

2022-23 Second Semester,- Comprehensive Examination- 10th May, 2023

DERIVATIVE AND RISK MANAGEMENT (FIN F311, ECON F354)

(Answer all questions.)

*** All Interest rates are continuously compounded rate unless stated otherwise*

Q.1). Suppose that the risk-free zero curve is flat at 7% per annum with continuous compounding and that defaults can occur halfway through each year in a new 5-year credit default swap. Suppose that the recovery rate is 30% and the hazard rate is 3%. Estimate the credit default swap spread.

Assume payments are made annually

(4 Marks)

Q.2) Assume a stock is currently priced at Rs 1200. There exists a call option with an exercise price of Rs 1240 and expiry of 90days. This 90-day period can be considered to be two periods of 45 days each. The price volatility of the stock is 25% .If the risk free rate is 6%, calculate the price of call by using the Binomial Option Pricing Model. What will be the value of put?(Use put call parity).

A Year =365 days

(4 Marks)

Q.3) Suppose that the term structure of interest rates is flat in the United States and Europe. The EURO interest rate is 7% per annum and the USD rate is 9% per annum. The current value of the USD is 0.62 EURO. In a swap agreement, a financial institution pays 8% per annum in USD and receives 4% per annum in EURO. The principals in the two currencies are 12 million EURO and 20 million USD. Payments are exchanged every year, with one exchange having just taken place. The swap will last two more years. What is the value of the swap to the financial institution?(Use Forward Rate method)

Assume all interest rates are continuously compounded. Approx to 4 decimals.

(4 Marks)

Q.4) American call on a non-dividend-paying stock is \$20. The stock price is \$155, the strike price is \$150, and the expiration date is in three months. The risk-free interest rate is 8%. Derive upper and lower bounds for the price of an American put on the same stock with the same strike price and expiration date

(2 Marks)

Q.5) A one-year call option on a stock with a strike price of Rs 300 costs Rs 30; a one-year put option on the stock with a strike price of Rs 300 costs Rs 40. Suppose that a trader buys two call options and one put option. What is the breakeven stock price above which the trader makes a profit? **(2Marks)**

Q.6) Present exchange rate is Rs 80 per dollar. A Company is worried about the possible of fluctuations in the exchange rate. How can the company manage this risk if their risk appetite is that a fall or rise in the rate by Rs.0.25 is acceptable? **(2 Marks)**

Q.7) Calls were traded on exchanges before puts. During the period of time when calls were traded but puts were not traded, how would you create a European put option on a non-dividend-paying stock synthetically? **(2 Marks)**

Q.8) A farmer faces uncertainty about the quantity and price of his wheat crop under the following possible scenarios:

Probability	Price of wheat per kg-Rs	Quantity-Kg	Revenue -Rs
0.6	20.00	40,000	8,00,000
0.4	30.00	30,000	9,00,000

What will his strategy be? What will be the assured revenue ? **(4 Marks)**

Q.9) What does it mean to assert that the delta of a call option is 0.7? How can a short position in 1,000 options be made delta neutral when the delta of each option is 0.7? **(2 Marks)**

Q.10) Current price of stock is currently Rs 610. This stock has volatility of 10% p.a (252 trading days). 4 months European call options are priced as follow. In Rs

Strike Price	Price
500	100
600	70
650	60
700	50

What trading strategy would you advise an investor for 4 months period (84 trading days) ? He is moderately risk averse and does not want lose too much.

Present the results of the strategy advised by you in a tabular form showing the pay off and profit in the given range of volatility **(3 Marks)**

Q.11) A call with a strike price of Rs. 180 costs Rs 18. A Put with same strike price and expiration costs Rs 16. Construct a table that shows the profit from Straddle. For what range of stock prices would the Straddle lead to a loss? **(2Marks)**

Q.12) A portfolio manager is worried about the fall in the value of his portfolio. The following information is available

Present Portfolio Value Rs 1 Million. Beta of the portfolio 2. Present Index value 1000
 Contract size 100, Dividend yield on portfolio and index is 4% p.a and risk free rate is 12% p.a
 .All rates are annual compounding

He needs his portfolio to be insured for 90% of the present value. Advise him about the number of contracts, option type and strike price **(3 Marks)**

Q.13) Sixty futures contracts are used to hedge an exposure to the price of silver. Each futures contract is on 5,000 ounces of silver. At the time the hedge is closed out, the basis is \$0.20per ounce. What is the effect of the basis on the hedger's financial position if

- (a) the trader is hedging the purchase of silver and
- (b) the trader is hedging the sale of silver? **(2 Marks)**

Q.14) The contract size of Allahabad Bank options is 2,450. Allahabad Bank shares are selling at INR 95 on March 1. Call options and put options are available with expiry on April 29 and an exercise price of INR 100. The volatility of the stock price is 18%, and the risk-free rate is 8%. Using the Black-Scholes options pricing model, calculate the per call and put option price on March 1.. Verify the parity

Consider 60days/365 **(4 Marks)**

Normal distribution table

<i>z</i>	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621