



(University of Choice)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

MAIN EXAMINATION

UNIVERSITY EXAMINATIONS 2022/2023 ACADEMIC YEAR

FIRST YEAR SECOND SEMESTER EXAMINATIONS

FOR THE DEGREE

BACHELOR OF SCIENCE IN ECONOMICS & BACHELOR OF SCIENCE IN ECONOMICS AND STATISTICS

COURSE CODE:

ECO 104

COURSE TITLE:

MATHEMATICS FOR ECONOMISTS II

DATE: TUESDAY 18TH APRIL 2023

TIME: 8:00-10:00

INSTRUCTIONS TO CANDIDATES

attempt question one and any other three

TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 4 Printed Pages. Please Turn Over.

QUESTION ONE (30 MARKS)

a) Distinguish between integrand and integral

[4 marks]

b) Faith has a mango firm in Kitui in which she has an objective of:

Maximizing profit = $60x - 2x^2 - xy - 3y^2 + 80y$

Subject to x + y = 12 as the constraint

i. Compute the values of x, y and λ at profit maximization point

[10 marks]

ii. What will be Faith's profit

[2 marks]

c). Find dy/dx for the following function

$$2x^2y^4 - xy^5 + x^3 + 3y^2 = 20$$

[5 marks]

$$\int (x^{2/3} - \frac{7}{x} + 5e^{3x}) dx$$

[3 marks]

d). e) Compute the following integral: $\int (x^{2/3} - \frac{7}{x} + 5e^{3x}) dx$ e). Find the derivatives of y with respect to x:

i. y =
$$\frac{(6x^5)(x^2-4)-(2x)(x^6)}{(x^2-4)^2}$$

[3 marks]

ii.
$$y = 3u^{1/2} + u^3$$

$$u = x^2 + 2x^2$$

[3marks]

OUESTION TWO (20 marks)

Consider the following utility function: (a)

$$U = 25x^{\frac{2}{5}}y^{\frac{3}{5}}$$

Find the MUx and MUy i.

[6 marks]

From your results, find the MRCS between the two goods. ii.

[3 marks] [2 marks]

By setting U = 100, derive the corresponding indifference curve. iii.

[2 marks]

Find the MRCS for x=2. iv. Does the indifference curve obey the Law of diminishing MRCS?

[1 mark]

b) Find the MPC and MPS for the following function:

$$S = -150 + 0.25Y$$

[3 marks]

You are given the following information regarding demand and supply functions: (c)

Demand function ; 4P + 2Q - 40 = 0

Supply function ; $P = 2Q^2 + 4Q + 2$

Determine:

The marginal revenue function. i.

[2 marks]

The marginal revenue at Q = 10ii.

[1 mark]

QUESTION THREE (20 marks)

a). Mr.Kiptoo is a price discriminating monopolist having the following functions for her milk production firm:

P1 = 32 - 2Q1

P2 = 22 - Q2

TC = 10 + 2Q + Q2

Determine the prices and quantities for the milk in the two different markets

[9marks]

b) The following demand and supply functions were extracted from a perfectly competitive market

P = 80 - 1/2Q

demand function

P = 20 + 1/10Q supply function

[6 marks]

Determine Producer Surplus and Consumer Surplus at equilibrium c)Determine the consumers surplus for a market price of P=4 given; P=5+Q

and $p=Q^2+Q+3$

[5marks]

QUESTION FOUR (20 marks)

a). What do you understand by the term Comparative Statics

[2marks]

b). Solve the following system of linear simultaneous equations using Cramer's rule

 $8x_1 - x_2 = 16$

 $2x_2 + 5x_3 = 5$

[6 marks]

 $2x_1 + 3x_3 = 7$

c) Given $u = \begin{pmatrix} 3 \\ 2 \\ 8 \end{pmatrix}$ and $v = \begin{pmatrix} 0 \\ -1 \\ 5 \end{pmatrix}$, evaluate uv and d(u,v)

[4 marks]

d). Discuss any four economic applications of derivatives

[8 marks]

QUESTION FIVE (20 marks)

a) What do you understand by the following

[6 marks]

- i. A matrix
- ii. Comparative statics
- iii. Input –output analysis
- b) Outline the assumptions of input output model

[6marks]

c) List any three examples of static equilibrium

[3 marks]

d) What is the usefulness of the Lagrangian multiplier in mathematical optimization [5 marks]