



MAASAI MARA UNIVERSITY

**REGULAR UNIVERSITY EXAMINATIONS
2023/2024 ACADEMIC YEAR**

**THIRD YEAR SECOND SEMESTER
SCHOOL OF PURE, APPLIED AND HEALTH
SCIENCES.
DEGREE IN APPLIED STATISTICS WITH
COMPUTING.**

COURSE CODE: STA 3236-1

COURSE TITLE: FINANCIAL MATHEMATICS II

DATE: 28/5/24

TIME: 1100-1300HRS

INSTRUCTIONS TO CANDIDATES

Answer Question ONE and any other TWO questions

This paper consists of FIVE printed pages. Please turn over.

QUESTION ONE (20 MARKS)

- (a)
- i. In financial statement analysis, give the difference between horizontal analysis and vertical analysis. **(4 mks)**
 - ii. Given the following income statement, use vertical analysis method to fill in the column of percentages. **(2 mks)**

Income statement		
	Amount	percentage
Net sales	193, 000	
Cost of goods	50, 759	
Gross profit	142, 241	
Opening expenses	90, 903	
Net income	51, 338	

- (b)
- i. Give the definition of a financial derivative. **(2 mks)**
 - ii. Name the four common financial derivatives. **(2 mks)**
 - iii. Describe the characteristics of a forward contract. **(6 mks)**
- (c) Given the price of the underlying asset on 8th March 2013 to be Ksh. 851.30 and the rate interest on a discrete basis is 6% per annum. With no arbitrage price, calculate the value of its future at the expiry on 28th March 2013. **(4 mks)**

QUESTION TWO (15 MARKS)

Suppose the stock price is 40 and we need to price a call option with a strike of 45 maturing in 4 months. The stock is not expected to pay dividends. The continuously-compounded risk free rate is 3% per year, the mean return on the stock is 7% per year, and the standard deviation of the stock return is 40% per year. Use Black Scholes formula to answer the following:

- (a) What are S and B? where S is the current stock price and B is the exercise price. **(3 mks)**
- (b) What is x_1 and x_2 ? where x_1 and x_2 are given by:

$$x_1 = \frac{\log(S/B)}{\sigma\sqrt{T}} + \frac{1}{2}\sigma\sqrt{T} \quad \text{and}$$

$$x_2 = \frac{\log(S/B)}{\sigma\sqrt{T}} - \frac{1}{2}\sigma\sqrt{T} \quad \text{(6 mks)}$$

- (c)
- i. Work out $N(X_1)$ and $N(X_2)$ where $N(X_1)$ and $N(X_2)$ are the standard normal values of X_1 and X_2 . **(2 mks)**
 - ii. What is therefore the Black-Scholes call price? **(2 mks)**
- (d) What is the Black-Scholes price for the European put with the same strike and maturity? **(3 mks)**

QUESTION THREE (15 MARKS)

Given the following balance sheet;

Balance sheet		
Assets	Amount (Dollars)	% age
Cash	1,681	11.4%
Receivables	2,651	18.1%

Inventory	1,669	11.4%
Total assets	14,685	100%
Liabilities		
Accounts payable	2,125	14.5%
Wages payable	3,100	21.1%
Total Liabilities	5,225	35.6%
Owner's equity		
Capital	9,460	64.4%
Total liabilities and Owner's equity	14, 685	100%

You are required to answer the following questions about the balance sheet:

- (a) Calculate the working capital. **(2 mks)**
(b) What is the current ratio and interpret your answer. **(3 mks)**
(c) Work out the Acid-Test (Quick) Ratio and interpret it. **(3 mks)**
(d)

i. You are provided with the following information:

Inventory on December 31, 1999 = 145,000
Inventory on December 31, 2000 = 130,000
Cost of goods sold = 325,000

Calculate the inventory Turnover. **(4 mks)**

- ii. Given the following data:
Net credit sales = 450,000
Accounts receivable on 31, 1999 = 57,900
Accounts receivable on 31, 2000 = 43,876

Work out the Account Receivable Turnover. **(3 mks)**

QUESTION FOUR (15 MARKS)

- (a) Give the distinction (difference) between options and futures. **(6 mks)**
(b) Give the meanings of the following persons.
i. A speculator **(2 mks)**
ii. An arbitrageur **(2 mks)**
iii. A ledger **(2 mks)**
(c) Give the assumptions behind arbitrage. **(3 mks)**

END//