



MAASAI MARA UNIVERSITY
REGULAR UNIVERSITY EXAMINATIONS

2022/2023

SCHOOL OF BUSINESS AND ECONOMICS
BACHELOR'S OF SCIENCE IN FINANCIAL
ECONOMICS

FOURTH YEAR SECOND SEMESTER

COURSE CODE: ECF 4205

COURSE TITLE: FINANCIAL DERIVATIVES

DATE:

TIME:

INSTRUCTIONS:

Attempt Question One and any other Three Questions

QUESTION ONE (25 MARKS)

- a) Define the following terms as used in financial derivatives
- i. Arbitrage. **(1 mark)**
 - ii. Intrinsic value. **(1 mark)**
 - iii. Derivative security. **(1 mark)**
 - iv. Strangle. **(1 mark)**
- b) State the main assumptions of the Black-Scholes option pricing model and comment on how realistic these assumptions are in practice. **(5 marks)**
- c) Clearly explain the difference between speculation, hedging and insurance. **(3 marks)**
- d) Explain the difference between taking a long position in a call option with a strike price of sh.950 and entering into a forward contract when the forward price is sh.950. **(4 marks)**
- e) A 1 year long forward contract on a non-dividend paying stock is entered into when the stock price is \$40 and the risk-free rate of interest is 10% with continuous compounding.
- i. What is the forward price and the initial value of the forward contract? **(4 Marks)**
 - ii. Six months later, the price of the stock is \$45 and the risk-free interest rate is still 10%.
What are the forward price and the value of the forward contract? **(5 Marks)**

QUESTION TWO (15 MARKS)

- a) Suppose you write a put contract with a strike price of shs.400 and an expiration date in three months. The current stock price is shs.410 and the contract is on 100 shares. What have you committed yourself to? How much do you stand to gain or loose? **(3 marks)**
- b) The market price of a security can be modelled by assuming that it will either increase by 12% or reduce by 15% each month independently of the price movement in other months. No dividends are payable during the next two months. The continuously compounded monthly risk-free rate of interest is 1%. The current market price of the security is 127.
- i. Use the binomial model to calculate the value of a two-month European put option on the security with a strike price of 125. **(6 marks)**
 - ii. Calculate the value of a two month European call option with a strike price of 125 using both the direct method and the put-call parity. **(6 marks)**

QUESTION THREE (15 MARKS)

- a) Distinguish between credit risk of over-the counter (OTC) and exchange traded derivative contracts (3 marks)
- b) Assuming an interest rate of 12% per annum convertible quarterly. The price of gold is currently \$500. The forward price for delivery in one year is 700. An arbitrageur can borrow money at 10% per annum. Assume that the cost of storing gold is zero. How can the arbitrageur make a risk free profit? (6 marks)
- c) An investor claims to be able to value a derivative on a non-dividend paying share using the pricing formula:

$$V_t = S_t^2 e^{-4S_t}$$

Where S_t denotes the price of the share at time t . Derive formulae for the Delta and Gamma of the derivative based on the pricing formulae. (6 marks)

QUESTION FOUR (20 MARKS)

- a) Discuss the differences between forward contracts and futures contracts. (3 marks)
- b) Consider three month options on the stock of CES Company with exercise price of 45. The variance of the stock is 20 and the risk free rate of interest is 6%. The current price of this stock is 45. Determine the prices of the call and put options based on the Black-Scholes model. (6 marks)
- c) Consider the following
- Straddle:** Buy call with exercise price 100 and simultaneously buy put with exercise price 100.
- Butterfly:** Simultaneously buy one call with exercise price of 100, sell two calls with exercise price of 110, and buy one call with exercise price of 120.
- Draw position diagrams for the straddle and butterfly, showing the pay-offs from the investor's net position. (6 marks)

QUESTION FIVE (15 MARKS)

- a) A European put option on WKE stock that expires in a year has a strike price of 99. The current stock price is 75 and the one year risk free rate of interest is 10%. The price of this put is 10.

- i. Is arbitrage possible? If yes what is the arbitrage position? **(5 marks)**
 - ii. What is the minimum arbitrage profit in this situation? **(5 marks)**
- b) Distinguish between credit risk of over-the-counter (OTC) and exchange traded derivative contracts. **(5 marks)**