EXAMINATION NO.: _____

THE MALAWI NATIONAL EXAMINATIONS BOARD

2023 MALAWI SCHOOL CERTIFICATE OF EDUCATION EXAMINATION

PHYSICS

Subject Number: M164/I

Monday, 10 July

Time Allowed: 2 hours
8:00 – 10:00 am

PAPER I

(100 marks)

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Instructions

1. **This paper contains 12 printed pages. Please check.**
2. Write your **Examination Number** at the top of each page of this question paper.
3. This paper contains **two** sections: **A** and **B.** In **Section A** there are **ten** short answer questions while in **Section B** there are **three** restricted essay questions.
4. Use of scientific calculators is allowed.
5. The maximum number of marks for each answer is indicated against each question.
6. In the table provided on this page, **tick** against the number of the question you have answered.
7. Hand in your paper to the invigilator when time is called to stop writing.

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Question Number	Tick if answered	Do not write in these columns	
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			

Section A (70 marks)

Answer all the **ten** questions in this section in the spaces provided.

1. a. What is the difference between absolute errors and relative errors?

_____

_____

(1 mark)

b. How can a long sightedness problem be corrected?

_____

_____

_____

(2 marks)

c. How does repeating an experiment minimise errors in an an investigation?

_____

_____

_____

(2 marks)

d. **Figure 1** is a diagram showing a thermometer that reads 31°C. Use it to answer the questions that follow:

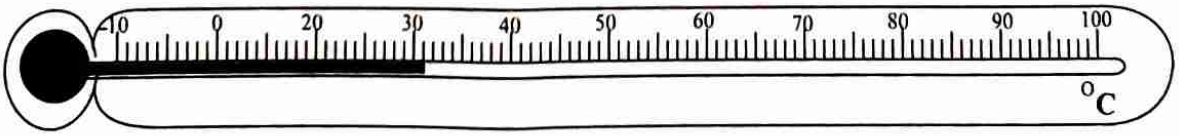

Figure 1

(i) What quantity does the instrument measure?

_____

(1 mark)

(ii) If a student reads 30°C what type of experimental error is made?

_____

(1 mark)

Continued/...

2. a. Give any **two** ways of preventing dangers of radio-active substances.

_____

_____

(2 marks)

b. How does Beta radiation occur?

_____

_____

_____

(2 marks)

c. Why does sugar spread faster when dropped in warm water than in cold water?

_____

_____

_____

(3 marks)

3. a. Convert **45μA** into **A.**

(2 marks)

b. Give any **two** reasons why the amplitude of an oscillating pendulum decreases with time.

_____

_____

_____

(2 marks)

Continued/…

3. **(Continued)**

c. Give any **two** effects of atmospheric pressure.

_____

_____

(2 marks)

4. **Figure 2** shows velocity – time graphs of moving objects, **A** and **B** on the same axis.

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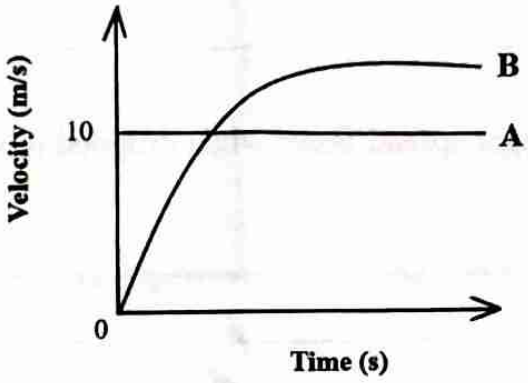

Figure 2

a. Describe the motion of objects **A** and **B.**

A: _____ **(1 mark)**

B: _____ **(1 mark)**

b. Calculate the time it would take for object **A** to cover a distance of 65 m.

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(3 marks)

5. a. (i) Define 'electrical resistance.'

_____

_____

(1 mark)

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(ii) Calculate the resistance of a bulb in which a voltage of 9V causes a current of 2.5A to flow in it.

(3 marks)

b. Calculate the frequency of red light of wavelength 5.5×10^{-7} m.
(Take 3.0×10^{8} m/s as speed of the electromagnetic wave)

(3 marks)

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c. Give any **two** properties of magnetic field lines.

_____

_____

(2 marks)

6. a. State any **two** examples of electromagnetic waves.

_____

_____

(2 marks)

b. Draw a circuit diagram in which a diode, a bulb and a cell are connected in series such that the diode is forward biased.

(3 marks)

c. How does a light dependent resistor work?

_____

_____

_____

(2 marks)

7. a. (i) State the use of Archimedes Principle.

_____

_____

(1 mark)

(ii) Calculate the weight of the water displaced when a 20 kg mass object immersed in water weighs 13 N.

(3 marks)

Continued/…

7. (Continued)

b. A man moved a trolley through a distance of 10 m on a horizontal ground. If he applied a force of 75 N at an angle of 30° to the horizontal, calculate the work done in moving the trolley horizontally.

(3 marks)

8. a. Give any **two** examples of scalar quantities.

_____

_____

(2 marks)

b. Two forces 40 N and 50 N are acting at an angle of 60° to each other. Using a scale of 1 cm to represent 10 N:

(i) draw a diagram to show the resultant force.

(3 marks)

(ii) find the size of the resultant force.

(2 marks)

Continued/...

9. a. State 'Boyles's law'.

_____

_____

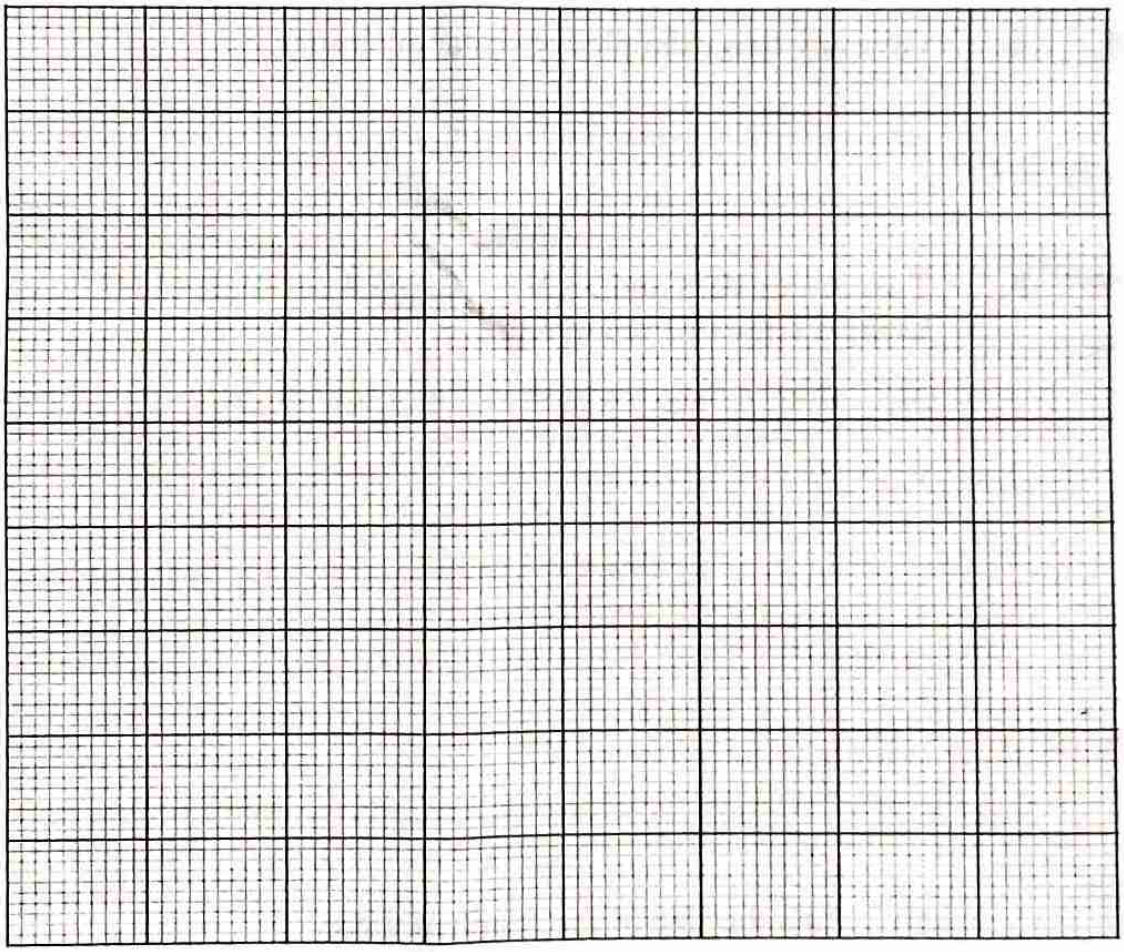
(1 mark)

b. In an experiment, Form 3 students obtained the readings shown in **Table 1**:

Table 1

Temperature (°C)	-50	-25	0	25	75
Pressure (kPa)	80	90	95	110	125

(i) Plot a graph of 'pressure' against 'temperature' on the graph paper below.



(5 marks)

(ii) What is the relationship between temperature and pressure?

_____

_____

(1 mark)

Continued/...

10. a. **Figure 3** shows an oscillating mass-spring system.

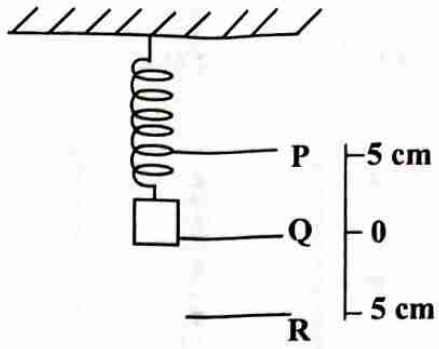


Figure 3

(i) Identify the:

1. amplitude of the oscillating system.

_____

(1 mark)

2. equilibrium position of the system.

_____

(1 mark)

(ii) If the mass moves from **P** to **R** in 5 seconds, calculate the frequency of the system.

(3 marks)

b. State any **three** applications of circular motion.

_____

_____

(3 marks)

Continued/...

Section B (30 marks)

Answer all the **three** questions in this section in an essay form in the spaces provided.

11. a. **Figure 4** is a diagram illustrating stages of a ball bearing falling in a jar containing oil.

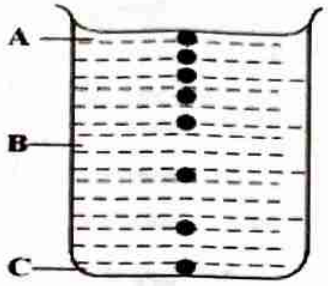


Figure 4

Describe the motion of the ball bearing from **A** to **C**.

_____

_____

_____

_____

_____

_____

_____

(6 marks)

b. Explain the way an optical projector works.

_____

_____

_____

_____

_____

_____

_____

(4 marks)

Continued/...

12. a. Explain how the floating in ships occur.

(4 marks)

b. With the aid of a diagram describe the way a dc electric motor works.

(6 marks)

Continued/…

13. a. How can the stuck glass tumblers be separated?

(5 marks)

b. **Figure 5** is a diagram of a transformer.

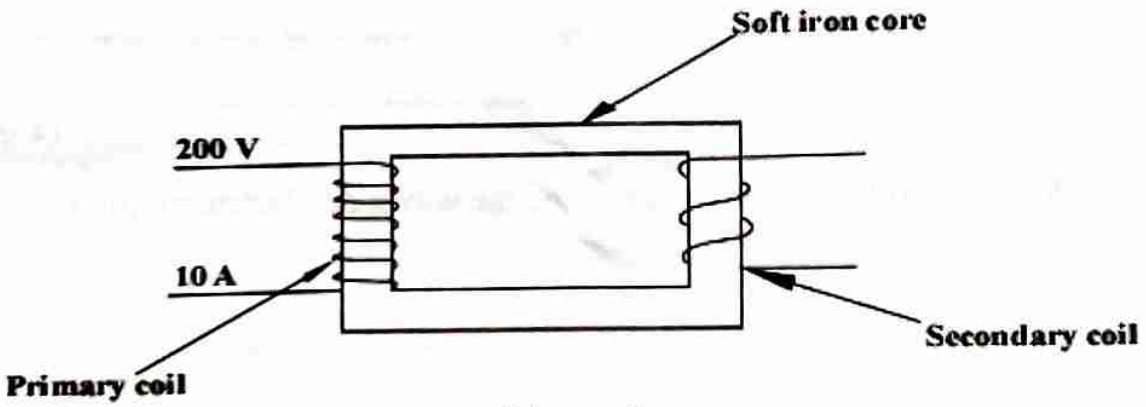


Figure 5

How does the transformer work?

(5 marks)

END OF QUESTION PAPER

NB: This paper contains 12 printed pages.