



MURANG'A UNIVERSITY OF TECHNOLOGY

SCHOOL OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

UNIVERSITY ORDINARY EXAMINATION

2018/2019 ACADEMIC YEAR

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

ECU 055 - MATHEMATICS III

DURATION: 2 HOURS

DATE: 15/4/2019

TIME: 2-4 P.M.

Instructions to candidates:

1. Answer question One 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 B – ANSWER ANY TWO QUESTIONS IN THIS SECTION

QUESTION ONE (30 MARKS)

- (a) Distinguish between discrete and continuous variables. (2marks)
(b) The time taken by employees to complete an operation was recorded on 80 occasions.

The results are as shown below:

Time (min)	10.0	10.5	11.0	11.5	12.0	12.5	13.0
Frequency (f)	4	8	14	22	19	10	3

- (i) State the class interval, the lower boundary of the third class, and the upper boundary of the seventh class. (3marks)
(ii) Determine the mean, the mode, the median and the standard deviation of the set of observations. (10 marks)
- (c) 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) Either A or B or A and B happening. (6marks)
- (d) Determine $Z = -1.4$ and $Z = 0.7$ (4marks)
- (e) Calculate the probabilities of having, in a family of 4 children:
- (i) At least one girl
(ii) At least one girl and one boy (5marks)

SECTION B – ANSWER ANY TWO QUESTIONS IN THIS SECTION

QUESTION TWO (20 MARKS)

- (a) A production department has 35 similar machines. The number of breakdowns on each machine averages 0.06 per week. Determine the probabilities of having:
- (i) One machine breaking down in any week.
(ii) Fewer than three machines breaking down in any week. (8marks)
- (b) In an experiment to determine the relationship between the current flowing in an electrical circuit and the applied voltage, the results obtained are:

Current(mA)	5	11	15	19	24	28	33
Applied Voltage(V)	2	4	6	8	10	12	14

Determine, using the product-moment formula, the coefficient of correlation for these results. (12marks)

QUESTION THREE (20 MARKS)

- (a) Draw an ogive for the data of component measurements given below, and hence determine the Median and the first and third quartile values for this distribution.(8marks)

Class intervals (mm)	1.24	1.27	1.30	1.33	1.36	1.39	1.42	1.45
	-	-	-	-	-	-	-	-
	1.26	1.29	1.32	1.35	1.38	1.41	1.44	1.47
Frequency(f)	2	4	4	10	11	5	3	1

- (b) 500 tins of paint have a mean content of 1010ml and the standard deviation of the contents is 8.7 ml. Assuming the volumes of the contents are normally distributed, calculate the number of tins likely to have contents whose volumes are less than:

(i) 1025 ml

(ii) 995 ml

(12 marks)

QUESTION FOUR (20 MARKS)

- (a) The gain of 90 similar transistors is measured and the results are as shown:

Gain (dB)	83.5-85.5	86.5-88.5	89.5-91.5	92.5-94.5	95.5-97.5
Frequency(f)	6	39	27	15	3

Draw a histogram of this frequency distribution and determine the Mean, Median, and Mode values. (10marks)

- (b) The following results were observed in an experiment to determine the relationship between frequency and the inductive reactance of an electrical circuit.

Frequency (f)	50	100	150	200	250	300	350
Reactance (Ω)	30	65	90	130	150	190	200

Determine the equation of the regression line of inductive reactance on frequency, assuming a linear relationship. (10marks)