

**Birla Institute of Technology & Science, Pilani
Pilani Campus – Rajasthan**

**Comprehensive Exam – ECON-F354/ FIN F311
Derivative & Risk Management (DRM)
Session – 2022-23 (II)
Open Book**

Maximum Marks: 65

Dated: 12/May/2023

Time Duration: 90 Minutes (Max)

Instructions:

- Do not forget to write your Name and ID number on the answer sheet
- You need to write the answers in the separate answer booklet provided to you and submit them to the invigilator before leaving the examination room. Failing to do so will result in zero marks in this evaluative component
- All questions are compulsory, and there is no negative marking for the wrong answers
- Read question-specific instructions before giving your answers
- **To get the full score, you need to show all the steps required to arrive at the final answer with proper interpretation**
- **Calculator is allowed**

Section C

Q1.

[12 +3 =15 Marks]

(i) You are given the following information concerning options on a particular stock:

Stock price = \$83

Exercise price = \$80

Risk-free rate = 6% per year, compounded continuously

Maturity = 6 months

Standard deviation = 47% per year

- a) What is the intrinsic value of the call option? Of the put option?
- b) What is the time value of the call option? Of the put option?

(ii) A stock is currently priced at \$35. A call option with an expiration of one year has an exercise price of \$50. The risk-free rate is 7 percent per year, compounded continuously, and the standard deviation of the stock's return is infinitely large. What is the price of the call option?

Q2.

[15 +5=20 Marks]

(i) Frostbite Thermalwear has a zero-coupon bond issue outstanding with a face value of \$25,000 that matures in one year. The current market value of the firm's assets is \$27,200. The standard deviation of the return on the firm's assets is 53 percent per year, and the annual risk-free rate is 5 percent per year, compounded continuously. Based on the Black-Scholes model, what is the market value of the firm's equity and debt?

[Hint: Consider total asset as current stock price, the face value of the bond as the strike price, the value of equity as call option; total assets= equity + debt]

(ii) Three put options on a stock have the same expiration date and strike prices of \$55, \$60, and \$65. The market prices are \$3, \$5, and \$8, respectively. Explain how a butterfly spread can be created. Construct a table showing the profit from the strategy. For what range of stock prices would the butterfly spread lead to a loss?

Q3:

[7+7+16=30]

(i) Companies A and B have been offered the following rates per annum on a \$20 million five-year loan:

	Fixed Rate	Floating Rate
Company A	5.0%	LIBOR+0.1%
Company B	6.4%	LIBOR+0.6%

Company A requires a floating-rate loan; company B requires a fixed-rate loan. Design a swap that will net a bank, acting as intermediary, 0.1% per annum and that will appear equally attractive to both companies.

(ii) Companies X and Y have been offered the following rates per annum on a \$5 million 10-year investment:

	Fixed Rate	Floating Rate
Company X	8.0%	LIBOR
Company Y	8.8%	LIBOR

Company X requires a fixed-rate investment; company Y requires a floating-rate investment. Design a swap that will net a bank, acting as intermediary, 0.2% per annum and will appear equally attractive to X and Y.

(iii) Consider a European call option where the underlying asset current price is Rs. 21, the strike price of the contract is Rs.20 with time to maturity 3 months. The market prevailing risk-free interest rate is 10% per annum with continuous compounding. If the market quoted call option price is 1.875, then what is the implied volatility? Interpret the result with proper reasoning.