TEVETA
Technical Education, Vocational and Entrepreneurship Training Authority

DIPLOMA IN BIOMEDICAL ENGINEERING

LEVEL 6 YEAR II EXAMINATIONS

FINAL INTEGRATED SUMMATIVE EXAMINATIONS

SITTING: JULY /AUGUST 2026

SUBJECT: ENGINEERING MATHEMATICS II

TIME: THREE (3) HOURS **TOTAL MARKS: 100**

PASS MARK: 50

INSTRUCTIONS TO CANDIDATE

1. **Write your examination number and National Registration Card Number on the answer booklet provided. Ensure to append your signature in the spaces provided on the answer booklet.**
2. **Write your answer script serial number on the examination register provided and the entry slip.**
3. **There are Eight (8) questions in this paper. ANSWER Five (5) questions**
4. **Diagrams may be used were necessary to clarify your answer.**
5. **Cell phones and programmable calculators are not allowed in the examination room.**

DO NOT TURN THIS PAPER UNTIL YOU ARE TOLD TO DO SO

QUESTION 1

A box contains 25 ECG Monitors, 18 Infusion Pumps, 12 Ventilators and 15 Pulse Oximeters. During quality assurance testing, two devices are selected one after the other without replacement for detailed inspection. Determine the probability that.

a) Both selected devices are ventilators. **[4 marks]**

b) Both devices are the same. **[6 marks]**

c) the first device is an ECG Monitor followed by an Infusion Pump. **[4 marks]**

d) at least one of the selected devices is an Infusion Pump. **[6 marks]**

[TOTAL: 20 MARKS]

QUESTION 2

a) Given the complex numbers $z = 3 + 4i$ and $w = 2 - 5i$. Determine

i. $|2z + w|$ **[5 marks]**

ii. zw **[5 marks]**

b) Given a complex number $z = x + iy$ which satisfies the equation $2z + \bar{z} = 9 + 3i$.

Determine the values of x and y . **[10 marks]**

[TOTAL: 20 MARKS]

QUESTION 3

a) The data below shows the number of patients diagnosed with different diseases in one month at Luanshya Mine Hospital

Disease	Malaria	Tuberculosis	HIV/AIDS	Diabetes	Hypertension
No of patients	45	20	30	25	40

i. Construct a bar chart to represent the data above. **[6 marks]**

ii. Identify the most Common disease. **[2 marks]**

b) The number of injuries reported by 15 employees in a week is as follows

0, 2, 1, 0, 3, 1, 2, 0, 1, 4, 2, 1, 0, 2, 3

i. Construct a line graph to represent the data above. **[6 marks]**

ii. Determine the mode, median and mean. **[6 marks]**

[TOTAL: 20 MARKS]

QUESTION 4

a) Simplify $\frac{1}{\sqrt{48}} - \frac{1}{\sqrt{27}} + \frac{1}{\sqrt{12}}$ leaving your answers in the form $p\sqrt{3}$. . **[5 marks]**

b) Evaluate the complex number $(-2 - j)^5$. **[5 marks]**

c) the data below shows the population in five countries

COUNTRY	POPULATION
ZAMBIA	22,700,000
MALAWI	22,000,000
CONGO DRC	115,000,000
SOUTH AFRICA	64,000,000
BOTSWANA	2,700,000

Present the information on a pie chart. **[10 marks]**

[TOTAL: 20 MARKS]

QUESTION 5

a) Using the first principal, differentiate $y = 4x^2 - 4$ **[5 marks]**

b) Differentiate the following.

i. $y = \cos x^2$ **[6 marks]**

ii. $y = 3x^2 + 5x^7$ **[5 marks]**

iii. $y = \int 7x\sqrt{x^2}dx$ **[4 marks]**

[TOTAL: 20 MARKS]

QUESTION 6

The table below shows the data relating to the number of successful graduates.

interval	5 – 10	10 – 15	15 – 20	20 – 25	25 – 30
frequency	8	24	20	30	14

Calculate the:

a) mean graduates. **[5 marks]**

b) modal graduates. **[5 marks]**

c) median. **[5 marks]**

d) variance. **[5 marks]**

[TOTAL: 20 MARKS]

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QUESTION 7

a) Evaluate:

i. $\int_4^3 e^{2x+1}dx$ **[5 marks]**

ii. $\int_{-2}^{1}(4-x^2)dx$ **[5 marks]**

b) Express the following in the form $z = a + bi$

i. $\frac{3+2i}{4-2i}$ **[5 marks]**

ii. $\frac{4+i}{-4+3i}$ **[5 marks]**

[TOTAL: 20 MARKS]

QUESTION 8

If 5 of 15 sample are infected and 8 of them are randomly chosen for inspection. Calculate the probability that:

a) None of the samples is infected. **[5 marks]**

b) Only one of the samples is infected. **[5 marks]**

c) At least four of the samples is infected. **[10 marks]**

[TOTAL: 20 MARKS]