BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI - K. K. BIRLA GOA CAMPUS

First Semester 2022-23- Mid Semester Examination November, 2022

DERIVATIVE AND RISK MANAGEMENT (FIN F311, ECON 354)

(Answer all questions. Figures to the right in bracket indicate marks.)

Total Mark: 35 **Time: 90 Minutes.** **Date: 05.11.2022**

Q, 1 a.) A 5-year bond with a yield of 11% (continuously compounded) pays an 9% coupon at the end of each year.
(a) What is the bond's price?
(b) What is the bond's duration?
(c) Use the duration to calculate the effect on the bond's price of a 0.3% decrease in its yield.
(d) Recalculate the bond's price on the basis of a 10.7% per annum yield and verify that the result is in agreement with your answer to (c)? **(4 Marks)**

Q, 1 b.) The cash price of six month and one year treasury bills are 94.00 and 89.00. A 1.5 year bond that will pay coupon of $4 every six month currently sells at $ 94.84. A two year bond that will pay coupons of $5 every six months currently sells at $97.12. Calculate the six month, one year, 1.5 year and 2 year zero rates . Face value of all bond is $100**.** **(3 Marks)**

Q.1 c.) Air Asia uses 20,000 barrels of ATF every month. On 1st September Air Asia would like hedge the price risk of ATF for October and would like to enter into future contract with expiry on 30th September. As there are no futures available for ATF , CFO of the Airline decided to enter into September Crude Oil futures. The contract size of crude oil futures is 1000 barrels and the price is $ 72 per barrel. The standard deviation of ATF price is $ 6 and of crude oil it $ 4. The correlation between ATF price and crude oil price is 0.90. How many future contracts should Air Asia enter into ? What will be hedging effectiveness? **(2 Marks)**

Q, 2 a.) Company P and Q have equal requirement for funds of Rs 50 crores. They have offered the following debt rates in the fixed and floating rate markets for debt.

	Fixed Rate	Floating rate
Company- P	10.00%	MIBOR + 50bps
Company- Q	12.00%	MIBOR + 150 bps

P wants funds at floating rate, while Q is happy to raise funds on fixed rate basis. A bank is willing to act as intermediary, with 20 bps as its remuneration. Depict a swap sharing the gains equally and find out the cost of funds for P and Q. What would the saving financing cost for each firm be? **(2 Marks)**

Q, 2 b.) Suppose that the term structure of interest rates is flat in the United States and Europe. The EURO interest rate is 7% per annum and the USD rate is 9% per annum. The current value of the USD is 0.62 EURO. In a swap agreement, a financial institution pays 8% per annum in USD and receives 4% per annum in EURO. The principals in the two currencies are 12 million EURO and 20 million USD. Payments are exchanged every year, with one exchange having just taken place. The swap will last two more years. What is the value of the swap to the financial institution?(Use Forward Rate method) Assume all interest rates are continuously compounded. Approx to 4 decimals **(4 Marks)**

Q, 3 a.) 2. The following spot and interest rates prevail in the market:

Spot rate(Rs per Euro)		84.70.	84.85
Interest rate:	Rupee	9.00%	9.50%
	Euro	5.00%	5.50%

Find out:

a) The lower bound to the 6-m forward ask rate

b) The upper bound to the 6-m forward bid rate **(3 Marks)**

Q, 3 b.) Following rates are available

	Bid	Ask
$/¥	0.0104	0.108
$/£	1.5670	1.5675

Find out the Bid/Ask rate of ¥/£ **(2 Marks)**

Q, 4 a.) 3.A US investor holds a one-month short forward position on pound sterling. The contract calls for investor to sell £2million in one month at delivery price of $ 1.61 per pound. The current forward price for delivery in one month is $ 1.5850 per pound. Suppose rate on interest is 6% continuously compounding. What is the value of the investor's position?. If the parties to the contract agree to unwind it today what is the amount and direction of cash flow? **(2 Marks)**

Q, 4 b.) . A trader owns a commodity that provides no income and has no storage costs as part of a long-term investment portfolio. The trader can buy the commodity for Rs 1250 per ounce and sell gold for Rs 1249 per ounce. The trader can borrow funds at 6% per year and invest funds at 5.5% per year. (Both interest rates are expressed with annual compounding.) For what range of one-year forward prices does the trader have no arbitrage opportunities? Assume there is no bid–offer spread for forward prices? **(2 Marks)**

Q, 5 a.) Today an Interest rate Swap is entered between AMCHI Bank Ltd. and X Ltd. As per the term Bank will pay fixed rate and receive MIBOR. Swap is of 360 days duration and payments will be exchanged at an interval of 90 days. 90, 180,270 and 360 days' MIBOR rates are (Rc,.p.a) are 4.8 %, 5.2 %, 5.4% 5.6%. Bank has offered fixed rate of 5.39% p.a(Rm) keeping an overall spread of 40 basis points to them?

Is the rate offered equitable ? Explain with your calculation **(3 Marks)**

Q, 5 b.) 10Today is 15th March 2022. The Cheapest-to-deliver bond in a September 2022 Treasury bond is a 12 % coupon bond which is quoted today at Rs 115 , Delivery is expected to be made on 30th September 2022. Coupon payments on the bond are made on February 4 and August 4 each year. The term structure is flat and the rate of interest semi annual compounding is 12% p.a. The conversion factor is 1.3 What should the quoted future price be for the contract?

Assume face value as 100.use actual/actual norm **(3 Marks)**

Q, 6 a.) A company enters into a short futures contract to sell 5,000 quintal of wheat for Rs750 per quintal. The initial margin is Rs 3,00,000 and the maintenance margin is Rs 2,00,000. What price change would lead to a margin call? Under what circumstances could Rs 75000 be withdrawn from the margin account? **(2 Marks)**

Q, 6.b.) A stock is currently selling at Rs 500. A call option on the same with 3 months to maturity with an exercise price of Rs 550 is selling for Rs 12. A put option with same strike price and maturity is actually selling at Rs 45. Assume interest rate as 8%, Can you benefit from this situation? What will be the cash flow when stock price at the maturity if stock is Rs 600, Rs 500 or Rs 400? Tabulate your answer. **(3 Marks)**