

Question Paper

Portfolio Management and Mutual Funds - I (MSF2D3) : July 2008

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. Which of the following statements is/are **not true** with respect to the various measures of evaluation of portfolio performance? [<Answer>](#)
- Jensen's measure provides absolute performance of the portfolio on a risk adjusted basis against a definite benchmark.
 - It is better to use Sharpe's measure to evaluate funds which are expected to be fully diversified.
 - It is better to use Treynor's measure to evaluate funds which are not expected to be well diversified.

- Only (I) above
- Only (III) above
- Both (I) and (II) above
- Both (II) and (III) above
- All (I), (II) and (III) above.

2. Which of the following statements is **not true** with respect to bond ladder strategy? [<Answer>](#)

- When interest rates decline, the investor gains on long term securities
- The downside of this strategy is that no consideration is given to the total return potential of the portfolio
- This strategy ensures better diversification, as investments are spread over different time horizons
- The coupon inflows are not subjected to reinvestment risk
- An evenly distributed portfolio across a maturity ladder helps in offsetting the interest rate risk.

3. Which of the following statements is **not true** with respect to the formula plans for portfolio revision? [<Answer>](#)

- The constant dollar value plan requires the investor to lay down action points which are referred to as revaluation points
- In case of constant ratio plan, there is no possibility that the money available in the bond portfolio may not be sufficient to rebalance the portfolio
- For the effective implementation of the constant dollar value plan, it is necessary to estimate the possibility and extent of the downward fluctuations in the value of the aggressive portfolio
- The benefits of the dollar cost averaging will be high in the initial periods of starting the investment
- Variable ratio plan requires less accurate forecasting than other plans and hence is less complicated.

4. If an investor believes that the probability of the price of a stock moving up is higher than the probability of the price plummeting, he should [<Answer>](#)

- Buy an in-the money put and sell an in-the-money call
- Buy an in-the-money call and sell an out-of-the-money put
- Buy an in-the-money call and buy an out-of-the-money put
- Sell an in-the-money call and buy an out-of-the-money put
- Sell an out-of-the money call and buy an in-the-money put.

5. Which of the following statements is/are **not true** with respect to the fair value of an index futures contract, if all other things remain constant? [<Answer>](#)

- An increase in the risk free rate increases the fair value of the futures contract.
- A decrease in the risk free rate increases the fair value of the futures contract.
- A reduction in the dividend yield reduces the fair value of futures contract.

- Only (I) above
- Only (II) above
- Only (III) above
- Both (I) and (III) above
- Both (II) and (III) above.

6. Mr. Harsha is planning to construct a minimum risk portfolio by investing in the shares of GE Shipping and GMR Industries. Returns expected from the investment in the shares of both the companies are 15% and 18% respectively. The risks associated with their returns are 23% and 25% respectively. If the coefficient of correlation between the returns of shares of both companies is 0, the proportion of funds to be invested in the shares of GE Shipping is [<Answer>](#)

- 45.84%
- 54.16%
- 66.67%
- 33.33%

(e) 50.00%.

7. Which of the following strategies can be termed as slightly bearish variation of a straddle involving purchase of two puts and one call?

[<Answer>](#)

- (a) Strangle
- (b) Strap
- (c) Strip
- (d) Bearish spread using call
- (e) Bearish spread using put.

8. Which of the following statements is **not true** with respect to the duration of a bond?

[<Answer>](#)

- (a) Duration is always less than the term to maturity in case of coupon paying bonds
- (b) Duration decreases when the maturity decreases
- (c) Duration is inversely related to yield to maturity
- (d) Duration of zero coupon bonds is zero
- (e) Duration is inversely related to the coupon rate.

9. Which of the following statements is **not true** with respect to the Black-Scholes model of Option Pricing?

[<Answer>](#)

- (a) European exercise terms are used
- (b) Short selling of securities is not permitted
- (c) Security trading is continuous
- (d) No arbitrage opportunity is possible
- (e) There are no transaction costs and taxes.

10. Which of the following statements is/are **true** with respect to interest rate anticipation strategy?

[<Answer>](#)

- I. It requires forecasting of only the direction of interest rate change and not the quantum of change.
- II. It suggests for investment in long duration bonds when interest rates are expected to decline.
- III. It is a semi active bond management strategy.

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

11. Which of the following models of portfolio selection believes that decision makers do not use mathematical models such as utility analysis and instead focus on reducing the bad outcomes?

[<Answer>](#)

- (a) Stochastic Dominance model
- (b) Safety First model
- (c) Geometric Mean model
- (d) Sharpe Optimization model
- (e) Markowitz model.

12. Based on the current dividend yields and expected growth rates, the expected rates of return on stocks of Prathibha Industries and Prime Pipes are 15% and 16% respectively. The beta of stock of Prathibha Industries is 0.9 and that of stock of Prime Pipes is 1.2. The T-bill is currently traded in the market at 6% while the market risk premium estimated by the analysts is 9%. If you currently hold a well diversified portfolio, which of the two stocks will you add to your portfolio?

[<Answer>](#)

- (a) Stock of Prime Pipes, since it is under valued
- (b) Stock of Prime Pipes, since it has higher expected return of 16%
- (c) Stock of Prathibha Industries, since its return is equal to that of market
- (d) Stock of Prathibha Industries, since it has a lower β of 0.9
- (e) Stock of Prathibha Industries, since it has a positive α of 0.9%.

13. The following securities are available in the market for investment:

[<Answer>](#)

Security	Return (%)	Standard Deviation (%)
Gilt-edged security	6	0
Equity	18	20

If you are planning to invest Rs.15,00,000 to construct a portfolio with a standard deviation of 18%, the return on such portfolio is

- (a) Rs.2,15,000
- (b) Rs.2,52,000
- (c) Rs.2,85,500
- (d) Rs.2,96,000
- (e) Rs.3,15,000.

14. Mr. Vardhan is holding a portfolio which involves equal investment in the stocks of Ramco Industries and Rolta India. The expected returns from the stocks of the companies are 18% and 15.6% respectively. The betas of the stocks of the companies are 2 and 1.68 respectively. The standard deviation of returns is 24% for the stocks of both the companies. If the coefficient of

[<Answer>](#)

correlation between the returns of the stocks of both the companies is 0.58, which of the following statements is/are **true** with respect to the portfolio of Mr. Vardhan?

- I. The expected return from the portfolio is 16.8%.
- II. The beta of the portfolio is 1.25.
- III. Coefficient of variation of returns of the portfolio is 1.27.

- (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.

15. The current price of share of Adani Industries is Rs.517 and it is expected that the share price after one year will be either Rs.568.7 or Rs.465.3. The risk free rate is 6%. If the exercise price of a call option on the stock of Adani Industries is Rs.487, the value of the call option is approximately [<Answer>](#)

- (a) Rs.34.28
- (b) Rs.45.00
- (c) Rs.55.00
- (d) Rs.68.09
- (e) Rs.77.08.

16. The expected return on the market portfolio is 16% and the standard deviation of its returns is 25%. If the slope of capital market line is 0.4, Treasury Bills are yielding [<Answer>](#)

- (a) 5.5%
- (b) 6.0%
- (c) 6.5%
- (d) 7.0%
- (e) 7.5%.

17. Which of the following techniques of measuring returns is most useful for open-ended mutual funds? [<Answer>](#)

- (a) Money weighted rate of return
- (b) Time weighted rate of return
- (c) Holding period return
- (d) Average return
- (e) Linked internal rate of return.

18. The following is the information pertaining to probabilities associated with the different economic scenarios and the probabilities for the returns on the stock of DLF Ltd.: [<Answer>](#)

Economic Scenario	Probability of Economic Scenario	Performance of Stock	Probability of Stock's performance in given economic scenario
Prosperity	0.4	Good	0.5
		Average	0.3
		Poor	0.2
Normal	0.4	Good	0.3
		Average	0.4
		Poor	0.3
Recession	0.2	Good	0.2
		Average	0.3
		Poor	0.5

The probability that the economy will be under recession and the stock will experience good performance is

- (a) 0.20
- (b) 0.16
- (c) 0.12
- (d) 0.06
- (e) 0.04.

19. You know that firm MM Sugar Mills is inefficiently managed. On a scale of 1(worst) to 10 (best), you would give it a score of 4. The market's consensus is that the management score is only 3. Your decision should be [<Answer>](#)

- (a) To sell the stock, as every one in the market believes the firm to be better than you believe
- (b) To buy the stock, as in your view, the firm is undervalued by the market
- (c) To hold the stock, till the conflict of ranking is resolved
- (d) To sell the stock, as the firm is not as bad as the market believes it to be
- (e) To hold the stock, as you strongly believe that the firm is not the worst.

20. Two bonds have identical times to maturity and coupon rates. One is callable at Rs.108 and the other at Rs.112. Which bond should have the higher yield to maturity? [<Answer>](#)

- (a) The bond callable at Rs.112, since it sells at a higher price
- (b) The bond callable at Rs.108, since it sells at a higher price
- (c) The bond callable at Rs.112, since it sells at a lower price
- (d) The bond callable at Rs.112, since it pays more redemption value at the time of call
- (e) The bond callable at Rs.108, since it sells at a lower price.

[<Answer>](#)

21. The Capital Market Line (CML) is upward sloping because

- (a) It shows the optimum combination of risky securities
- (b) It contains all securities weighted by their respective market values
- (c) Investors are risk-averse
- (d) It indicates the required return for each portfolio risk level
- (e) It considers efficient portfolio.

[<Answer>](#)

22. The standard deviation of returns on the stock of Andhra Petro is 18%. The unsystematic risk of the returns on the stock is $90(\%)^2$. The coefficient of correlation between the returns of the market index and the stock of Andhra Petro is

- (a) 0.58
- (b) 0.65
- (c) 0.78
- (d) 0.85
- (e) 0.94.

[<Answer>](#)

23. Portfolio P has expected return of 12% and standard deviation of 21%. Portfolio Q has expected return of 15% and standard deviation of 18%. Rational investors will

- (a) Borrow at the risk free rate and buy P
- (b) Sell Q short and buy P
- (c) Sell P short and buy Q
- (d) Borrow at the risk free rate and buy Q
- (e) Lend at the risk free rate and buy Q.

[<Answer>](#)

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

- 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.

[<Answer>](#)

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

- 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.

[<Answer>](#)

26. An investor has Rs.2,00,000 to invest and he wants to construct a portfolio which would be exposed to only systematic risk with a beta of 0.20. Which of the following strategies can provide his desired objective?

- (a) Invest Rs.2,00,000 in the market portfolio
- (b) Invest Rs.40,000 in the market portfolio and Rs.1,60,000 in treasury bills
- (c) Invest Rs.2,00,000 in a stock with beta of 0.20
- (d) Borrow Rs.2,00,000 so that he can invest a total of Rs.4,00,000 in the market portfolio
- (e) Invest Rs.1,20,000 in a stock with beta of 0.20 and Rs.80,000 in treasury bills.

[<Answer>](#)

27. Which of the following statements is **not true** with respect to investment strategies?

- (a) Investment management process involves two steps, information process and implementation process
- (b) Information process deals with the selection of stocks
- (c) Volume of stock trading and frequency of trading are vital for determining the expected cost of liquidity for the appropriate size
- (d) Information motive arises out of the need to increase or decrease the equity exposure
- (e) As information is liable to be spread across the market rapidly, it loses value soon.

[<Answer>](#)

28. As described by Markowitz, which of the following portfolios cannot lie on the efficient frontier?

Portfolio	Expected Return (%)	Standard Deviation (%)
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A	20	40
B	12	25
C	16	20
D	10	14
E	7	8

- (a) A
(b) B
(c) C
(d) D
(e) E.

29. The NAV of each unit of a closed-end fund at the beginning of the year was Rs.15. By the year end, its NAV equals Rs.15.50. At the beginning of the year, each unit was selling at a 2% premium to NAV. By the end of the year, each unit is selling at a 4% discount to NAV. The fund paid year-end distributions of income and capital gains of Rs.2.60 on each unit. The rate of return to the investor in the fund during the year is

[<Answer>](#)

- (a) 12.25%
(b) 13.52%
(c) 13.86%
(d) 14.25%
(e) 14.85%.

30. Which of the following is **not** a feature of an index futures contract?

[<Answer>](#)

- (a) Index futures are traded in the stock exchange
(b) Performance of all index futures are guaranteed by the exchange's clearing corporation
(c) Index futures are leveraged instruments and require only an initial margin
(d) Index futures are necessarily cash settled with no delivery of underlying stock
(e) The buyer of index futures contract receives a cash settlement on the expiration date, if the closing price exceeds the contract price.

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. The current yield curve for default free zero coupon bonds is as follows:

[<Answer>](#)

Maturity (Years)	1	2	3
YTM (%)	11	12	13

(Assume that the face value of each bond is Rs.1,000)

You are **required** to:

- a. Compute the implied one year forward rates. (2 marks)
- b. Determine what will the pure yield curve (that is, the yields to maturity on one- and two year zero coupon bonds) be next year, if market expectations are accurate. Assume that the pure expectations hypothesis holds good. (2 marks)
- c. Compute the expected total rate of return over the next year, if you purchase a two year zero coupon bond now. What if you purchase a three year zero coupon bond? (4 marks)
- d. Compute the current price of a three year maturity bond with a 13% coupon rate paid annually? If you purchased it at that price, what would your total expected rate of return be over the next year (coupon plus price change)? (4 marks)

2. Ms. Soudha, a portfolio manager of an index fund worth of Rs.3,36,00,000 opines that in the near future there is a chance for the fall in the share prices. In order to benefit from her expectations, she is planning to write 3360 October call option on a benchmark index trading at a premium of Rs.115.43. The contract size of call option is 140. Treasury bills are trading at 6% p.a. The following is the information pertaining to the index fund and October call option on benchmark index for different weeks:

[<Answer>](#)

Week	0	1	2	3	4	5
NAV of index fund (Rs.)	342.08	351.92	368.66	374.81	380.55	396.24
Premium on index call option (Rs.)	115.43	158.27	304.64	349.65	398.75	532.00

You are **required** to:

- Compute the Incremental Risk Adjusted Return from options.
- Interpret the results.

(8 marks)

(2 marks)

3. Ms. Sneha is trying to construct an optimal portfolio using the three stocks namely Oriental Trimax, Oriental Bank and Orient Hotel. The relevant market data is given as under:

[<Answer>](#)

Stock	Expected monthly return (%)	Variance-covariance matrix (%) ²		
		Oriental Trimax	Oriental Bank	Orient Hotel
Oriental Trimax	22.50	361.25	112.5	175
Oriental Bank	25.00	112.5	500	243.75
Orient Hotel	16.25	175	243.75	281.25

You are **required** to calculate the proportions of funds to be invested in each of the three securities by Ms. Sneha so as to generate a target return of 20% with the least possible risk.

(12 marks)

4. The total amount of an investor's corpus is Rs.50 lakh, which he wants to invest using a variable ratio plan. Initially he has decided that 50% of the corpus i.e. Rs.25 lakh, should be invested in an aggressive portfolio and the balance Rs.25 lakh in a conservative portfolio comprising bonds. The current market price of each unit of aggressive portfolio is Rs.300. The investor wants to rebalance the portfolio, if the unit price increases by 25% or more from the previous action point, in such a way that the ratio of aggressive portfolio to the conservative portfolio will be 4:6. If the unit price declines by 25% or more from the previous action point, the ratio of aggressive portfolio to conservative portfolio will be changed to 6:4. The price of unit is first likely to decline to Rs.225 and then rise to Rs.375. Assuming the unit price moves in step of Rs.15, you are **required** to show how the rebalancing of the portfolio can be carried out.

[<Answer>](#)

(10 marks)

5. A fund manager has purchased index futures contract. The closing value of the index as on 24 April 2008 is 4900. A three-month futures contract on the index expiring on 31st July 2008 can be purchased for 5100. The T-bill yield is 6% p.a. Further it is also assumed that 40% of the stocks in the index, which paid dividends last year, will pay dividends during three months also and the dividend yield of 4.5% on the index will remain unchanged. The multiple for the futures contract is 50.

[<Answer>](#)

You are **required** to:

- Calculate the fair value of the index futures contract.

(2 marks)

- Verify whether there exists a scope for risk-free arbitrage using index futures contract, if the index closes at (i) 5,000 or (ii) 4,700 on maturity.

(4 marks)

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. World over, the institutional investors have exerted an important influence on capital markets. Typically, the market turns buoyant under the influence of institutional buying; likewise under the pressure of institutional selling, the market becomes depressed. Explain the key drivers of investment policies of institutional investors.

[<Answer>](#)

(10 marks)

7. The investor wants the asymmetric protection of his portfolio, so that its value will be guaranteed not to fall under a floor value when the market goes down while it will be free to appreciate when the market goes up. This approach of portfolio protection is portfolio insurance. Static portfolio insurance is a type of portfolio insurance. Discuss the practical problems with static portfolio insurance.

[<Answer>](#)

(10 marks)

END OF SECTION C

END OF QUESTION PAPER

Suggested Answers

Portfolio Management and Mutual Funds - I (MSF2D3) : July 2008

Section A : Basic Concepts

Answer	Reason	
1. D	Jensen's measure calculates the differential return generated by a portfolio and not the absolute return so statement I is correct. Sharpe's measure uses standard deviation as a measure of risk and Treynor's measure takes beta or systematic risk as a measure of risk. In case of a fully diversified portfolio, the total risk will be equal to systematic risk. So it is better to use Sharpe's measure to evaluate funds which are not expected to be fully diversified and use Treynor's ratio to evaluate funds which are expected to be fully diversified. Hence, statements (II) and (III) are not correct. So, the correct answer is (d).	< TOP >
2. D	In bond laddering, the investor staggers the maturities of the securities. By doing so he ensures that money is available for reinvestment at regular intervals. If the interest rates decline, the investor will lose on the short-term securities since the entire redemption amount has to be invested whereas he gains from the long-term investments since they remain locked at higher rates. So statement (a) is correct. The downside of this strategy is that no consideration is given to the total return potential of the portfolio. This strategy ensures better diversification, as investments are spread over different time horizons. The coupon inflows are subjected to reinvestment risk, as they have to be reinvested at uncertain interest rates at regular intervals. An evenly distributed portfolio across a maturity ladder helps in offsetting the interest rate risk. Since alternative (d) is not correct, it is the answer.	< TOP >
3. E	The constant dollar value plan requires the investor to lay down action points which are referred to as revaluation points. In case of constant ratio plan, there is no possibility that the money available in the bond portfolio may not be sufficient to rebalance the portfolio. For the effective implementation of the constant dollar value plan, it is necessary to estimate the possibility and extent of the downward fluctuations in the value of the aggressive portfolio. The benefits of the dollar cost averaging will be high in the initial periods of starting the investment. The success of variable ratio plan depends on the accuracy of forecasts. Since alternative (e) is incorrect, it is the answer.	< TOP >
4. C	If the probability of stock price moving up is higher than the probability of the price plummeting an in-the-money call option will facilitate purchase of the stock at the exercise price whereas an out-of-the money put option will facilitate selling at the prevailing market price. So, the correct answer is (c).	< TOP >
5. E	The fair price of a futures contract is given by $F_0 = I_0 + I_0 \times R_f - I_0 D_t$ Where I_0 = Current value of market index R_f = Risk-free rate D_t = Dividend yield on the index. An increase in risk free rate will increase the fair value of the futures contract other things remaining constant. So, obviously I is correct and II is not correct. Similarly a reduction in dividend yield will result into an increase in the fair price of the futures contract. So III is not correct. So the correct answer is (e).	< TOP >
6. B	Let the proportion of investment to be made in GE Shipping be W_A For constructing a minimum risk portfolio the condition to be satisfied is $= \quad \quad \quad = 0.5416$ $\therefore W_A = 54.16\%$	< TOP >
7. C	A long straddle involves buying a call and put options with same exercise price and expiration date. Strip strategy involves buying two puts and one call with same exercise price and expiration date. As strip involves one more put option it can be called as bearish version of straddle.	< TOP >

8. D Duration is always less than the term to maturity in case of coupon paying bonds. Duration decreases when the maturity decreases. Duration is inversely related to yield to maturity. Duration of zero coupon bonds is equal to maturity. Duration is inversely related to the coupon rate. Hence, alternative (d) is answer. [< TOP >](#)
9. B The assumptions of Black Scholes model are : European exercise terms are used, Short selling of securities is permitted, Security trading is continuous, No arbitrage opportunity is possible, There are no transaction costs and taxes. Hence, alternative (b) is answer. [< TOP >](#)
10. A It requires forecasting the direction of interest rate change and the quantum of change. It suggests for investment in long duration bonds when interest rates are expected to decline. It is a active bond management strategy. Hence, alternative (a) is answer. [< TOP >](#)
11. B Safety first model advocates that decision makers do not use mathematical model such as utility analysis and instead focus on reducing bad outcome. Hence (b) is the answer. [< TOP >](#)
12. E Let the stock of Prathibha and Prime be X and Y respectively,
 The α of stock Prathibha = $R_X - (R_f + \beta_X (R_m - R_f))$
 $= 15\% - (6\% + 0.9 (9\%)) = 0.9\%$
 The α of stock Prime = $R_Y - (R_f + \beta_Y (R_m - R_f))$
 $= 16\% - (6\% + 1.2(9\%)) = -0.8\%$
 Stock X would be a good addition since it is undervalued with a positive α . [< TOP >](#)
13. B $\sigma_p^2 = W_f^2 \sigma_f^2 + W_r^2 \sigma_r^2 + 2 W_f W_r \sigma_f \sigma_r \rho_{fr}$ [< TOP >](#)
 Since, standard deviation of Gilt-edged securities is 0 and its' correlation with the equity is also 0, the above formula will be reduced to
 $\sigma_p^2 = W_r^2 \sigma^2$
 $\sigma_p = W_r \sigma$
 $18\% = 20\% W_r$
 $W_r = 18\%/20\% = 0.9$
 $R_p = W_f R_f + W_r R_r = 0.1 \times 6\% + 0.9 \times 18\% = 16.8\%$
 Return (in rupees) = $16.8\% \times 15,00,000 = \text{Rs.}2,52,000$.
14. D Return on the Portfolio(E_r) = $W_A R_A + W_B R_B =$ $= 0.168 = 16.8\%$ [< TOP >](#)
 Portfolio's Beta = $\frac{W_A \beta_A + W_B \beta_B}{W_A + W_B} = \frac{0.5 \times 0.24 + 0.5 \times 0.58}{0.5 + 0.5} = 1.84$
 $\sigma_p^2 = (0.5 \times 0.24)^2 + (0.5 \times 0.58)^2 + 2 \times 0.5 \times 0.5 \times 0.58 \times 0.24 \times 0.24 = 455.04(\%)^2$
 $\sigma_p = 21.33\%$
 Coefficient of Variation = $\sigma_p/E_r = 21.33/16.8 = 1.27$
 Hence (I) and (III) are true. So the correct answer is (d).
15. E Probability of price rise in Binomial Model is given by [< TOP >](#)
 $P = \frac{R - u}{d - u} = \frac{1.06 - 0.5687}{1.1 - 0.5687} = 0.8$
 $\therefore 1 - P = 1 - 0.8 = 0.2$
 Value of the Call Option = $C_u - P C_d$
 $C_{up} = \text{Rs.}81.7$ and $C_d = 0$
 $\therefore$ Value of the Call option = $81.7/1.06 = \text{Rs.}77.08$
16. B $\frac{C_u}{R} = \frac{C_d}{R} = \frac{C}{R}$

Slope of CML =

 $r_f = 6\%$

17. E Money weighted rate of return is not a useful technique for open-ended mutual funds as this technique is dependent on the timing of cash flows and in case of open ended mutual funds there are frequent cash flows. Time weighted rate of return method is also dependent on the intermediate cash flows. Linked internal rate of return method tries to overcome the disadvantages of these methods by calculating periodic rates of return and linking them to calculate the equivalent rate of return for the entire holding period. Hence the correct answer is (e). [< TOP >](#)
18. E The probability of economy being in recession stage is 0.2 and the probability that the stock experiences good performance is 0.2. The probability with which both the conditions will prevail simultaneously is 0.04. [< TOP >](#)
19. B The decision should be to buy the stock. It is because, in your view, the firm is not as bad as everyone else believes it to be. Therefore, you view the firm as undervalued by the market. You are less pessimistic about the firm's prospects than the beliefs built into the stock price. [< TOP >](#)
20. E The bond callable at Rs.108 should sell at a lower price because the call provision is more valuable to the firm, as it can be called at lower price of Rs.108 when compared with the bond callable at Rs.112. Therefore, its YTM should be higher. [< TOP >](#)
21. C Capital Market line depicts the relationship between return and risk. It shows the return expected by investors on efficient portfolios for various levels of risk. It is upward sloping because the investors are risk averse and would like to be adequately compensated for additional risk undertaken by them. Hence (c) is the correct answer. [< TOP >](#)
22. D Coefficient of determination
= Systematic Risk/Total Risk = $(18^2 - 90)/324 = 0.7222$
Coefficient of correlation = 0.85 [< TOP >](#)
23. C 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. [< TOP >](#)
24. B 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. [< TOP >](#)
25. A 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. [< TOP >](#)
26. B If security is exposed to only systematic risk, there is no unsystematic risk. [< TOP >](#)
Unsystematic risk = 0
Beta of market portfolio = 1
Since unsystematic risk of the portfolio should be zero, investment should be only made in market portfolio and risk free assets.
If 40,000 is invested in market portfolio and 1,60,000 in T bills
Beta of portfolio = $W_m \times B_m + W_f \times B_f$
 $= (40,000/2,00,000) \times 1 + (1,60,000/2,00,000) \times 0 = 0.2$
Hence, the ideal combination requires investment of Rs.40,000 in the market portfolio and Rs.1,60,000 in Treasury bills.
27. D Investment management process involves two steps information process and implementation process. [< TOP >](#)
Information process deals with the selection of stocks.
Cashflow motive not information motive arises out of the need to increase or decrease the equity exposure.
Volume of stock trading and frequency of trading are vital for determining the expected cost of liquidity for the appropriate size.
As information is liable to be spread across the market rapidly, it loses value soon.
Hence, alternative (d) is answer.
28. B The portfolio B cannot lie on the efficient frontier because it is dominated by another portfolio. For example, portfolio C has higher expected return and lower standard deviation. [< TOP >](#)
29. D The price of unit at the beginning of the year = $\text{Rs.}15 \times 1.02 = \text{Rs.}15.3$ [< TOP >](#)
The price of unit at the end of the year = $\text{Rs.}15.5 \times 0.96 = 14.88$
The price of the fund fell by -0.42 ($14.88 - 15.3$)
Rate of return = $(2.6 - 0.42)/15.3 = 14.25\%$.
30. C Even if futures are leveraged instruments, in addition to initial margin, the investor has to mark to margin daily by keeping minimum maintenance margin. [< TOP >](#)

Section B : Problems

1. a.

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Maturity (year)	YTM(%)	Price (Rs.)	Forward rate (%)
1	11	900.90	
2	12	797.19	$(1.12^2/1.11) - 1 = 13.01\%$
3	13	693.05	$(1.13^3/1.12^2) - 1 = 15.03\%$

b. We obtain next year's prices and yields by discounting each zero's face values at the forward rates for next year that we derived in part (a):

Maturity (Year)	Price (Rs.)	YTM (%)
1	$1000/1.1301 = 884.88$	13.01
2	$1000/(1.1301 \times 1.1503) = 769.26$	14.02

Note that this year's upward sloping yield curve implies, according to the expectations hypothesis, a shift upward in next year's curve.

c. Next year, the 2-year zero will be a 1-year zero, and will therefore sell at $\text{Rs.} 1000/1.1301 = \text{Rs.} 884.88$. Similarly, the current 3-year zero will be a 2 year zero and will sell for $\text{Rs.} 769.26$

Expected total rate of return:

2-year bond: $(884.88/797.19) - 1 = 0.11 = 11\%$

3-year bond: $(769.26/693.05) - 1 = 0.10996 = 10.996\%$

d. The current price of the bond should equal the value of each payment times the present value of Rs.1 to be received at the "maturity" of that payment. The present value schedule can be taken directly from the prices of zero-coupon bonds calculated above.

Current price = $130 \times 0.9009 + 130 \times 0.79719 + 1,130 \times 0.69305$
 $= 117.117 + 103.6347 + 783.1465 = \text{Rs.} 1003.9$

Similarly, the expected prices of zeros in 1 year can be used to calculate the expected bond value at that time:

Expected price 1 year from now = $130 \times 0.88488 + 1130 \times 0.7692$

$= 115.0344 + 869.2638 = 984.23$

Total expected rate of return = $[130 + (984.23 - 1003.9)]/1003.9$

$= 0.1099 \sim 10.99\%$.

2. a. The premium received by short selling the call options

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Index value = $3360 \times 140 = 4,70,400$

Number of contracts to be purchased = $3,36,00,000/4,70,400 = 71.43 \sim 71$

Premium received = $140 \times 115.43 \times 71 = \text{Rs.} 11,47,374$

Number of units = $3,36,00,000/342.08 = 98,223$

If the premium received is invested in the index fund at current NAV, the number of units additionally bought =

$\text{Rs.} 11,47,374/\text{Rs.} 342.08 = 3354 \text{ units}$

Total number of units = $98,223 + 3,354 = 1,01,577 \text{ shares}$

	NAV (Rs.)	Unoptioned (98223 units)	Long stock + Premium (101577 units)	Premium	Optioned portfolio
0	342.08	33600000	34747460	11,47,374	33600086
1	351.92	34566638	35746978	15,73,204	34173774
2	368.66	36210891	37447377	30,28,122	34419255
3	374.81	36814963	38072075	34,75,521	34596554
4	380.55	37378763	38655127	39,63,575	34691552
5	396.24	38919882	40248870	52,88,080	34960790

Unoptioned	Return relative (R_U)	$(R_U - R_O)$	$(R_U - R_O)^2$	Optioned	Return relative (R_O)	$(R_O - R_O)$	$(R_O - R_O)^2$
33600000				33600086			

34566638	1.02877	-0.00114	0.0000012996	34173774	1.017074	0.009091	0.0000826463
36210891	1.04757	0.01766	0.0003118756	34419255	1.007183	-0.0008	0.00000064
36814963	1.01668	-0.01323	0.0001750329	34596554	1.005151	-0.00283	0.000008
37378763	1.01531	-0.01460	0.00021316	34691552	1.002746	-0.00524	0.00002746
38919882	1.04123	0.01132	0.0001281424	34960790	1.007761	-0.000222	0.000000493
Total	5.14956		0.0008295105		5.039915		0.0001188
Average	1.02991		0.00020738		1.007983		0.0000297
S.D			0.014400611				0.00545

SH_o = Sharpe ratio of the optioned portfolio

SH_u = Sharpe ratio of the unoptioned portfolio

σ_o = Standard deviation of optioned portfolio

$IRAR = (SH_o - SH_u) \sigma_o$

$SH_u = (0.02991 - 0.001154) / 0.014400611 = 1.9969$

$SH_o = (0.007983 - 0.001154) / 0.00545 = 1.253$

$IRAR = (1.253 - 1.9969) \times 0.00545 = -0.00405/\text{week}$

Annualized IRAR = -21.08%

b. According to this approach, positive IRAR reflects above average performance, while a negative IRAR shows that the portfolio would have performed better in the absence of options. Since IRAR is negative in the present case, it can be said that the portfolio would have performed better in the absence of options. It is due to the fact that the market has performed as against to her expectations of fall in price.

3. Assume the proportion invested in Oriental Trimax, Orient Bank and Orient Hotel are X_A , X_B and X_C respectively. Minimize (Total risk of portfolio) [< TOP >](#)

$$Z = 361.25 + 500 + 281.25 + (2 \times 112.5 \times X_A X_B) + (2 \times 175 \times X_A X_C) + (2 \times 243.75 X_C X_B) \quad (I)$$

Subject to:

$$22.5X_A + 25X_B + 16.25X_C = 20 \quad (II)$$

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

We have to incorporate the return constraint (II) as part of the objective function (I) 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 (III) in both the equations (I) and (II) and this replacement will transform the equation (I) into two variable equations.

$$\begin{aligned} Z &= 361.25 + 500 + 281.25 (1 - X_A - X_B)^2 + (2 \times 112.5 \times X_A X_B) + 2 \times 175 X_A \times (1 - X_A - X_B) + 2 \times 243.75 X_B (1 - X_A - X_B) \\ &= 361.25 + 500 + 281.25 (1 + + + 2X_A X_B - 2X_A - 2X_B) + 350 X_A (1 - X_A - X_B) \\ &\quad + 487.5 X_B (1 - X_A - X_B) + 225 X_A X_B \\ &= 361.25 + 500 + 281.25 + 281.25 + 281.25 + 562.5 X_A X_B - 562.5 X_A - 562.5 X_B + 350 X_A - 350 \\ &\quad - 350 X_A X_B + 487.5 X_B - 487.5 X_A X_B - 487.5 + 225 X_A X_B \\ &= 361.25 + 281.25 - 350 + 500 + 281.25 - 487.5 + 562.5 X_A X_B - 350 X_A X_B - 487.5 X_A \\ &\quad X_B + 225 X_A X_B - 562.5 X_A + 350 X_A - 562.5 X_B + 487.5 X_B + 281.25 = 0 \end{aligned}$$

$$= 292.5 + 293.75 - 50 X_A X_B - 212.5 X_A - 75 X_B + 281.25 = 0$$

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

$$22.5X_A + 25X_B + 16.25(1 - X_A - X_B) = 20$$

$$22.5X_A + 25X_B + 16.25 - 16.25X_A - 16.25X_B = 20$$

$$= 6.25X_A + 8.75X_B = 3.75$$

$$\text{or } 6.25X_A + 8.75X_B - 3.75 = 0 \quad (\text{IV})$$

Using lagrangian multiplier, the revised objective function is

$$Z = 292.5 + 293.75 - 50X_A X_B - 212.5 X_A - 75 X_B + 281.25 + \lambda (6.25X_A + 8.75X_B - 3.75)$$

$$= 292.5 + 293.75 - 50 X_A X_B - 212.5 X_A - 75 X_B + 281.25 + 6.25X_A\lambda + 8.75X_B\lambda - 3.75\lambda$$

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

$$= 585X_A - 50 X_B - 212.5 + 6.25\lambda = 0 \quad (\text{V})$$

$$= 587.5 X_B - 50 X_A - 75 + 8.75\lambda = 0 \quad (\text{VI})$$

$$= 6.25X_A + 8.75X_B - 3.75 = 0 \quad (\text{VII})$$

$$\text{From (V)} \times 8.75 \text{ we get } 5118.75X_A - 437.5 X_B + 54.6875\lambda = 1859.375$$

$$\& \text{ (VI)} \times 6.25 \text{ we get } -312.5 X_A + 3671.875 X_B + 54.6875\lambda = 468.75$$

$$\begin{array}{rcl} & + & - & - & - \\ \text{On subtracting} & 5431.25X_A & - 4109.375 X_B & & = 1390.625 \quad (\text{VIII}) \end{array}$$

Taking (VII) and (VIII) we have:

$$5431.25X_A - 4109.375 X_B = 1390.625$$

$$6.25X_A + 8.75 X_B = 3.75$$

$$\text{From (VIII)} \times 6.25 \text{ we get } 33945.31 X_A - 25683.59 X_B = 8691.41$$

$$\& \text{ (VII)} \times 5431.25 \text{ we get } 33945.31 X_A + 47523.44 X_B = 20367.19$$

$$\begin{array}{rcl} \text{On subtracting} & - 73207.03X_B & = - 11675.78 \end{array}$$

$$X_B = 15.95\%$$

$$6.25X_A + 8.75X_B = 3.75$$

$$X_A =$$

$$X_A = 37.67\%$$

$$X_C = 1 - 0.1595 - 0.3767$$

$$= 46.38\%$$

$$R_p = 0.3767 \times 22.5 + 0.1595 \times 25 + 16.25 \times 0.4638 = 20\%$$

4.

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Stock price	Value of Buy and hold portfolio (Rs. in lakhs)	Value of conservative portfolio (Rs. in lakhs)	Value of aggressive portfolio (Rs. in lakhs)	Total value of variable ratio portfolio (Rs. in lakhs)	Aggressive to Conservative portfolio	Revision	Total No. of shares in aggressive portfolio
300	50.00	25	25.00	50.00	1:1	–	8,333
285	47.50	25	23.75	48.75	0.95:1	–	8,333
270	45.00	25	22.50	47.50	0.90:1	–	8,333
255	42.50	25	21.25	46.25	0.85:1	–	8,333
240	40.00	25	20.00	45.00	0.80:1	–	8,333
225	37.50	25	18.75	43.75	0.75:1	–	8,333
225	37.50	17.5	26.25	43.75	0.60:0.40	Buy 3,333	11,666
240	40.00	17.5	28.00	45.50	1.6:1	–	11,666
255	42.50	17.5	29.75	47.25	1.7:1	–	11,666
270	45.00	17.5	31.50	49.00	1.8:1	–	11,666
285	47.50	17.5	33.25	50.75	1.9:1	–	11,666
285	47.50	30.45	20.30	50.75	0.4:0.6	Sell 4,544	7,122
300	50.00	30.45	21.37	51.82	0.70:1	–	7,122
315	52.50	30.45	22.43	52.88	0.74:1	–	7,122
330	55.00	30.45	23.50	53.95	0.77:1	–	7,122

Stock price	Value of Buy and hold portfolio (Rs. in lakhs)	Value of conservative portfolio (Rs. in lakhs)	Value of aggressive portfolio (Rs. in lakhs)	Total value of variable ratio portfolio (Rs. in lakhs)	Aggressive to Conservative portfolio	Revision	Total No. of shares in aggressive portfolio
345	57.50	30.45	24.57	55.02	0.81:1	–	7,122
360	60.00	30.45	25.64	56.09	0.84:1	–	7,122
360	60.00	33.65	22.44	56.09	0.4:0.6	Sell 889 shares	6,233
375	62.50	33.65	23.37	57.02	0.7:1	–	6,233

5. a. The fair value of the futures contract is given by

$$F_0 = I_c + I_c (R_f - D)$$

$$\therefore \text{the fair value of the futures contract} = 4900 + 4900 (0.06 \times 0.25 - 0.4 \times 0.045) = 4,885.3$$

The futures contract is available at 5100. Hence it is overpriced.

- b. Since the futures is overpriced there is scope for arbitrage profit.

Go short in futures.

Go Long on stocks.

Index closes at 5,000

$$\text{Gain on futures} = (5,100 - 5,000) \times 50 = \text{Rs.} 5,000$$

$$\text{Gain on stocks} = (5,000 - 4,900) \times 50 = \text{Rs.} 5,000$$

$$\text{Dividends received} = (4,900 \times 0.4 \times 0.045) \times 50 = \text{Rs.} 4,410$$

$$\text{Net Gain} = \text{Rs.} 14,410$$

Index closes at 4700

$$\text{Gain on futures} = (5100 - 4700) \times 50 = \text{Rs.} 20,000$$

$$\text{Loss on stocks} = (4900 - 4700) \times 50 = \text{Rs.} 10,000$$

$$\text{Dividends received} = 4,900 \times 0.4 \times 0.045 \times 50 = \text{Rs.} 4,410$$

$$\text{Net Gain} = \text{Rs.} 14,410$$

Section C: Applied Theory

6. Drivers of investment policies

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The key drivers of the investment policy of an insurance company are as follows:

- Asset Liability Matching
- Regulatory and Legal considerations
- Tax considerations
- Liquidity needs
- Unique Needs, Circumstances and references.

Asset-Liability Matching

An important principle of insurance investment is to “match” assets with liabilities. Absolute matching would mean choosing assets to produce a stream of cashflows identical to the investor’s emerging liabilities. Unfortunately, absolute matching is unattainable for many institutional investors due to the non-existence of assets which fit the characteristics of the liabilities. But where liabilities are fixed in monetary terms and are not of too long maturities, it is possible to ensure that the present value of assets and liabilities are

influenced by the same and exactly matching liabilities. This process is known as immunization. In general immunization requires the following conditions to be fulfilled.

1.	Duration (Assets)	Duration (Liabilities)
2.	PV (Assets)	PV (Liabilities)
3.	Dispersion (Assets)	Approximately equal to the duration of assets.
4.	Dispersion (Liabilities)	Approximately equal to the duration of liabilities.

Regulatory and Legal Considerations

Most institutional investors are regulated regarding the eligible class of assets, the minimum and/or maximum amount that can be placed in a particular asset class, and the maximum amount that can be invested in a given asset. Within an asset class, there can be restrictions on the particular assets eligibility for investment.

Regulatory restrictions on investment patterns and on the inclusion of certain types of investment vehicles obviously reduce the insurance companies' investor's ability to achieve a better risk-return trade off. For example, strategies involving futures and options may allow the insurance company to achieve unique risk-return speculative by the regulators. These derivative instruments may not qualify as eligible investment vehicles. Fortunately, in the recent years, more and more regulators have become familiar with the economic role of these instruments, and they have broadened their position regarding the use of new financial products by the institutions they regulate. In fact, there is a trend to replace traditional "laundry lists" of approved investments by the "Prudent Man Rule" which allows the insurance companies the much needed flexibility to keep up with the ever changing array of investment alternatives.

Tax Considerations

Institutional investors like Pension Funds are basically tax-exempt entities; and would therefore; tilt their portfolios to high-yield stocks if the high-yield stocks offer higher pre-tax returns. In the Indian context, we are aware that approved mutual funds are exempt from taxes under Sec. 10(23-D) of the Income Tax Act. But there are other institutional investors such as banks and insurance companies which are subject to income taxes. Therefore, the investment policies of such investors must consider the tax factor and the nuances of the tax code applicable to them.

Liquidity Considerations

The degree of liquidity required by an insurance company varies significantly. For example, the liquidity needs of a life assurance company are considerably less than those of a non-life insurance company transacting marine or fire insurance business. Even among companies transacting non-life insurance business, mature companies may be less concerned with liquidity than newly created companies. In the pension area, the liquidity needs of a pension fund will depend upon the current age distribution of future beneficiaries, with relatively young plans of growing firms having less need for liquidity than older plans where considerable benefits must be paid in the near future. In the mutual funds industry, open-ended schemes need to have more liquidity in their portfolios than close-ended schemes. A need for liquidity implies a need to tilt the portfolio to the most readily marketable and liquid types of bonds and money-market instruments such as Treasury Bills and Commercial Paper.

Unique Needs, Circumstances and Preferences

Portfolio construction would be sterile without a provision for the special requirements of each investor like social responsibility, issues that may preclude investing in firms that make objectionable products or do business, in certain countries. The investment committee of the institution may have a pre-defined portfolio structure where the quality and/or the maturity range of the portfolio holdings are restricted. Such considerations must be taken into account while framing the investment policy.

7. Practical Problems with Static Portfolio Insurance:

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Static portfolio insurance suffers from a series of major problems:

The maximum maturity quoted is often much shorter than the desired horizon for the protection and is also rarely liquid enough. Suppose, there is no liquidity on the desired option beyond 6 months. After each 6-month period, a roll over can be effected but this practice is costly. The effective cost of the protection is only known when the last premium is paid and it depends largely on the moves of the underlying asset until maturity of the protection (this is called a path dependent insurance and this property is clearly undesirable);

Sometimes only American options are available. American options can be more expensive than the European ones, but the investor cares only about the value of his/her portfolio at expiration and would be happier with European options;

Options on the exchanges are standardized: only a few exercise prices and maturities are used. Moreover, the underlying asset used for the options may differ from the portfolio to be insured;

Liquidity on the desired options may fall short;

Option on the underlying asset may not exist. In Switzerland, for example, listed puts do not exist for all securities;

In the case of a portfolio, the total risk is not the sum of the individual risks and it would be expensive and unnecessary to purchase puts for each individual risk; what is needed is in fact a put for the whole portfolio.

For these reasons, other insurance strategies have been developed in a dynamic (rather than static) framework.

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