

ISLAMIC UNIVERSITY IN UGANDA

**FACULTY OF ARTS & SOCIAL SCIENCES
DEPARTMENT OF ECONOMICS & DEVELOPMENT**

**END OF SEMESTER I EXAMINATIONS 2024/2025
ACADEMIC YEAR**

COURSE: BA.EDUC

YEAR: 1

**PAPER: INTRODUCTION TO MATHEMATICS
FOR ECONOMISTS (ECQ 1102)**

DAY: THURSDAY

DATE: 5TH DECEMBER, 2024

TIME: 02:00PM – 05:00PM (3 HOURS)

***READ THE INSTRUCTIONS CAREFULLY.
DO NOT WRITE ANYTHING ON THE QUESTION.***

INSTRUCTIONS:

- 1) Attempt any four questions.
- 2) Each question carries 25 marks.

QUESTION ONE

- a) Using a well labeled diagram, write the different types of real numbers that constitute the Real Number System. **(10 marks)**
- b) Explain five properties or features of each of any four types of numbers of the real number systems. **(15 marks).**

QUESTION TWO

- a) You are given the following functions:-

$$\begin{aligned} \text{(i)} \quad Q_d &= 4 - 2P + Q + 35C \\ \text{(ii)} \quad Q_s &= 3 + 4P + 6D + 2T \end{aligned}$$

Identify the dependents variable, the constant, the coefficient and independent variables for each function **(10 marks).**

- b) Explain three ways in which you can write a set of objects or numbers. Give an example (s) of each. **(10 marks)**
- c) Transform the following sets from list method to rule method. **(5 marks)**

QUESTION THREE

- a) Distinguish between a general function and a specific function. **(5 marks)**
- b) Indicate which of the following are general and which ones are specific functions. Justify your answer **(15 marks).**
 - (i) $y = f(x, m, n)$
 - (ii) $y = fx$
 - (iii) $y = 2x + 6m + 4n$
 - (iv) $Q_d = +3 - 4P$
 - (v) $Q_s = 34 + P$

QUESTION FOUR

- a) Find the partial derivatives of the following specific functions:

$$\begin{aligned} \text{(i).} \quad y &= 3x^4 - 2x^3 + x && \mathbf{(3 \text{ marks})} \\ \text{(ii).} \quad y &= 5x^6 + 9 && \mathbf{(3marks)} \end{aligned}$$

- b) You are given the following Total Revenue functions: Find the marginal revenue (MR) function of each.

$$\begin{aligned} \text{(i)} \quad TR &= 3Q^2 + 2Q + 6 && \mathbf{(4 \text{ marks})} \\ \text{(ii)} \quad TR &= Q^2 + Q && \mathbf{(4 \text{ marks})} \end{aligned}$$

- c) You are given the total cost functions (TC) below Find the marginal cost function (MC).
 - (i) Find the marginal cost when $Q=5$, $TC=6Q+3$ **(4 marks)**

d) Draw the graph of $y = x$ (7 marks)

QUESTION FIVE

a) Express 75 marks out of 100 marks as a percentage. (4 marks)

b) Express 400 out of 240 as a percentage (4 marks).

c) Given the matrices below:

$$B = \begin{bmatrix} 6 & 2 \\ 4 & 3 \end{bmatrix} \quad C = \begin{bmatrix} 19 & 4 \\ 3 & 2 \end{bmatrix} \quad D = \begin{bmatrix} 4 & 2 & -1 \\ 6 & 3 & 3 \end{bmatrix}$$

i. Find $B+C$ (2 marks)

ii. Find $2D$ (2 marks)

d) Find $\det C$ (2 marks)

e) What is meant by the term set operations (3 marks)

f) Explain the operations "Complement of a set" and "Union set". (8 marks).

QUESTION SIX

a) Differentiate between a zero (Null) matrix and a diagonal matrix. (5 marks)

b) If $A = \begin{bmatrix} 3 & 1 \\ 5 & 2 \end{bmatrix}$. Find the inverse of A^{-1} i.e the inverse of A. (5 Marks)

c) **If** $B = \begin{bmatrix} 2 & -1 \\ 7 & 4 \end{bmatrix}$; $|B| = 8 - (-7) = 15$ (5 marks)

d) Show that the inverse of $A = \begin{bmatrix} 2 & -3 \\ -6 & 9 \end{bmatrix}$ *does not exist* (5 marks)

e) Show that for any matrix:

$$A = \begin{bmatrix} a_1 & a_2 \\ b_1 & b_2 \end{bmatrix} \text{ and the identity matrix } I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$IA = AI = A \quad (5 \text{ Marks})$$

QUESTION SEVEN

a) By applying the laws of exponents, simplify the following exponents where m, n, 5, 3, 2, and 0 are real numbers:

$$\text{Find: (i) } a^m \cdot a^n \quad (\text{ii) } (a^2)^4 \quad (\text{Iii) } (a^m)^{2n} \quad (2\text{marks}) \quad (6 \text{ marks})$$

b) Given the following sets: $A = \{1, 2, 3, 4\}$, $B = \{1, 3, 5, 7\}$ and $C = \{1, 5, 6, 8\}$

c) Using relevant Venn diagrams, find and show $A \cap B \cap C$ (9 marks)

d) Find $(A \cup B \cup C)$ hence draw and show $(A \cup B \cup C)'$ (10 marks)

QUESTION EIGHT

- a) What is a vector in mathematical vector analysis **(4 marks)**.
- b) Differentiate between a row vector and a column vector. **(4 marks)**
- c) If k is a scalar and u is a row vector, $u = [u_1 u_2 \dots u_m]$, find ku **(4 marks)**.
- d) If $u = [1,2], v = [3,5], w = [4,7]$

Find : (i) $u - v$ **(2 marks)** and (ii) : $2u + 3w$ **(6 marks)**

- e) Given $ux^2y + xy^4$. Find the partial derivative of u with respect to x . **(5 marks)**