

Birla Institute of Technology and Science, Pilani

First Semester 2021-2022

Mid-semester Test

Course Name: Derivatives and Risk Management (ECON F 354 / FIN F 311)

Maximum Marks: 90 (30% Weightage)

Duration: 90 Minutes

Date: 29/10/2021

Type: Close Book

Important Note: If the question requires you to prepare a table or graph, then it is mandatory that you answer the question accordingly. Clearly show the working (calculations) for all the sub-parts of each question.

- ✓ 1. Prepare the pay-off (graph) diagram for the following position and label strike price, break-even point, and maximum gain or loss (*graph not to scale*):
Long call in 1 contract; break-even price Rs 105; intrinsic value is Rs 0; Option premium Rs 5; Lot size = 1 share. **(8 Marks)**

- ✓ 2. Given are the following details: risk free rate is 6%; beta of the stock is 1.5; market risk premium is 12%; annual cash flows generated by the company at $t=0$ is Rs 180,000; this annual cash flow is expected to grow at a rate of 8% per annum forever. Calculate the value of the firm. **(12 Marks)**

- ✓ 3. Replicate the below table in your answer sheet. You are required to calculate the daily mark to market gain/loss on the given position taken by the trader. The position is long 1 futures contract on ABC Ltd. at futures price of Rs 103 on day 1. Lot size is 1 share. **(15 Marks)**

Day	Closing Futures price (Rs)	MTM (Rs)
1	105	
2	107	2
3	100	2
4	99	-7
		-1

- ✓ 4. A trader anticipates bearish trend in the stock price of SusageP Ltd. and decides to take a short position in 5 futures contracts expiring in the near month. The company is facing a litigation in the court and chances are it might be proven guilty in data snooping charges violating civil liberties. Because of the high anticipated risk the SPAN margin and the exposure margin requirements on futures for this stock are 10 per cent and 6 per cent respectively. The margin requirements for futures contract are calculated based on futures price. On day 1 when the trader shorts futures, the share price of SusageP Ltd. in the spot market is Rs 133 per share and the futures on SusageP Ltd trades at Rs 6 premium to the spot price. One futures lot on SusageP Ltd. contains 8,000 shares (lot size). The stock receives a hammering in the stock market and for the following 6 days crashes significantly, the daily price movement in the spot and futures is given in the

table below. The trader decides to square-off 3 futures contracts on day 5 at the closing price and continues with the remaining position beyond day 6.

a. What is the initial margin? (5 Marks)

b. Replicate the below table in your answer sheet and fill in the required blanks. (18 Marks)

c. What is the threshold price beyond which the counterparty will receive a margin call? (5 Marks)

a. What is the Initial margin: ? (write your answer at the top row of this table in your answer sheet)

b. Below are daily price movements, fill in the required (last) column.

Day	End of day (closing) Spot Price (Rs)	End of day (closing) Futures Price (Rs)	Cash balance in the margin account (Rs)
1	128	134	?
2	120	126	?
3	103	108	?
4	89	93	?
5	73	76	?
6	65	67	?

c. What is the threshold price for margin call: ?

5. A trader is bullish on a stock and decides to trade put options expiring in the near month (1 lot size contains 3000 shares). Since there are several put options available for the given underlying, the trader decides to trade 1 at-the-money, 1 in-the-money, and 1 out-of-the money put option (*either all long or all short*). The stock is currently trading at Rs 147 per share (spot price) and the available strikes for put options are Rs 140, Rs 147, and Rs 153. The put option prices (option premium) are Rs 17, Rs 12, and Rs 6.

a. Prepare **one single** pay-off diagram having all the three put options together, and clearly label the y-axis and break-even points. *Graph not to scale.*

(15 Marks)

b. Replicate the below table in your answer sheet:

(12 Marks)

Maximum possible profit for this trader (in rupees)	Total profit or loss if the spot price is Rs 150 on expiry (in rupees)	Net profit or loss if the spot price is Rs 160 on expiry (in rupees)	Maximum possible loss for this trader (in rupees)

ECON F 354 / FIN F 311 – Derivatives and Risk Management
Mid-sem Test – Solution

1. Long call pay-off diagram; show that max loss is Rs 5; max gain unlimited; and strike price is Rs 100 **(8 Marks)**
2. Expected return (discount rate) = 24% (use CAPM); Value = Rs 1,215,000 **(Marks 6+6)**
3. Daily MTM is 2, 2, -7, -1 **(15 Marks)**
4. Initial margin = Rs 889,600 **(5 Marks)**
Cash bal (in Rs): 1089600, 1409600, 2129600, 2729600, 1363840, 1507840 **(18 Marks)**
Margin call price = Rs 130.66 **(5 Marks)**
5. Draw short put pay-off diagram having all the three options in one single graph, the intercepts will be Rs 6 (Strike price Rs 140), Rs 12 (Strike price Rs 147), and Rs 17 (Strike price Rs 153); corresponding break-even points will be Rs 134, Rs 135, Rs 136 **(15 Marks)**
6. Max profit = Rs 105,000; Profit @ Rs 150 = Rs 96,000; Profit @ Rs 160 = Rs 105,000; Max loss = Rs 1,215,000 **(12 Marks)**

Mid-sem answer sheets will be distributed during regular hour on 10 Nov.

Note: Answer sheets **NOT** to be collected on anyone's behalf. Those students who are not on campus can collect their answer sheets after their return. Date for another round of distribution will be announced after remaining students have returned. *Please follow these instructions and adopt COVID appropriate behavior during paper distribution.*
