CBCS SCHEME

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18MBAFM405

Fourth Semester MBA Degree Examination, July/August 2022
Financial Derivatives

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer any FOUR full questions from Q.No.1 to Q.No.7.***
2. ***Question No. 8 is compulsory.***
3. ***Use of Natural logarithms,*** e^x, e^{-x} ***and Normal distribution table is permitted.***

1 a. What is a hedge ratio? How it is determined? **(03 Marks)**

b. Bring out the difference between forward and futures contracts. **(07 Marks)**

c. Using the following data, prepare the margin account of the Investor. Assume that if a margin call is made at any time, the Investor would deposit the amount called for.
Position : Short
Contract size : 500 units
Unit price : Rs.22
Number of contracts : 8
Initial margin : 12 percent
Maintenance margin : $\frac{3}{4}^{th}$ of Initial margin
Date of contract : June 4

Date	June 5	June 6	June 7	June 10	June 11	June 12	June 13
Price	22.30	23.10	22.90	23.00	23.15	22.85	22.95

(10 Marks)

2 a. When is the option said to be : (i) In – the Money (ii) At – the Money
(iii) Out-of the Money. **(03 Marks)**

b. Consider a 6-month forward contract on 100 shares with a price of Rs.38 each. The risk free rate of Interest (continuously compounded) is 10% per annum. The share is expected to yield a dividend of Rs.1.50 in 4 months from now. Determine the value of the forward contract. **(07 Marks)**

c. Assume that a market-capitalisation weighted Index consists of 5 stocks only. Currently, the Index stands at 5000. Obtain the price of a futures contract, with expiration in 115 days, on this Index having reference to the following additional information :
Dividend of Rs.6 per share expected on share B, 20 days from now.
Dividend of Rs.3 per share expected on share E, 28 days from now.
Continuously compounded risk-free rate of return = 8% p.a.
Lot size : 300
Other information :

Company	Share price (Rs.)	Market capitalization
A	22	110
B	85	170
C	124	372
D	54	216
E	25	200

(10 Marks)

3 a. Differentiate between American and European option. **(03 Marks)**

b. Discuss the various factors affecting the prices of options. **(07 Marks)**

c. The current price of a share is Rs.50 and it is believed that at the end of one month the price will be either Rs.55 or Rs.45. What will a European call option with an exercise price of Rs.53 on this be valued at. If the risk free rate of Interest is 15% per annum? Also calculate the hedge ratio. **(10 Marks)**

4 a. What is currency swap? **(03 Marks)**

b. What is credit default swap? Explain the features of a credit default swap. **(07 Marks)**

c. Consider the following data about call option on BHEL for which one contract involves 1100 shares.

Strike Price	Premium
Rs.170	Rs.21.10
Rs.180	Rs.14.00
Rs.190	Rs.8.00

Help an Investor to build a butterfly spread. Find the pay-off at various ranges of stock prices. Illustrate by taking stock price as Rs.168, Rs.176, Rs.185, Rs.189 and Rs.198. **(10 Marks)**

5 a. Define Put-Call parity. **(03 Marks)**

b. Company A wishes to borrow USD at fixed rate. Company B wishes to borrow Japanese Yen at a fixed rate. The amount required by these two companies is same at the current exchange rate. The companies are quoted the following rates on Interest.

Company	US Dollar	Japanese ¥
A	8.6%	4.0%
B	9.0%	5.5%

Design a swap that is equally attractive to both the companies and that will net a bank acting as an intermediary 50 basis points per annum. The foreign exchange risk is assumed by the bank. Also show the Swap diagram. **(07 Marks)**

c. From the following data, obtain the call and put options values based on Black and Scholes formulation:
Stock price = Rs.206 ; Exercise price = Rs.200; Time to expiration = 47 days
Standard deviation = 0.26 ; Continuously compounded risk free rate of return = 8 % **(10 Marks)**

6 a. What is forward rate agreement? **(03 Marks)**

b. Suppose that the spot (zero) rates with continuous compounding as follows :

Maturity (years)	1	2	3	4	5
Rate (% per annum)	12	13	13.7	14.2	14.5

Calculate forward Interest rates for the second, third, fourth and fifth year. **(07 Marks)**

c. What do you mean by VaR? Describe the three approaches to determine VaR. **(10 Marks)**

7 a. Investor A bought a Rs.370 call option contract involving 1000 shares of a company. He paid a premium of Rs.6 per share on this. On the expiry of the contract, the settlement price was Rs.385. What was Investor A's profit/loss on this contract? **(03 Marks)**

b. The market price of shares of a company ABC is Rs.40 per share currently. The company is expected to pay a divided of Rs.2.50 per share, three months from now. If the continuously compounded risk free rate of Interest is 12% pa. Calculate the theoretical price of a 6 month futures on 100 shares. **(07 Marks)**

c. A portfolio of shares consists of investment in shares of A valued at Rs.500,000 and in shares of B valued at Rs.2,50,000. The daily standard derivation of returns of A and B are 3% and 3.5% respectively. The correlation coefficient between the returns of these two stocks is 0.65. Compute the 10 day VaR of the portfolio at 97.5% confidence level. By what amount has the diversification has reduced VaR? **(10 Marks)**

8 **CASE STUDY: (compulsory)**

On January 1, 2020 an Investor has a portfolio of 5 shares is given here :

Security	Price	No. of shares	Beta
A	59.50	5000	1.05
B	81.85	8000	0.35
C	101.10	10000	0.80
D	125.15	15000	0.85
E	140.50	1500	0.75

The cost of capital to the Investor is 12.5% per annum.

You are required to :

a. Calculate the beta of his portfolio. **(05 Marks)**

b. Calculate the theoretical value of the NIFTY futures for February. **(05 Marks)**

c. If its current value is 1005 and NIFTY futures have a minimum trade lot requirement of 200 units, obtain the number of contracts of NIFTY he needs to sell in order to get a full hedge until February for his portfolio. Assume that the futures are trading at their fair value. **(05 Marks)**

d. Calculate the number of futures contacts the Investor should trade if he desires to reduce the beta of his portfolio to 0.7. **(05 Marks)**

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