two managers are similar, a separate style can be formed for every manager making it very difficult to compare their styles. This suggests that styles should be outlined along with broad policy framework. A universe is suitable for comparison with a given manager only when the selection of that manager implies a good alternative for the investors. While evaluating the new strategies such as dedication, immunization and other combinations, this concern becomes more important. The target returns fixed to these strategies are generally stated in absolute terms and are customized to suit specific investors with specified liability stream. The comparison process will be very difficult if the comparison portfolios are not customized properly for the same liability stream. For example, comparison of the dedicated portfolio with immunized portfolio will not be appropriate for a traditional style universe. The second problem, which may be thought of as an extension of the first problem, relates to the difficulty attached in exactly categorizing managers into styles. Universe manager developers are those persons who select and help investment managers in successfully understanding the investment management process for both domestic and international investment. They can demand comprehensive information about investment process, objectives, constraints, and philosophy. This clearly suggests that some subjective resolution should be made in positioning a manager within a universe.

The amount of time that is available for performance with the manager is another problem. Superior or inferior kind of performance for a fixed period can be attributed to good or bad luck of the investment manager rather than his superior or inferior skills. If this is the case, one should not expect this to continue for longer periods of time and hence actual performance over a long phase may not always be accessible. The absence of long performing years states that new performers may not have a long record of actual performance. In addition to this, the old performers may sometimes undergo a change in personnel or investment outlook.

In spite of these difficulties attached to such manager universe comparison, it is very likely that an investor will ask how his manager's performance differs from that of others. A constant superior performance over a long period of time enhances the investor's confidence that excess returns are a result of good skill rather than sheer luck. However, a consistent inferior performance for a given period of time should not be attributed to bad skills, unless a detailed study upholds that conclusion.

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