Birla Institute of Technology & Science, Pilani Hyderabad Campus

Summer Term 2023

Mid Semester Examination (Closed Book)

Course No.: ECON F354 / FIN F311 **Time: 03:30 PM to 05:00 PM** **Date: 16-06-2023**

Course Title: Derivatives and Risk Management **Marks: 30** **Duration: 1 Hour 30 Mins**

Instructions:

1. **Answers to the Questions should be very brief. Lengthy and irrelevant answers in the form of big paragraphs would be penalized heavily.**
2. **Any inappropriate point in the answer will result in a penalty.**
3. **For numerical questions, showing of the formula, the most important steps and the final answer are mandatory.**

Q1. Consider the following two bonds

	Bond A	Bond B
Coupon	4%	6%
Yield to Maturity	5.3%	5.3%
Face Value	100	100
Maturity	5 years	5 years

A. Calculate the price of both the bonds rounded to the nearest 3 digits. (Use annual compounding) **[4 Marks]**

B. Justify the reason why the price of one bond is higher than the price of the other bond **[1 mark]**

C. Compute the Macaulay duration and Modified duration for both the bonds **[4 Marks]**

D. Justify the reason why the durations of both the bonds are different though the maturity of both the bonds remains the same **[1 mark]**

E. What would be the price of the bonds if the 1 year spot rate is 4.5%, the 2-year spot rate is 4.75%, the 3-year spot rate is 5%, the 4-year spot rate is 5.25% and the 5-year spot rate is 5.5% **[4 Marks]**

F. Using the spot rates is (e), compute the (i) 1-year forward rate two years from now and (ii) 3 year spot rate two years from now. **[4 Marks]**

Q2. An investor trades in five futures contracts on Gold at MCX on 7-Jun-23. He enters into a long position. The expiration date is 4-Aug-23. Each contract is for 1 Kg of gold. The price quotation is INR 59985.00 per 10g. The tick size is INR 1. Initial margin is set at 5% of the contract value on any day, while the maintenance margin is 80% of the initial margin. Find out the gain/loss on a daily basis for long position in five contracts of gold if the clearing prices for the next 5 days are given below as

Sl No	Day	Clearing Price
1.	7-Jun-23	59503.00
2.	8-Jun-23	59891.00
3.	9-Jun-23	59821.00
4.	12-Jun-23	59641.00
5.	13-Jun-23	59218.00

Indicate the position of the margin account at the beginning as well as at the end of each trading day and margin calls if any, on a daily basis when the contracts are marked to market. If any margin call exists, assume that the trader deposits the variation margin based on the new initial margin computed for that trading day. **[6 Marks]**

Q3. Sheela, the finance manager of Gemini enterprises requires INR 5,000,000 for expansion over a period of two years. She approaches the bank for a loan to finance this expansion project on January 1, 2022. The bank offers her two choices:

(i) A loan with a fixed rate of 9% for the next two years, with interest payable every six months

(ii) A floating-rate loan with the base rate of 6-month MIBOR, with a reset period every six months. The rate on the loan will be 6-month MIBOR + 200 basis points (2%), and interest will be payable at the end of every six months. MIBOR on January 1, 2022, at the time of taking the loan is 6%. Going by this example, she will have to pay accumulates to 5,000,000 * (1+8%/2) at the end of 30-Jun-22.

Sheela is not sure which of these loans she should opt for. She has contacted some analysts to get some idea about where MIBOR rates could be in the next two years, and the analysts estimates are: 6-month MIBOR on July 1, 2022 is 6.8%; on January 1, 2023, is 7.3%; and on July 1, 2023, is 7.1%.

A. Calculate the interest amount on June 30, 2022; December 31, 2022; June 30, 2023; and December 31, 2023, under both fixed rate loan and floating rate loan **[4 Marks]**

B. On the basis of the interests calculated, determine which alternative should be chosen. What other factors need to be considered in deciding on which loan should be opted for? **[2 Marks]**