This question paper contains 4 printed pages.

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Your Roll No. .....

MBA (FT)

A

Paper F–3109— FINANCIAL DERIVATIVES

Time : 3 hours *Maximum Marks* : 70

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt any five questions. All questions carry equal marks.

1(a) In what sense do calls and puts provide insurance? If you have written a call option on a stock and also on the S&P500, What will happen at maturity, if the two options are in –the money?

(3)

(b) When is a long call ' in- the money and when is a long put out -of -the money? A one month European put option on a non dividend paying stock is currently selling for Rs.2.50. The stock price is Rs 47, the strike price is Rs.50, and the risk free interest rate is 6% per annum. What opportunities are there for an arbitrageur?

(7)

(c) Based on the traders decisions to buy or sell futures contract, explain the terms short hedge, long hedge ,Cross hedge and hedge ratio.

(4)

2(a) State and prove Put-Call Parity theorem for European options.

(4)

(b) European put and call options with strike price Rs. 240 and expiry in 6 months is trading at Rs. 50.09 and Rs 70.78, respectively. The current stock price is Rs. 200.37 with risk free interest rate continuous compounding equal to 7.48%. Is there an arbitrage opportunity? How can it be exploited?

(4)

(c) Assume a stock trades for Rs.120. A call option on this stock has a strike price of Rs. 120 and costs Rs. 11. A put option also has a strike price of Rs. 120 and costs Rs 8. A risk free bond promises to pay Rs. 120 at the expiration of the option in one year. What should the price of this bond be? Explain. (6)

Turn over

3(a) Futures contract as hedging tools and help in protecting the risks associated with uncertainties in exchange rates, explain. (4)

(b) It is March 25, 2011, the spot rate is Rs. 44.00 per USD and the prevailing continuously compounded interest rates in India and US are 10% and 7%. What is the price of one year futures contract? What opportunities are there for an arbitrageur, if the prevailing one year USD-INR forward rate today is (i) Rs. 44.50 and (ii) Rs. 46?

(c) The spot exchange rate of USD to INR is 46 and the 90-day forward rate is 44.75. If the interest rate in India is 2.5% for this period, what is the net cost of carrying USD from today till expiry of the forward?

On June 20, 2010, a ank sells Euro 300,000 forward for delivery on 20 December 20, 2010. The spot exchange rate is INR 51.65/euro. The following interest rates were observed at the initiatiobn and at another point in the life of the contract

Interest rate (p.a)	On June 20 ,2010	On October 20, 2010
Euro	3.50%	3.65%
INR	6.25%	5.95%
Spot exchange rate/ euro	51.65	52.20

Compute the no-profit forward exchange rate at the time of initiation and on October 20,2010 for the same delivery date of the original contract. On October 20, 2010, is the contract a liability or asset for the bank? Assume 30/360-day convention. (5)

4(a) intuitively, why is an American call or put option worth more than a similar European option? (4)

(b) The current stock price is Rs. 100. The stock can increase or decrease by 10% per period. The risk free rate is 5% per period. Using the BOPM show at each node of the Binomial tree, the stock price and the value of a European put which expires in two periods and has a strike price of K = Rs. 100. Also, calculate the hedge ratio at each node and show that the hedged portfolio has the same value at the two nodes at t =1. (10)

5(a) Would you pay more for a call option on a stock where the underlying stock had an annual return volatility of 20% p.a. rather than one which one which had an annual volatility of 10% p.a.? (4)

(b) Calculate the Black-Scholes price for European call option on a stock with 6 months to maturity. The stock is selling at Rs. 100, the strike price is Rs 100 and risk free interest rate is 10% p.a.

(c.c.). What is the call premium, if the volatility is 20%? What happens to call premium if the next day the volatility increases to 30% p.a.? What is put premium? (10)

6(a) What are differences between a long straddle and a short butterfly spread? A call with a strike price Rs. 50 costs Rs. 2 and a put with strike price Rs. 50 costs Rs.4. What are the payoffs and profits from a short straddle? Who might use short straddle? (5)

(b) You expect the stock market to rise over next 3months. What are the advantages and disadvantages of buying a call or a bull spread? (4)

(b) What is a protective put? Why it is like purchasing insurance on your stock portfolio? The current stock price is Rs.100 and a put with a strike price Rs. 98 is available at a price of Rs. 4. What is the payoff and profit from the protective put at various values for the stock price, at maturity? Who might use protective put? (5)

7(a) State Ito's lemma. If the stock price S at time t follows the process

$$\Delta S = \mu S \Delta t + \sigma S \varepsilon \sqrt{\Delta t},$$

find the process followed by $\log_e S$. (7)

(b) HDFC Mutual fund has the following portfolio (named A) of options:

Option	Position (no. of options held)	Delta	Gamma	Vega
Call	-1500	0.5	2.2	1.8
Call	-1000	0.8	0.6	0.2
Put	-3000	-0.4	1.3	0.7
Call	-1000	0.7	1.8	1.4

The following options are also available for trade:

Option	Delta	Gamma	Vega
Y	0.1	0.5	0.3
Z	0.6	1.5	0.6

i. What position in Z and portfolio A would make the overall portfolio both gamma and delta neutral?

ii. What position in Z and portfolio A would make the overall portfolio both vega and delta neutral?

iii. What position in Y, Z and portfolio A would make the overall portfolio gamma vega and delta neutral? (7)