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Plot No. 2, Knowledge Park-III, Greater Noida (U.P.) –201306

POST GRADUATE DIPLOMA IN MANAGEMENT (2023-25)
MID TERM EXAMINATION (TERM -IV)

Subject Name: Financial Derivatives — Time: **01.00 hr**

Sub. Code: PGF-41 — Max Marks: 20

Note: This is a case study based examination. There are four questions and all questions are compulsory. Each question carries 5 marks.

Case Background:

Sarah is a risk manager for a financial institution specializing in derivatives trading. Her team frequently engages in futures and options trading to hedge risks or capitalize on market inefficiencies. Recently, Sarah's team identified opportunities in the stock of ABC Corporation, a mid-sized technology company. Given the market's volatility due to ongoing technological advancements, Sarah is considering several strategies involving futures contracts, options, and arbitrage to profit from potential price movements while minimizing risks.

Market Overview:

The current stock price of ABC Corporation is $100. Sarah believes the market will experience significant price fluctuations in the coming months, but the direction of the movement is uncertain. Her team decides to analyze both futures and options pricing to formulate a strategy that takes advantage of the situation.

Futures Contract:

Spot Price (S0): $100

Risk-Free Rate (r): 5% per annum (compounded continuously)

Time to Maturity (T): 6 months

Storage Costs: Assume there are no storage costs for the stock.

Dividends: ABC Corporation is not expected to pay any dividends during this period.

Sarah’s team plans to trade in futures contracts on ABC Corporation’s stock. The fair price of the futures contract for 6 months can be determined using the cost-of-carry model.

Arbitrage Opportunity:

While discussing the pricing strategy, one of Sarah’s analysts notes that the market price for the 6-month futures contract on ABC Corporation is currently $104. Sarah sees a potential arbitrage opportunity because the theoretical fair value of the futures price, calculated using the cost-of-carry model, should be different. The market price seems too high, so Sarah begins to evaluate an arbitrage strategy that could profit from this mispricing.

Her plan involves:

Selling the overpriced futures contract.

Buying the underlying stock in the spot market.

Borrowing the funds to finance the stock purchase at the risk-free rate.

Sarah will unwind her position when the futures contract expires in 6 months. She wants to determine the arbitrage profit from this strategy and calculate the impact on her portfolio.

Options Contracts:

In addition to futures trading, Sarah is also evaluating the purchase of call and put options on ABC Corporation's stock to hedge her positions. Her team is analyzing the following options:

Call Option:

Strike Price: $105

Premium Paid: $6

Expiration Date: 6 months

Put Option:

Strike Price: $95

Premium Paid: $4

Expiration Date: 6 months

Sarah considers various scenarios where ABC Corporation's stock price could fluctuate between $90 and $120 in 6 months. She is particularly interested in calculating the options payoff and identifying breakeven points for each option.

At the end of 6 months, the stock price of ABC Corporation ends up at $110. Sarah wants to calculate the net payoff from both the call and put options based on this final stock price.

Questions:

Q-1- Futures Pricing: Using the cost-of-carry model, calculate the theoretical fair value of the futures contract on ABC Corporation's stock. Based on the spot price of $100, a risk-free interest rate of 5%, and a time to maturity of 6 months, what is the fair futures price $F0$? How does this compare to the market futures price of $104? **(5 marks)- CO-1 (Bloom Level-L-4)**

Q-2- Arbitrage Strategy: Given that the market futures price is $104 and the theoretical fair price you calculated is different, outline an arbitrage strategy. How much arbitrage profit could Sarah make by selling the overpriced futures contract and buying the stock in the spot market? Show the detailed steps of the arbitrage process. **(5 marks) CO-1 (Bloom Level-L-6)**

Q-3- Options Payoff: If Sarah holds a call option with a strike price of $105 and a put option with a strike price of $95, calculate the net payoff for both options at expiration. Use the stock price at expiration, which is $110, to determine the payoffs for each option. How much profit (or loss) does Sarah make after accounting for the premiums paid for each option?

(5 marks) CO-2 (Bloom Level- L-3)

Q-4- Breakeven Analysis: Determine the breakeven stock prices for both the call and put options. At what stock price does Sarah begin to make a profit on the call option? At what price does she start profiting on the put option? **(5 marks) CO-2 (Bloom Level- L-3)**

COs	**Marks Allocated**
CO1	10 Marks
CO2	**10 Marks**