Mid-Semester Exam – ECON-F354/ FIN F311
Derivative & Risk Management (DRM)
Session – 2022-23 (I)
Closed Book

Maximum Marks: 105   **Dated**: 02/Nov./2022
Time Duration: 90 Minutes (**Max**)

Instructions:

- Do not forget to write your Name and ID number on the answer sheet
- 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**

Q1.   **[15 Marks]**
There are two stocks in the market i.e., stock A and stock B. The current value of stock A is Rs.75. The price of stock A will be Rs.64 next year if the economy is in a recession, Rs.87 if the economy is normal, and Rs.97 if the economy is expanding. The probabilities of recession, normal and expansion are 0.2, 0.6 and 0.2 respectively. The correlation coefficient of stock A with market portfolio is 0.7. Stock B has an expected return of 14% and standard deviation of 34% with correlation coefficient with market portfolio 0.24. In addition, the stock B has correlation with stock A of 0.36, and the standard deviation of market portfolio is given as 18%. Based on your analysis, answers the following questions:
a. If you are a risk averse investor, which stock would you prefer and why?
b. What are the expected return and standard deviation of a portfolio consisting of 70 percent of stock A and 30 percent of stock B?
c. What is the beta of the portfolio is part (b)?

Q2.   **[30 Marks]**
There are three securities in the market. The following chart shows their possible payoffs:

State of Economy	Probability	Return on 1	Return on 2	Return on 3
1	0.15	0.20	0.20	0.05
2	0.35	0.15	0.10	0.10
3	0.35	0.10	0.15	0.15
4	0.15	0.05	0.05	0.20

a. What are the expected returns and standard deviation of each of the security?
b. What are the covariances and correlations between the pairs of securities?
c. What are the expected return and standard deviation of a portfolio with half of its funds invested in security 1 and half in security 2?
d. What are the expected return and standard deviation of a portfolio with half of its funds invested in security 1 and half in security 3?
e. What are the expected return and standard deviation of a portfolio with half of its funds invested in security 2 and half in security 3?
f. What do you answer in parts (a), (c), (d), and (e) imply about diversification?

Q3.   **[25 Marks]**
After deciding to buy a new car, you can either lease the car or purchase it with a three-year loan plan. The car you wish to buy is Rs.28000. The dealer has a leasing arrangement where you pay Rs.2400 today and Rs.380 per month for the next three years. If you purchase the car, you will pay it off in monthly payments over the three years at 6% interest rate per annum. You believe that you will be able to sell the car for Rs.17000 in three years. Should you buy or lease the car? What break-even resale price would make you indifferent between buying and leasing?

Q4:   **[30+5=35 Marks]**

(A) The current price of a stock is 200, and the continuously compounded risk-free interest rate is 4%. A dividend will be paid every quarter for the next 3 years, with the first dividend occurring 3 months from now. The amount of the first dividend is 1.50, but each subsequent dividend will be 1% higher than the one previously paid. Calculate the fair price of a 3-year forward contract on this stock. [Hint: D1=D0(1+g), where D1: Dividend at t=1, D0: Dividend at t=0, g=growth rate of dividend]

(B) A market maker in stock index forward contracts observe a 6-month forward price of 112 on the index. The index spot price is 110 and the continuously compounded dividend yield on the index is 2%. The continuously compounded risk-free interest rate is 5%. Describe actions the market maker could take to exploit an arbitrage opportunity and calculate the resulting profit