

Question Paper

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

Section A : Basic Concepts (30 Marks)

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

1. The ratio between the amount of current consumption that can be exchanged for a certain future consumption is called [< Answer](#)
[>](#)
(a) Cost of capital (b) Pure rate of interest
(c) Return on investment (d) Real rate of interest
(e) Inflation rate.

2. According to Treynor, key motives for trading are value, information and _____. [< Answer](#)
[>](#)
(a) Volume (b) Profitability (c) Liquidity
(d) Cash flow (e) Impact cost.

3. The standard deviation of a portfolio of two stocks will be the weighted average of the standard deviation of the stocks, if the coefficient of correlation between two stocks is [< Answer](#)
[>](#)
(a) 0 (b) -1 (c) +1 (d) 0.5 (e) -0.5.

4. Which of the following statements is/are **true** in the context of different investment policies? [< Answer](#)
[>](#)
I. The portfolio under absence of policy is formed over a longer period of time as the investor picks up different stocks that suit his comfort level.
II. Income policy has stemmed up from the belief that only income can be spent and the capital gains need to be reinvested for further returns.
III. Multi asset total return policy is one of the most flexible investment policies that gives a lower rate of return.
(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.

5. Which of the following is/are the assumption(s) of classical decision-making theory? [< Answer](#)
[>](#)
I. Asset comparison.
II. Risk aversion.
III. Irrational exuberance.
(a) Only (I) above (b) Only (II) above
(c) Both (I) and (III) above (d) Both (I) and (II) above
(e) Both (II) and (III) above.

6. Immunization is **not** a strictly 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 having the same duration with the passage of time.
7. Making forecasts or predictions based on the under quality data may not be always correct because of the existence of the human element in such data. Which of the following can be attributed to the failure of economic forecasts? [< Answer](#)
≥
- I. Non-linear perceptions.
- II. Group think.
- III. Messenger syndrome.
- (a) Only (I) above (b) Only (III) above
- (c) Both (I) and (II) above (d) Both (II) and (III) above
- (e) Both (I) and (III) above.
8. Which of the following is **not true** in the context of style analysis in asset allocation? [< Answer](#)
≥
- (a) It involves the use of quadratic programming
- (b) It determines a fund's exposure to the changes in returns of the asset classes
- (c) The objective of this analysis is to find the best asset class exposure that sums up to 100%
- (d) The goal of this analysis is to select a style that minimizes the variance of the difference between the return of the fund and the active portfolio with the same style
- (e) The goal is to infer about the funds exposure as much as possible to variations in returns of the asset classes.
9. Which of the following is/are **not** the characteristics of a return factor model of dynamic strategy? [< Answer](#)
≥
- I. The correlation of the non-factor-related return with the values of the factors should be one.
- II. Most of the return should be factor- related.
- III. The returns from one security in the portfolio should not show significant correlation with the return from another security in the same portfolio.
- (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.
10. Mr. Jain has constructed a portfolio, which has 990 unique covariance terms. The number of securities included in the portfolio is [< Answer](#)
≥
- (a) 30 (b) 35 (c) 45 (d) 65 (e) 95.
11. While managing a portfolio, at which level of decision-making process, the setting of benchmark is done? [< Answer](#)
≥
- I. Strategic policy decisions.
- II. Asset allocation decisions.
- III. Asset selection decisions.
- (a) Only (I) above (b) Only (III) above

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

12. Which of the following is **not** the characteristic of information ratio? [< Answer](#) [>](#)
- (a) It estimates ex post value added and relates this to ex ante opportunity available in the future
 - (b) It identifies the residual frontier that describes the opportunities accessible to the passive manager
 - (c) It is the ratio of value added to residual risk incurred
 - (d) It decides the level of aggressiveness for each manager
 - (e) Value added depends on the managers' prospects and aggressiveness.
13. A portfolio manager has tracking error of 2.8% and alpha value of 1.2%. The approximate number of years, he would need to sustain this performance to be 90% confident of its significance is [< Answer](#) [>](#)
- (a) 8.69 years (b) 10.48 years (c) 11.62 years
 - (d) 12.00 years (e) 14.64 years.
14. Holding a long position stock while creating a synthetic short position in order to get the possibility of arbitrage profits is called [< Answer](#) [>](#)
- (a) Synthetics (b) Conversions (c) Reversals (d) Strips
15. The inability to satisfy the investor's objectives is termed as [< Answer](#) [>](#)
- (a) Portfolio risk (b) Performance risk
 - (c) Tracking error risk (d) Fund risk
 - (e) Attribution risk.
16. Which of the following situations is/are likely to lead to tracking error risk? [< Answer](#) [>](#)
- I. If the benchmark index comprises only investment grade bonds, but the managed portfolio consists of both investment grade as well as non-investment grade bonds.
 - II. If the benchmark index consists of mortgage-backed securities but the managed portfolio does not include them.
 - III. The managed portfolio consisting of different securities from those of benchmark index has the same duration as that of benchmark index.
- (a) Only (II) above (b) Only (III) above
 - (c) Both (I) and (II) above (d) Both (I) and (III) above
 - (e) All (I), (II) and (III) above.
17. Which of the following is **not** true with respect to yield spread analysis? [< Answer](#) [>](#)
- (a) Yield spread analysis assumes that there exists abnormal relationship between the yields for bonds in alternative sectors
 - (b) Yield spread is affected by yield volatility and the behavior of embedded options
 - (c) The effect of yield volatility on the business cycle influences yield spread
 - (d) The spread seems to increase during periods of recession and decreases during periods of expansion
 - (e) Yield volatility and transaction liquidity affect yield spread.
18. Which of the following is **not** the bond index enhancement strategies that help in offsetting the proportion of tracking error that would come from expenses and transaction? [< Answer](#) [>](#)

- (a) Lower cost enhancement
- (b) Currency selection enhancement
- (c) Yield curve enhancement
- (d) Sector enhancement
- (e) Call exposure enhancement.

19. Which of the following is **not true** with respect to different asset allocation strategies?

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

- (a) Tactical asset allocation takes into consideration the changes in expected return, risks as well as correlations
- (b) In strategic asset allocation, when each asset mix is expressed in terms of the percentage of the total amount invested in each asset class, it is termed as constant asset mix strategy
- (c) Strategic asset allocation indicates an optimal asset mix to be held under normal conditions
- (d) Tactical asset allocation considers the possibility of investor's risk-tolerance
- (e) Insured asset allocation is aimed at achieving the objectives of the investor without depending on market timing.

20. Which of the following is **true** with respect to formula plans in portfolio revision techniques?

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

- (a) They offer no suggestions to select securities
- (b) They are flexible
- (c) They do not appear mechanical
- (d) They really eliminate the need for projections regarding the movement of asset prices
- (e) They are suitable for too short period as well as for too long period.

21. Consider the following information related to an Index fund and its benchmark index for a period of six months

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

Return of fund	Return on Benchmark Index
15.42%	15.92%
16.76%	16.92%
15.42%	15.45%
14.39%	14.41%
15.92%	15.88%
15.69%	15.02%

The tracking error of the Index fund's return during the last six months is

- (a) 0.09%
- (b) 0.18%
- (c) 0.38%
- (d) 0.85%

22. The expected return on a portfolio is 16.25% and standard deviation of its return is 10.75%. If the expected utility of an investor from this portfolio is 4.25%, risk tolerance of the investor is

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

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

23. The bond issued by Harichandana Industries Ltd. of face value Rs.1000 and coupon of 10% is currently selling in the market at Rs.1000. The bond presently has 7 years to maturity. What is the percentage change in the price of the bond, if there is 75 BP decrease in the market interest rate, when the coupon is paid annually?

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

- (a) Increases by 2.82%
- (b) Increases by 4.76%

(c) Increases by 3.65% (d) Decreases by 2.82%

(e) Decreases by 3.65%.

24. The Sharpe ratio and Treynor ratio of a Mutual Fund scheme are 1.24 and 6.25 respectively. The correlation coefficient between returns of the fund and the market index is 0.95. The standard deviation of the market index's return is

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

(a) 3.09% (b) 4.79% (c) 10.47% (d) 11.29%

25. Assume that the assets below are correctly priced according to the SML:

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

$$E(r_1) = 12\% \quad \beta_1 = 0.4$$

$$E(r_2) = 20\% \quad \beta_2 = 1.2$$

The expected return on an asset with a beta of 1.8 is equal to

(a) 22% (b) 24% (c) 26%
(d) 28% (e) Insufficient data.

26. The data given below relates to the sensitivity of a stock based on the BIRR model.

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

Risk Factor	Estimated Factor Sensitivity	Estimated Market price for Risk (%)
Confidence risk	0.88	3.36
Time horizon risk	0.67	2.24
Inflation risk	?	-3.63
Business Cycle risk	-1.42	0.95
Market Timing risk	1.62	2.45

If the risk-free rate is 6% and the expected return on the stock is 14.24, the estimated factor sensitivity associated with inflation risk is

(a) -0.10 (b) -0.25 (c) -0.32 (d) +0.25

27. A stock with a beta of 0.86 is currently trading at Rs.80. After one year the price of the stock is expected to be Rs.88. The market return is 12.5% and the risk-free rate is 6%. If stock pays Re.1 as dividend during the next year, which of the following statements is/are **true**?

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

- I. The expected return on stock is 11.25%.
II. The alpha of the stock is 0.28%.
III. The stock is under priced and should be purchased.

(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.

28. Analysis carried out on the performance of a fund for last year is compiled as under:

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

Total selectivity	3.80%
Net selectivity	1.84%
β of portfolio	1.2
Return on market index	14%
Standard deviation of market returns	15%
Risk free return, R_f	6%

The total risk (σ_i) of portfolio is

- (a) 15.12% (b) 18.27% (c) 21.68%
 (d) 24.86% (e) Data not sufficient.

29. An investor has constructed a strap strategy using the following options available on a stock.

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

Option	Strike price (Rs.)	Premium (Rs.)
Call	480	2.5
Put	480	30.0
Call	450	3.0

If the investor closes his position, when the stock is selling at Rs.460 per share, profit/loss is

- (a) Rs.18 profit (b) Rs.20 loss (c) Rs.20 profit (d) Rs.35 loss
 (e) Rs.15 loss.

30. The following are four stocks of a portfolio:

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

Stock	Market Value (Rs.)	Residual Risk (%) ²	Variance (%) ²
A	2,00,000	55	285
B	3,00,000	79.2	360
C	2,50,000	80.4	268
D	7,50,000	132.06	426

If market return is 12.5%, variance of returns on market is 250 (%)² and the risk free rate is 6%, the expected return on the portfolio is

- (a) 10.50% (b) 10.75% (c) 11.50% (d) 12.66%

END OF SECTION A

Section B : Problems (50 Marks)

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

1. Mr. Rudra, a portfolio manager of an index fund worth of Rs.240,00,000 opines that in the near future there is a chance for the fall in the share prices. In order to benefit from his expectations, he is planning to write 2400 June-call option on a benchmark index trading at a price of Rs.82.45. The contract size of call option is 100. Treasury bills are trading at 6% p.a.

The following is the information pertaining to the index fund and June-call option on benchmark index for different weeks:

Week	NAV of index fund (Rs.)	Premium on index call option (Rs.)
0	244.34	82.45
1	251.37	113.05
2	263.33	217.60
3	267.72	249.75

4	271.82	284.82
5	283.03	380.00

You are **required** to

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

(8 + 2 + 1 = 11 marks) < Answer >

- Mr. Shah has zeroed in on the following stocks with the parameters given below:

Stock	Cov with the market (%) ²	Expected Return (%)	Proportion of returns not explained by the market
IOC	23.80	11.23	0.1340
MUL	26.88	12.51	0.2480
Wipro	38.08	14.52	0.1177
HDFC	32.20	14.04	0.1870
Ranbaxy	33.60	14.05	0.2177

The market is generating 6% more return than the return on T-bills. The variance of returns on market is 28(%)². The 180-day T-bills are trading in the market 6% p.a.

You are **required** to construct an optimum portfolio using the Sharpe's optimization method.

(10 marks) < Answer >

- The risk preference of Mr. Prachodia can be represented by the following utility function:

$U = E(r) - 0.35\sigma^2$, where symbols denote the standard uses in terms of proportions.

Three portfolios for which data are provided below are available for investment by Mr.Prachodia.

Portfolio I: An investment in an equally weighted portfolio with four securities all of which are perfectly and positively correlated with each other. The expected returns and standard deviation for the securities are as follows:

Security	Expected Return (%)	Standard Deviation (%)
ACC	6	6
Bajaj Auto	15	32
Ceat Tyres	18	27
Dollex Inds	23	36

Portfolio II: The minimum variance portfolio comprising an investment in the following securities:

Security	Expected Return (%)	Standard Deviation (%)
Eicher Motor	20	35
Falcon Tyres	18	30

The correlation coefficient between securities Eicher Motor and Falcon Tyres is 0.7.

Portfolio III: A portfolio with an expected return of 18%, covariance with the market portfolio of 522.72(%)² and unsystematic risk of 13%. The volatility of market returns is 22%.

You are **required** to

- Compute the expected return and risk for each portfolio.
- Determine which portfolio Mr. Prachodia is likely to select.

(6 + 2 = 8 marks) < Answer >

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

Maturity (Years)	YTM (%)
1	10
2	11
3	12

(Assume that the face value of each bond is Rs.1000)

You are **required** to

- Compute the implied one-year forward rates.
- 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.
- 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?
- Compute the current price of a three-year maturity bond with a 12% 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)?

(2 + 2 + 4 + 3 = 11 marks) [< Answer >](#)

- Mr. Lohit has observed the following information relating to options on the stock of a leading pharmaceutical company, which is presently trading in the market at Rs.850:

Options	Exercise Price (Rs.)	Premium (Rs.)	Expiry Month
Call	840	31.7	May
Call	860	20.25	May
Call	860	39.9	June
Put	840	6.2	May
Put	860	14.1	May
Put	840	10	June

You are **required** to construct 3:5 ratio spread

- Using calls with minimum possible initial investment, if Mr. Lohit expects that there will be a huge bullish trend in the market in near future and also show the pay-off diagram indicating maximum loss and break even points.
- Using puts with initial inflow, if Mr. Lohit expects that there will be a huge downward movement in share price from present level in near future and also show the pay-off diagram indicating maximum loss and break even points.

(Show the payoff in the price range of Rs.800-Rs.920 in multiples of Rs.10)

(5 + 5 = 10 marks) [< Answer >](#)

END OF SECTION B

Section C : Applied Theory (20 Marks)

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

- Econometric approach is one of the most formal short-term forecasting approaches. This approach tries to describe

the present economic condition as a function of certain policies and variables and the economic relationship attached to these variables. Explain the advantages and problems of using econometric models.

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

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.

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

END OF SECTION C

END OF QUESTION PAPER

Suggested Answers

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

Section A : Basic Concepts

1. Answer :

Reason : The trade-off between the amount available for present consumption and future consumption is at the heart of all savings and investments. The ratio between the amount of current consumption that can be exchanged for a certain future consumption is called the pure or risk-free rate of interest or pure time value of money. Hence, (b) is answer.

[< TOP >](#)

2. Answer :

Reason : According to Jack Treynor, key motives for trading are value, information and cash flow. Hence, (d) is answer.

[< TOP >](#)

3. Answer :

Reason : If coefficient of correlation between two stock's return A and B is +1 and W_A and W_B is the amount invested in a portfolio of these two stocks. Portfolio risk will be

[< TOP >](#)

$$\sigma_p^2 = W_A^2 \sigma_A^2 + W_B^2 \sigma_B^2 + 2(+1) W_A W_B \sigma_A \sigma_B$$

$$\sigma_p^2 = (W_A \sigma_A + W_B \sigma_B)^2$$

$$\sigma_p = W_A \sigma_A + W_B \sigma_B$$

Hence answer is (c).

4. Answer :

Reason : The portfolio under absence of policy is formed over a longer period of time as the investor picks up different stocks that suit his comfort level. Income policy has stemmed up from the belief that only income can be spent and the capital gains need to be reinvested for further returns. Multi asset total return policy is one of the most flexible investment policies that gives not only a higher rate of return but also takes care of the risk aversion of the individual investors.

[< TOP >](#)

Hence, alternative (c) is answer.

5. Answer :

Reason : Classical decision-making theory revolves around three assumptions: asset

[< TOP >](#)

integration (comparison), risk aversion, and rational expectation. Hence, alternative (d) is answer.

6. Answer :

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 requires 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.

7. Answer: (d)

Reason: Linear perceptions, group think and messenger syndrome can be attributed to the failure of economic forecasts. Hence alternative (d) is answer.

8. Answer :

Reason : Style analysis involves the use of quadratic programming for the purpose of determining a fund's exposure to the changes in returns of the asset classes. The objective of this analysis is to find the best asset class exposure that sums up to 100% .The goal of this analysis is to select a style that minimizes the variance of the difference between the return of the fund and the passive not active portfolio with the same style. The goal is to infer about the funds exposure as much as possible to variations in returns of the asset classes. Hence, alternative (d) is answer.

9. Answer :

Reason : To be dependable, a return factor model should possess the following three characteristics. One, the correlation of the non-factor-related return with the values of the factors should be very low, close to zero, in fact. Two, most of the return should be factor-related. Three, the returns from one security in the portfolio should not show any significant correlation with the return from another security into same portfolio. Hence, alternative (a) is answer.

10. Answer :

Reason : Number of unique covariances = $n(n-1) / 2 = n(n-1) / 2 = 990$
 $= n^2 - n - 1980$
 $n = 45$

11. Answer : (a)

Reason: While managing a portfolio, at strategic level of decision making process, the setting of benchmark is done. Hence, alternative (a) is answer.

12. Answer :

Reason : Information ratio is the ratio of value added (alpha) to residual risk incurred. Value added depends on the managers' prospects and aggressiveness. It estimates ex post value added and relates this to ex ante opportunity available in the future. It identifies the residual frontier that describes the opportunities accessible to the active manager. It decides the level of aggressiveness for each manager. Alternative (b) is answer.

13. Answer :

Reason : Information ratio = Alpha / Tracking error = $1.2/2.8 = 0.42857 \sim 0.43$ [TOP](#) [>](#)

The number of years of the sustained performance = $(\text{Confidence level}/\text{Information ratio})^2$

As the level of significance is 90%, 1.645 is the confidence level
 $(1.645/0.43)^2 = 14.635 \sim 14.64$ years.

14. Answer :

Reason : Conversions mean holding a long position stock while creating a synthetic short position in order to get the possibility of arbitrage profits. [TOP](#) [>](#)

15. Answer :

Reason : The inability to satisfy the investor's objectives is termed as performance risk. [TOP](#) [>](#)

16. Answer :

Reason : Tracking error risk occurs in the following three situations. [TOP](#) [>](#)

I. The benchmark index comprises only investment grade bonds, but the managed portfolio consists of both investment grade as well as non-investment grade bonds, the latter has greater credit risk than the benchmark index.

II. If the benchmark index consists of mortgage-backed securities but the managed portfolio does not include them, the latter is not exposed to prepayment risk.

III. If the managed portfolio has different securities from those of market portfolio, it leads to tracking error risk irrespective of duration.

Alternative (e) is answer.

17. Answer :

Reason : Yield spread analysis assumes that there exists normal relationship between the yields for bonds in alternative sectors. The spread is seen to increase during periods of recession and decreases during periods of expansion. There are three ways by which spreads will be affected. [TOP](#) [>](#)

- a. Yield volatility and the behavior of embedded options
- b. The effect of yield volatility on the business cycle
- c. Yield volatility and transaction liquidity

Hence, alternative (a) is answer.

18. Answer :

Reason : Various indexing strategies help in offsetting the proportion of tracking error that would come from expenses and transaction costs. These enhancement strategies can be lower cost, issue selection, yield curve positioning, sector and quality positioning and call exposure positioning. [TOP](#) [>](#)

19. Answer :

Reason : Tactical asset allocation takes into consideration the changes in expected return, risks as well as correlations, but it does not consider the possibility of investor's risk-tolerance. In strategic asset allocation, when each asset mix is expressed in terms of the percentage of the total amount invested in each asset class, it is termed as constant asset mix strategy. Strategic asset allocation indicates an optimal asset mix to be held under normal conditions. Insured asset allocation is aimed at achieving the objectives of [TOP](#) [>](#)

the investor without depending on market timing. Hence, alternative (d) is answer.

20. Answer :

Reason : Formula plans offer no suggestions to select securities. They are very rigid and not suitable for too short a period or too long a period. They appear mechanical, but do not really eliminate the need for projections regarding the movement of asset prices. Hence, alternative (a) is answer.

21. Answer : (c)

Reason : Tracking error = Standard deviation of Abnormal return of the index fund.

Abnormal return

$$\begin{aligned} &= 15.42 - 15.92 = -0.5 \\ &16.76 - 16.92 = -0.16 \\ &15.42 - 15.45 = -0.03 \\ &14.39 - 14.41 = -0.02 \\ &15.92 - 15.88 = 0.04 \\ &15.69 - 15.02 = 0.67 \end{aligned}$$

$$\text{Average Abnormal return} = 0/6 = 0.$$

Standard deviation of Abnormal return

$$\begin{aligned} &[((-0.5 - 0)^2 + (-0.16 - 0)^2 + (-0.03 - 0)^2 \\ &+ (-0.02 - 0)^2 + (0.04 - 0)^2 + (0.67 - 0)^2) / 5]^{1/2} \\ &= 0.38\%. \end{aligned}$$

22. Answer : (b)

$$\begin{aligned} \text{Reason : Utility} &= E(r) - \frac{\sigma_1^2}{t_k} \\ 4.25 &= 16.25 - \frac{(10.75)^2}{t_k} \\ \frac{(10.75)^2}{t_k} &= 16.25 - 4.25 = 12.00 \\ t_k &= \frac{(10.75)^2}{12} \\ t_k &= 9.63\%. \end{aligned}$$

23. Answer : (c)

Reason : As the face value and prevailing market price of Attire bond is same hence,

$$\text{YTM} = \text{Coupon rate} = 10\%$$

Duration when, $r_c = r_d$

$$\text{PVIFA}(r_d, n) (1 + r_d) = 4.8684 (1.1) = 5.355$$

$$\text{Hence, modified Duration} = \frac{\text{Duration}}{1+r} = \frac{5.355}{1.1} = 4.868$$

$$\begin{aligned} \text{\% change in price} &= \text{Modified duration} \times \frac{(-)\Delta BP}{100} \\ &= 4.868 \times \frac{(-) \times -75}{100} = 3.65\% \end{aligned}$$

i.e., 3.65% increase in price.

24. Answer : (b)

$$\text{Reason : } \frac{\text{Treynor-ratio}}{\text{Sharperatio}} = \frac{\frac{R_i - R_F}{\beta}}{\frac{R_i - R_F}{\sigma_i}} = \frac{\sigma_i}{\beta}$$

$$\frac{6.25}{1.24} = \rho \frac{\sigma_i}{\sigma_m} = \frac{\sigma_m}{\rho}$$

$$\sigma_m = \frac{6.25}{1.24} \times 0.95$$

$$\sigma_m = 4.79\%.$$

25. Answer : (c)

$$\text{Reason : } E(r_1) = R_f + \beta_1 (R_m - R_f)$$

$$\Rightarrow 12 = R_f + 0.4 (R_m - R_f) \quad \text{--- I}$$

similarly,

$$E(r_2) = 20 = R_f + 1.2 (R_m - R_f) \quad \text{--- II}$$

By subtracting I from II,

$$8 = 0.8 \times (R_m - R_f)$$

$$(R_m - R_f) = 8/0.8 = 10$$

$$\text{Hence, } R_f \text{ from I, } R_f = 12 - 0.4 \times 10 = 8$$

$$E(r) \text{ at } \beta=1.8 \text{ will be } = 8 + 1.8 \times 10 = 26\%.$$

26. Answer :

Reason : Expected return as per BIRR model

= Σ (Estimated Factor sensitivity $\times$ Estimated Market Price for risk) + Risk free rate

Using the given data, we get

$$\begin{aligned} \text{Expected return} &= 0.88 \times 3.36 + 0.67 \times 2.24 + x \times (-3.63) + (-1.42) \times 0.95 \\ &+ 1.62 \times 2.45 + 6 = 14.24\%. \end{aligned}$$

$$X = -0.32$$

27. Answer : (a)

$$\text{Reason : Expected return} = \frac{88-80+1}{80} = 11.25\%$$

$$\text{Required rate of return} = 6 + 0.86 (12.5 - 6) = 11.59\%$$

$$\alpha = 11.25 - 11.59 = -0.34\%$$

As alpha is negative the stock is over priced and should be sold.

28. Answer : (c)

Reason : Total selectivity – Net selectivity

$$= [R_A - \{R_f + \beta_A (R_m - R_f)\}] - \left[R_A - \left\{ R_f + (R_m - R_f) \frac{\sigma_A}{\sigma_m} \right\} \right]$$

$$3.8 - 1.84 = (R_m - R_f) \left[\frac{\sigma_A}{\sigma_m} - \beta_A \right]$$

$$1.96 = (14 - 6) \left[\frac{\sigma_A}{15} - 1.2 \right]$$

$$\sigma_A = 21.675 \text{ i.e., } 21.68\%$$

29. Answer : (e)

Reason : A strap strategy involves buying two calls and one put at same strike price.

$$\begin{aligned} \text{Initial cash out flow} &= 2 \times (2.5) + 30 = 5 + 30 \\ &= \text{Rs.35} \end{aligned}$$

When the stock price is Rs.460, calls will not be exercised but put option will be exercised. Gain on put = (480 – 460) = Rs.20

$$\text{Total} = -35 + 20$$

$$\text{Profit/Loss} = -\text{Rs.15.}$$

30. Answer :

Reason :

Stock	Market Value (Rs.)	Residual Risk	Variance (%) ²	Systematic Risk	Beta = (Systematic Risk/Market Variance) ^{1/2}
A	2,00,000	55	285	230	0.96
B	3,00,000	79.2	360	280.8	1.06
C	2,50,000	80.4	268	187.6	0.87
D	7,50,000	132.06	426	293.94	1.08

With average beta of the portfolio

$$\begin{aligned} &0.96 \times \frac{2,00,000}{15,00,000} + 1.06 \times \frac{3,00,000}{15,00,000} \\ &+ 0.87 \times \frac{2,50,000}{15,00,000} + 1.08 \times \frac{7,50,000}{15,00,000} \end{aligned}$$

$$\begin{aligned} &= 1.025 \\ \text{Expected returns} &= 6 + 1.025 (12.5 - 6) \\ &= 12.6625\% \sim 12.66. \end{aligned}$$

Section B : Problems

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

Index value = $2400 \times 100 = 2,40,000$

Number of contracts to be purchased = $240,00,000 / 2,40,000 = 100$

Premium received = $100 \times 82.45 \times 100 = \text{Rs.} 8,24,500$

Number of units = $240,00,000 / 244.34 = 98223.79$

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

$\text{Rs.} 8,24,500 / \text{Rs.} 244.34 = 3374.4$ units

Total number of units = $98223.79 + 3374.4 = 1,01,598.19$ shares

	NAV (Rs.)	Unoptioned (98223.79 units)	Long stock + Premium (101598.19 units)	Premium	Optioned portfolio
0	244.34	24000001	24824502	8,24,500	24000002
1	251.37	24690514	25538737	11,30,500	24408237
2	263.33	25865271	26753851	21,76,000	24577851
3	267.72	26296473	27199867	24,97,500	24702367
4	271.82	26699191	27616420	28,48,200	24768220
5	283.03	27800279	28755336	38,00,000	24955336

Unoptioned	Return relative (R_U)	$(R_U - \bar{R}_U)$	$(R_U - \bar{R}_U)^2$	Optioned	Return relative (R_O)	$(R_O - \bar{R}_O)$	$(R_O - \bar{R}_O)^2$
24000000				24000002			
24690514	1.028771	-0.00114	0.0000012996	24408237	1.01701	0.009161	0.00008281
25865271	1.047579	0.017664	0.00031201689	24577851	1.006949	-0.0009	0.00000081
26296473	1.016671	-0.01324	0.0001752976	24702367	1.005066	-0.00278	0.00000729
26699191	1.015315	-0.0146	0.00021316	24768220	1.002666	-0.00518	0.00002601
27800279	1.041241	0.011325	0.00012825562	24955336	1.007555	-0.00029	0.00000009
Total	5.149577		0.00083002971		5.039246		0.00011701
Average	1.029915		0.00020751		1.007849		0.0000292525
S.D			0.014406396				0.00546411

SH_O = Sharpe ratio of the optioned portfolio

SH_U = Sharpe ratio of the unoptioned portfolio

σ_O = Standard deviation of optioned portfolio

$IRAR = (SH_O - SH_U) \sigma_O$

$$SH_u = (0.029915 - 0.001154) / 0.014406396 = 1.9964$$

$$SH_o = (0.007849 - 0.001154) / 0.00546411 = 1.225268$$

$$IRAR = (1.225268 - 1.9964) \times 0.00546411 = -0.00421355/\text{week}$$

$$\text{Annualized IRAR} = -21.91\%$$

- b. ROS = Unoptioned portfolio – Optioned portfolio

$$\text{Unoptioned portfolio} = 1.028771 \times 1.047579 \times 1.016671 \times 1.015315 \times 1.041241 = 1.15834518$$

$$\text{Optioned portfolio} = 1.01701 \times 1.006949 \times 1.00566 \times 1.002666 \times 1.007555 = 1.039806$$

$$\text{ROS} = 1.039806 - 1.15834518 = -0.11853918$$

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

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2.

Stock	Cov with the market (%) ²	Beta = (1/Var _m)	Required rate of return (%) = R _f + β(R _m - R _f)	(Alpha (%) = Expected return - 3)	Systematic Risk (%) ² = β ² × Var _m	Proportion of returns not explained by the market*	Proportion of returns explained by the market (1-6)	Total Risk (%) ² = (5/7)	Residual Risk (%) ²
	1	2	3	4	5	6	7	8	9
IOC	23.80	0.85	11.10	0.13	20.23	0.1340	0.8660	23.36	3.13
MUL	26.88	0.96	11.76	0.75	25.80	0.2480	0.7520	34.31	8.51
Wipro	38.08	1.36	14.16	0.36	51.79	0.1177	0.8823	58.70	6.91
HDFC	32.20	1.15	12.90	1.14	37.03	0.1870	0.8130	45.55	8.52
Ranbaxy	33.60	1.20	13.20	0.85	40.32	0.2177	0.7823	51.54	11.22

The return on the market = 6 + 6 = 12%.

Stock	α _i	β _i	σ _{ei} ²	R _i - R _f	(R _i - R _f) / β _i	Rank
IOC	0.13	0.85	3.13	5.23	6.153	5
MUL	0.75	0.96	8.51	6.51	6.781	2
Wipro	0.36	1.36	6.91	8.52	6.265	4
HDFC	1.14	1.15	8.52	8.04	6.991	1
Ranbaxy	0.85	1.20	11.22	8.05	6.708	3

Rank	Stock	σ _{ei} ²	β _i	R _i - R _f	(R _i - R _f) × β _i	(R _i - R _f) β _i / σ _{ei} ²
1.	HDFC	8.52	1.15	8.04	9.25	1.086
2	MUL	8.51	0.96	6.51	6.25	0.734

3	Ranbaxy	11.22	1.20	8.05	9.66	0.861
4	Wipro	6.91	1.36	8.52	11.59	1.677
5	IOC	3.13	0.85	5.23	4.45	1.422

Stock	$\frac{(R_i - R_f)\beta_i}{\sigma_{ei}^2}$	$\frac{\beta_i^2}{\sigma_{ei}^2}$	$\frac{(R_i - R_f)\beta_i}{\Sigma \sigma_{ei}^2}$	$\frac{\beta_i^2}{\Sigma \sigma_{ei}^2}$	$C_i = \frac{\sigma_m^2 \Sigma \frac{(R_i - R_f)\beta_i}{\sigma_{ei}^2}}{1 + \sigma_m^2 \Sigma \frac{\beta_i^2}{\sigma_{ei}^2}}$
HDFC	1.086	0.155	1.086	0.155	5.694
MUL	0.734	0.108	1.820	0.263	6.093
Ranbaxy	0.861	0.128	2.681	0.391	6.283
Wipro	1.677	0.268	4.358	0.659	6.273
IOC	1.422	0.231	5.780	0.890	6.244

$$C^* = 6.283$$

$$Z_i = \frac{\beta_i}{\sigma_{ei}^2} \left(\frac{R_i - R_f}{\beta_i} - C^* \right)$$

$$Z_{HDFC} = \frac{1.15}{8.52} (6.991 - 6.283) = 0.0956$$

$$Z_{Mul} = \frac{\beta_i}{\sigma_{ei}^2} \left(\frac{R_i - R_f}{\beta_i} - C^* \right)$$

$$= \frac{0.96}{8.51} (6.781 - 6.283) = 0.0562$$

$$Z_{Ranbaxy} = \frac{1.2}{11.22} (6.708 - 6.283) = 0.0455$$

$$Z_i = 0.0956 + 0.0562 + 0.0455 = 0.1973$$

$$\%_{HDFC} = \frac{0.0956}{0.1973} = 0.4845 = 48.45\%$$

$$\%_{Mul} = \frac{0.0562}{0.1973} = 0.2849 = 28.49\%$$

$$\%_{Ranbaxy} = \frac{0.0455}{0.1973} = 0.2306 = 23.06\%$$

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3. a. Portfolio I:

Expected return on a portfolio $R_p = W_1 E(r_1) + W_2 E(r_2) + W_3 E(r_3) + W_4 E(r_4)$

In case of portfolio I, all the stocks are in equal proportion

$\therefore$ Expected Return = $(6+15+18+23)/4 = 15.5\%$

$$\text{Volatility on a portfolio } (\sigma) = \sqrt{w_1^2 \sigma_1^2 + w_2^2 \sigma_2^2 + w_3^2 \sigma_3^2 + w_4^2 \sigma_4^2 + 2w_1 \sigma_1 w_2 \sigma_2 \rho_{12} + 2w_2 \sigma_2 w_3 \sigma_3 \rho_{23} + 2w_3 \sigma_3 w_4 \sigma_4 \rho_{34} + 2w_1 \sigma_1 w_4 \sigma_4 \rho_{14}}$$

$$\text{Volatility} = \sqrt{\begin{aligned} &0.25^2 \times 6^2 + 0.25^2 \times 32^2 + 0.25^2 \times 27^2 + 0.25^2 \times 36^2 \\ &+ 2 \times 0.25 \times 6 \times 0.25 \times 32 \times 1 + 2 \times 0.25 \times 32 \times 0.25 \times 27 \times 1 \\ &+ 2 \times 0.25 \times 27 \times 0.25 \times 36 \times 1 + 2 \times 0.25 \times 6 \times 0.25 \times 36 \times 1 \\ &+ 2 \times 0.25 \times 27 \times 0.25 \times 6 \times 1 + 2 \times 0.25 \times 32 \times 0.25 \times 36 \times 1 \end{aligned}}$$

$$\sqrt{192.8125 + 24 + 108 + 121.5 + 27 + 20.25 + 144} = 25.25$$

or

Correlation among securities is +1, weighted standard deviation of all securities is standard deviation of portfolio.

$$\frac{6 + 32 + 27 + 36}{4} = 25.25\%$$

Portfolio II:

We can find the minimum variance portfolio with the following formula:

$$X_E = \frac{\sigma_F^2 - \text{Cov}_{E,F}}{\sigma_E^2 - 2\text{Cov}_{E,F} + \sigma_F^2} = \frac{\sigma_F^2 - \rho_{E,F} \times \sigma_E \times \sigma_F}{\sigma_E^2 - 2\rho_{E,F} \times \sigma_E \times \sigma_F + \sigma_F^2}$$

Substituting the given values, we get

$$\begin{aligned} X_E &= \frac{0.30^2 - 0.7 \times 0.35 \times 0.30}{0.35^2 - 2(0.7 \times 0.35 \times 0.3) + 0.30^2} \\ &= 0.2519 \sim 0.252 \end{aligned}$$

$$X_F = 1 - 0.252 = 0.748$$

$$\text{Expected return} = 0.252 \times 20 + 0.748 \times 18 = 18.50\%$$

$$\begin{aligned} \text{Volatility} &= \sqrt{0.252^2 \times 35^2 + 0.748^2 \times 30^2 + 2 \times 0.252 \times 35 \times 0.748 \times 30 \times 0.7} \\ &= 29.3\% \end{aligned}$$

Portfolio III:

$$\text{Expected return} = 18\%$$

$$\text{Covariance of portfolio with market portfolio} = 23.76\%$$

$$\text{Market variance} = 22\%$$

$$\text{Beta} = 522.72 / 22^2 = 1.08$$

$$\text{Volatility} = \sqrt{\beta_i^2 \times \sigma_m^2 + \sigma_e^2}$$

Substituting the given values, we get,

$$\text{Volatility} = \sqrt{1.08^2 \times 0.22^2 + 0.13^2} = 0.2708 = 27.08\%$$

- b. Using the given utility function we can calculate the utilities of the three portfolios.

$$\text{Portfolio I: } U = 0.155 - 0.35 \times 0.2525^2 = 0.1327$$

$$\text{Portfolio II: } U = 0.1850 - 0.35 \times 0.293^2 = 0.15495$$

$$\text{Portfolio III: } U = 0.18 - 0.35 \times 0.2708^2 = 0.1543$$

The portfolio with highest utility is portfolio II, therefore Mr. Prachodia will select this portfolio.

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Maturity (year)	YTM(%)	Price (Rs.)	Forward rate (%)
1	10	909.09	
2	11	811.62	$12.01 = (1.11^2/1.1) - 1$
3	12	711.78	$14.03 = (1.12^3/1.11^2) - 1$

- b. 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	$892.78 = 1000/1.1201$	12.01
2	$782.93 = 1000/(1.1201 \times 1.1403)$	13.02

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

- c. c. Next year, the 2-year zero will be a 1-year zero, and will therefore sell at $\text{Rs.} 1000/1.1201 = \text{Rs.} 892.78$. Similarly, the current 3-year zero will be a 2 year zero and will sell for $\text{Rs.} 782.93$

Expected total rate of return:

2-year bond: $(892.78/811.62) - 1 = 1.100 = 10\%$

3-year bond: $(782.93/711.78) - 1 = 1.100 = 10\%$

- 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 = $120 \times 0.90909 + 120 \times 0.81162 + 1,120 \times 0.71178$
 $= 109.09 + 97.39 + 797.19 = \text{Rs.} 1003.68$

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 = $120 \times 0.89278 + 1120 \times 0.78293$
 $= 107.1336 + 876.8816 = 984.02$

Total expected rate of return = $120 + (984.02 - 1003.38)/1003.68$
 $= 0.10028 \sim 10.03\%$

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5. a. If 3:5 ratio spread is to be adopted, buying and selling options with the same maturity, there are four combinations

1. Sell 3 calls at low strike price and buy 5 calls at high strike price:

It involves initial investment of $\text{Rs.} 6.15 (\text{Rs.} 31.7 \times 3 - \text{Rs.} 20.25 \times 5)$

2. Sell 3 calls at high strike price and buy 5 calls at low strike price:

It involves initial investment of $\text{Rs.} 97.75 (-\text{Rs.} 31.7 \times 5 + \text{Rs.} 20.25 \times 3)$

3. Buy 3 calls at high strike price and sell 5 calls at low strike price:

It involves initial inflow of Rs.97.75 ($\text{Rs.}31.7 \times 5 - \text{Rs.}20.25 \times 3$)

4. Buy 3 calls at low strike price and sell 5 calls at high strike price

It involves initial inflow of Rs.6.15 ($-\text{Rs.}31.7 \times 3 + \text{Rs.}20.25 \times 5$)

Of these four combinations, combinations 1 and 2 give positive payoff when the market is in up trend. And the minimum investment involved is for combination 1. In case of combinations 3 and 4, even if there is positive initial cash inflow, pay off is negative when the market is in up trend. Hence, (1) is appropriate strategy.

Sell 3 calls at lower strike price and buy 5 calls at higher strike price:

Sell 3 calls at lower strike price for Rs.31.7 each = $\text{Rs.}31.7 \times 3 = \text{Rs.}95.1$

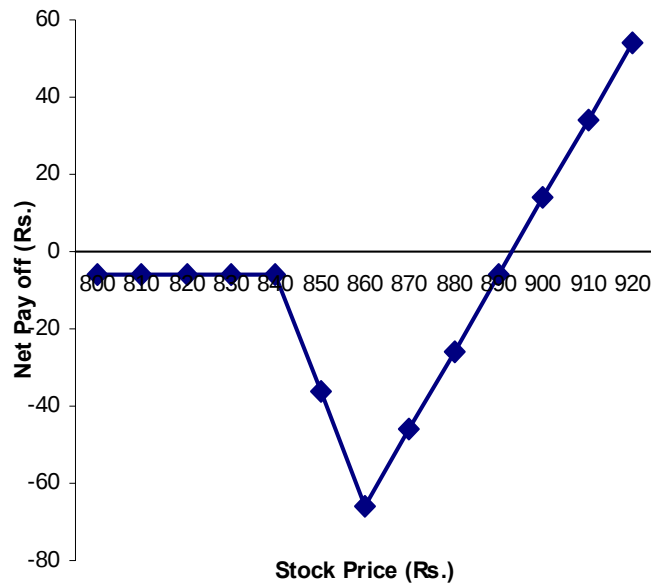
Buy 5 calls at higher strike price for Rs.20.25 each = $\text{Rs.}20.25 \times 5 = \text{Rs.}101.25$

Initial Investment = - Rs.6.15

Stock Price (Rs.)	Sell 3 calls at Rs.840	Buy 5 calls at Rs.860	Net Pay off
800	-	-	-6.15
810	-	-	-6.15
820	-	-	-6.15
830	-	-	-6.15
840	-	-	-6.15
850	-30	-	-36.15
860	-60	-	-66.15
870	-90	50	-46.15
880	-120	100	-26.15
890	-150	150	-6.15
893.075	-159.225	165.375	0
900	-180	200	13.85
910	-210	250	33.85
920	-240	300	53.85

Break even point for this strategy is at the stock price of Rs.893.075 and maximum loss is at the higher strike price of Rs.860.

3:5 Ratio Spread Using Calls



b. If 3:5 ratio spread is to be adopted, buying and selling options with the same maturity, there are four combinations

1. 1. Sell 3 puts at low strike price and buy 5 puts at high strike price:
It involves initial investment of Rs.51.9 ($-\text{Rs.}14.1 \times 5 + \text{Rs.}6.2 \times 3$)
2. Sell 3 puts at high strike price and buy 5 puts at low strike price:
It involves initial inflow of Rs.11.3 ($-\text{Rs.}6.2 \times 5 + \text{Rs.}14.1 \times 3$)
3. Buy 3 puts at high strike price and sell 5 puts at low strike price:
It involves initial investment of Rs.11.3 ($-\text{Rs.}14.1 \times 3 + \text{Rs.}6.2 \times 5$)
4. Buy 3 puts at low strike price and sell 5 puts at high strike price
It involves initial inflow of Rs.51.9 ($\text{Rs.}14.1 \times 5 - \text{Rs.}6.2 \times 3$)

Of these four combinations, combinations 3 and 4 give negative payoff when the market is in huge down trend, even if there is initial inflow for combination 4. In case of combinations 1 and 2, even if there is positive payoff in huge down trend for both the combinations, combination 1 involves investment where as combination 2 involves initial inflow. Hence, (2) is appropriate strategy.

Buy 5 puts at low strike price $6.2 \times 5 = -\text{Rs.}31$

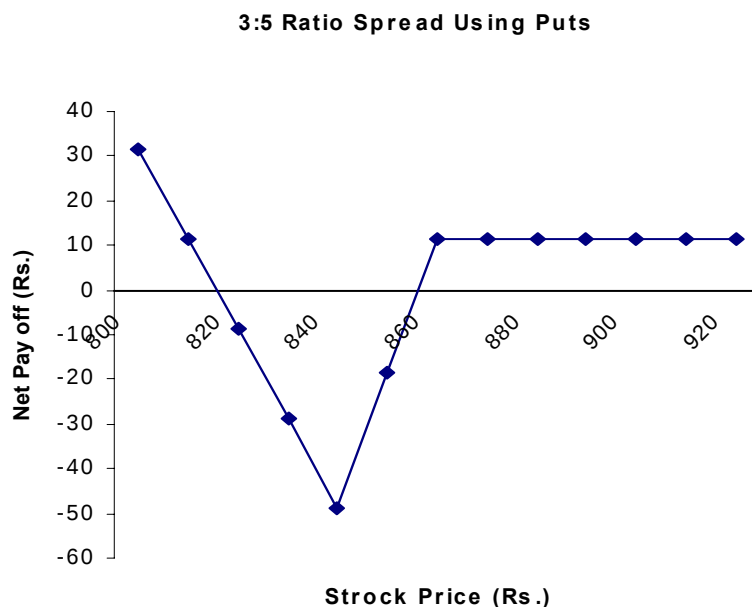
Sell 3 puts at high strike price $14.1 \times 3 = \text{Rs.}42.3$

Initial inflow = Rs.11.3

Stock Price (Rs.)	Sell 3 puts at Rs.860	Buy 5 puts at Rs.840	Net Pay off
800	-180	200	31.3
810	-150	150	11.3
815.65	-133.05	121.75	0
820	-120	100	-8.7
830	-90	50	-28.7
840	-60	0	-48.7
850	-30	0	-18.7

856.233	-11.30	0	0
860	0	0	11.3
870	0	0	11.3
880	0	0	11.3
890	0	0	11.3
900	0	0	11.3
910	0	0	11.3
920	0	0	11.3

Break even points for this strategy are at the stock price of Rs.815.65 and Rs.856.233 and maximum loss is at the price of Rs.840.



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Section C: Applied Theory

6. Advantages of using econometric Models

Following are the main advantages of using models:

Testing of hypothesis and idea of an economic indicator. Examples: Test to know how low interest rates stimulate growth and whether wages can be used as a predictor of inflation.

Estimating sensitivities. Example: Would one percentage point rise in the US Consumer Price Index typically translate into 1 a-year bond yield?

Developing internally consistent forecasts. Example: When researchers are using a judgmental approach, they may fail to see that something they are implying about income growth does not jibe with their assumption on employment growth.

Running simulation of complex scenario. Example: A government economist may need to find out what happens if interest rates and government spending are both cut.

Problems in the Use of Models

The main problem in using the models is the lack of consistency of the data. Investment professionals should be aware of this before any decision is taken based on these models. Other problems that arise in these models are:

Implausible Result: A number of variables used to isolate one may cause an implausible result. If any

of the variables among them is working then the prediction might be quite unreliable.

Statistical VS. Real World: The other problem is the difference in the statistical result and the result in the real world.

Error in the Underlying Data: Past data used may be good predictors of some variable but in certain cases where variables are subject to huge revision they create problems when using models.

Assumption: Assumption is the most vital problem in using models. It is not possible to predict every variable, so every model has some assumptions. So it is suggested to be careful while using assumptions.

Structural Changes: Most of the models assume that past relationships have some, validity in predicting future relationships but this prediction may not be significant where fundamental structure changes due to rapidly changing economies.

Simultaneity: Simultaneity is the term used to measure the influence of one variable on another when that second variable also influences the first one. These occurrences can create confusion in using statistical models.

Time Series Data: The time series data i.e., the data that frequently changes due to some economic factors like population growth, GDP growth sometimes- have a number of problems. These data may violate some assumptions due to their, trend properties.

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7. **Practical Problems with Static Portfolio Insurance:**

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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