TEVETA

Technical Education, Vocational and Entrepreneurship Training Authority

DIPLOMA IN BIOMEDICAL ENGINEERING TECHNOLOGY

LEVEL 6 YEAR I EXAMINATIONS

FINAL INTEGRATED SUMMATIVE EXAMINATIONS

SITTING: JULY/AUGUST 2025

SUBJECT: FUNDAMENTALS OF BIOMEDICAL ENGINEERING

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

PASS MARK: 50

INSTRUCTIONS TO CANDIDATE

1. Write your Examination number and National Registration Card (NRC) number on the answer booklet provided. Ensure you append your signature in the space provided on the answer booklet.
2. Write the ANSWER SCRIPT SERIAL NUMBER on the examination register and on the entry slip.
3. There are EIGHT (8) questions in this paper. Answer FIVE (5) questions.
4. Diagrams may be used where necessary to clarify your answer.
5. Cell phones and programmable calculators are not allowed in the examination room.

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

QUESTION 1

a) Define radiation. [2 marks]
b) State the forms of ionization radiation. [4 marks]
c) Explain statutory bodies regulating the use of radiation emitting materials in the following countries:
   i) Zambia. [2 marks]
   ii) United Kingdom. [2 marks]
   iii) United States. [2 marks]
   iv) Japan. [2 marks]
d) Describe **three (3)** medical equipment that uses radiation in the diagnosis of ailments. [6 marks]

[TOTAL 20 MARKS]

QUESTION 2

a) Explain the functions of the following testing tools:
   i) Digital Multimeter. [4 marks]
   ii) Oscilloscope. [4 marks]
   iii) Oxygen analyser. [4 marks]
   iv) Defibrillator simulator. [4 marks]
b) Outline the procedures in testing a 12 V battery using a digital Multimeter. [4 marks]

[TOTAL 20 MARKS]

QUESTION 3

a) State **four (4)** maintenance record forms used in medical equipment maintenance activities. [12 marks]
b) Explain **two (2)** of the maintenance record forms stated in Q3 (a). [8 marks]

[TOTAL 20 MARKS]

QUESTION 4

a) Explain the ethical responsibility of the biomedical engineering professional towards a patient in the following areas:
   i) Non-maleficence. [4 marks]
   ii) Patient confidentiality. [4 marks]
   iii) Beneficence. [4 marks]
b) Describe **four (4)** codes of ethics by the Engineering Institution of Zambia (EIZ). [8 marks]

[TOTAL 20 MARKS]

QUESTION 5

a) Explain **five (5)** functions of a Biomedical Engineer. [10 marks]
b) Describe **five (5)** important qualities of a biomedical engineer. [10 marks]

[TOTAL 20 MARKS]

QUESTION 6

State the information contained on the following forms used during the maintenance of medical equipment:

a) Job request form. [5 marks]
b) Medical equipment annual planning form. [5 marks]
c) Medical equipment acceptance record form. [5 marks]
d) Preventive maintenance checklist. [5 marks]

[TOTAL 20 MARKS]

QUESTION 7

a) Define a chemical hazard. [2 marks]
b) Explain the following **two (2)** types of chemical hazards:
   i) Health. [3 marks]
   ii) Physicochemical. [3 marks]
c) Describe the following routes of entry of chemicals into the human body:
   i) Absorption. [3 marks]
   ii) Ingestion. [3 marks]
   iii) Injection. [3 marks]
   iv) Inhalation. [3 marks]

[TOTAL 20 MARKS]

QUESTION 8

a) Define the following terms in relation to electricity:
   i) Current. [2 marks]
   ii) Resistance. [2 marks]
   iii) Voltage. [2 marks]
   iv) Grounding. [2 marks]
b) Explain actions that could lead to the following electrical disasters:
   i) Electrocution and burns. [3 marks]
   ii) Arc Flash. [3 marks]
   iii) Fires. [3 marks]
   iv) Falls. [3 marks]

[TOTAL 20 MARKS]