



Name :

Roll No. :

Invigilator's Signature :

CS/MBA/SEM-4FT & 6PT/FM-406/2013

2013

DERIVATIVES AND RISK MANAGEMENT

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :

10 × 1 = 10

- i) The concept of 'convenience yield' is applicable for
 - a) carry type commodities
 - b) non-carry type commodities
 - c) indices
 - d) stocks.



- ii) The Black-Scholes Option price in theory is based on the following assumption that
- a) the stock movement is taken to be random
 - b) the stock pays regular dividends
 - c) there is cyclical change in interest rate
 - d) the call option can be exercised any time during the life period.
- iii) When should a risk be avoided ?
- a) When the risk event has a low probability of occurrence and low impact
 - b) When the risk event is unacceptable, generally one with a very high probability of occurrence and high impact
 - c) When it can be transferred by purchasing insurance
 - d) A risk event can never be avoided.
- iv) FLEX option means
- a) Flexible Exchange Index Option
 - b) Floating Rate Exchange Option
 - c) Fined Leverage Exchange Option
 - d) none of these.
- v) If Buy Call and Put Option are made at different exercise prices is known as
- a) strangle
 - b) straddle
 - c) hedging
 - d) none of these.



GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following.

3 × 5 = 15

2. Explain the concept of gamma of an option.
3. "Futures rely on a great deal on expected spot prices. The theoretical framework suggests that forward rates reflect the expected spot rates." How do futures differ from forwards ? Explain.
4. Describe the difference between a stack hedge and strip hedge. What are the advantages and disadvantages of each ?
5. Use the Black-Scholes model to value the following call option :
Stock Price — Rs. 210
Strike price — Rs. 220
Time to expiration — 167 days
Risk-free interest rate — 10%
Variation of annual stock returns — 20%.
6. Your brother in USA has invested heavily in stock with a strong Asian exposure, and he tells you that his portfolio has a positive delta. Give an intuitive explanation of what does this mean ? Suppose the value of these stocks that your brother holds increases significantly explain what will happen to the value of his portfolio.
7. A highly diversified portfolio is currently worth Rs. 10 lakh and has a beta of 1.0. The BSE Sensex is currently at 19,600. Show how a (hypothetical) put option on the BSE Sensex with a strike price of Rs. 18,300 can be used to provide portfolio insurance. Assume that each option is for 10 times the value of the index.

**GROUP – C****(Long Answer Type Questions)**

Answer any *three* of the following. $3 \times 15 = 45$

8. Three companies X, Y and Z have come together to reduce their interest cost. Following are the requirement of those companies and interest rates offered to them in different markets.

Company	Requirement	Fixed \$	Floating \$	Fixed Euro
X	Fixed \$ Funds	5.75%	LIBOR+0.90%	6.00%
Y	Floating \$ Funds	5.25%	LIBOR+0.75%	6.50%
Z	Fixed Euro Funds	6.00%	LIBOR+0.60%	6.25%

The amount required by the companies are equal and are for three years on bullet payment basis. You are required to arrange a swap between three parties in such a way so that the benefit of swap is equally divided among parties.

9. a) Discuss the various hedging strategies which are applied to manage price risk of futures.
- b) An aviation company calculates that it will need 12 million gallon fuel of jet in the next six months. The standard deviation of the change in price per gallon of fuel over six months is calculated as 0.030. The company chooses to hedge by buying future contracts on aviation fuel. The standard deviation of the change in futures prices over a three months period is 0.035 and the coefficient of correlation between three month change in price of aviation fuel and three months change in future price is 0.5. Calculate the optimal hedge ratio and number of contracts company should buy to hedge the risk. One contract size is 42000 gallons. $10 + 5$



10. There exists a call option on a stock with the strike price of Rs. 50 selling at a premium of Rs. 6 expiring in 2 months from now. A put option with similar features trades at a price of Rs. 5. The pay-off of the holder of call and put option for stock prices ranging between Re. 0 and Rs. 1000. Determine the pay-off of the call option with and without premium.

- a) Determine the pay-off of the put option with and without premium.
- b) Plot the pay-off of the call holder
- c) Plot the pay-off of the put holder
- d) Determine the pay-off of the call and put option writers with and without premium
- e) Plot the pay-off of the call and put writers with premium.

11. a) The following information is available about Copper Scrap :

Spot price : £ 5,000 per ton

Future price : £ 5,400 per ton for one year contract

Interest rate : 10%

P.V. (Storage cost) : £ 250 per year.

What is the PV (Convenience yield) of Copper Scrap ?



- b) Consider a two-year American call option with a strike price of Rs. 50 on a stock, the current price of which is also Rs. 50. Assume that there are two time periods of one year and in each year the stock price can move up or down by equal percentage of 20%. The risk free interest rate is 6%. Using binomial model, calculate the probability of price moving up and down. Also draw a two step binomial tree showing prices and payoffs at each node.

12. Write short notes on any *three* of the following : 3 × 5

- a) Warrant
- b) Energy futures
- c) Vega option
- d) Forward Rate Agreements (FRAs)
- e) Cross-hedging.

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