



MACHAKOS UNIVERSITY

University Examinations 2019/2020 Academic year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF PHYSICAL SCIENCES

FIRST/SECOND YEAR FIRST SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE IN PUBLIC HEALTH

HPH103: PHYSICS FOR PUBLIC HEALTH

DATE: 6/12/2019

TIME: 8.30-10.30 AM

INSTRUCTIONS TO CANDIDATES

Answer **QUESTION ONE** and **ANY OTHER TWO** questions.

Question 1 carries **30**marks and the others carry **20**marks each.

YOU MAY USE:

You may need to use the following constants

- Density of water = $1.0 \times 10^3 \text{ kg/m}^3$
- Acceleration due to gravity, $g = 9.8 \text{ m/s}^2$

QUESTION ONE (30 MARKS)

- a) Differentiate between a scalar and vector quantity. Give an example of each. (4 marks)
- b) Identify the SI units for following quantities;
- Amount of substance
 - Pressure
 - Temperature
 - Power
 - Voltage
 - Energy (6 marks)
- c) How many significant figures are in the following values? (4 marks)
- 1005
 - 0.0001005
 - 1.0001005
 - 10000

- d) The resistance of metal is given by $V=IR$. The voltage in the resistance is $V= (80.5\pm0.1)V$ and current in the resistance is $I=(20.2\pm0.2)A$, calculate the relative percentage error in the resistance R . (4 marks)
- e) A lift is accelerating upwards at $1m/s$. What would be the apparent weight of a $65kg$ man sitting on the lift? (4 marks)
- f) While writing its equation, state the ideal gas law. (3 marks)
- g) Identify the three radioactive emissions (3 marks)
- h) What are the three components making up of an R-C-L of an alternating circuit? (2 marks)

QUESTION TWO (20 MARKS)

- a) You are performing a laboratory experiment, with appropriate examples, discuss the three classifications of errors that you might potentially encounter. (8 marks)
- b) State the three Newton's laws of motion (4 marks)
- c) The gas in a used oil can is at a pressure of $103atm$ at $25^{\circ}C$. If the can is thrown onto a fire, what will the pressure be when temperature reaches $928^{\circ}C$? (4 marks)
- d) A stone of mass $300kg$ lands on the surface of a table whose dimensions are $1.8m$ by $2.4m$. Calculate the pressure exerted on the table. (4 marks)

QUESTION THREE (20 MARKS)

- a) Discuss the four types of nuclear reactions (8 marks)
- b) Describe the biological effects, prevention and control of harmful radiations (12 marks)

QUESTION FOUR (20 MARKS)

- a) What is meant by the term, "Ideal fluid"? (2 marks)
- b) Write Poiseuille's equation and state one application (3 marks)
- c) Describe the three forms of heat transfer (6 marks)
- d) Using a suitable diagram, describe the working principle of a cathode ray oscilloscope (CRO) and identify any three applications in public and environmental health practices. (9 marks)

QUESTION FIVE (20 MARKS)

- a) State the following laws:
 - i) First law of thermodynamics (2 marks)
 - ii) Charles' law (2 marks)
 - iii) Boyle's law (2 marks)
- b) Name any four fundamentals and four non-fundamental forces. (8 marks)
- c) Differentiate between laminar, turbulent and streamline flows. (6 marks)