SIR ARTHUR LEWIS COMMUNITY COLLEGE
ACADEMIC YEAR (2024/2025) – SEMESTER TWO
END OF SEMESTER FINAL EXAMINATION

COURSE CODE	:	**PHY003**
COURSE TITLE	:	**ELEMENTARY PHYSICS II**
LECTURER(S)	:	**MR CECIL FEVRIER**
DATE	:	**April 28, 2025**
TIME	:	**1 p.m.**
DURATION	:	**2 HOURS**
STUDENT ID #	:	_____

GENERAL INFORMATION AND INSTRUCTIONS

- Students must sign **IN** and **OUT** on the examination class list.
- Write your ID number on the question paper.
- This paper consists of **FIVE Questions**. Answer ALL questions

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO

Instructions: Answer all 5 questions on the foolscap paper provided.

Ensure that units are included in all working and final answers *where appropriate*.

The use of a scientific calculator is permitted. No graphing calculators are allowed.

1.

a. Use the kinetic theory of matter to explain:

i. how the molecules inside a gas cylinder containing oxygen are able to exert pressure; *(2 marks)*

ii. why pumping in more oxygen increases the gas pressure; (2 marks)

iii. how, and by what factor, does the pressure of the gas in the cylinder change if the temperature were doubled. *(2 marks)*

b. A fixed-volume cylinder contains some oxygen at room temperature, 35.0 ^{o}C, and the pressure inside the cylinder is 8.0 x 10^5 Pa. The temperature rises to 40 ^{o}C.

i. Determine the initial and final temperatures in Kelvin. *(1 mark)*

ii. Find the new pressure inside the cylinder. *(3 marks)*

2.

a. Distinguish between 'transverse' and 'longitudinal' waves giving one example of each. *(2 marks)*

b. What is the relationship between velocity frequency and wavelength of a wave? *(1 mark)*

c. A wave motion has a frequency of 770 Hz and a wavelength of 0.4 m. Calculate the speed of the wave. *(2 marks)*

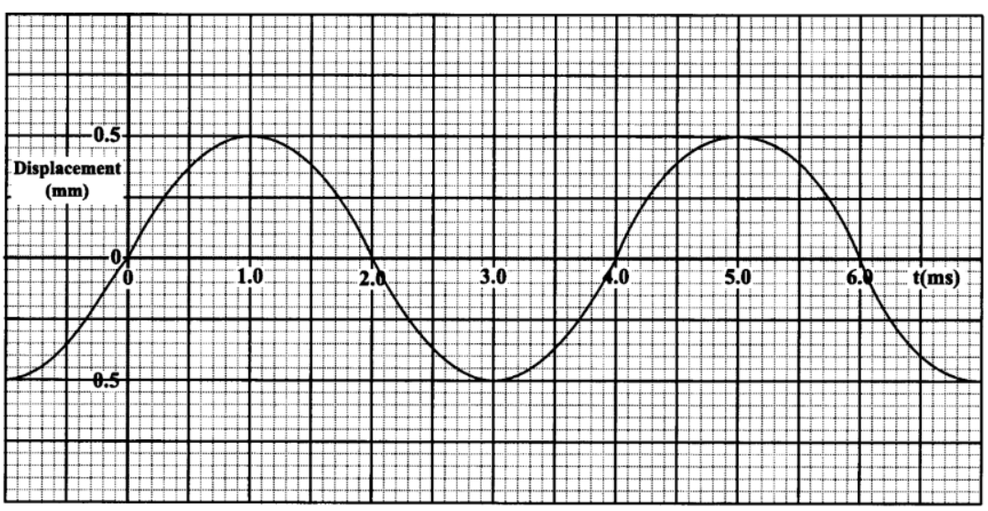

Fig. 1

d. Fig. 1 shows a sinusoidal wave. Use Fig. 1 to determine the wave's:

i. amplitude (in metres) *(2 marks)*

ii. period (in seconds) *(2 marks)*

iii. frequency (in hertz) *(2 marks)*

3. a. Define the term *Magnetic Field* *(1 mark)*

b. Draw a diagram showing how the magnetic around two bar magnets with their north poles facing each other. *(2 marks)*

c. With the aid of a diagram describe the shape of the Earth's magnetic field. Your diagram should include the direction of the field, and the location of the magnetic poles responsible for the overall shape of the field. (3 marks)

d.

i What is the *Solar wind.* *(1 mark)*

ii How does the presence of the Earth's magnetic field protect us from harmful effects of the solar wind? *(2 marks)*

iii What does the presence of the Earth's magnetic field tell us about the nature of its core? *(1mark)*

4. In order to separate the emissions from a radioactive source, they are subjected to a uniform electric field, E, perpendicular to their path as shown in Fig. 3.

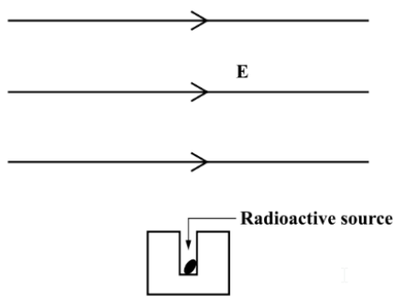

Fig. 3

a. Describe the path of each of the three emissions (α, β and γ) when subjected to a uniform electric field from left if the emissions are projected up towards the top of your page. *(6 marks)*

b. Electrons have a charge of 1.60×10^{-19} C. α (alpha) emissions from radioactive sources are Helium nuclei (a helium atom that is missing two electrons). What would be the total electric charge of an alpha particle? *(1 mark)*

c. If the electric field from part (a) has a field strength of 50 NC^{-1}, what would be the resulting force on the alpha particle passing through? Report your final answer in scientific form. *(3 marks)*

5 a. Distinguish between the *terminal potential difference* and the *electromotive force* (EMF) of a cell when connected in a closed circuit. *(2 marks)*

b The power supply shown for the circuit in Fig. 4 has an internal resistance of 4Ω and supplies a current of 30 mA to the rest of the circuit.

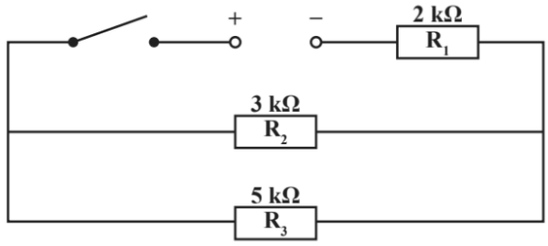

Fig. 4

i Determine the total resistance, external to the power supply, in this circuit, assuming negligible resistance of the connecting wires. *(2 marks)*

ii Calculate the terminal potential difference and the EMF of the supply. *(4 marks)*

iii If the 2 kΩ resistor burns out, how much current now flows in the 5 kΩ resistor? *(1 marks)*

END OF EXAMINATION