



# MACHAKOS UNIVERSITY

University Examinations for 2020/2021 Academic Year

SCHOOL OF BUSINESS AND ECONOMICS

DEPARTMENT OF ACCOUNTING BANKING AND FINANCE

THIRD YEAR FIRST SEMESTER EXAMINATION FOR

BACHELOR OF COMMERCE (FINANCE OPTION)

BAC 309: FINANCIAL DERIVATIVES

DATE: 13/8/2021

TIME: 2.00-4.00 PM

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## INSTRUCTIONS:

Answer question ONE and any other TWO questions

### QUESTION ONE (30 MARKS) (COMPULSORY)

- a) Futures contracts are highly standardized instruments. When developing a new contract, the exchange must specify certain features regarding the contract. Explain the feature “contract size”. (4 marks)
- b) On 1st September 2020 a company took a long position in a contract on May 2021 crude oil futures. It closes out its position in March 2021. The futures price (per barrel) is \$88.30 when it enters into the contract, \$90.50 when it closes out its position, and \$89.10 at the end of December 2020. One contract is for the delivery of 1,000 barrels.
- What is the profit per barrel? (3 marks)
  - What is the company’s total profit? (3 marks)
  - If the Company had closed out its position at the end of December 2020, how much profit would it have lost by closing the position earlier than March 2021? (4 marks)
- c) Explain the following terms as used Derivatives Market. (6 marks)
- Delta
  - Vega
  - Rho
- d) Distinguish between the following terms as used in Derivatives Market. (6 marks)
- Stock price and Stock Index
  - Swaps and Swaption
  - Caps and Floors

- e) A call option of XYZ Co. has an exercise price of shs 125. Find the intrinsic value of the call if the current price is:
- i. shs 110
  - ii. shs 130 (4 marks)

### QUESTION TWO (20 MARKS)

- a) Derivatives are classified into various forms. With the help of a well labeled diagram, identify and explain each of these forms (6 marks)
- b) The derivatives market is similar to any other financial market and has three broad categories of participants. Identify and explain these three participants clearly indicating the role played by each. (3 marks)
- c) Describe how the following Derivatives markets Operate:
- i. Exchange Traded Markets
  - ii. Over the Counter Markets
  - iii. Electronic Markets (3 marks)
- d) Suppose that a European put option to sell a share for Shs.60 costs Shs.8 and is held until maturity.
- i. Under what circumstances will the seller of the option (the party with the short position) make a profit? (2 marks)
  - ii. Under what circumstances will the option be exercised? (2 marks)
  - iii. Draw a diagram illustrating how the profit from a short position in the option depends on the stock price at maturity of the option. (4 marks)

### QUESTION THREE (20 MARKS)

In October 2020, a speculator considered that a stock was likely to increase in value over the following 2 months. The stock price was Shs.20 then, and a 2-month call option with a Shs.22.50 strike price was then selling for Shs.1. The speculator was willing to invest Shs2,000 and had two possible alternatives:

1. One alternative was to purchase 100 shares
2. The other alternative involved the purchase of 2,000 call options (i.e., 20 call option contracts).

Suppose that the speculator's prediction was correct and the price of the stock increased to Shs.27 by December 2020.

- a) Calculate the profit that the first alternative of buying the stock would lock in. (4 marks)
- b) Calculate the profit that the second alternative would lock in (4 marks)

- c) Which alternative was more profitable and by how much? (2 marks)
- d) If the Speculators prediction was not correct and the price of the stock declined to Shs.15 by December 2020,
- i. Calculate the loss that the first alternative of buying the stock would yield (4 marks)
  - ii. Calculate the loss that the second alternative would yield (4 marks)
  - iii. Comment on the use of options as a tool for risk management (2 marks)

#### QUESTION FOUR (20 MARKS)

- a) What do the following terms mean with respect to a call option?
- i. In-the-money
  - ii. Out of –the-Money
  - iii. At- the- Money (6 marks)
- b) The exercise price of a non-dividend paying stock is Shs.25 and its current price is Shs.28 with an implied volatility of 21%. Using Black and Scholes Model:
- i. Calculate the value of a call option written on this stock with a maturity of three months given a short-term risk- free interest rate of 5%. (9 marks)
  - ii. Using Put-Call Parity theorem, calculate the value of a put option on the same stock given the same risk-free interest rate. (5 marks)

#### QUESTION FIVE (20 MARKS)

- a) A futures contract is an agreement between two parties to buy or sell an asset at a certain time in the future for a certain price. Futures contracts are normally traded on an exchange. When developing a new contract, the exchange must specify in some detail the exact nature of the agreement between the two parties. Identify and clearly explain five features that must be specified. (10 marks)
- b) The Black – Scholes Model is neat and intuitive. It describes a process for calculating the fair value of a European call option but one of its many attractions is that it can easily be modified to handle other types such as foreign exchange, the Greeks or interest rate options. Incorporated in the model are certain assumptions. Identify and clearly explain five such assumptions. (5 marks)
- c) A stock index currently stands at 350. The risk-free interest rate is 8% per annum (with continuous compounding) and the dividend yield on the index is 4% per annum. Calculate a futures price for a 4-month contract written on this index. (5 marks)