



MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY
(MMUST)

UNIVERSITY EXAMINATIONS
2023/2024 ACADEMIC YEAR
FIRST YEAR FIRST SEMESTER EXAMINATIONS

FOR THE DEGREE OF
BACHELOR OF EDUCATION
REGULAR EXAM

COURSE CODE: ESM 111

COURSE TITLE: QUANTITATIVE SKILLS I

DATE: 7/12/2023

TIME: 8:00-10:00 AM

INSTRUCTIONS TO CANDIDATES

Question 1 is Compulsory and carries 20 marks. Answer ANY OTHER two Questions each carrying 20 marks

MMUST observes ZERO tolerance to examination cheating

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

Question One 20 MARKS

(a) Given that the matrix below is singular, find the possible values of X

$$A = \begin{pmatrix} X & 0 \\ 1 & 1-X \\ 2 & \end{pmatrix} \quad (3 \text{ Marks})$$

(b) Distinguish between the following:

- (i) The Arithmetic Mean and the Median (1 mark)
- (ii) A Bar Chart and a Histogram (1 mark)
- (iii) A Square Matrix and a Unit Matrix (1 mark)
- (iv) A Linear Equation and a Quadratic Equation (1 mark)

(c) Simplify:

$$\frac{3X^2 - 5X + 2}{-7x + 2X^2 + 5} \quad (3 \text{ Marks})$$

(d) Given Matrix A, Find A^{-1} the inverse of A

$$A = \begin{pmatrix} 4 & 6 \\ 3 & 4 \end{pmatrix} \quad (3 \text{ Marks})$$

(e) Given set A, set B and set C. Draw a Venn diagram and show by shading the region $A \cap B \cap C$ (3 Marks)

(f) Given the following data, determine cumulative frequencies of the distribution (4 Marks)

Class mark	0 – 9	10 – 19	20 – 29	30–39	40 - 49
Frequency	3	8	15	25	12

QUESTION TWO

Given the matrix $A = \begin{pmatrix} 4 & 2 & 2 \\ 4 & 2 & 2 \\ 2 & 4 & 2 \end{pmatrix}$

(i) Determine its inverse (7 Marks)

(ii) Hence or otherwise solve the following system of simultaneous equations

$$2x + 2y + 4z = 2$$

$$4x + 2y + 2z = 4$$

$$2x + 4y + 2z = 6$$

(7 Marks)

(iii) The data below represents beef consumed at Kakamega prisons per week

WEEK	1	2	3	4	5	6	7	8	9	10
BEEF (Kg)	40	70	90	130	110	120	130	120	150	140

Using the above information calculate:

(i) The 3 yearly moving averages (3 Marks)

(ii) The Five yearly moving averages (3 Marks)

QUESTION THREE

A firm wished to employ a computer expert whose age was to be between 30 and 50 years. The ages of the following 40 applicants were recorded.

37 40 42 40 41 40 39 40 39 43
37 43 40 39 37 41 41 38 42 38
44 40 37 36 39 37 45 40 43 41
38 41 36 40 42 38 37 41 42 37

(i) Make a frequency distribution table using class intervals 35-37, 38-40 (7 Marks)

(ii) Calculate the mean age (5 Marks)

(iii) Calculate the medium age (3 Marks)

(iv) Calculate the standard deviation (5 Marks)

QUESTION FOUR

(a) The 960 boys of Kakamega High School are allowed by the school Principal to enroll in any of the three Co-curricular activities and represent the school in the relevant festivals. The three activity areas are music, drama and poems. Given that 320 joined music, 490 joined drama and 440 joined poems. Also 150 joined both music and drama. 170 joined music and poems, and 140 joined drama and poems, 90 boys didn't join any of the three games, Co-curricular activities, but 80 joined all the three.

- (i) Illustrate the information on a Venn diagram **(7 Marks)**
- (ii) Determine the number of boys who:
- (a) Joined only one activity **(2 Marks)**
 - (b) Joined two activities only **(2 Marks)**
 - (c) Did not join either music or drama **(2 Marks)**

(b) Consider the following pair of simultaneous equations

$$3x + 2y = 12$$

$$4x - y = 5$$

- (i) Determine both the co-efficient and constraints matrices **(2 Marks)**
- (ii) Use the matrix method to solve the pair of simultaneous equations **(7 Marks)**