

Question Paper

Portfolio Management and Mutual Funds - I (MSF2D3) : July 2007

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. The portfolio composition of Mr. Sujith is given below:

[< Answer >](#)

Equity	Rs.360 lakh
Cash / Cash equivalents	Rs.90 lakh
Total	Rs.450 lakh

The beta of the equity portfolio is 0.89. The current NSE index futures value is 3820 with a multiple of 200. To achieve an overall portfolio beta of 1.12, the number of futures contracts Mr. Sujith should go long is

- (a) 15 contracts
 (b) 24 contracts
 (c) 42 contracts
 (d) 85 contracts
 (e) 98 contracts.
2. Which of the following statements is/are **true** with respect to ExMark?

[< Answer >](#)

- I. It is a term that defines the relationship between a fund's return and return on a market index.
 II. An ExMark below 80% indicates more predictability of relative performance.
 III. Funds with an ExMark of 95% or above provide little opportunity to add value over and above the market's return.

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

3. 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.
4. 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) Strip
 (b) Strap
 (c) Strangle
 (d) Bearish spread using call
 (e) Bearish spread using put.

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

[< Answer >](#)

- I. Return from net selectivity is zero.
 II. Return from net selectivity will be equal to return from total selectivity.
 III. Unsystematic risk is zero.
 IV. Return from net selectivity will be equal to 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.
6. An investor has Rs.1,00,000 to invest and he wants to construct a portfolio which would be exposed to only systematic risk with a beta of 0.60. Which of the following strategies can provide his desired objective? [< Answer >](#)
- Invest Rs.1,00,000 in the market portfolio
 - Invest Rs.60,000 in the market portfolio and Rs.40,000 in treasury bills
 - Invest Rs.1,00,000 in a stock with beta of 0.60
 - Borrow Rs.1,00,000 so that he can invest a total of Rs.2,00,000 in the market portfolio
 - Invest Rs.60,000 in a stock with beta of 0.60 and Rs.40,000 in treasury bills.
7. An active portfolio manager faces a trade-off between [< Answer >](#)
- Using the Sharpe measure.
 - Holding too much of the risk-free asset.
 - Exploiting perceived security mispricings.
 - Using mean-variance analysis.
 - Letting a few stocks dominate the portfolio.
- Both (I) and (II) above
 - Both (II) and (V) above
 - Both (III) and (V) above
 - Both (III) and (IV) above
 - Both (II) and (III) above.
8. The Sharpe ratio and Treynor ratio of Reliance Equity Fund are 0.48 and 5.26 respectively. Standard deviation of the fund's return is 13.15%. The beta of the fund is approximately [< Answer >](#)
- 0.80
 - 1.05
 - 1.20
 - 1.35
 - 1.50.
9. The following is the information pertaining to an open-ended mutual fund scheme: [< Answer >](#)

Particulars	Rs. in million
Value of investments	360.0
Receivables	18.4
Accrued income	8.6
Other current assets	47.6
Liabilities	37.2
Accrued expenses	11.4

If the number of outstanding units is 182 lakh and the entry load charged by the fund is 2.5%, the public offer price is approximately

- Rs.12.4145
 - Rs.15.4512
 - Rs.18.4274
 - Rs.21.7526
 - Rs.28.3664.
10. For computing the variance of a portfolio consisting of certain number of securities, we will have to compute 325 unique covariance terms. The number of variance terms in the portfolio is [< Answer >](#)
- 19
 - 23
 - 26
 - 29
 - 33.
11. The beta of a mutual fund scheme is 1.6 and variance of its returns is $384 (\%)^2$. The variance on market's return is $100 (\%)^2$. The proportion of variance of its returns not explained by the market is [< Answer >](#)
- 0.88
 - 0.75
 - 0.67
 - 0.33
 - 0.22.
12. The intrinsic value of an out-of-the-money call option is [< Answer >](#)
- Call premium
 - Stock price minus exercise price
 - Negative

- (d) Strike price
- (e) Zero.

13. An investor can construct a portfolio that lies to the right of the optimal risky portfolio on asset allocation line by

[< Answer >](#)

- I. Borrowing at the risk-free rate and investing in the optimal risky portfolio.
- II. Lending some money at the risk-free rate and investing the remainder in the optimal risky portfolio.
- III. Investing only in risk free security.

- (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.

14. Convexity of a bond can be viewed as the sensitivity of the

[< Answer >](#)

- (a) Duration to the term to maturity
- (b) Market price to the interest rates
- (c) Market price to the duration
- (d) Market price to the term to maturity
- (e) Duration to interest rates.

15. Which of the following information is required by a portfolio manager for making an international diversification successful?

[< Answer >](#)

- I. Returns available in different countries.
- II. The risk attached to each foreign market.
- III. The correlation coefficient between domestic market and international markets.

- (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.

16. Duration of a bond portfolio is 8 years and its average YTM is 12.60%. If average YTM increases to 12.70%, the percentage change in value of the portfolio is

[< Answer >](#)

- (a) + 0.36%
- (b) - 0.71%
- (c) - 1.12%
- (d) + 0.71%
- (e) + 1.12%.

17. Which of the following measures indicates the percentage of the variance in the portfolio's returns that is explained by the market's returns?

[< Answer >](#)

- (a) Coefficient of determination
- (b) Coefficient of correlation
- (c) Standard deviation
- (d) Variance
- (e) Alpha.

18. Which of the following factors represent the value measure as explained by Goldman Sachs Asset Management (GSAM) Factor Model?

[< Answer >](#)

- (a) Price Momentum
- (b) Retained EPS/Price
- (c) Estimate revisions
- (d) Beta
- (e) Disappointment risk.

19. Which of the following statements is/are **not true** with respect to Dollar Cost Averaging (DCA)?

[< Answer >](#)

- I. The benefits of DCA will be high in the latter periods of investment cycle.
- II. The DCA helps in figuring out the stocks to be invested.
- III. This technique is suitable for those who are building a fund with periodical inflows.

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

20. Which of the following statements is/are **true** with respect to the duration of a bond?

[< Answer >](#)

- I. Duration is always less than the term to maturity for bonds paying coupon interest.
- II. Duration is directly related to frequency of coupon payments.
- III. Duration decreases as the maturity increases.
- IV. Duration is directly related to yield to maturity.

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

21. Consider the following information:

[< Answer >](#)

	Return (%)	Risk (%) ²	Beta (Sensitivity of Returns of Ranbaxy's stock)	
			With Sensex	With Pharma index
Ranbaxy	15	684	1.25	1.56
Sensex	20	420		
Pharma Index	22	490		

What is the approximate unsystematic risk associated with the returns of stock of Ranbaxy?

- (a) 18.25(%)²
- (b) 27.75(%)²
- (c) 112.35(%)²
- (d) 146.45(%)²
- (e) 163.75(%)².

22. Consider the following information pertaining to stocks of three companies:

[< Answer >](#)

Stock	Realized Return (%)	Beta
Satyam	22.00	1.40
Grasim	17.50	1.10
Maruti	8.00	0.23

A portfolio consists of above three stocks in equal proportions. If the market index generates a return of 18% and the risk free rate is 6%, the excess return generated by the portfolio is

- (a) -1.75%
- (b) -1.62%
- (c) -1.09%
- (d) +1.75%
- (e) +1.09%.

23. The portfolio rebalancing should ensure that

[< Answer >](#)

- (a) The systematic risk remains constant
- (b) The unsystematic risk remains at unity
- (c) The systematic risk remains at unity
- (d) The systematic risk remains at zero
- (e) The total risk does not exceed unity.

24. A zero-investment portfolio with a positive expected return arises when

[< Answer >](#)

- (a) An investor has downside risk only
- (b) There is a difference between risk free lending and borrowing rates
- (c) A risk free arbitrage opportunity exists
- (d) The purchasing power parity exists
- (e) An investor has upside risk only.

25. All the efficient portfolios of the CML are also located on the SML but opposite is not true. This is because

[< Answer >](#)

- I. A portfolio of risky assets will have an expected return in proportion to its beta as predicted by SML.
- II. Every portfolio that lies on the SML need not be efficient and therefore cannot lie on the CML.
- III. Efficient portfolios are rare portfolios and very difficult to form.

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

26. The expected return on the market portfolio is 18% and the standard deviation of its returns is 28%. If the risk free rate of return is 6%, the slope of capital market line would be

[< Answer >](#)

- (a) 0.20

- (b) 0.34
- (c) 0.43
- (d) 0.67
- (e) 0.86.

27. The current value of Sensex is 13,380 and the annualized dividend yield on the index is 3.5%. The risk free interest rate is 6.5% p.a. If 25% of stocks forming part of the Sensex are likely to pay dividends during the next 3 months, the cost of carry for the 3 month stock index futures is [< Answer >](#)

- (a) Rs. 69.69
- (b) Rs. 81.25
- (c) Rs.100.35
- (d) Rs.127.65
- (e) Rs.151.35.

28. Key motives for trading are value, information and cash flows. Which of the following statements is/are **true** with respect to these key motives? [< Answer >](#)

- I. Value traders, by reducing the time of the trading, can reduce the cost of trading.
- II. Information traders tend to be more careful with respect to the time.
- III. Cash-flow motives arise out of the need to increase or decrease the equity exposure.

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

29. Immunization is not strictly a passive strategy because [< Answer >](#)

- (a) It requires choosing an asset portfolio that matches an index
- (b) There is likely to remain a slight gap between the duration of assets and liabilities in most portfolios
- (c) Durations of assets and liabilities fall at the same rate
- (d) It requires frequent rebalancing as maturities and interest rates change
- (e) It requires to buy and sell securities with the passage of time.

30. Which of the following statements are **true** with respect to bond laddering strategy? [< Answer >](#)

- I. Bond laddering means buying bonds scheduled to mature at several different dates in the future, rather than all at the same time.
- II. A bond laddering is an effective tool for some one who needs to ride the yield curve.
- III. In bond laddering each group of bonds represents a rung on the investment maturity ladder.
- IV. Bond laddering is an active bond management strategy.

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

[< Answer >](#)

1. Consider the following information pertaining to a bond issued by Rolta Industries Limited:

Date of issue	Years to maturity	Face value and Redemption value	Coupon
02.07.2007	4	Rs.1,000	9% paid annually

The yield to maturity from the same quality bonds of 4 year maturity is 9.5%, 3 year maturity is 9.25%, 2 year maturity is 9% and 1 year maturity is 8.75%. The yields for all the maturities are expected to decline by 25 basis points after one year.

You are **required** to

- Find total return from the bond over a one year period.
- Show that the total return from the bond is equal to the sum of
 - Current yield
 - Amortization of premium or discount
 - Price change due to slope
 - Price change due to shift in yield curve.

(4 + 4 = 8 marks)

2. Mr. Ajay is trying to construct an optimal portfolio with least risk and a target return of 18% p.a. from the three stocks namely Sundaram Finance, Century Textiles and Tech Mahindra. The relevant market data is given as under:

[< Answer >](#)

Stock	Expected return (%)	Standard deviation (%)	Variance-covariance matrix (%) ²		
			Sundaram Finance	Century Textiles	Tech Mahindra
Sundaram Finance	20	20	336	120	170
Century Textiles	22	22	120	440	200
Tech Mahindra	15	15	170	200	280

You are **required** to calculate the proportions of funds to be invested in each of the three securities by Mr. Ajay so as to generate target return with least possible risk.

(12 marks)

3. Performance of two portfolios managed by two portfolio managers Danial and Dolphin, along with the benchmark, is given below:

[< Answer >](#)

Asset class	Benchmark		Portfolio managed by Danial		Portfolio managed by Dolphin	
	Weight (%)	Return (%)	Weight (%)	Return (%)	Weight (%)	Return (%)
Stocks	70	16	60	10	40	12
Bonds	20	10	30	7	40	6
Cash and Equivalents	10	6	10	4	20	3

You are **required** to

- Compare the total value added by the two portfolio managers.
- Calculate the total value added by the selection and allocation abilities of the portfolio managers.

(2 + 6 = 8 marks)

4. Consider the following data pertaining to stocks of three companies.

[< Answer >](#)

Scenario	Probability (%)	Returns from stocks		
		ONGC (%)	HDFC (%)	ACC (%)
Optimistic	20	50	40	20
Most likely	70	35	28	15
Pessimistic	10	20	22	-15

You are **required** to determine whether investing in a combination of all the three stocks in equal proportions is better than investing in any one stock.

(10 marks)

[< Answer >](#)

5. Mr. Pandit has 10,000 shares of Bharati Airtel. Each share of Bharati Airtel is currently trading in the market at the price of Rs.720. Mr. Pandit would like to defer selling the stock until October 2007. In October 2007, however he will need to sell all his holdings to provide for a down payment on his new house. In order to hedge the price risk involved, he is considering the following three strategies:

Strategy A: To write October 2007 call options on Bharati Airtel shares with a strike price of Rs.750 each. Each of these calls is currently selling at a premium of Rs.75.

Strategy B: To buy October 2007 put options on Bharati Airtel shares with a strike price of Rs.710 each. Each of these options is available at a premium of Rs.75.

Strategy C: To write October 2007 call options at a strike price of Rs.750 each and to buy October 2007 put options at a strike price of Rs.710 each. The premium is Rs.75 in each case.

You are **required** to determine the pay-off for each strategy and suggest the best strategy for Mr. Pandit.

(4 + 4 + 4 = 12 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. Mutual funds are said to be the best for small investors as mutual funds provide professional management for the funds collected by them. What are the other advantages and disadvantages of mutual funds?

[< Answer >](#)

(10 marks)

7. Asset allocation is one of the crucial steps in the process of portfolio building. Discuss the different types of asset allocation.

[< Answer >](#)

(10 marks)

END OF SECTION C

END OF QUESTION PAPER

Suggested Answers

Portfolio Management and Mutual Funds-I (MSF2D3): July 2007

Section A : Basic Concepts

1. Answer : (b)

[< TOP >](#)

$$\text{Reason : } F_e \times \beta_e + F_c \times \beta_c + F_f \times \beta_f = F_p \beta_p$$

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.

$$360,00,000 \times 0.89 + 90,00,000 \times 0 + 3,820 \times 200 \times \text{Number of futures contracts} \\ = 1.12 \times 450,00,000$$

$$\text{Number of futures contracts} = 24.03 \text{ i.e., 24 futures contract.}$$

2. Answer : (c)

[< TOP >](#)

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 little opportunity to add value over and above the market's return. Since statements (I) and (III) are true, alternative (c) is answer.

3. Answer : (b) [< TOP >](#)
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.
4. Answer : (a) [< TOP >](#)
Reason : 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.
5. Answer : (b) [< TOP >](#)
Reason : If the coefficient of correlation of a portfolio with market index is 1 then its unsystematic risk is zero as unsystematic risk =
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.
6. Answer : (b) [< TOP >](#)
Reason : If security is exposed to only systematic risk, there is no unsystematic risk.
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 60,000 is invested in market portfolio and 40,000 in T bills
Beta of portfolio = 0.6
Hence, the ideal combination requires investment of Rs.60,000 in the market portfolio and Rs.40,000 in Treasury bills.
7. Answer : (e) [< TOP >](#)
Reason : An active portfolio manager faces a tradeoff between holding too much of the risk-free asset and exploiting perceived security mispricings.
8. Answer : (c) [< TOP >](#)
Reason :
$$= \frac{10.96\%}{1.15} = 9.53\%$$

$$= 13.15\%$$

$$= 1.2.$$
9. Answer : (d) [< TOP >](#)
Reason: NAV of the fund unit =
$$= 21.2088$$

The public offer price (POP) = Rs.21.7526.
10. Answer : (c) [< TOP >](#)
Reason : Number of unique covariances = $n(n-1) / 2 = 325$.
$$(n^2 - n) / 2 = 325$$

$$n^2 - n = 650$$

$$n^2 - n - 650 = 0$$

$$n^2 - 26n + 25n - 650 = 0$$

$$n(n-26) + 25(n-26) = 0$$

$$(n-26)(n+25) = 0$$

$$n = 26 \text{ or } n = -25$$

Since the existence of negative number of shares is not possible,
$$n = 26.$$
11. Answer : (d) [< TOP >](#)
Reason : Systematic Risk = $1.6^2 \times 100 = 256 (\%)^2$
Proportion of risk not explained by the market = $(384 - 256) / 384 = 0.33$.
12. Answer : (e) [< TOP >](#)
Reason : The option premium can be broken down into two components - intrinsic value and time value. The intrinsic value of a call is $\text{Max} [0, (S_t - K)]$. Similarly, the intrinsic value of a put is $\text{Max} [0, (K - S_t)]$, where K is the strike price and S_t is the spot price. Options which are OTM and ATM have only time value and they do not have intrinsic value and hence, their intrinsic value is zero. Hence, alternative (e) is

answer.

13. Answer : (a)

[< TOP >](#)

Reason : By borrowing at the risk-free rate and investing in the optimal risky portfolio, an investor can form the portfolio which lies right to the risky portfolio on asset allocation.

By lending some money at the risk-free-rate and investing remainder in the optimal risky portfolio an investor can form the portfolio which lies left to the risky portfolio on asset allocation. Investing only in risk-free assets will ensure that portfolio will lie on Y axis. Hence, statements (I) correct and alternative (a) is answer.

14. Answer : (e)

[< TOP >](#)

Reason : Duration is a measure of the approximate sensitivity of a bond's value to rate changes. Duration is in fact a first (linear) approximation for small change in interest rates. The approximation can be improved by using second approximation. This approximation is referred as convexity. Therefore, convexity can be viewed as sensitivity of duration to interest rates.

15. Answer : (e)

[< TOP >](#)

Reason : An international portfolio manager requires the following information. (a) Return available in different countries. (b) The risks attached to each foreign market and (c) The coefficient of correlation between domestic market and other foreign markets. All (I), (II) and (III) is correct.

16. Answer : (b)

[< TOP >](#)

Reason : Change in YTM = $12.7 - 12.6 = 0.10\%$

Change in price of the bond = -0.71% .

17. Answer : (a)

[< TOP >](#)

Reason : Portfolio alpha is a measure of the excess return generated on the portfolio. Standard deviation and variance are measures of total risk of the portfolio. Coefficient of correlation is a measure of the comovement in the returns on the securities constituting the portfolio or of the comovement between the return on market index and the return on the portfolio. Coefficient of determination (r^2) is a measure of the variance in the portfolio's return that is explained by the market's return.

18. Answer : (b)

[< TOP >](#)

Reason : Goldman Sachs Asset Management factor model uses the following three measures.

- (i). Value
- (ii). Growth and momentum
- (iii). Risk

The factors used in this model are

Value		Growth and Momentum		Risk	
i.	Book/Price	i.	Estimate revisions	i.	Beta
ii.	Retained EPS/Price	ii.	Price momentum	ii.	Residual risk
iii.	EBITD/Enterprise value	iii.	Sustainable growth	iii.	Disappointment risk

Retained EPS/Price is value measure. Price momentum and estimate revisions growth and momentum measures. Beta and disappointment risk are risk measures. Hence, (b) is answer.

19. Answer : (c)

[< TOP >](#)

Reason : The benefits of DCA is high in the initial periods of starting the investments. It does not attempt any active investment policy by figuring out the stocks for the purpose. This technique is suitable for those who are building a fund with periodical inflows. Since statements (I) and (II) are false, alternative (c) is answer.

20. Answer : (a)

[< TOP >](#)

Reason : For bonds which pay periodic coupons, the duration is always less than the term to maturity. This is because the investor recovers a part of his investment every year. When due weightage is given to the recoveries made in the intermediate periods, the bond's duration will be shorter than the term to maturity. Duration is inversely related to frequency of coupon payments. As the maturity of a coupon-bearing bond is lengthened, the duration also increases, albeit at a slower rate. Duration is inversely related to yield to maturity. Hence, alternative (a) is answer.

21. Answer : (b)

[< TOP >](#)

Reason : Unsystematic Risk = Total risk – Systematic risk

$$= 684 - (1.25^2 \times 420)$$

$$= 684 - 656.25 = 27.75\%$$

22. Answer : (c)

[< TOP >](#)

Reason : Realized return on the portfolio = $(22 + 17.5 + 8)/3 = 15.83\%$
 Portfolio beta = $(1.4 + 1.1 + 0.23)/3 = 0.91$

$$\text{Expected return on the portfolio} = R_f + \beta_p(R_m - R_f) = 6 + 0.91(18 - 6) = 16.92\%$$

$$\text{Excess return} = 15.83 - 16.92 = -1.09\%.$$

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

Reason : The portfolio balancing should always ensure that systematic risk of portfolio remains constant.

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

Reason : Under the risk-free arbitrage opportunity, an investor can make riskless profit due to market inefficiency in semi-strong form i.e., the fundamentals may not be reflected in the current market price of the asset or its derivatives.

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

Reason : All portfolios, efficient and inefficient can be plotted on SML but only efficient portfolios can be plotted on CML. Clearly (II) is correct. Again a portfolio of risky assets will have an expected return in proportion to its beta as predicted by SML. Hence (I) is correct.

Efficient portfolios are not rare portfolios hence (I) and (II) are correct and (d) is the answer.

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

$$\text{Reason : Slope of CML} = \frac{R_M - R_f}{\sigma_M} = 0.43.$$

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

$$\text{Reason : Cost of carry} = I(R_f - D)$$

$$= 13380(0.065 \times 0.25 - 0.25 \times 0.035)$$

$$= \text{Rs.}100.35.$$

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

Reason: Value traders, by extending the time of the trading, can reduce the cost of trading; information traders tend to be more careful with respect to the time as information loses value with the passage of time. Cash-flow motives arise out of the need to increase or decrease the equity. Hence, statements (II) and (III) are true and alternative (d) is the correct answer.

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

Reason : Immunization is an approach where the bond manager matches the duration of portfolio with the current investment horizon to get the promised yield and neutralize the effect of interest rate change. However, the immunized portfolio require periodic rebalancing because of ever changing duration of the bond portfolio as well as the yield which is in contravention of the assumption under immunization.

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

Reason : Bond laddering is a passive bond management strategy where the purpose is to match the assets with liability in the terms of maturity. Here the effort is not made to take advantage of change in yield curve.

Section B : Problems

1. a. Current Market Price, [< TOP >](#)

$$\begin{aligned} P_0 &= 90 \times \text{PVIFA}(9.5\%, 4) + 1,000 \times \text{PVIF}(9.5\%, 4) \\ &= 90 \times 3.204 + 1000 \times 0.696 = \text{Rs.}984.36 \end{aligned}$$

Market price of bond after 1 year at discount of 9% as per new yield curve

$$\begin{aligned} P_1 &= 90 \times \text{PVIFA}(9\%, 3) + 1,000 \times \text{PVIF}(9\%, 3) \\ &= 90 \times 2.531 + 1000 \times 0.772 = \text{Rs.}999.79 \end{aligned}$$

Total return for holding the bond for a year

$$\begin{aligned} &= (\text{coupon income} + \text{price change}) / \text{initial price} \\ &= [(90 + (999.79 - 984.36)) / 984.36] \\ &= 0.1071 \text{ i.e., } 10.71\%. \end{aligned}$$

b. Market price of bond after 1 year at the discount rate of 9.5% assuming a flat yield curve

$$= 90 \times \text{PVIFA}(9.5\%, 3) + 1000 \times \text{PVIF}(9.5\%, 3)$$

$$= 90 \times$$

$$= 90 \times 2.509 + 1,000 \times 0.762 = \text{Rs.}987.81$$

Market price of bond after 1 year at the discount rate of 9.25%

$$= 90 \times$$

$$= 90 \times 2.52 + 1000 \times 0.767 = \text{Rs.}993.8$$

Total Return = C + A + R + I

i. Current yield, C = = 0.0914 i.e., 9.14%

ii. Amortization of premium/discount, A =

$$= = 0.0035 \text{ i.e. } 0.35\%$$

iii. Price change due to slope, R = = 0.0061 i.e., 0.61%

iv. Return on account of change in Interest Rate, I = = 0.0061 i.e., 0.61%

Therefore, total return = 9.14 + 0.35 + 0.61 + 0.61 = 10.71% i.e. 10.71% as arrived in (a) above.

2. Assume the proportion invested in Sundaram Finance, Century Textiles and Tech Mahindra are X_A , X_B and X_C respectively. The objective is to minimize total risk of portfolio.

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$$\begin{aligned} \therefore Z = & 336 + 440 + 280 + (2 \times 120 \times X_A X_B) \\ & + (2 \times 170 \times X_A X_C) + (2 \times 200 X_C X_B) \end{aligned} \quad (I)$$

Subject to:

$$20X_A + 22X_B + 15X_C = 18 \quad (II)$$

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

We have to incorporate the return constraint (2) as part of the objective function (1) using the lagrangian 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 variables equation.

$$\begin{aligned} Z = & 336 + 440 + 280 (1 - X_A - X_B)^2 + (2 \times 120 \times X_A X_B) + 2 \times 170 X_A \times (1 - X_A - X_B) \\ & + 2 \times 200 X_B (1 - X_A - X_B) \\ = & 336 + 440 + 280 (1 + + + 2X_A X_B - 2X_A - 2X_B) + 340X_A (1 - X_A - X_B) + 400 X_B (1 - X_A - X_B) + 240 X_A X_B \\ = & 336 + 440 + 280 + 280 + 280 + 560X_A X_B - 560 X_A - 560X_B + 240 \\ & X_A X_B + 340X_A - 340 - 340X_A X_B + 400X_B - 400X_A X_B - 400 \\ = & 276 + 320 + 60 X_A X_B - 220 X_A - 160 X_B + 280 \end{aligned}$$

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

$$\begin{aligned} 20X_A + 22X_B + 15 (1 - X_A - X_B) &= 18 \\ 20X_A + 22X_B + 15 - 15X_A - 15X_B &= 18 \\ = 5X_A + 7X_B &= 3 \\ \text{or } 5X_A + 7X_B - 3 &= 0 \end{aligned} \quad (IV)$$

sing lagrangian multiplier, the revised objective function is

$$\begin{aligned} Z = & 276 + 320 + 60X_A X_B - 220 X_A - 160 X_B + 280 + \lambda (5X_A + 7X_B - 3) \\ = & 276 + 320 + 60 X_A X_B - 220X_A - 160 X_B + 280 + 5X_A\lambda + 7X_B\lambda - 3\lambda \end{aligned}$$

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

$$= 552X_A + 60 X_B - 220 + 5\lambda = 0 \quad (V)$$

$$= 640 X_B + 60 X_A - 160 + 7\lambda = 0 \quad (VI)$$

$$= 5X_A + 7X_B - 3 = 0 \quad (VII)$$

$$\text{From (V)} \times 7 \text{ we get } 3864X_A + 420 X_B + 35\lambda = 1540$$

$$\& \text{ (VI)} \times 5 \text{ we get } 300X_A + 3200 X_B + 35\lambda = 800$$

$$\text{On subtracting } 3564X_A - 2780 X_B$$

$$= 740 \quad (VIII)$$

Taking (VII) and (VIII) we have:

$$3564X_A - 2780X_B = 740$$

$$5X_A + 7X_B = 3$$

From (VIII) $\times 5$ we get $17820X_A - 13900X_B = 3700$

& (VII) $\times 3564$ we get $17820X_A + 24948X_B = 10692$

On subtracting $38848X_B = 6992$

$$X_B = 0.18$$

$$5X_A + 7X_B = 3$$

$$X_A =$$

$$X_A = 0.348$$

$$X_C = 1 - 0.348 - 0.18$$

$$= 0.472$$

$$R_p = 0.348 \times 20 + 0.18 \times 22 + 0.472 \times 15$$

$$= 18\%$$

3. a. Total value added by portfolio manager Danial = Portfolio return – Benchmark return

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$$\text{Portfolio return} = 10 \times 0.60 + 7.0 \times 0.30 + 4 \times 0.10 = 8.5\%$$

$$\text{Benchmark return} = 16 \times 0.70 + 10 \times 0.20 + 6.0 \times 0.10$$

$$= 13.80$$

$$\text{Value added} = 8.5 - 13.8$$

$$= -5.3\%$$

Total value added by portfolio manager Dolphin = Portfolio return – Benchmark return

$$\text{Portfolio return} = 12 \times 0.40 + 6.0 \times 0.40 + 3 \times 0.20 = 7.8\%$$

$$\text{Value added} = 7.8 - 13.8$$

$$= -6\%$$

- b. **Allocation Effect:**

Allocation Effect				
Manager	Deviation in Allocation (weight in the portfolio – weight in the benchmark)	Deviation in Returns (Return of asset of the Benchmark – Return of the Benchmark)	i^{th} Allocation Effect	Total
	(1)	(2)	(1) $\times$ (2)	
Danial	-0.10	$16 - 13.8 = 2.2$	-0.22	-0.60
	0.10	$10 - 13.8 = -3.8$	-0.38	
	0.00	$6 - 13.8 = -7.8$	0.00	
Dolphin	-0.30	$16 - 13.8 = 2.2$	-0.66	-2.20
	0.20	$10 - 13.8 = -3.8$	-0.76	
	0.10	$6 - 13.8 = -7.8$	-0.78	

Selection Effect:

Selection Effect				
Manager	Actual Weights	Deviation in Returns (%) (Return of the asset of the portfolio – Return of the asset of the Benchmark)	i^{th} Selection Effect	Total (%)
	(1)	(2)	(1) $\times$ (2)	
Danial	0.60	$10 - 16 = -6$	-3.60	-4.7
	0.30	$7 - 10 = -3$	-0.9	
	0.10	$4 - 6 = -2$	-0.2	
Dolphin	0.40	$12 - 16 = -4$	-1.6	-3.8
	0.40	$6 - 10 = -4$	-1.6	
	0.20	$3 - 6 = -3$	-0.6	

For Danial

Excess Returns = Allocation Effect + Selection effect = $-0.60 - 4.7 = -5.3\%$

This implies that Danial has under performed the benchmark by 5.3.

For Dolphin

Excess Returns = Allocation Effect + Total selection effect = $-2.20 - 3.80 = -6\%$

Dolphin has under performed the benchmark by 6%

Thus, out of the two, performance of Danial has been better.

4. $\text{Return on ONGC} = 0.2 \times 0.50 + 0.7 \times 0.35 + 0.10 \times 0.20 = 0.365$

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$\text{Return on HDFC} = 0.2 \times 0.40 + 0.7 \times 0.28 + 0.10 \times 0.22 = 0.298$

$\text{Return on ACC} = 0.2 \times 0.20 + 0.7 \times 0.15 - 0.10 \times 0.15 = 0.13$

Standard deviation of ONGC

$$= [(0.50 - 0.365)^2 \times 0.2 + (0.35 - 0.365)^2 \times 0.7 + (0.20 - 0.365)^2 \times 0.10]^{1/2} = 0.0808$$

Standard deviation of HDFC

$$= [(0.40 - 0.298)^2 \times 0.2 + (0.28 - 0.298)^2 \times 0.7 + (0.22 - 0.298)^2 \times 0.10]^{1/2} = 0.054$$

Standard deviation of ACC

$$= [(0.20 - 0.13)^2 \times 0.2 + (0.15 - 0.13)^2 \times 0.7 + (-0.15 - 0.13)^2 \times 0.10]^{1/2} = 0.0954$$

The covariance of the three stocks with each other can be calculated as follows:

$$\begin{aligned} \text{Cov(ONGC, HDFC)} &= (0.50 - 0.365)(0.40 - 0.298) \times 0.2 + (0.35 - 0.365)(0.28 - 0.298) \times 0.7 \\ &\quad + (0.20 - 0.365)(0.22 - 0.298) \times 0.10 = 0.00423 (\%)^2 \end{aligned}$$

$$\begin{aligned} \text{Cov(HDFC, ACC)} &= (0.40 - 0.298)(0.20 - 0.13) \times 0.2 + (0.28 - 0.298)(0.15 - 0.13) \times 0.7 \\ &\quad + (0.22 - 0.298)(-0.15 - 0.13) \times 0.10 = 0.00336 (\%)^2 \end{aligned}$$

$$\begin{aligned} \text{Cov(ONGC, ACC)} &= (0.50 - 0.365)(0.20 - 0.13) \times 0.2 + (0.35 - 0.365)(0.15 - 0.13) \times 0.7 \\ &\quad + (0.20 - 0.365)(-0.15 - 0.13) \times 0.10 = 0.0063 (\%)^2 \end{aligned}$$

The expected return from a portfolio consisting of ONGC, HDFC and ACC in equal proportions will be

$$= 0.2643$$

The standard deviation of the portfolio will be

$$\begin{aligned} &= [1/3^2 \times 0.0808^2 + 1/3^2 \times 0.054^2 + 1/3^2 \times 0.0954^2 + 2 \times 1/3^2 \times 0.00423 \\ &\quad + 2 \times 1/3^2 \times 0.00336 + 2 \times 1/3^2 \times 0.0063]^{1/2} \\ &= 0.0717 \end{aligned}$$

The return per unit of risk for the three stocks and the portfolio can be calculated as follows:

Description	Return	Standard Deviation	Return / Risk
Stock ONGC	0.365	0.0808	4.517
Stock HDFC	0.298	0.054	5.5185
Stock ACC	0.13	0.0954	1.363
Portfolio	0.2643	0.0717	3.686

No, it is better to invest in stock HDFC, rather than the portfolio, as the return per unit of risk is highest from stock HDFC.

5. a. By writing covered call options, Mr. Pandit takes in premium income of Rs.7,50,000. If the price of the stock in October is less than or equal to Rs.750, he will have his stock plus the premium income. But the most he can have is Rs.(75,00,000 + 7,50,000) because the stock will be called away from him if its price exceeds Rs.750.

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This strategy offers some extra premium income but leaves substantial downside risk. At an extreme, if the stock price fell to zero, Mr. Pandit would be left with only Rs.7,50,000. The strategy also puts a cap on the final value at Rs.82,50,000.

b. By buying put options with a Rs.710 exercise price, Mr. Pandit will be paying Rs.7,50,000 in premiums to ensure a minimum level for the final values of his position. That minimum value is $710 \times 10,000 - 7,50,000 = \text{Rs.}63,50,000$. This strategy allows for upside gain, but exposes Mr. Pandit to the possibility of a moderate loss equal to the cost of the puts.

c. The net cost is zero. If the stock price is less than or equal to Rs.710, it preserves Rs.71,00,000 in principal. If the price exceeds Rs.750, the value of Mr. Pandit portfolio can rise to a cap of Rs.75,00,000. In between, his proceeds equal 10,000 times the stock price.

The best strategy obviously is C since it satisfies the two requirements of preserving the Rs.71,00,000 in principal while offering a chance of getting Rs.75,00,000.

Section C: Applied Theory

6. ADVANTAGES OF MUTUAL FUNDS

Investments in stocks, bonds and other financial instruments requires considerable expertise and constant supervision, to enable an investor to take informed decisions. Small investors usually do not have the necessary expertise and the time to undertake any study that can facilitate informed decisions. While this is the predominant reason for the popularity of mutual funds, there are many other benefits that can accrue to small investors. Some of the advantages are listed below:

Diversification benefits: Diversified investment improves the risk-return profile of the portfolio. Small investors may not have the amount of capital that would allow optimal diversification. Since the corpus of a mutual fund is substantially big as compared to individual investments, optimal diversification becomes possible. As the individual investors' capital gets pooled into a mutual fund, all of them are able to derive the benefits of diversification.

Low transaction costs: The transactions of a mutual fund are generally very large. These large volumes attract lower brokerage commissions (as a percentage of the value of the transaction) and other costs, as compared to the smaller volumes of the transactions entered into by individual investors. The brokers quote a lower rate of commission due to two reasons. The first is competition for the institutional investors' business. The second reason is that the overhead costs for executing a trade does not differ much for large and small orders. Hence, for a large order, these costs spread over a larger volume, enabling the broker to quote a lower commission rate.

Availability of various schemes: Mutual funds generally offer a number of schemes to suit the requirements of the investors. Thus the investors can choose between regular income schemes and growth schemes, between schemes that invest in the money market and those that invest in the stock market, etc. Some schemes provide some added advantages. For example, automatic reinvestment schemes reinvest the distributed income automatically, thus making the management of funds easier. In case of direct investment in securities, the reinvestment of income in the same proportion as the assets held, is very difficult, and sometimes impossible. Funds that invest in overseas markets offer the additional advantage of international diversification, which may otherwise not be feasible to the lay investor.

Professional management: Management of a portfolio involves continuous monitoring of various securities and the innumerable economic and non-economic variables that may affect the portfolio's performance. This requires a lot of time and effort on the part of the investor, along with in-depth knowledge of the functioning of the financial markets. Mutual funds are generally managed by knowledgeable, experienced professionals whose time is solely devoted to tracking and updating the portfolio. Thus, investment in a mutual fund not only saves time and efforts for the investor, it is also likely to produce better results.

Liquidity: Liquidating a portfolio is not always easy. There may not be a liquid market for all the securities held. In case only a part of the portfolio is required to be liquidated, it may not be possible to sell all the securities forming part of the portfolio in the same proportion as they are represented in the portfolio. These problems can be solved by investing in a mutual fund. A mutual fund generally stands ready to buy and sell its units on a regular basis. Thus, it is easier to liquidate holdings in a mutual fund as compared to direct investment in securities.

DISADVANTAGES OF MUTUAL FUNDS

Investment in mutual funds has its disadvantages as well. For one, the investors cannot choose the securities they want to invest in, or the securities they want to sell. Secondly, the investors face the risk of the fund manager not performing well. Also, if the fund manager's compensation is linked to the fund's performance, he may be tempted to show good results in the short-term without paying attention to the expected long-term performance of the fund. This would harm the long-term interests of the investors. Another disadvantage of investing in mutual funds is the management fees charged by the fund. It reduces the returns available to the investors. Lastly, while investors in securities can decide the amount of earnings they want to withdraw in a particular period, investors in a mutual fund have no such discretion as the amount of earnings that are to be paid out to the investors in a particular year is decided by the mutual fund.

7. The process of asset allocation described above is referred to as integrated asset allocation. The name is justified, considering that all the major aspects of asset allocation have been included in the analysis, in a systematic manner. If you recall the process explained once again, you will realize that the process involves not only integrating all the aspects, but also review of the allocation. Thus, the process is dynamic as well as integrated. Sometimes it may be desirable to skip some of the steps in the allocation process. Depending on the steps that are skipped, asset allocation can be of three types – strategic asset allocation, tactical asset allocation and insured asset allocation.

Strategic Asset Allocation

Strategic asset allocation is also referred to as long run asset allocation or policy asset allocation. Strategic asset allocation is generally undertaken periodically. In this type of asset allocation, relatively few and broad categories of assets are considered. For example, one may consider the mix of stocks and bonds in various proportions starting from say, 10% in bonds and 90% in stocks to 10% in stocks and 90% in bonds. Using these proportions, the likely range of outcomes from the investment are estimated. The asset mix thus chosen by the investor is taken as the long run or the policy asset mix. Generally, the asset mix is held constant. Such a strategy is referred to as constant asset mix strategy. This should not be confused with a buy-and-hold strategy. In a constant mix strategy, transactions are necessary to ensure that the mix remains constant.

In strategic asset allocation, long run predictions regarding the capital markets are used. These are assumed to be constant during the period of analysis (planning horizon). Thus, in the asset allocation process, we no longer have the step relating to prediction of future on an ongoing basis as, once predicted, the conditions are taken to be

constant. Similarly, the risk tolerance of the investor is also assumed to remain constant during this period.

Tactical Asset Allocation

Tactical asset allocation is performed routinely, as part of active asset management. It is aimed at benefitting from short run underpricing and overpricing of assets. Tactical asset allocation may involve switching funds between equities, bonds and cash. Within equities and bonds, investments may also be switched from one category of equities to another and one category of bonds to another. In this type of asset allocation, it is assumed that the risk tolerance of the investor is constant. Tactical asset allocation decisions are often contrarian. They are made with a view to benefit from a steep fall or rise in the market. The basic assumption in this type of asset allocation is that markets overreact to information. Implicit in this is the belief of the investors that make tactical allocation that their predictions regarding the movements of the market are not only different from the other investors, but are also superior.

In tactical asset allocation, as already explained, changes in the risk tolerance of the investor are ignored. But, it does not mean that the risk characteristics of the investments are also ignored. They are not.

Insured Asset Allocation

Insured asset allocation is aimed at achieving the objectives of the investor without depending on market timing, unlike tactical asset allocation. Insured asset allocation is very similar to tactical asset allocation in that it is applied routinely as part of active asset management. This type of asset allocation is based on the assumption that the risk tolerance of the investors is highly sensitive to the changes in their net worth. A minimum value of the net worth or asset value (as the case may be, based on the goal), is called the floor. If the value of the assets or net worth crosses the floor, the allocation to risky assets is increased. Above the floor, higher the value, higher the allocation to risky assets. Similarly, lower the value, lower the allocation to risky assets. That is, the asset mix is made conservative. At any rate, it is ensured that the floor value is achieved. This type of asset allocation does not, as can now be seen, focus on the desirability of investing in more risky assets based on their risk-return characteristics. It is based on the implicit assumption that risk-return characteristics of the asset classes remain constant.

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