(University of Choice)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS
2022/2023 ACADEMIC YEAR

FIRST YEAR SECOND SEMESTER
MAIN EXAMINATIONS

FOR THE DEGREE
OF
BACHELOR OF SCIENCE IN MEDICAL LABORATORY SCIENCES & MEDICAL BIOTECHNOLOGY

COURSE CODE: BML 124

COURSE TITLE: PHYSICS FOR BIOMEDICAL LABORATORY SCIENCES

DATE: 24TH APRIL 2023 **TIME: 8.00 – 10.00AM**

INSTRUCTIONS TO CANDIDATES

This paper is divided into three sections, **A B** and **C,** carrying respectively: Multiple Choice Questions (**MCQs**), Short Answer Questions (**SAQs**) and Long Answer Questions (**LAQs**). Answer all questions. **DO NOT WRITE ON THE QUESTION PAPER.**

TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating

SECTION A: Multiple Choice Questions (20 Marks)

1. Stephen is thinking of going to the hospital for checking whether he has tuberculosis since he believes that he may have some early symptoms of the disease. His friend suggests him to do an x-ray checkup to clear up the confusion. Is the suggestion made by Stephen's friend going to help him?
   A) True
   B) False
   C) Not sure
   D) All the above
2. Photoelectric effect was explained by
   A) Einstein
   B) Faraday
   C) Plank
   D) Hertz
3. Three types of radioactive elements are emitted when unstable nuclei undergo radioactive decay. Which of the following is not one of them
   A) Beta
   B) Gamma
   C) Alpha
   D) delta
4. A radio can tune to any station in the frequency range from 2.5 MHz to 15 MHz bands. What is the corresponding wavelength band?
   A) 30 m to 130 m
   B) 40 m to 140 m
   C) 20 m to 120 m
   D) 10 m to 110 m
5. The idea of preventing one component from affecting another through their common electric and magnetic field is referred to as
   A) Hall effect
   B) Shielding
   C) Grounding
   D) Preventing
6. Ohm's law cannot be applied to which material?
   A) Aluminium
   B) Silver
   C) Silcon carbide
   D) Copper
7. "Sum of all currents meeting at a point is zero", stated law is
   A) Kirchhoff's first rule
   B) Kirchhoff's third rule
   C) Kirchhoff's fourth rule
   D) Kirchhoff's second rule
8. Evaporation of electrons from the surface of the metal surface is called
   A) Condensation
   B) Thermionic emission
   C) Convection
   D) Radiation
9. The direction of force o a current carrying conductor placed in a magnetic field can be found by
   A) Flemings left hand rule
   B) Hookes law
   C) Flemings right hand rule
   D) Ohms law

10. A reflected sound wave is known as ...
    A) A repeat.
    B) An echo.
    C) A return.
    D) A reverberation.

11. Identify the correct equation to calculate wave speed.
    A) $v = f\lambda$
    B) $v = F.\lambda$
    C) $v = \lambda F$
    D) $v = f.\lambda$

12. Ultrasound waves are used for medical scans because they are partly reflected at a boundary between...
    A) Air and body tissue.
    B. Body tissue and bone only.
    C) Body tissues of the same type.
    D) Two different types of body tissue

13. Which of the given waves has the maximum penetrating power?
    A) α-rays
    B) β-rays
    C) γ-rays
    D) All of the mentioned

14. Which of the following electromagnetic waves is used in medicine to destroy cancer cells?
    A) X-rays
    B) Visible rays
    C) Gamma rays
    D) Ultraviolet rays

15) Which of the following is called heat radiation?
    A) X-rays
    B) Gamma rays
    C) Microwave
    D) Infrared radiation

16) According to Maxwell's theory, a changing electric field causes:
    A) Electric field
    B) Induced Electromotive force
    C) Magnetic field
    D) Magnetic dipole

17) Which of the following is not a basic physical quantity?
    A) Mass (M)
    B) Temperature (θ)
    C) Time (T)
    D) None of the above

18) Device that is used to store charge, is named as
    A) Capacitor
    B) Resistor
    C) Transistor
    D) Diode

19) Which physical quantity is described by the expression **F/A.**
    (A) Current (B) pressure (C) mass (D) Density.

20) Which of the following term define by the statement "a natural tendency of an object to maintain a state of rest or maintain a uniform motion in straight line".

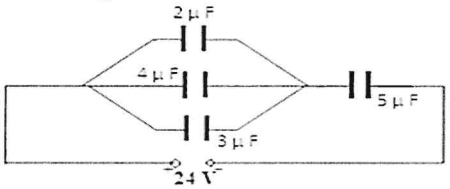
A) Inartia (B) Inertia (C) Enartia (D)Enertia

SECTION B: Short Answer Questions (40 Marks)

a) Environmental errors are examples of systematic errors in measurement. State any three possible causes of environmental errors while taking measurements in a medical laboratory (3 Marks)

b) Two cells, each of 1.5 V are used to drive a current through a wire AB of resistance 90Ω. Calculate the current in the circuit (3 Marks)

c) Using the circuit given below find the effective capacitance of capacitors.(5 Marks)



d) By the help of a diagram explain the following :

i) Wavelength of a wave (2mks)

ii) The magnetic domains theory (2mks)

e) A length of wire has a resistance of 10 ohms. What is the resistance of a wire of the same material three times as long and twice the cross-sectional area? (4 Marks)

f) State three laws of thermodynamics. (3 Marks)

g) State the following laws as applied in physics (3mks)

a) Flemings right hand grip rule

b) Kirchhoff's laws of current

c) Newton's first law of motion.

h) State three factors affecting heating effect of an electric current. (3 Marks)

i) i) State two factors that affect pressure in solid (2mks)

ii) Explain how each of the factors affect pressure. (2mks)

j) State and explain the factors that affect the magnitude of induced EMF in a transformer. (5 Marks)

k) State three properties of electromagnetic waves (3marks)

SECTION C: Long Answer Questions (40 Marks)

1. a) Explain the following as used in measurements and give an example of each

i) Precision (2 mks)

ii) Accuracy (2 mks)

iii) Distinguish between fundamental and derived physical quantities giving an example of each (4mks)

b) a) Describe any four forces that apply in the preparation of specimens for laboratory investigations (8mks)

b) Explain how each of the forces in part (a) apply (4mks)

2 a) Show that the effective resistance of three resistors of in a parallel circuit is found by

$$\frac{1}{RT} = \frac{1}{R1} + \frac{1}{R2} + \frac{1}{R3}$$

(8mks)

b) Describe the factors that affect resistance of resistors (6mks)

c) Explain any three factors that cause energy losses in transformers and how the loss is minimized (6mks)

3) i) Identify and by using equation show how the three radioactive particles are given out during radioactive decay of a sample (6mks)

ii) Describe any four electromagnetic waves and explain how they are applied in the medical world (8mks)

iii) Explain any three dangers associated with exposure to some of the electromagnetic waves (6mks)