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

**Comprehensive Exam – ECON-F354/ FIN F311**
**Derivative & Risk Management (DRM)**
**Session – 2023-24 (I)**
**Open Book**

**Maximum Marks**: 60 **Dated**: 12/December/2023
**Time Duration**: 90 Minutes (**Max**)

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**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.**

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Q1: [15 Marks]

(A) Consider a 9-month dollar-denominated American put option on British pounds. You are given that:

(i) The current exchange rate is 1.43 US dollars per pound.

(ii) The strike price of the put is 1.56 US dollars per pound.

(iii) The volatility of the exchange rate is $\sigma = 0.3$.

(iv) The US dollar continuously compounded risk-free interest rate is 8%.

(v) The British pound continuously compounded risk-free interest rate is 9%.

Using a three-period binomial model, calculate the price of the put.

Q2: [20 Marks]

Mr. Sanjay Singh is the CEO of BNP Sundaram Paribas. The board of directors has granted Mr. Singh 25,000 at-the-money European call options of the company's stock, which is currently trading at $55 per share. The stock pays no dividend. The options will expire in five years, and the standard deviation in the stock returns is 61%. The risk-free rate of interest is 6% with continuous compounding.

(a) Use Black-Scholes model to calculate the value of the stock options.

(b) You are Mr. Singh's financial adviser. He must choose between the previously mentioned stock option package and an immediate $750,000 bonus. If he is risk neutral, which would you recommend?

(c) How would you answer (b) if Mr. Singh were risk-averse and he could not sell the options prior to expiration?

Q3: [25 Marks]

You are currently working for Clissold Industries. The company, which went public five years ago, engages in the design, production, and distribution of lighting equipment and specialty products worldwide. Because of recent events, Mal Clissold, the company president, is concerned about the company's risk, so he asks for your input. Mal has provided you with the following option prices on four call options that expire in six months. The risk-free rate is 4 percent, and the current stock price is $53.

| Scenario | Strike Price | Option Price |
|---|---|---|
| 1 | 50 | $12.78 |
| 2 | 55 | 10.14 |
| 3 | 60 | 7.99 |
| 4 | 65 | 5.81 |

You are required to calculate the implied volatilities for each of the scenarios given in the above table. In addition, explain with proper reasoning on the relationship between implied volatility and option price, and implied volatility and strike price.