Indian Institute of Technology, Delhi

Investment planning (MEL 323)

Major Exam (May 5, 2015)

Note: Attempt all questions. All parts of a given question should be done at one place.MM=80

Problem 1: Write True [T] or False [F] in the answer sheet: **(1x5 = 5 marks)**

a) The put option writer will suffer loss if the value of the underlying asset declines below the exercise price

b) Delta measures change in option price for a change in the volatility of the underlying asset.

c) In the Black-Scholes model, the value of a call is inversely related to the stock's volatility.

d) As LIBOR decreases, stocks prices in general should go up.

e) Swaps are exchange-traded derivative instruments.

Problem 2: Fill in the blanks: (1x5 = 5 marks)

a) The value of Call option ..... when the value of underlying stock .....

b) First Interest Rate swap occurred between ..... and ..... in 1981.

c) Stock 1 ..... at strike of 440 is ..... –the- money when the spot price of Stock 1 is at 410.

d) If the underlying asset does not provide any ..... then, it never pays to exercise an ..... option prior to expiration.

e) If the call option seller does not own the ....., then it is called "writing .....

Problem 3: Answer the following (5 marks)

An equity related contract is defined as follows:
If the price of XYZ stock is less than 30, you have to pay Rs. 30, if it is between Rs. 30 and Rs. 60, you must pay the then going spot price to buy the stock. If the stock price is above Rs. 60, you must pay an amount given by the formula:

$60 + .1\,(S - 60)$ where S is the stock price ($S \geq$ Rs. 60)

Construct a payoff table and draw a payoff diagram for the contract.

Problem 4: Answer the following (2x5 = 10 marks)

a) Suppose the stock price of Dish TV is Rs.63, and the call price is Rs. 4 with a strike price of Rs. 65. If you write a covered call option, and stock rises to Rs. 71, find the profit or loss.

b) Draw the profit/loss diagram of a put option writer.

c) How can put option be used to insure your position in underlying asset? Give example.

d) *"Supreme Court cancelled coal blocks allotted to companies"* and *"Jaiprakash Power likely to default on $200 million convertible bonds" (Economic Times)*. Do you think there is any connection between the two news? How?

e) What will be the intrinsic value of a CALL and PUT option if the strike price is Rs. 20 and the spot price is Rs. 25?

Problem 5: Answer the following in not more than 100 words: (4+3+3= 10 marks)

- *India's interest-rate swaps slumped the most since October 2013 and sovereign bonds rallied after the Reserve Bank of India reduced interest rates in an unscheduled move for the second time this year.* (Bloomberg, March, 2015)

a) Why the interest-rate swaps slumped and Bonds rallied after RBI reduced interest rates?

- *State Bank of India to raise $ 300 million via bonds (Economic Times, 2014)*

b) Why do you think that most bonds are being offered by Financial Services companies?

- *"Govt. approves central funding to improve infrastructure services in 500 cities over next 5 years" (FE, April 30, 2015).*

c) Identify 3 industries, benefitting from this decision.

Problem 6: Answer the following: (3x5 = 15 marks)

a) What will be the payoff of a call option whose underlying asset is a put option?
b) How is LIBOR calculated?
c) What is the risk of a PUT option writer and the CALL option writer?
d) Write 3 advantages of investing in options
e) Give an example of how interest rate swap works.

Problem 7: Answer the following questions (3 + 4 + 4 + 4 = 15 marks)

A European call option on ABC stock with strike price Rs. 50 matures in 1 year. ABC's share (trading at Rs.40) is expected to appreciate at an annual rate of 20%. The standard deviation of that return is assessed at 30% annually. The annualized risk-free rate is 5%. If a binomial option pricing analysis is carried by subdividing the 1-year time interval into two 6-month intervals:

a) Draw the binomial tree for the call option, showing payoff at each node.
b) What is the risk-neutral probability of ABC's stock going up every 6 months?
c) What would the value of ABC's stock be after a year, if the stock value rose each period?
d) What is the value of the call option?

Problem 8: Answer the following questions (4 + 3 + 3+ 5 = 15 marks)

Consider an option with 3 months to expiration. The strike price is Rs. 75 and the price of the stock Rs. 80 and the stock has σ^2 of 16%. Assume that RBI interest rate for 1 year T-bill is 14%. Using appropriate model, (given that $N(d_1) = .7249$ and $N(d_2) = .6546$, $e = 2.718$)

a) Find the value of d_1 and d_2
b) If you wanted to replicate buying this call, how much money would you need to borrow?
c) If you wanted to replicate buying this call, how many shares of stock would you need to buy?
d) Calculate the value of both CALL and PUT option.