



TECHNICAL UNIVERSITY OF MOMBASA
FACULTY OF ENGINEERING & TECHNOLOGY
DEPARTMENT OF ELECTRICAL & ELECTRONIC ENGINEERING

UNIVERSITY EXAMINATION FOR:
HIGHER DIPLOMA IN ELECTRICAL AND ELECTRONIC ENGINEERING

EEA 3203: ENGINEERING MATHEMATICS III

END OF SEMESTER EXAMINATION

SERIES: MAY 2016

TIME: 2 HOURS

DATE:

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of FIVE questions. Attempt any **THREE Questions**

Do not write on the question paper.

QUESTION ONE

- (a) suppose the white cell count of a healthy individual per cubic millimeters of blood is distributed as poisson with parameter $\mu = 6$. Find correct to five decimal places the probability that:-
- i) There will be no cells in the blood
 - ii) There will be a white cell
 - iii) There will be two or more white cells in blood.
- (6marks)

- (b) i) Find the mean m_x , the variance σ_x^2 and the standard deviation of the function

$$p(x) = \begin{cases} \frac{1}{a}, & -\frac{a}{2} \leq x \leq \frac{a}{2} \\ 0, & \text{elsewhere} \end{cases} \quad (7\text{marks})$$

- c) The life-time in hours of bulbs from a factory was recorded as follows:-

Life-time (hrs)	60-64	65-69	70-74	75-79	80-84	85-89
Frequency	10	14	26	15	8	9

From the data, determine-

- i) The mean
 ii) Standard Deviations (7marks)

QUESTION TWO

- (a) Given that x and y are the continuous random variables with joint probability density function.

$$f(x, y) = \begin{cases} 4xy & 0 < x < 1, 0 < y < 1 \\ 0, & \text{elsewhere} \end{cases}$$

Determine

- i) \bar{x} and \bar{y} iii) $E[4x+3y]$ (10marks)
- b) From the following data, determine
- i) The two regression equations
 ii) The coefficient of correlation between marks in Economics and Statistics
 iii) The most likely marks in Statistics when marks in Economics is 30

Marks in Economics	25	28	35	32	31	36	29	38	34	32
Marks in Statistics	43	46	49	41	36	32	31	30	33	39

(10marks)

QUESTION THREE

- (a) Use Newton –Raphson iterative formula to estimate the positive root of the equation

$$(x + 4)^3 - e^{1.92x} + 5 \cos\left(\frac{x}{3}\right) = 9 \quad (8\text{mks})$$

- b) Use the Newton Raphson formula to determine the cube root of 123 correct to 7.d.p (5mks)
- c) Determine the value of $f(-1)$ from the set of functions using Newton Gregory formula

x	-4	-2	0	2	4	6	8
F(x)	541	55	1	-53	-155	31	1225

(7mks)

QUESTION FOUR

- (a) Define the following terms:-

i) Skewness and distinguish between positive and negative Skewness

ii) Coefficient of dispersion (6marks)

- b) A continuous random variable x has a probability density function $f(x)$ is defined by

$$f(x) = \begin{cases} \frac{c^2}{2} e^{cx}, & x \geq 0 \\ 0, & elsewhere \end{cases}$$

is a p.d.f

Determine: -

(i) The value of the constant c

(ii) The expected value of x

(iii) The standard deviation σ (14 marks)

QUESTION FIVE

(a) Determine the smallest possible root of the equation $x^2 - 5x + 3 = 0$ using Newton-Raphson iterative method. Give your answer correct to 6 decimal places.

(5marks)

(b) The marks of 500 in an examination are normally distributed with mean of 45 marks and standard deviation of 20marks.

i) Given that the pass mark is 41, estimate the number of candidates who passed the examination.

ii) If 5% of the candidate obtained a distinction by scoring x marks or more, Estimate the value x .

(8marks)

c) Use Newton-Gregory forward difference to obtain a polynomial of minimum degree will exactly fit the data given below.

x	-1	-0.7	-0.4	-0.1	0.2	0.5
f(x)	12	12.357	12.336	12.099	11.808	11.625

(7marks)