MURANG'A UNIVERSITY OF TECHNOLOGY

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

UNIVERSITY ORDINARY EXAMINATION

2017/2018 ACADEMIC YEAR

SECOND YEAR **FIRST** SEMESTER EXAMINATION FOR THE DIPLOMA IN ELECTRICAL AND ELECTRONIC ENGINEERING

SEE 1201 – ENGINEERING MATHEMATICS III

DURATION: 2 HOURS

DATE: 24TH APRIL, 2018

TIME: 9.00 – 11.00 A.M.

Instructions to Candidates:

1. Answer **Question 1** and **Any Other Two** questions.
2. Mobile phones are not allowed in the examination room.
3. You are not allowed to write on this examination question paper.

SECTION A – ANSWER ALL QUESTIONS IN THIS SECTION

QUESTION ONE

a) Determine the mean, mode and median of the following data:

{2, 3, 7, 5, 5, 13, 1, 7, 4, 8, 3, 4, 3} (3 marks)

b) The frequency distribution for the value of resistance in ohms of 48 resistors is as shown. Determine the mean value of resistance.

20.5 – 20.9	3	22.0 – 22.4	13
21.0 – 21.4	10	22.5 – 22.9	9
21.5 – 21.9	11	23.0 – 23.4	2

(4 marks)

c) Determine the probabilities of having, in a family of 4 children,

i. at least 1 boy

ii. at least 1 girl and 1 boy

Assume that there is equal probability of male and female birth (4 marks)

d) A box contains 74 brass washers, 86 steel washers and 40 aluminium washers. Three washers are drawn at random from the box without replacement. Determine the probability that all the three are steel washers. (3 marks)

e) Determine the coefficient of correlation for the following data:

X	24	41	9	18	73
Y	39	46	90	30	98

(6 marks)

f) Some engineering components have a mean length of 20mm and a standard deviation of 0.25mm. assuming that the data is normally distributed, determine the number of components, in a batch of 500, that are longer than 20.54mm. (6 marks)

g) Determine the standard deviation from the mean of the set of numbers: {5, 6, 8, 4, 10, 3}

(4 marks)

SECTION B – ANSWER ANY TWO QUESTIONS IN THIS SECTION

QUESTION TWO

a) Determine the numbers contained in the

i. 41^{st} to 50^{th} percentile group, and

ii. 8^{th} decile group of the set of numbers shown below

{14, 22, 17, 21, 30, 28, 37, 7, 23, 32, 24, 17, 20, 22, 27, 19, 26, 21, 15, 29} (6 marks)

b) The frequency distribution for the values of resistance in ohms is as shown. Calculate the standard deviation, correct to 3 decimal places:

20.5 – 20.9	3	22.0 – 22.4	13
21.0 – 21.4	10	22.5 – 22.9	9
21.5 – 21.9	11	23.0 – 23.4	2

(14 marks)

QUESTION THREE

a) A package contains 50 similar components and inspection shows that four have been damaged during transportation. If six components are drawn at random from the contents of the package determine the probabilities that in this sample

i. One component is damaged

ii. Less than three are damaged (12 marks)

b) The probability of event A happening is $\frac{3}{5}$ and the probability of event B happening is $\frac{2}{3}$.

Calculate the probabilities of:

i. both A and B happening

ii. only event A happening

iii. only event B happening

iv. either A or B or A and B happening. (8 marks)

QUESTION FOUR

a) The probability of a person having an accident in a certain period of time is 0.0003. For a population of 7500 people, draw a histogram showing the probabilities of 0, 1, 2, 3, 4, 5 and 6 people having an accident in this period. (10 marks)

b) The experimental values relating centripetal force and radius, for a mass travelling at constant velocity in a circle, are as shown:

Force (N)	5	10	15	20	25	30	35	40
Radius (m)	55	30	16	12	11	9	7	5

Determine the equation of the regression line of force on radius. (10 marks)