NAME…………………………………………………………..INDEX NO:……………………

CANDIDATE’S SIGN………..

DATE:…………………………………………….

232/2

PHYSICS

PAPER 1 (THEORY)

TIME: 2 HOURS

**SUKULLEMO JOINT EXAMINATION - 2023**

INSTRUCTIONS TO THE CANDIDATE:

1. *Write your* ***name*** *and* ***index number*** *in the spaces provided above.*
2. *Sign and write the* ***date*** *of the examination in the spaces provided above.*
3. *This paper consists of two Sections* ***A*** *and* ***B****.*
4. *There are 11 printed pages, with 15 questions.*
5. *Answer* ***all*** *questions in sections* ***A*** *and* ***B*** *in the spaces provide.*
6. *All working* ***must*** *be clearly shown in the spaces provided.*
7. *Mathematical tables and electronic calculators may be used.*

**FOR EXAMINER’S USE ONLY**

|  |  |  |  |
| --- | --- | --- | --- |
| Section | Question | Maximum Score | Candidate’s Score |
| A | 1-10 | 25 |  |
| B | 11 | 9 |  |
| 12 | 10 |  |
| 13 | 12 |  |
| 14 | 10 |  |
| 15 | 14 |  |
| Total score | | 80 |  |

**SECTION A (25 MARKS)**

1. Two similar razor blades were placed on a wooden block and the other on an iron block as in the figure.

**Magnets**

**N**

**N**

**Razor blades**

**Iron**

**Wood**

It was observed that the razor blade on the wooden block is attracted by the magnet while that on the iron block was not. Explain. (2 mk)

1. The figure below shows a wave profile

**-4**

**Displacement(mm)**

**4**

**Time (s)**

**a**

**b**

**c**

**e**

**d**

**f**

**6s**

* + 1. Name **two** sets of points that are
       - 1. One wavelength apart (2mk)
         2. In phase
    2. Determine the frequency of the wave. (3mk)

The figure below shows a voltmeter connected across two charged parallel plates. Use it to answer question 3 & 4



1. When a thin sheet of mica is inserted between the plates, the reading of the voltmeter is observed to reduce. Explain this observation. (2mks)
2. State any other two factors that will have the same effect on the voltmeter as in question 3 above. (2mks)
3. How many **100W** electric irons could be safely connected to a **240V** moving circuit fitted with a **13A** fuse? (3mk)
4. A plastic rod is rubbed with cotton and it is observed that the rod acquires a negative charge. The same cotton is brought near the cap of positively charged electroscope.
5. State the observation made on the leaf of the electroscope. (1mk)
6. Explain the observation (2mk)
7. State the major difference between a dry cell and a wet cell. (1mk)
8. Recharging is one of the practices of maintenance of accumulators. State two measurements, which need to be taken to help you decide when an accumulator is due for charging. (2mks)
9. Figure below shows an object placed in front of a concave mirror. Using ray diagram, locate the image position. (3mk)

**O**

**F**

**C**

1. A building standing 100m from a pinhole camera produces on the screen of the camera an image **5 cm** high **10 cm** behind the pinhole. Determine the actual height of the building.

(2mk)

**SECTION B (**55 MARKS)

1. Two students investigated how the strength of an electromagnet depended on the current. The set up is as shown in the figure below.

**100 turns**

**Soft iron**

**Load**

They plotted the following graph showing how the load varies with the magnetizing current.

**0**

**20**

**40**

**60**

**80**

**100**

**120**

**140**

**1**

**2**

**3**

**4**

**5**

**6**

**7**

**8**

**9**

**10**

**160**

**Magnetizing current (A)**

**Load (N)**

(a). From the graph determine the load that can be supported by the electromagnet when the current was

* + 1. 2.5 A (1mks)
    2. 6.0A (1mks)

(b). Sketch on the same axis a graph you would expect if coil of 50 turns was used. (1mk)

(c). (i) Using the domain theory explain what happens to the iron. (2mks)

(d). State any other two ways the strength of the electromagnet can be increased (2mks)

(e). Give any two practical applications of an electromagnet (2mks)

1. (a)(i) State snells law. (1mk)

(ii) Figure (i) and (ii) show refraction of light at air-water interface

Ø

**420**

**Water**

**Air**

**Water**

**Air**

**250**

***(i)***

***(ii)***

**300**

Determine angle θ in figure (ii) (3mks)

(b) Water waves from a given source move from a deeper to a shallow to end. What effect would this have on the;

* + 1. Frequency (1mk)
    2. Wavelength (1mk)
    3. Velocity of the wave (1mk)

(c) The figure below shows a ray of light traveling from medium 1 to medium 2. Given that the refractive index of medium 1 and medium 2 are n1=1.67 and n2=1.43 respectively. Determine angle x0. (3mks)

**X0**

**Medium 2**

**Medium 1**

1. (a)You are provided with a converging lens in a lens holder, a metre rule and a screen, explain how the focal length of a convex lens may be estimated by focusing a distant object. (2mks)

(b). The figure below shows a pin 5cm long placed along the principal axis of a convex lens whose focal length is 10cm. The near end of the pin is 12cm. (diagram not drawn to scale)

C

C

F

F

5 cm

12 cm

pin

Determine the length of the image pin. (5mks)

(c). The figure below shows one of the common eye defects.

State the type of defect and its possible cause. (2 mk)

1. Show on the diagram how the defect can be corrected. (2 mk)
2. What is meant by accommodation of the eye? (1mk)
3. (a) State Ohms law (1mk)

(b). You are provided with three resistors 1Ω, 3 Ω, and 5Ω.

(i). Draw a circuit diagram to show the arrangement of the resistor which gives a circuit with effective resistance of 2.875Ω across a 12V source. (1mk)

(ii). determine the voltage across the 3 Ω resistor. (3mks)

(c). The graph below shows how terminal voltage, V, of a certain battery varies with the current, I, being drawn from the battery.

**Current (A)**

**0.5**

**0.4**

**0.3**

**0.2**

**0.1**

**0**

**1.0**

**3.0**

**2.0**

**4.0**

**Voltage (V)**

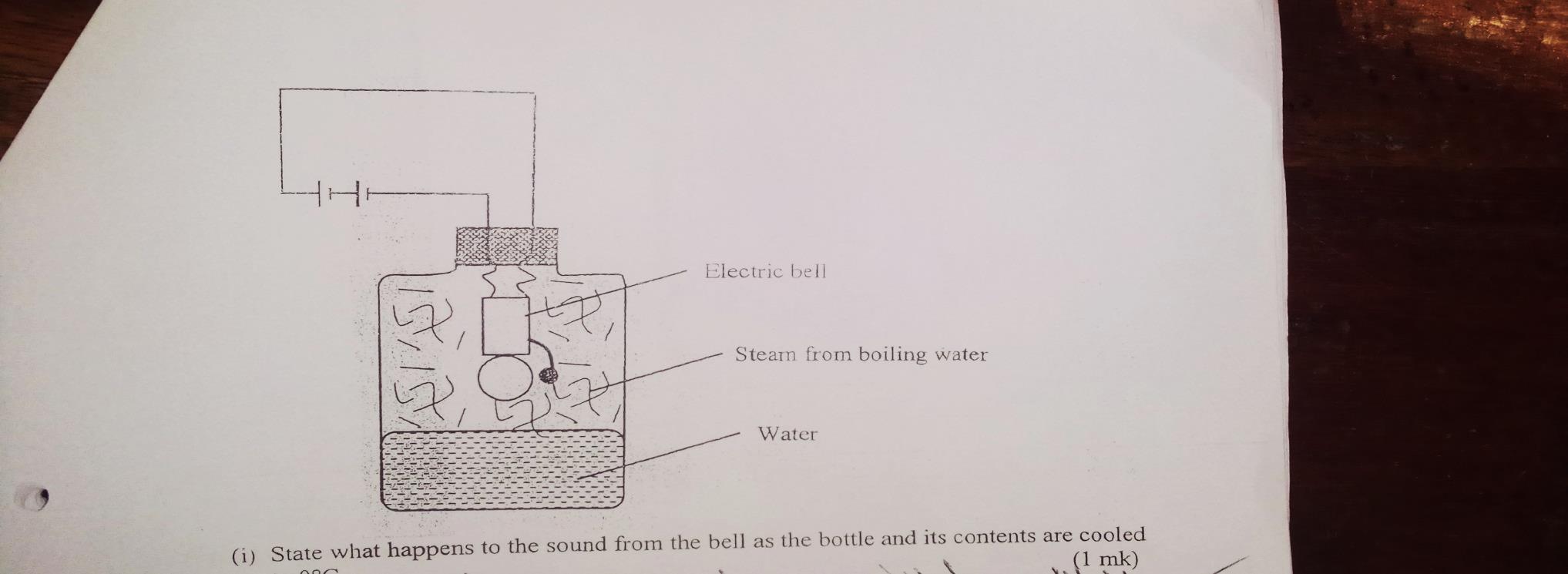
(i). Sketch the circuit diagram that could be used to obtain the plotted results. (2mks)

(ii). Given that Emf, E=V+Ir, where r is the internal resistance of the battery, determine the internal resistance of the battery from the graph. (3mks)

1. a) State one difference between light and sound waves (1mk)
2. In determining the depth of a sea, an echo sounder produces ***ultrasonic sound***. Give ***two*** reasons why this sound is preferred. (2mks)

c) Explain how an increase in temperature affects the velocity of sound in air. (2mks)

d) The figure below shows a set up made by a Form 2 student to study an aspect of a wave.



Electric bell

Steam from boiling water

Water

(i)State what happens to the sound from the bell as the bottle and its contents are cooled to 0°C (1 mk)

(ii)Explain the observation in (i) above. (2 mks)

1. A boy stands some distance from a high wall and claps his hands. He claps again each time he hears an echo.

(i)What ***two*** measurements would need to be made in order to determine the speed of sound? (2mks)

(ii)Explain how the above measurements can be used to determine the speed of sound in air. (1mks)

(iii)The boy’s friend notes that it takes 10 s to make 11 claps. Determine how far the boy is from the wall, given that the speed of sound in air is 330 m/s. (3mks)