(*University of Choice*)

MASINDEMULIROUNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

MAIN EXAMINATION

(MAIN/KISUMU)

UNIVERSITY MAIN EXAMINATIONS

2018/2019 ACADEMIC YEAR

FIRST YEAR SECOND SEMESTER

COURSE CODE : **BML 124**

COURSE TITLE : **PHYSICS FOR BIOMEDICAL LABORATORY SCIENCES**

DATE: 27TH MAY 2019 **TIME: 8.00 -10.00 AM**

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 6 Printed Pages. Please Turn Over.

SECTION A (20 MARKS)

1) Which dimension is defined by 'a force acting on a body for a short time.
(A) Impulsive force (B) Frictional Force (C) Adhesive Force (D) Surface Tension

2) 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.

3) Force that produces an acceleration of 1 ms^{-2} in a body of mass of 1 kg is called
A) Slow newton
B) Zero newton
C) One newton
D) Two newton

4) 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

5) 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

6) Among the electromagnetic waves which one is not among the first four in terms of their wavelengths.

(A) Infrared Light (B) Power Waves (C) Radio waves (D) Microwaves

7) State Pauli Exclusion Principle

(A) No single electron can be in the same quantum state at the same time.
(B) No two electrons can be in the same quantum state at the same time.
(C) No two quantum states can accommodate each of any given two electrons
(D) None of any two quantum states can accommodate all electrons at the same time

8) Which dimension is defined by 'a force acting on a body for a short time.
(B) Impulsive force (B) Frictional Force (C) Adhesive Force (D) Surface Tension

9) 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.

10) According to the first law of thermodynamics, if work is done in a system then;

(A) The internal energy of the system must change.
(B) Heat must be transferred from the system.
(C) Both of the above.
(D) Heat is transferred to the system

11) 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.

12) Three capacitors of capacitance $0.5F$,$0.33F$ and $0.25F$ are connected in series. Find the total capacitance. Express your answer to four decimal places.

(A) 1.0800F (B) 1.0833F (C) 1.0830F (D) 1.0803F

13) In the Fleming's Left-hand rule which finger always point the direction current.

(A) First finger. (B) Second finger. (C) Thumb. (D) Third Finger.

14) When do we say that a magnetic material is in a saturated state of magnetism.

(A) When all the dipoles are aligned toward one direction
(B) When all the domains are aligned toward one direction.
(C) When all the dypoles are aligned toward one direction.
(D) When the domeins are aligned toward one direction.

15) The capacity to do work is call as:

(A) A heat
(B) B Enery
(C) C work
(D) D none of the above

16) State Newton's law of gravitation

(A) Every particle in the universe has an attractive interaction with every other particle.
(B) The gravitational attraction increases as the square of the distance between two point masses increases.
(C) The gravitational attraction increases the square root of the distance between two point masses decreases.
(D) The gravitational attraction decreases as square of the distance between two point masses.

17) Calculate the amount of current flowing through a bulb 400 coulombs of charge flow through it in 3.5 minutes.

(A) 0.2A (B) 2.0A (C) 2.0mA (D) 0.2mA

18) What is the name given to smaller sub-atomic magnets in a magnetic material.

(A) Domains (B) Polarities (C) Dipoles (D) Magnetic Axes

19). Potential difference in electrical terminology is known as?

A) Voltage
B) Current
C) Resistance
D) Conductance

20) Temperature of a gas is increased, its kinetic energy would

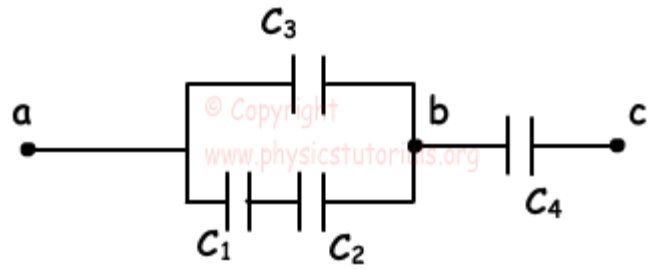
A) Increase
B) Decrease
C) Remain same
D) Increase and decrease both

SECTION B (40 MARKS)

a) A 1 kg ball moving at 12 m/s collides head on with 2 kg ball moving with 24 m/s in opposite direction. What is the velocity after collision if the two balls got stuck together? (5 Marks)

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

c) In the circuit given below, C1=40μF, C2=30 μF, C3=6 μF and C4=18 μF. If the potential difference between points a and b Vab= 120V find the charge of the second capacitor. (5 Marks)



d) Find the energy of x-rays whose wavelength is 1.0×10^{-10} m in a vacuum (c=3.0x108m/s h=6.63x10-34Js) (3 Marks)

e) State three applications of heating effect of an electric current . (3 Marks)

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

i) Mutual inductance (3mks)

ii) State three factor that affect resistance (3mks)

iii) State three characteristics of waves (3mks)

g) What is the equivalent resistance of three resistors (1.0Ω, 2.0Ω and 3.0Ω) when they are connected in parallel. (3 Marks)

h) State the following laws as applied in physics (3mks)
   a) Kirchhoff's law
   b) Newton's second law of motion
   c) Basic law of electrostatics

1) A student designed a transformer to supply a current of 20A at a potential difference of 70V to a motor from an a.c. mains supply of 240V. If the efficiency of the transformer is 80%, calculate:
   i) The power supplied to the transformer. (6 Marks)
   ii) The current in the primary coil. (4 Marks)

SECTION C (40 MARKS)

a) (i) i) State three radiation particles emitted by radioactive materials and Explain their properties (9 Marks)

ii) what is half-life of a radioactive substance (1mk)

iii) Lead $-214\left[{}^{214}_{82}Pb\right]$ decays to $Polonium-214\left({}^{214}_{84}Po\right)$ by emitting $\beta-particle$. Calculate the number of $\beta-particle$ emitted.

(4 Marks)

(ii) Explain how impurities and low temperatures affects surface tension (8 Marks)

b) i) By use of diagram explain any three properties waves. (9 Marks)

ii) Eplain three facors that affect Photoelectric Effect (3mks)

c) Explain the hazards of the following electromagnetic waves and outline how the effects are minimized (6Mks)

i) X-rays
ii) Infrared
iii) Microwaves