



**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY
(MMUST)**

**SUPPLEMENTARY/SPECIAL EXAMINATION
(MAIN/SHIVERS/KISUMU)**

**UNIVERSITY MAIN EXAMINATIONS
2017/2018 ACADEMIC YEAR**

FIRST YEAR SECOND SEMESTER

COURSE CODE : BML 124
**COURSE TITLE : PHYSICS FOR BIOMEDICAL LABORATORY
SCIENCES**

DATE:

TIME:

INSTRUCTIONS TO CANDIDATES

Attempt question **ONE (1)** and **ANY THREE(3)** other questions
Read additional instructions under various sections

MMUST observes **ZERO** tolerance to examination cheating

This Paper Consists of 3 Printed Pages. Please Turn Over.

QUESTION ONE (20 MARKS)

- 1) Which of the following is not a basic physical quantity?
 - a. Mass (M)
 - b. Temperature (θ)
 - c. Time (T)
 - d. None of the above
2. Which gas law is described by the expression $PV = \text{Constant}$ provided temperature is kept constant.
(A) Charles' Law (B) Grahams' Law (C) Boyles' Law (D) Pressure Law.
3. Energy in a capacitor can be stored in form of
 - a. $\frac{1}{2} CV^2$
 - b. $2 CV^2$
 - c. $1 CV^2$
 - d. $\frac{1}{2} CV$
4. The circuit in which current has a complete path to flow is called _____ circuit.
 - a. short
 - b. open
 - c. closed
 - d. open loop
5. Identify an odd one out description of inelastic collision among the following statement.
 - a. The momentum is conserved while Kinetic Energy is not conserved
 - b. The total mass is the sum of the masses of the individual bodies.
 - c. The momentum is not conserved while the kinetic energy is conserved.
 - d. The bodies end up moving with a common velocity.
6. The following are factors that affect pressure in liquid, which one is not.
 - a. Density of the liquid.
 - b. Gravitational force acting on the liquid.
 - c. Volume of the liquid.
 - d. Column height of the liquid.
7. Temperature of a gas is increased, its kinetic energy would
 - a. Increase A
 - b. Decrease
 - c. Remain same
 - d. Increase and decrease both
8. Which of the following represents the energy in storage?
 - a. heat
 - b. work
 - c. internal energy
 - d. none of the mentioned
9. In the Fleming's right-hand grip rule which finger always point the direction current.

- a. First finger.
 - b. Second finger.
 - c. Thumb
 - d. Third Finger.
10. Electromagnetic waves are classified by range of frequencies and wave length. Which wave is not among the last four in terms of wavelengths?
- a. Ultraviolet Light
 - b. X-Rays
 - c. Microwaves
 - d. Infrared Light.
11. Laminated insulations coated with varnish are normally used in the transformer
- a. To reduce reluctance of magnetic path
 - b. To reduce the effect of eddy current
 - c. To increase the reluctance of magnetic path
 - d. To reduce the hysteresis effect
12. Define linear momentum.
- a. Is the product of density and the mass of an object
 - b. Is the product of mass and velocity of an object
 - c. Is the product of mass and speed of an object
 - d. Is the product of mass and displacement of the object.
13. A potential difference across a lump is 12 volts. How many joules of electrical energy are changed to heat when a charge of 5 coulombs passes through it?
- a. 60J
 - b. 06J
 - c. 0.6J
 - d. 6.6J
14. Features of best hydraulic liquid are given below.
- a. Be incompressible.
 - b. Low Freezing point and high boiling point.
 - c. Should not corrode the parts of the hydraulic system.
 - d. High freezing point and low boiling point.
15. Eliminate a statement which is not true about weight.
- a. It is a pull of gravity on a body
 - b. Is a vector quantity
 - c. Measured using spring balance
 - d. It is the same everywhere.
16. What is the S. I. Unit symbol for length?
- a. M^2
 - b. m
 - c. m^3
 - d. km
17. A container with a mass of 5 kg is lifted to a height of 8 m. How much work is done by the external force?
- a. 400 J .
 - b -400 J
 - c. zero

d. 50 J E. -50J

18. A girl of mass 40 kg wears heels with an area of 1 cm² in contact with ground, pressure on ground is (take earth's gravitational field strength)

- a. 4×10^{-5}
- b. 4×10^4
- c. 4×10^5
- d. 40×10^5

19. Basic source of magnetism _____.

- a. Charged particles alone
- b. Movement of charged particles
- c. Magnetic dipoles
- d. Magnetic domains

20. A machine does 2500 J of work in 1 min. What is the power developed by the machine?

- a. 21 W
- b. 42 W
- c. 150 W
- d. 2500 W
- e. 150000 W

QUESTION TWO (40 MARKS)

- 1) i) Explain reasons why clinical thermometer temperature scale ranges from 35⁰C to 43⁰C (2mks)
ii) Outline any three factors that cause energy loss in a transformer (3mks)
- 2) By the use of an example explain the radio activity process below; (4mks)
 - i) Nuclear fusion and Nuclear fission
 - ii) State Ohm's law and give its mathematical expression (2mks)
- 3) The minimum frequency of light that will cause photoelectric emission from potassium surface is 5.37×10^{14} Hz. When the surface is irradiated using a certain source photoelectrons are emitted with a speed of 7.9×10^5 ms⁻¹ calculate ($h = 6.63 \times 10^{-34}$ Js, $m = 9.11 \times 10^{-31}$ Kg $c = 3.0 \times 10^8$ m/s)
 - (i) Work function of potassium. (3mks)
 - (ii) Maximum K.E of the photoelectrons. (3mks)
 - (iii) The frequency of the source of irradiation (3mks)
- 4) Define the terms (2mks)
 - i) Threshold frequency.
 - ii) Threshold wavelength
 - (iii) Distinguish between magnetic field and electric field (2 mks)
 - iv) State three Newton's Laws of motion (3 mks)
- 5) i) Define the terms Vector quantity and Scalar quantity, giving examples. (2mks)
 - ii) State the following laws showing their mathematical expressions (4mks)
 - I) Gauss's law
 - II) Coulomb's law
 - iii) State three factors that affect magnitude of induced e.m.f. (3mks)

6) .The audible frequency range for a certain person is between 30Hz and 16500Hz. Determine the largest wavelength of Sound in air the person can detect (speed of sound in air is 333m/s) (3mks)

QUESTION THREE (40 MARKS)

- i) State three radiation particles emitted by radioactive materials and Explain their properties (9 Marks)
 - ii) what is half-life of a radio active substance (1mk)
2. Thorium – ${}_{90}^{230}\text{Th}$ undergoes a decay to become Radon – ${}_{86}^{222}\text{Rn}$. Use two different methods to find the number of alpha particles emitted. (5 Marks)
3. i) A transformer is to be used to provide power to a 12V lamp from an a.c. mains supply of 240V. Find the number of turns of the secondary coil if the primary coil has 10 turns. (3mks)
ii) Define efficiency of a transformer (2 Marks)
4. With an aid of diagram, describe the function of an X-ray tube? (15 Marks)
5. Starting from $I_T = I_1 + I_2 + I_3$ show that the resistance of resistors in parallel is given by $\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$ (5mks)