**NAME: ……………………………………….… INDEX NUMBER: ……………………/…….**

**SIGNATURE: …………………………..……. DATE…………………………………….…….**

**232/2**

**PHYSICS**

**PAPER 2**

2 HOURS

**FORM 4**

**Instruction to Candidates**

1. Write your name, index number in the spaces provided above.
2. Sign and write the date of examination in the spaces provided above.
3. This paper consists of **two** sections: **A** and **B**.
4. Answer **all** the questions in sections **A** and **B** in the spaces provided.
5. **All** working **must** be clearly shown.
6. Silent non programmable electronic calculators may be used.
7. Candidates should answer the questions in English.

 **For Examiners Use Only**

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| --- | --- | --- | --- |
| **Section** | **Question** | **Maximum****Score** | **Candidate’s****Score** |
| **A** | 1 – 11 | 25 |  |
| **B** | 12 | 15 |  |
| 13 | 10 |  |
| 14 | 12 |  |
| 15 | 14 |  |
| 16 | 4 |  |
|  **Total Score** | **80** |  |

This paper consists of 12 printed pages. Candidates should check the question paper to ascertain that all pages are printed as indicated and that no questions are missing

**SECTION A (25 marks)**

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

1. The figure below showsthe two mirrors of a kaleidoscope. Use the diagram to show how the instrument form a beautiful pattern of images of the bead placed between the two mirrors. **(2 marks)**
2. Repulsion is the only sure way of testing polarity of magnets. Explain? **(1 mark)**

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1. State the basic law of electrostatics, **(1 mark)**

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1. The figure below shows two spheres in contact placed close to a positively charged rod.

+

+
+

+
+

Insulating

stand

1. Show the distribution of charges in the two spheres. **(1 mark)**
2. In two more steps, use diagrams to show how the two spheres can be charged. **(2 marks)**
3. State two reasons why prism periscopes are preferred to mirror periscope. **(2 marks)**

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1. A current carrying conductor AB is in a magnetic field as shown in figure 1 below.

Conductor

Direction of current

S

N

1. Indicate the direction of the force F acting on the conductor. **(1mark)**
2. State two factors that determine the direction of the force F. **(2marks)**

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1. The diagram below shows a series of plane waves incident on a convex reflector.

Complete the diagram to show how the waves move after reflection. **(2 marks)**

1. Five successive wave fronts in a ripple tank are observed to spread over a distance of **6.4 cm**. If the vibrator has a frequency of **8 Hz**, determine the speed of the wave. **(3 marks)**

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1. In a certain pinhole camera, the screen is **10 cm** from the pinhole. When the camera is placed **6 m** away from a tree, a sharp image of the tree **16 cm** high is formed on the screen. Determine the height of the tree. **(3 marks)**

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1. Draw a diagram to illustrate how dispersion of white light can be achieved using a prism by drawing only the red and violet rays **(2 marks)**
2. A small object lies at the bottom of a water pond at a depth of 1.2m. given that the refractive index of water is 1.3, determine the apparent depth of the object.*(Give your answer to one decimal place)*  **(3 marks)**

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**SECTION B (55 marks)**

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

1. (a) State Ohm’s law. **(1 mark)**

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(b) State **three** conditions which must be satisfied for Ohm’s law to be obeyed by a conductor.

 **(3 marks)**

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1. The figure below shows part of the scale of a voltmeter, which is being used in an experiment to measure potential difference across a resistor.

**0.6V**

**3.0V**

1

2

0

3

0.2

0

0.4

0.6

**V**

1. State the accuracy of the upper and the lower scales of the voltmeter. **(2 marks)**

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1. Record the reading shown by the scale of the voltmeter. **(1 mark)**

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1. The figure below shows an electrical circuit with three resistors connected across a battery of negligible internal resistance and of electromotive force, E.

2.4 Ω

E

2 Ω

8 Ω

If the ammeter reads **0.5 A**, determine the:

1. Current through the 2 Ω resistor. **(3 marks)**

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1. Voltmeter reading. **(2 marks)**

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1. The electromotive force, E, of the battery **(2 marks)**

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1. (a) Define the terms. **(2 marks)**
2. Wavelength.

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1. speed as used in waves.

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(b) Below is a wave traveling to the right side. Indicate the direction in which the particle at point Q is going to move.

Q

(c) Name and briefly explain three properties of electromagnetic waves. **(3 marks)**

(d) Sound waves are generated at point P. They hit a reflecting surface at Q and come back. A detector is put at point P. If it takes a time of 3 seconds to detect the echo,

Detector

Q P

1. How far is Q from P.? Take speed of sound as 340m/s **(3 marks)**

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1. What will be the effect of increased humidity of the surrounding air
2. Decreasing the amplitude on loudness of sound? **(1 mark)**

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1. Increasing the frequency? **(1 mark)**

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1. (a) Show the charge distribution on the hollow conductor shown below if it is positively charged. **(1mark)**

Insulator

(b) State three factors affecting capacitance of a parallel plate capacitor. **(3marks)**

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(c) The diagram below shows a circuit containing three capacitors.

C2

C1

X

C3

Y

1. Write an expression for effective capacitance between X and Y. **(2marks)**

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1. If c1=6µF, c2=4.5µF and c3=5 µF, calculate the charge stored when point XY is connected in series with a battery of 6V **(3marks)**

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d) The graph below shows the relationship between the voltage drop across a certain capacitor and the charge stored in the capacitor.



2

4

6

8

0

5

10

15

20

Charge (C)

Potential difference (V)

From the graph calculate the capacitance of the capacitor. **(3marks)**

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1. (a) State **two** conditions which must be satisfied for total internal reflection to occur. **(2 marks)**

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(b) The diagram below shows two rays of light incident normally on face **PQ** of a glass prism, whose critical angle is **420**.

450

P

R

Q

Complete the diagram to show the paths of the two rays as they pass through the prism.

 **(3 marks)**

(c) A pin is fixed horizontally at the centre of a rectangular container with thin transparent walls as shown below.

Pin

16 cm

Rectangular

container

A

A transparent liquid is then poured into the container. When viewed from side **A**, the distance of the pin is **6 cm** from the surface of the liquid. Determine the refractive index of the liquid.  **(3 marks)**

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(d) The figure below shows a coin placed in a large empty beaker. An observer looking into the beaker from the position shown is unable to see the coin.

Coin

Observer

Container

Sketch two rays from a point on the coin to show how the observer is able to see the image of the coin after the container if filled with water. **(3 marks)**

(e) A ray of light is incident on a water-glass interface as shown in the diagram below.

300

r

Water

Glass

Calculate the value of angle, **r**, given that the refractive index of glass and water are **1.5** and **1.33** respectively. **(3 marks)**

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1. (a) Define principal focus **(1 mark)**

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1. Figure 3 show an object placed in front of a convex mirror.



**F**

**O**

On the same diagram draw the appropriate rays and locate the image formed. **(3marks)**