



(University of Choice)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY

UNIVERSITY SPECIAL/SUPPLEMENTARY EXAMINATIONS

2018/2019 ACADEMIC YEAR

FIRST YEAR EXAMINATIONS

FOR THE DEGREE

OF

PUBLIC HEALTH

COURSE CODE: BSP 136

COURSE TITLE: PHYSICS

DATE: Friday 18th October 2019

TIME: 9:00 AM- 12:00 Noon

INSTRUCTIONS TO CANDIDATES

TIME: 2 Hours

Answer question ONE and any TWO of the remaining
Symbols hold their meaning

MMUST observes ZERO tolerance to examination cheating

You may require the following constants;
Gravitational acceleration, $g=10\text{m/s}^2$
Universal gravitation constant $G=6.67\times 10^{-11}\text{Nm}^2/\text{kg}^2$

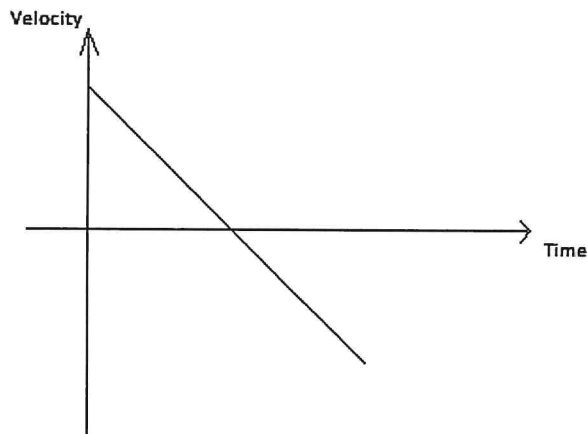
Plank's constant $h=6.626 \times 10^{-34} \text{J/s}$

QUESTION ONE (30 MARKS)

- (a). Define range , R of a projectile and derive the expression for range. (4 marks)
- (b). What is an extrinsic semiconductor? Name the two types of extrinsic semiconductors (4 marks)
- (c). A monkey lets go off a tree when a gun is fired. At what angle should the gun be pointed so that the bullet hits the monkey while in free fall? (5marks)
- (d). State Newton's three laws of motion. (3marks)
- (e). Describe the structure of an atom according to Bohr. (3marks)
- (f). Convert the following temperatures into kelvin. (i) 0°C (ii) Body temperature, 37°C (ii) Boiling point of pure water(6marks)
- (g). The acceleration due to gravity at the moon's surface is $g_m=1.70\text{m/s}^2$ and the radius of the moon is $1.74 \times 10^6\text{m}$. Calculate the mass of the moon. (3marks)
- (h). Define centrifugal force and state one of application of the force in medicine. (2mark)
- (i). Distinguish between transverse and longitudinal waves. (2marks)

QUESTION TWO (20 MARKS)

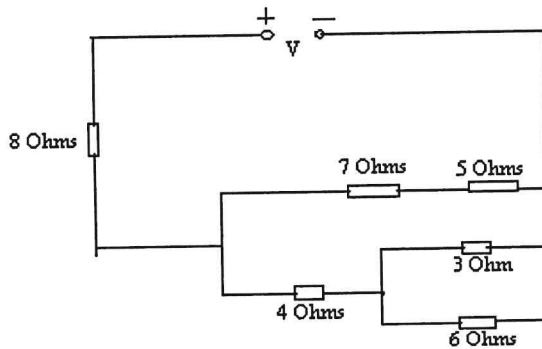
- (a). Calculate the acceleration of a moto vehicle whose initial velocity is 15m/s and the final velocity is 3 m/s (3 marks)
- (b). A ball is thrown vertically into the air at 50m/s . How far does it rise and how long will it take to reach that height? ($g=10\text{m/s}$) (5marks)
- (c). Describe the motion represented by the figure below. Calculate the distance covered (6marks)



- (d). A submarine-launched ballistic missile (SLBM) is fired to our city from a distance of 3000Km . Assuming it was detected at firing time, how much warning time is there and what is the launch velocity? Make the assumption of flat earth, constant gravitational acceleration and firing angle of 45° . (6 marks)

QUESTION THREE (20 MARKS)

- (a). An isotope of a material releases an alpha particle. State the change in its mass number (1mark)
- (b). Beginning from $R = R_0 e^{-\lambda t}$, show that the half-life of a radio active material is given by; $T_{\frac{1}{2}} = \frac{0.693}{\lambda}$. All symbols have usual meaning. (5marks)
- (c). Find the activity of 1 gram of Radon, mass number 222, half life 91.7 hours and proton rest mass is $1.66 \times 10^{-27} \text{kg/u}$. How long does it take 60% of a sample of a radionuclide Radon to decay. (6marks)
- (d). Calculate the equivalent resistance of the combination of resistors in the circuit below. Compute the total current and the current through the 7Ω resistor. (8marks)



QUESTION FOUR (20 MARKS)

- (a). State Newton's law of universal gravitation. (1mark)
- (b). Show that Kepler's third law is consistent with Newton's law of universal gravitation. (4marks)
- (c). The pressure difference between two points on a horizontal blood vessel through which blood is flowing is 1.4 cm of mercury. Due to non-uniform cross-section, the speed of flow of blood at the part of greater cross section is 60cm/s, calculate the speed at the narrow part. (5marks)
- (d). State and explain five properties of waves. (10marks)

QUESTION FIVE (20MARKS)

- (a). Distinguish between the terms; Projectile and Trajectory (1marks)
- (b). Obtain the formula for the maximum height of a body undergoing projectile motion (4marks)
- (c). A mass of 2Kg is attached to a string of 60cm. It is whirled in a circle in a vertical plane at 5 revolutions per second. Calculate the tension in the string when the mass is at the highest and the lowest point of the circle. (5marks)

- (d). Describe the terms; steady flow and turbulent flow as used in fluid dynamics.
(2marks)
- (e). Define the following terms (i) Rectification (ii) Smoothing (2marks)
- (f). State and explain three factors that affect the resistance of a conductor. (6marks)