



(University of Choice)
**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY
(MMUST)**

MAIN CAMPUS

**UNIVERSITY EXAMINATIONS
2021/2022 ACADEMIC YEAR**

THIRD YEAR SPECIAL/SUPP SEMESTER EXAMINATIONS

FOR

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE CODE: DEE-~~002~~⁰⁸¹
COURSE TITLE: ENGINEERING MATHEMATICS V

DATE: Friday 7th Oct, 2022

TIME: 2.00 Pm – 4.00Pm

INSTRUCTIONS TO CANDIDATES

Question ONE (1) is compulsory
Answer Any Other TWO (2) questions

TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 5 Printed Pages. Please Turn Over.

Question One

a) Define the following terminologies as used in probability and statistics for engineers:

i) Descriptive statistics

(2 Marks)

ii) Inferential statistics

(2 Marks)

iii) Population

(2 Marks)

iv) Sample

(2 Marks)

b) Calculate the harmonic mean of the numbers: 13.5, 14.5, 14.8, 15.2 and 16.1

(4 Marks)

c) A survey was conducted in which the main purpose was to establish the intelligence quotient (IQ) of residents in a given area. The obtained results are tabulated below:

IQ	No. of residents
1 – 20	6
21 – 40	18
41 – 60	32
61 – 80	48
81 – 100	27
101 – 120	13
121 – 140	2

Compute the Modal IQ

(5 Marks)

d) The quality controller in a given firm had an accurate record of all the iron bars produced in May 1997. The following data shows those records

Bar lengths (cm)	No. of bars(f)
201 – 250	25
251 – 300	36
301 – 350	49
351 – 400	80
401 – 450	51

Calculate the standard deviation of the lengths of the bars

(5 Marks)

e) Based on the grouped data below, find the Interquartile Range

(6 Marks)

Time to travel to college	Frequency
1 –10	8
11 –20	14
21 – 30	12
31 – 40	9
41 – 50	7

f) Explain what is meant by a test statistic?

(2 Marks)

Question two

a) Given the data below

X 100 105 90 80 80 85 87 92 90 95 93 95 85 70 85

Y 9 8 5 2 4 6 4 7 6 7 5 5 4 3 3

Fit the least squares simple regression line to the data. Using the equation above, find the estimate of y when x = 84.

(10 Marks)

b) Consider the data below and compute co-efficient of correlation (r)

Pupll	A	B	C	D	E	F	G	H	I	J
Maths mark (out of 30) x	20	23	8	29	14	11	11	20	17	17
Physics mark (out of 40) y	30	35	21	33	33	26	22	31	33	36

(10 Marks)

Question Three

A lecture on a topic of public health is held and 300 people attend. They are classified in the following way:

Gender	Doctors	Nurses	Total
Female	90	90	180
Male	100	20	120
Total	190	110	300

If one person is selected at random, find the following probabilities:

- (a) $P(\text{a doctor is chosen})$; (3 Marks)
- (b) $P(\text{a female is chosen})$; (3 Marks)
- (c) $P(\text{a nurse is chosen})$; (3 Marks)
- (d) $P(\text{a male is chosen})$; (3 Marks)
- (e) $P(\text{a female nurse is chosen})$; (4 Marks)
- (f) $P(\text{a male doctor is chosen})$. (4 Marks)

Question Four

A medical survey was conducted in order to establish the proportion of the population which was infected with cancer. The results indicated that 40% of the population were suffering from the disease.

A sample of 6 people was later taken and examined for the disease. Find the probability that the following outcomes were observed

(20 Marks)

- a) Only one person had the disease
- b) Exactly two people had the disease
- c) At most two people had the disease
- d) At least two people had the disease
- e) Three or four people had the disease

Question Five

- a) The mean number of accidents per month at a certain intersection is 3. What is the probability that in any given month 4 accidents will occur at this intersection?

(2 Marks)

- b) Suppose, you enter a fishing contest. The contest takes place in a pond where the fish lengths have a normal distribution with mean = 16 inches and standard deviation = 4 inches.

(12 Marks)

Problem 1: What's the chance of catching a small fish — say, less than 8 inches?

Problem 2: Suppose a prize is offered for any fish over 24 inches. What's the chance of catching a fish at least that size?

Problem 3: What's the chance of catching a fish between 16 and 24 inches?

- c) The quality department of a wire manufacturing company periodically selects a sample of wire specimens in order to test for breaking strength. Past experience has shown that the breaking strengths of a certain type of wire are normally distributed with standard deviation of 200 kg. A random sample of 64 specimens gave a mean of 6200 kgs. Find out the population mean at 95% level of confidence.

(6 Marks)