



SIR ARTHUR LEWIS COMMUNITY COLLEGE
ACADEMIC YEAR (2024/2025) - SEMESTER ONE

END OF SEMESTER EXAMINATION

COURSE CODE : PHY003
COURSE TITLE : Elementary Physics II
LECTURER(S) : Alexander Daniel
DATE : 9th December 2024
TIME : 1 p.m. – 3 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 has seven Questions.
- Answer a total of EIGHT (8) questions. Answer any FIVE (5)

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

1. (a) Identify one similarity and one difference between solids and liquids. [2]
- (b) Identify two differences between boiling and evaporation. [2]
- (c) Define 'latent heat of fusion'. [2]
- (d) Figure 1 below shows how the temperature of a substance varies as heat is supplied to it.

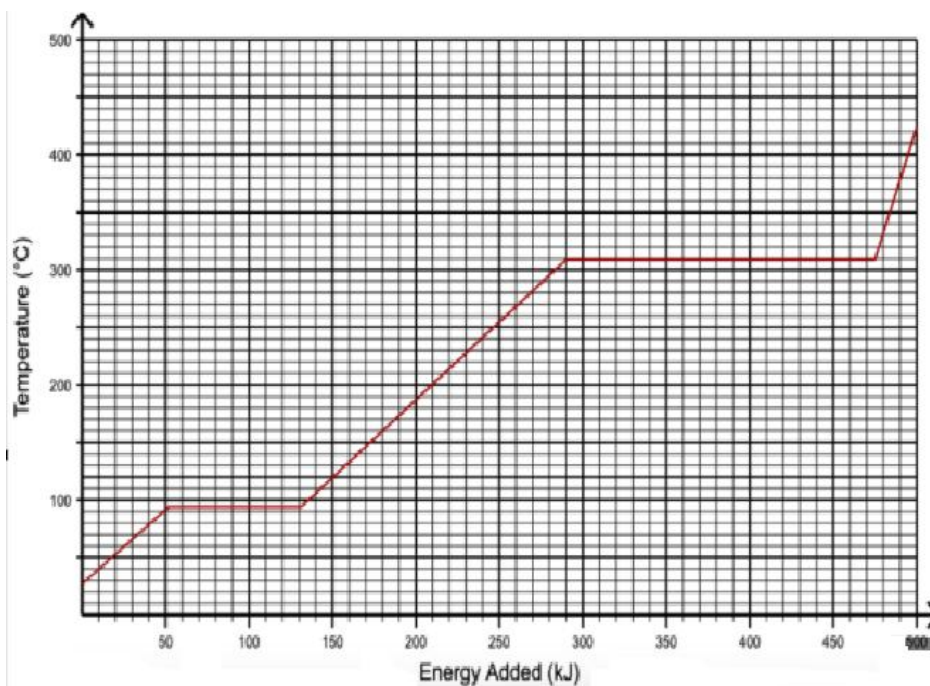
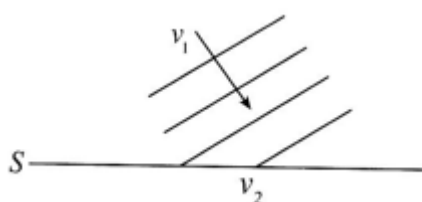


Figure 1 – Graph of Temperature against Heat supplied to a substance.

Use the graph to answer the following:

- (i) What is the melting point of the substance? [2]
 - (ii) Which is greater, the latent heat of fusion or the latent heat of vaporisation of the substance? Give a reason for your answer. [2]
2. (a) Which temperature scale is based on the properties of an ideal gas? [2]
 - (b) The pressure of a gas at 27 °C is 100 kPa. At what temperature would the same gas exert a pressure of 150 kPa? [4]
 - (c) In an experiment, a metal block of mass 120 g at a temperature of 90 °C is dropped into 200 g of water at 30 °C in an insulated cup. The water and metal acquire thermal equilibrium at 45 °C. Assuming that no heat is lost to the surrounding during the experiment, calculate the specific heat capacity of the metal. [4]
3. (a) Microwaves and X-rays are both electromagnetic waves.
 - (i) What are electromagnetic waves? [2]
 - (ii) Identify ONE difference between the two waves. [1]
 - (iii) State one important use of one of the waves mentioned above. [1]
 - (b) Explain what is meant by the term diffraction. [2]
 - (c) A plane wave of speed v_1 approaching a boundary S is depicted in Figure 6.



After crossing the speed $v_2 = 2v_1$. diagram and show boundary S.

Figure 6
boundary, the wave travels at a
Copy the
the wave after crossing the

[4]

4. (a) Distinguish between transverse and longitudinal waves. [2]
 (b) Figures 4 (b) (i) and (ii) below show the displacement-distance and displacement-time graph respectively of a wave.

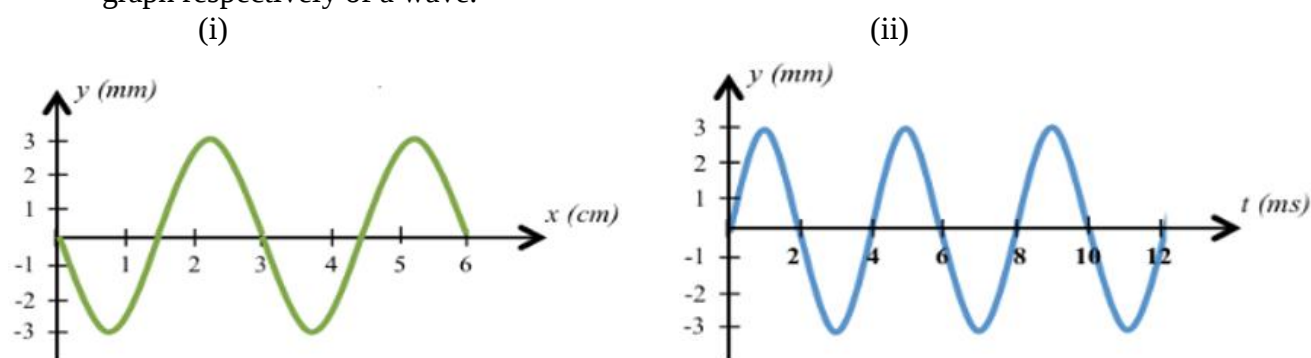
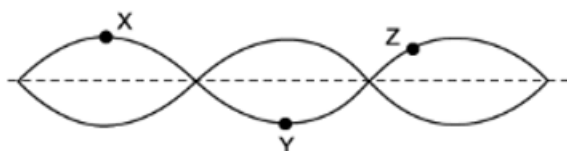


Figure 4 (b)

Determine:

- (i) the amplitude of the wave, [1]
 (ii) the wavelength of the wave, [2]
 (iii) the frequency of the wave. [2]

- (c) Figure 4 (c) shows a standing wave set up on a vibrating wire. The dashed line represents the equilibrium position.



Figure

4 (c)

- (i) What is the name given to the point labelled X on the graph? [1]
 (ii) State the phase relationship between the points Y and Z on the wire. [2]

5. (a) Explain briefly, what are magnetic poles. [2]
 (b) Distinguish between an electrical conductor and insulator. Give one example of each. [3]
 (c) Sketch the electric field pattern for a positive and a negative point charge in close proximity. [2]
 (d) The electric field strength between two parallel plates is 2000 V/m. What is the force acting on an electron moving through this electric field? [3]
6. (a) A student was asked to determine the how the current through a bulb varied with the potential difference across it. She built a circuit consisting of a cell, a bulb, a variable resistor R, an ammeter and a voltmeter as shown in figure 6 (a)

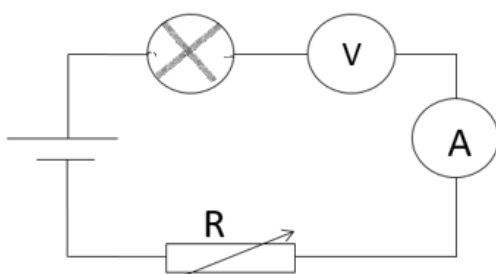
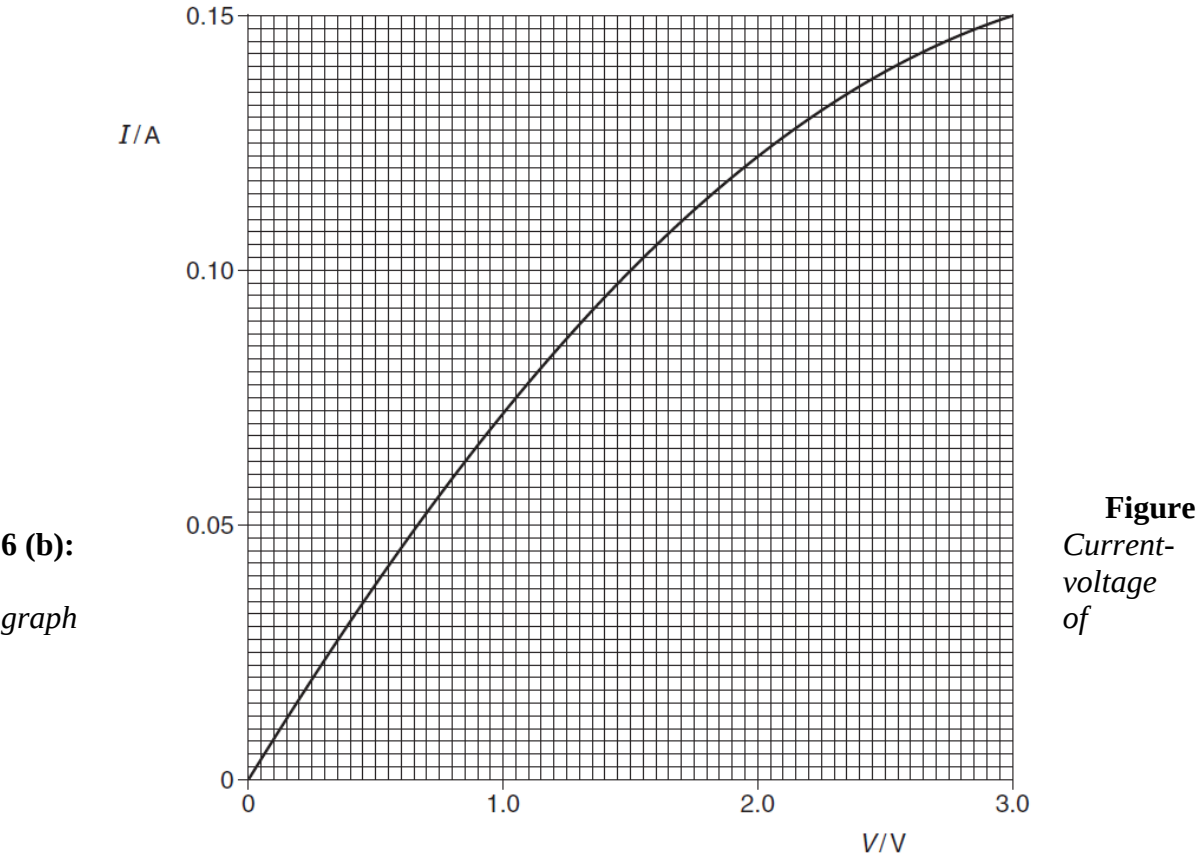


Figure 6 (a)

- (i) Identify the error in the circuit. [1]
 (ii) Redraw the circuit, correcting the error. [2]

(b) Figure 6 (b) below shows the current-voltage characteristics of an electrical component.



component.

- (i)

State with a reason, whether the device obeys Ohm’s law.

[2]
- (ii)

Use the graph to determine the resistance of X when a current of 0.5 A flows through it.

[3]
- (c)

What is the electrical power dissipated by the component when a potential difference is applied across it?

[2]

7. (a)

Explain the factors that determine the resistance of a wire.

[3]
- (b)

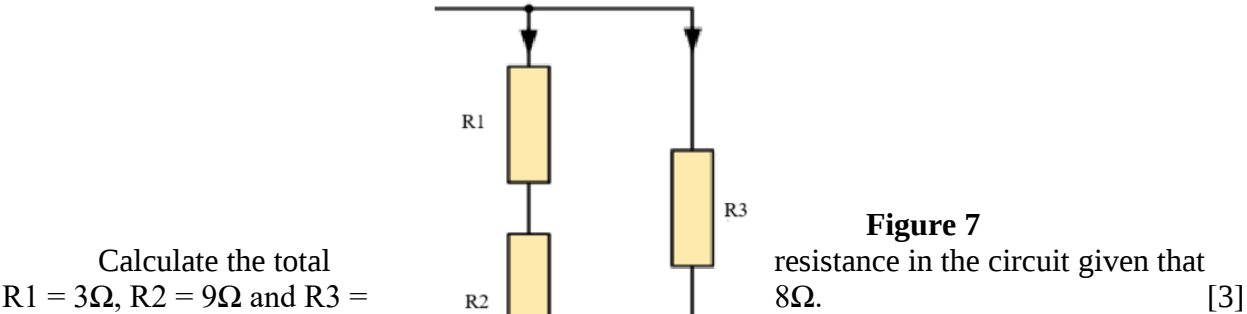
Four identical resistors connected in series have a combined resistance of 80 Ω. What is the resistance of one of the resistors?

[2]
- (c)

What would be the combined resistance of a 30 Ω resistor and a 20 Ω resistor connected in parallel?

[2]

(d) Three resistors R1, R2 and R3 are connected as shown in Figure 7 below.



8. (a)

Identify two differences between a proton and an electron.

[2]
- (b)

What are isotopes?

[3]
- (c)

What does the atomic number of an atom indicate?

[1]
- (d) (i)

Explain what is meant by the half-life of a radioactive substance.

[2]

- (ii) Use the graph of figure 8 to determine the half-life of the radioactive source. [2]

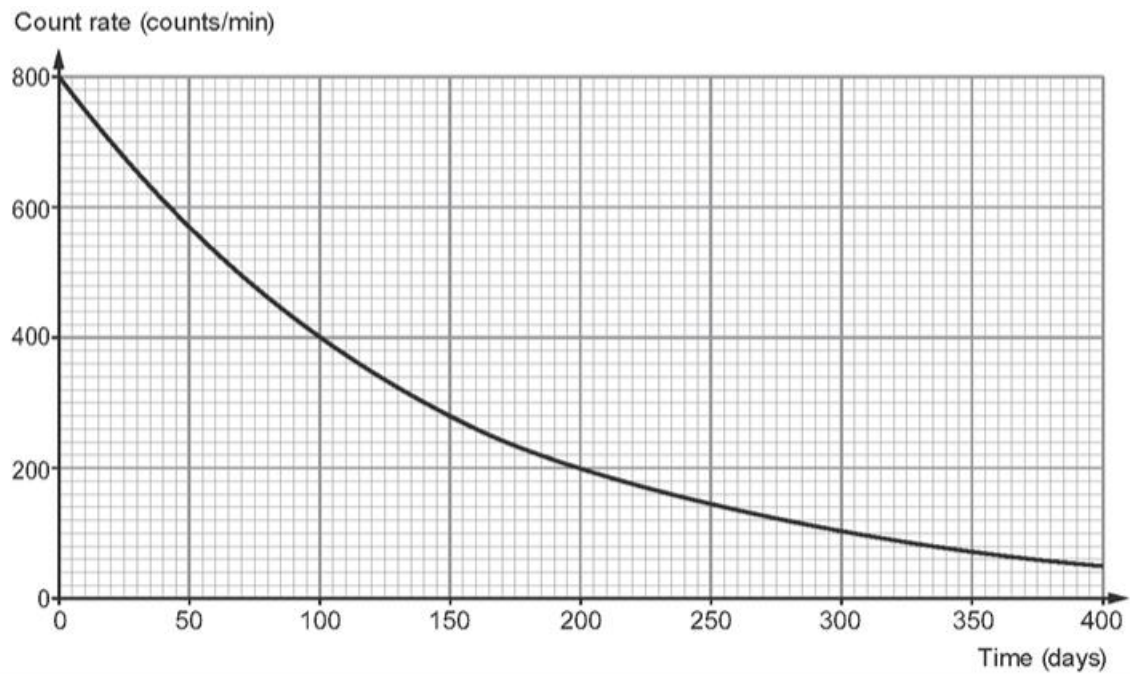


Figure 8: Graph of count rate against time of radioactive source.