

**UNIVERSITY OF COLOMBO, SRI LANKA**  
**FACULTY OF MANAGEMENT AND FINANCE**

Bachelor of Business Administration in Finance (Level II-Semester VII)

Examination, July - 2016

**FIN 2204 – Derivatives and Alternative Investments**

**Two (02) Hours**

**Answer all Four (04) questions.**

**Part iv of the Question 4 is a structured question. Use the space provided to answer and detach it from the question paper and attach it to the answer scripts.**

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- 1.
- i. Explain clearly the difference between speculation, arbitrage and hedging. (03 Marks)
- ii. Discuss how a futures contract can be used for;  
a. speculation  
b. hedging (05 Marks)
- iii. Suppose that LKR-USD spot and forward exchange rates are as follows;
- |                       |            |
|-----------------------|------------|
| Spot price            | Rs. 145.80 |
| 90-day Forward price  | Rs. 145.56 |
| 180-day Forward price | Rs. 145.18 |
- a. Clearly explain how an arbitrageur can use each of the following situations to achieve his/her objectives. (Ignore the time value of money)
- I. A 180-day European call option to buy \$1 for Rs. 142 costs Rs. 2
- II. A 90-day European put option to sell \$1 for Rs. 149 costs Rs. 2
- b. If you accommodate the time value of money concept in the above calculation, comment on the viability of the above arbitrage opportunities. (10 Marks)
- iv. Two 5-year CDs are available from a bank. The first one guarantees the original principal with interest at an effective annual rate of  $r\%$ . The second one is an equity-linked CD that guarantees the original principal with interest at an effective annual

rate of  $j\%$ , plus  $q\%$  of the percentage gain on the underlying stock index over the 5-year period. The initial value of the stock index is 1,000 and its value at the end of 5 years is Rs. 1390. It turns out that the maturity values of the two CDs are equal at the end of 5 years.

- a. If  $j = 2$  and  $q = 60$ , determine  $r$ . (3 marks)
- b. Draw the pay off graph corresponding to the equity linked CD and calculate the intrinsic values if the maturity value of the index is,
  - I. Rs. 850
  - II. Rs. 1050

(Total 25 Marks)

2. A stock price is currently Rs. 50. Over each of the next three, three-month periods it is expected to go up by 6% or down by 5%. The risk free interest rate is 5% per annum with continuous compounding.

- i. Draw the three-stage binomial tree for the given scenario. (05 Marks)
- ii. Using the risk-neutral approach, calculate the value of a nine-month European call option and a put option with a strike price of Rs. 50. (12 Marks)
- iii. Verify that the answers in part (ii) satisfy put-call parity relationship. (03 Marks)
- iv. One of your colleagues is interested in applying the Black-Scholes formula to calculate the option price of a nine-month European Call option for a different stock with the same strike price under the following market information.
  - a. If your friend has only the following information, clearly show how you could assist him/her to calculate the Call premium.
    - Delta of the call option is 0.65
    - $N(d_2) = 0.55$
    - $Put\ premium = Ke^{-rt}N(-d_2) - S_0N(-d_1)$  where  $K$  is the strike price,  $r$  is the continuously compounded risk-free interest rate,  $t$  is the time to maturity and  $S_0 = 50$  is the current spot price.

(07 Marks)

- b. Briefly explain a major drawback of the Black-Scholes formula when compared to the binomial tree. (03 Marks)

(Total 30 Marks)

3. Justify the following statements.

- i. Call premiums are greater than the put premiums for a given underlying asset at a given strike price under the same market conditions.
- ii. A put option is an insurance, and an insurance is a put option.
- iii. There is a strong positive correlation between the price of an option and the time to expiration.
- iv. Put-call parity implies that given any three of the four of a stock, a call, a put, and a risk free bond, the fourth can be replicated using the given three.
- v. The equity holders of a debt financed firm can be thought as holding a call option on the asset of the firm.

(04 X 5 = 20 Marks)

4.

- i. Consider a swap contract with swap price of Rs. 110 in one year and Rs. 120 in two years and Rs. 130 in three years under the following spot rates.

| Term to Maturity (in Years) | Yield rate on Zero Coupon Bond |
|-----------------------------|--------------------------------|
| 1                           | 4.5 %                          |
| 2                           | 5 %                            |
| 3                           | 5.5 %                          |
| 4                           | 6 %                            |

- a. What is the pre-paid price of the swap contract? (4 marks)
- b. Assume that immediately after the contract is entered into, forward prices increase to Rs.115 in year 1 and Rs. 122 in year 2.
  - I. What is the pre-paid price of the new swap contract? (3 marks)
  - II. What is the level annual swap price of new contract? (3 marks)

(Sub Total 10 Marks)

4.

iv. Use the space provided to answer and attach this sheet to the answer book/ script.

a. Draw and name the payoff graphs which are involved in constructing a Protective Put with a strike price  $K$ .

|       |       |
|-------|-------|
| ..... | ..... |
|-------|-------|

b. If you are going to use the above strategy to hedge your position, state the main disadvantage of the strategy and suggest a new strategy to avoid the disadvantage.

|                        |
|------------------------|
| Disadvantage:<br>..... |
| New Strategy:<br>..... |

c. With the same position in the asset, briefly explain how you could use a call option to hedge your position. State which combination of financial instruments should be used to create the payoff graph as same as the hedged position.

|                    |
|--------------------|
| .....              |
| .....              |
| .....              |
| Combination: ..... |

(15 marks)  
(Total 25 Marks)