PART-B

Maximum Marks:60   **Dated**: 22/December/2022

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 to the invigilator before leaving the examination room. Failing to do so will result in zero marks in this evaluative component
- 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**

Q1:   [15 marks]

You are considering the purchase of 100 units of a 3-month 25-strike European call option on a stock.

        You are given:

(i)   The Black-Scholes framework holds.
(ii)   The stock is currently selling for 20.
(iii)   The stock's volatility is 24%.
(iv)   The stock pays dividends continuously at a rate proportional to its price. The dividend yield is 3%.
(v)   The continuously compounded risk-free interest rate is 5%.

Calculate the price of the block of 100 options.

Q2:   [15 +10 =25 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.

(B) Consider the following three-period binomial tree model for a stock that pays dividends continuously at a rate proportional to its price. The length of each period is 1 year, the continuously compounded risk-free interest rate is 10%, and the continuous dividend yield on the stock is 6.5%.
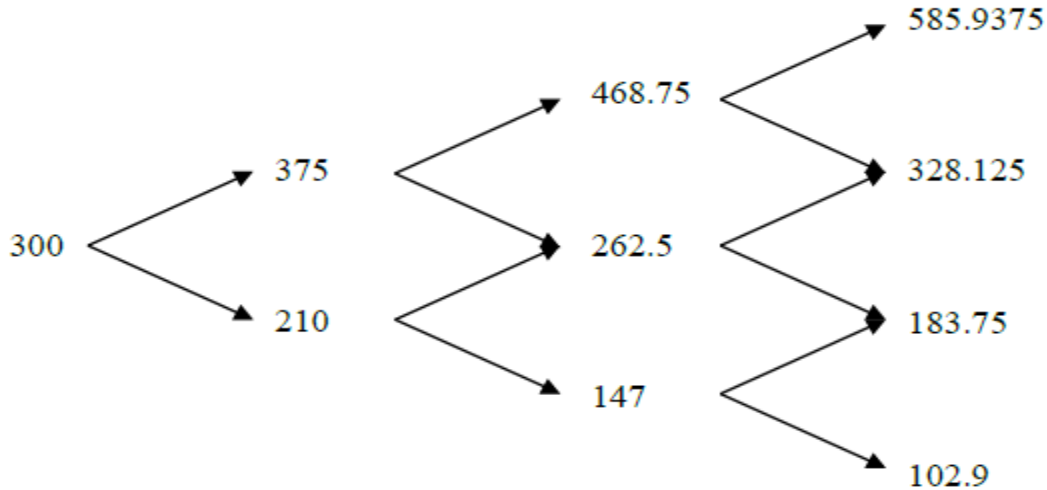
Calculate the price of a 3-year at-the-money American put option on the stock.

Q3:   [12+4+4= 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?