



MAASAI MARA UNIVERSITY

REGULAR UNIVERSITY EXAMINATIONS

2023/2024 ACADEMIC YEAR

FIRST YEAR FIRST SEMESTER

SCHOOL OF BUSINESS AND

ECONOMICS

BSC ECONOMICS, BSC AGRICULTURAL

ECONOMICS, BSC AGRIBUSINESS,

BSC FINANCIAL ECONOMICS, BSC

ECONOMICS AND STATISTICS

COURSE TITLE: MATHEMATICS FOR

ECONOMISTS I

COURSE CODE: ECO 1104 – 1

DATE:

TIME:

INSTRUCTIONS TO CANDIDATES

Answer Question **ONE** and any other **TWO** questions

QUESTION ONE (20 MARKS)

- a) Define the following terms as used in Mathematics for Economists. Use examples where necessary. **(4 Marks)**

- i. Finite and Infinite Sets
- ii. Identity matrix and principal sub -Matrix

- b) Given the universal set T and its subsets A and B:

$$T = \{1,2,3,5,7,9,10\}$$

$$A = \{1,3,7,9\}$$

$$B = \{1,2,5,9\}$$

Using a Venn Diagram, determine the intersection and union of the two sub -sets.

(3 Marks)

- c) The following Demand and Supply Functions represent General Market Equilibrium model for two commodities.

$$Q_{d1} = a_0 + a_1P_1 + a_2P_2$$

$$Q_{d2} = \alpha_0 + \alpha_1P_1 + \alpha_2P_2$$

$$Q_{s1} = b_0 + b_1P_1 + b_2P_2$$

$$Q_{s2} = \beta_0 + \beta_1P_1 + \beta_2P_2$$

Find Equilibrium Prices and Quantities for the two commodities.

(10 Marks)

- d) Find the determinant of the following matrix using cofactor expansion

(3 Marks)

$$A = \begin{bmatrix} 4 & 9 & 10 \\ 5 & 2 & 0 \\ 6 & 1 & 6 \end{bmatrix}$$

QUESTION TWO (15 MARKS)

- i. Discuss the limitation of static equilibrium Analysis. **(5 Marks)**
- ii. The economy of Karumanzira has three sectors: Agriculture, Industry and Service. Each unit of gross output of Agricultural product (QA) requires inputs of 0.3 units of its own product, 0.2 units of Industrial product and 0.4 units of Service sector products. Each unit of gross output of Industrial product (QI) requires 0.3 units of its own product, 0.2 units of Agricultural products and 0.2 units of Service sector products. Each unit of gross output of Service product (Qs) requires 0.2 units of its own product, 0.4 units of Agricultural products and 0.1 units of Industrial product. Using Leontief Inverse Rule, find the required gross outputs QA, QI and Qs when the final demands for Agriculture, Industry and Service sector products are given as 80, 120 and 40 respectively. **(10 Marks)**

QUESTION THREE (15 MARKS)

a) Explain three importance of Mathematics for Economists. **(3 Marks)**

b) A company produces three types of speed regulators X, Y and Z, each of which requires assembly, calibration, and testing;

Type X requires 2 hours for assembly, 3 hours for calibration and 1 hour for testing Type Y requires 5 hours for assembly, 1 hour for calibration and 2 hours for testing Type Z requires 3 hours for assembly, 2 hours for calibration and 1 hour for testing. The company has 27 hours for assembly, 20 hours for calibration, and 11 hours for testing. Use the information provided to:

i) Formulate a system of simultaneous equations. **(3 Marks)**

ii) Calculate the number of speed regulators of each type produced using the crammer's rule given that there is an optimum utilization of resources in the company. **(9 Marks)**

QUESTION FOUR (15 MARKS)

a) A three- sector Economy is represented by the following model:

$$C = 200 + 0.8Y$$

$$I = 1400 - 10r$$

$$MD1 = 0.4Y$$

$$MD2 = 850 - 15r$$

$$MS = 1900$$

$$G = 1550$$

i) Derive IS and LM curve. **(3Marks)**

ii) Compute the equilibrium level of Income (Y^*) and determine the amount of Consumption (C^*) at this Income level. **(5 Marks)**

iii) Given that $A = \begin{bmatrix} 2 & 2 \\ 3 & 1 \end{bmatrix}$ $B = \begin{bmatrix} 1 & 1 \\ 3 & 4 \end{bmatrix}$ $C = \begin{bmatrix} 3 & 1 \\ 2 & 2 \end{bmatrix}$

Show that:

(i) $(A + B)^T = A^T + B^T$

(ii) $(AB)^T = B^T A^T$

(iii) $(ABC)^T = C^T B^T A^T$. **(7 Marks)**

.....**END**.....