(*University of Choice*)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

UNIVERSITY EXAMINATIONS

2022/2023 ACADEMIC YEAR

FIRST YEAR FIRST SEMESTER EXAMINATIONS

UNIVERSITY WIDE COURSE EXAMINATION

REGULAR EXAM

COURSE CODE: ESM 101

COURSE TITLE: QUANTITATIVE SKILLS I

DATE: 6/12/2022 **TIME:** 8:00-10:00am

INSTRUCIONS TO CANDIDATES

Answer Question ONE compulsory carrying 25 marks and any other THREE questions each carrying 15 marks.

MMUST observes ZERO tolerance to examination cheating

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

QUESTION ONE

a) By use of examples distinguish between

i. A prime number and an odd number (2 marks)

ii. An integer and a whole number (2 marks)

iii. A rational and irrational number (2 marks)

b) Given matrix $A = \begin{vmatrix} 6 & 4 \\ 4 & 3 \end{vmatrix}$

Find the inverse of matrix A (2 marks)

Hence or otherwise solve the following simultaneous equations

$6x + 4y = 15$

$4x + 3y = 11$ (3 marks)

c) i. if U= {a, b,c,d,e,f} A= {a,b,c}

B = {c, d, f} C = {c,d,e}

Find (A n B) U (A n C) (3 marks)

d) i. Solve the quadratic equation by use of quadratic formula.

$2x^2 - 4x - 30 = 0$

ii. The volume of frustum is given by the formula $V = 1/3\pi r^2 H^2 - 1/3\ \pi r^2 h$

make r the subject of the formula (3 marks)

e) *Mr John Kamau's sales for his hardware business were as shown below;*

Year	2016	2017	2018	2019	2020	2021
Sales Ksh (million)	10	14	17	20	23	28

i. Determine three year moving averages (2 marks)

ii. By use of the average, plot the trend line and project his sales for the year 2023? (4 marks)

QUESTION TWO

a. Explain briefly what is meant by the term time series analysis (2 marks)

b. Find the least square line for the data given below (8 marks)

X	-2	-1	0	1	2
Y	1	2	3	3	4

Where the trend line is given by $y = a + bx$ and the normal equations are

$\sum y = na + b\sum x$ and

$\sum xy = b\sum x + a\sum ax^2$

c. By use of the graph paper draw the trend line. (5 marks)

QUESTION THREE

The following data represents the age of teachers in a secondary school.

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

Required;

i. Make a frequency distribution table using clss intervals 35 – 37, 38 – 40……(3 marks)

ii. Calculate the mean age (4 marks)

iii. Calculate the median age (3 marks)

iv. Calculate the standard deviation (5 marks)

QUESTION FOUR

Given the matrix $B = \begin{vmatrix} 1 & 2 & 3 \\ 0 & 1 & 4 \\ 5 & 6 & 0 \end{vmatrix}$

a. Find the inverse of matrix B (7 marks)

b. Hence or otherwise find the solution of the following system of simultaneous equations.

$$X + 2y + 3z = 1$$
$$Y + 4z = 2$$
$$5x + 6y = 3$$

(8 marks)

QUESTION FIVE

The following data relates to Masinde Muliro university students who visited Kakamega referral hospital for treatment of Malaria, flu and common cold.

In the first week of March 2022, 240 students visited the hospital. Of the 240 students, 80 had malaria, 120 had flu and 110 had common cold. Also 35 had malaria and flu, 40 had malaria and common cold while 35 had flu and common cold. 25 did not have any of the three ailments, but 20 had had all the three ailments. By using a vane diagram, determine:

i. The number of students who had malaria only (2 marks)
ii. Those who had common cold only (2 marks)
iii. Those who had malaria and flu only (2 marks)
iv. Those who had malaria and common cold only. (3 marks)
v. Those who did not have either malaria or flu (3 marks)
vi. How many students had two of the three ailments? (3 marks)