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

Maximum Marks: 105   **Dated**: 15/March/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 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**

Q1.   **[10 x 3 = 30 Marks]**

(A) Super Polycarbons Ltd. has the following information about LDPE and HDPE Granules (raw material used for Manufacturing Plastic Films, Polyfilms and Plastic Sheets –

Stock Item	LDPE Granules	HDPE Granules
Spot Price [So]	$75 per kg	$85 per kg
Carrying Cost	4% p.a. [continuous compounding]	$100 per Quintal per quarter (payable after 2 months)
3-Month's Futures Contract Rate (500 Kgs)	$38,500	$44,600

Risk free interest rate is at 12% p.a. Advise Super Polycarbons on the course of action to be taken?

(B) The price of Compact Stock on 31st December, 2013 was $414 and the futures price on the same stock on the same date i.e., 31st December, 2013 for March, 2014 was $444. Other features of the contract and the related information are as follows:
- Time to expiration 3 months (0.25 year)
- Dividend on the stock is 30% on the face value of the stock $10 which is payable on 31.3.2014.
- Borrowing Rate is 20 % p.a. with continuous compounding.

Calculate future price for compact stock on 31st December 2013. Also explain whether any arbitrage opportunity exists.

(C) Compute the theoretical forward price of the following securities for 2 month, 3 months and 4 months:

Securities of	A Ltd.	B Ltd.	D Ltd.
Spot Price [So]	$4,550	$360	$900
Dividend Expected	$50	$20	$50
Dividend Receivable in	2 Months	3 Months	4 Months
6 Month's Futures Contract Rate	$4600	$390	$920

You may assume a risk-free interest rate of 9% p.a. with continuous compounding. What action should follow to benefit from futures contract?

Q2.   **[20 +10 =30 Marks]**
(A) A study by a financial analyst has revealed the following data in respect of the three securities:

Security	σ (%)	Correlation with Market Index, ρ_{sm}
P	20	0.66
Q	18	0.95
R	12	0.75

The Standard Deviation of the Market Portfolio (BSE Sensex) is observed to be 18%.

(i) What is the sensitivity of returns of each stock with respect to the market?
(ii) What are the Co-variances among the various stocks?
(iii)What would be the risk of portfolio consisting of all the three stocks equally?
(iv)What is the beta of the portfolio consisting of equal investment in each stock?
(v) What is the total systematic and unsystematic risk of the portfolio in (iv)?

(B)
(i) Calculate the market sensitivity index, and the expected return on the portfolio using the following data:

Standard deviation of an asset	4.5%
Market standard deviation	4.0%
Risk - free rate of return	15.0%
Expected return on market Portfolio	17.0%
Correlation coefficient of Portfolio with market	0.89

(ii) What will be the expected return on the Portfolio? If Portfolio beta is 0.5 and the risk-free return is 10%.

Q3.   **[30 + 15 = 45 Marks]**
(A) Assume that your uncle is now 50 years old, plans to retire in 10 years, and expects to live for 25 years after he retires-that is until age 85. He wants his first retirement payment to have the same purchasing power at the time he retires as $40,000 has today. He wants all of his subsequent retirement payments to be equal to his first retirement payment. His retirement income will begin the day he retires, 10 years from today, and he will then receive 24 additional annual payments. Inflation is expected to be 5% per year from today forward. He currently has $100,000 saved and expects to earn a return on his saving 8% per year with annual compounding. To the nearest dollar, how much must he save during each of the next 10 years (with equal deposits being made at the end of each year, beginning a year from today) to meet his retirement goal?

(B) Ravi has received a job offer from WorldQuant as a Research Analyst. His base salary will be $55,000. He will receive his first annual salary payment one year from the day he begins to work. In addition, he will get an immediate $10,000 bonus for joining the company. His salary will grow at 3.5 percent each year. Each year he will receive a bonus equal to 10 percent of his salary. Ravi is expected to work for 25 years. What is the present value of the offer if the discount rate is 9 percent?