# GENERAL CERTIFICATE OF EDUCATION BOARD

General Certificate of Education Examination

**JUNE 2025** **ORDINARY LEVEL**

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|---|---|
| Subject Title | **Physics** |
| Paper No. | **2** |
| Subject Code No. | **0580** |

## Duration: Two and a Half Hours

***Answer ALL questions.***

*Section I is designed to be answered in 1 hour and Section 2 in 1½ hours.*

*You are advised to divide your time accordingly.*

***In section II answer EITHER the a, b and c OR the d, e, and f of each question***

*For your guidance the approximate mark for each part of a question is indicated in brackets.*

*You are reminded of the necessity for good English and orderly presentation in your answers.*

*In calculations you are advised to show all the steps in your working, giving your answer at each stage.*

*Where necessary, assume:*

- *the acceleration of free fall, $g = 10\ m\ s^{-2}$*
- *the speed of light in air, $c = 3 \times 10^8\ m\ s^{-1}$*
- *the charge on an electron, $e = 1.6 \times 10^{-19}\ C$*

***Calculators are allowed.***

## SECTION I

**Answer all questions in one hour.**

1. (a) Define force **(2 marks)**
   (b) Friction and weight are two examples of forces.
   (i) State one situation in daily life in which frictional force acts on an object. **(1 mark)**
   (ii) State a difference between these forces. **(2 marks)**

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2. (a) A glass rod is charged by rubbing with a piece of cloth.
   (i) State the type of charge acquired by the glass rod. **(1 mark)**
   (ii) Explain the origin of the charge acquired by the rod. **(2 marks)**
   (b) You are provided with an uncharged metal sphere, A, and a positively charged rod, B, as shown in figure 1.

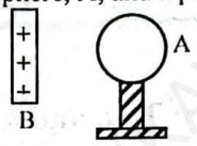


**Figure 1**

   (i) Using sketch diagrams outline the steps you would follow to charge the sphere. **(4 marks)**
   (ii) Name the method of charging used. **(1 mark)**

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3. (a) Define critical angle. **(2 marks)**
   (b) (i) State the conditions necessary for total internal reflection to occur. **(2 marks)**
   (ii) Name one application of total internal reflection. **(1 mark)**

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4. A student places her mouth at one end of a U-shaped tube containing water of density $1000\ kg\ m^{-3}$. She sucks and causes a displacement as shown in figure 2.

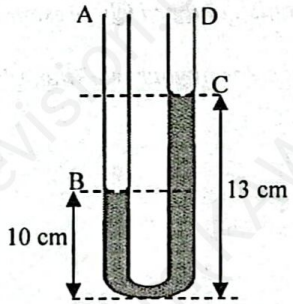


**Figure 2**

   (a) (i) Using a letter on the diagram, state where she places her mouth. **(1 mark)**
   (ii) Explain why the displacement occurs. **(2 marks)**

   (b) Determine the pressure difference caused by the sucking. **(3 marks)**

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5. (a) Figure 3 shows a network of resistors connected to a 12 V power source.

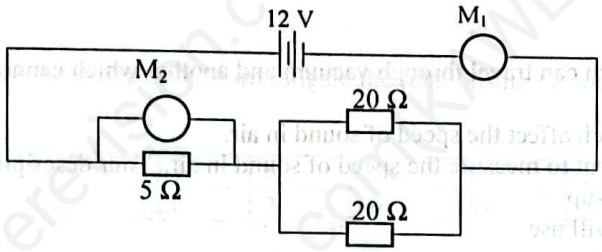


**Figure 3**

(i) Identify the meters $M_1$ and $M_2$. **(2 marks)**
(ii) State a property of each meter which makes it suitable for the connection as shown. **(2 marks)**

(b) Determine:
(i) The combined resistance in the circuit. **(3 marks)**
(ii) The current in the circuit. **(3 marks)**

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6. (a) (i) State the basic law of magnetism. **(2 marks)**
(ii) Name one material which may be attracted by a magnet and one other material which may not be attracted by a magnet. **(2 marks)**

(b) Draw a diagram to show the magnetic flux pattern between two unlike poles of magnets placed near each other. **(2 marks)**

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## SECTION II

***Answer all questions choosing, EITHER the a, b and c OR the d, e, and f of each question.***

***Answer EITHER 7 a, b and c***

7. (a) (i) Define thermometric property. **(2 marks)**
(ii) Name the two fixed points used on the celsius scale for temperature measurements. **(2 marks)**

(b) (i) Define specific heat capacity. **(2 marks)**
(ii) Describe an experiment to measure the specific heat capacity of water. Your description should include:
- a diagram of the set-up
- the procedure you will use
- data or measurements
- how the data or measurements can be used to obtain the specific heat capacity
- any precaution taken **(8 marks)**

(iii) Calculate the quantity of heat required to change the temperature of 2.0 kg of a liquid of specific heat capacity 4000 J $kg^{-1}$ $k^{-1}$ from 30 $^0$C to 80 $^0$C. **(3 marks)**

(c) Name the three methods by which heat can be transmitted from one place to another. **(3 marks)**

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***OR 7 d, e, and f***

7. (d) (i) Define a wave? **(2 marks)**

(ii) Name one wave which can travel through vacuum and another which cannot travel through vacuum. **(2 marks)**

(e) (i) State two factors which affect the speed of sound in air. **(2 marks)**

(ii) Describe an experiment to measure the speed of sound in air. Your description should include:
- a diagram of the set-up
- the procedure you will use
- data or measurements
- how the data or measurements can be used to obtain the speed of sound
- any precaution taken **(8 marks)**

(iii) A stationary ship is 220 m from a high cliff. When it sounds its horn, an echo is heard 1.3 seconds later. Calculate a value for the speed of sound in air. **(3 marks)**

(f) Name any three waves which form part of the electromagnetic spectrum. **(3 marks)**

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***Answer EITHER 8 a, b and c***

8. (a) Below is recorded data from an experiment to investigate the relationship between acceleration, a, and force, F

| F / N | 0 | 14 | 30 | 45 | 61 | 75 |
|---|---|---|---|---|---|---|
| a / $ms^{-2}$ | 0 | 1 | 2 | 3 | 4 | 5 |

(i) Define acceleration. **(2 marks)**

(ii) Plot a graph of force, F, on the Y-axis against acceleration, a, on the X-axis. **(6 marks)**

(iii) Determine the slope of the graph. **(3 marks)**

(b) Figure 4 shows a uniform metre rule (of length 100 *cm*) pivoted at the 30 *cm* mark and in equilibrium.

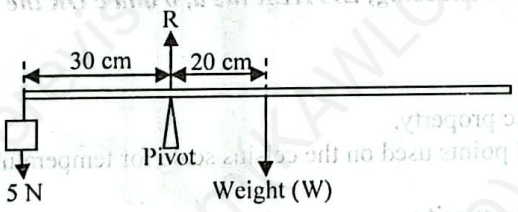


**Figure 4**

(i) Calculate the weight of the metre rule. **(3 marks)**

(ii) Calculate the value of the reaction force, R, at the pivot on the metre rule? **(3 marks)**

(c) (i) State Newton's first law of motion. **(2 marks)**

(ii) Give one practical application of Newton's first law of motion. **(1 mark)**

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***OR 8 d, e and f***

8. (d) Below is recorded data from an experiment to investigate the relationship between the resistance, R, of a material and its length, l.

| l/m | 2 | 4 | 6 | 8 | 10 | 12 |
|---|---|---|---|---|---|---|
| R/Ω | 12 | 23 | 30 | 46 | 58 | 70 |

(i) Define resistance. **(2 marks)**
(ii) Plot a graph of resistance, R, on the Y-axis against length, l, on the X-axis. **(6 marks)**
(iii) Determine the slope of the graph. **(3 marks)**

(e) Figure 5 shows a modern socket used for house wiring.

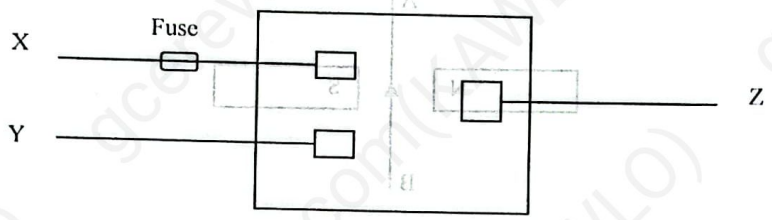


**Figure 5**

(i) Name the wires represented by the letters X, Y and Z **(3 marks)**
(ii) If the mains voltage is 220 V and a device in the house has a resistance of 100 Ω, calculate the current flowing through the device. **(3 marks)**

(f) (i) State Ohm's law **(2 marks)**
(ii) Give an example of an Ohmic conductor **(1 mark)**

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***Answer EITHER 9 a, b and c***

9. (a) (i) Define a semiconductor **(2 marks)**
Differentiate between;
(ii) Intrinsic and extrinsic semiconductors. **(2 marks)**
(iii) P-type and n-type semiconductors. **(2 marks)**

(b) Magnesuim-28, $^{28}_{12}Mg$, is unstable and has a half- life of 21 days. It is known to emit beta particles.
(i) Name the particles that constitute the nucleus of an atom. **(2 marks)**
(ii) How many neutrons are in $^{28}_{12}Mg$ **(2 marks)**
(iii) If $^{28}_{12}Mg$ nucleus emits two beta particles, write a balanced decay equation. **(2 marks)**
(iv) If initially there are 200 radioactive atoms of $^{28}_{12}Mg$, how many radioactive atoms will be left after 42 days? **(2 marks)**

(c) (i) Sketch the tracks of alpha and beta particles in cloud chambers. **(2 marks)**
(ii) Name the three properties responsible for the shape of the alpha tracks. **(3 marks)**
(iii) State one use of radioactivity. **(1 mark)**

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*OR 9 d, e and f*

9. (d) (i) Define an electromagnet **(2 marks)**

(ii) Name a material which is suitable for the core of an electromagnet and state the property which makes it suitable. **(2 marks)**

(iii) State two ways by which the strength of an electromagnet can be increased **(2 marks)**

(e) A transformer is constructed with a primary coil of 400 turns and a secondary coil of 200 turns.

(i) Name the two types of transformers. **(2 marks)**

(ii) If the primary coil is connected to a 240 V a.c mains, determine the secondary voltage, **(3 marks)**

(iii) Name one cause of energy losses in practical transformers. **(1 mark)**

(iv) State what can be done to minimize the above named cause of energy loss. **(1 mark)**

(f) Figure 5 shows a current-carrying conductor, AB, lying in a magnetic field.

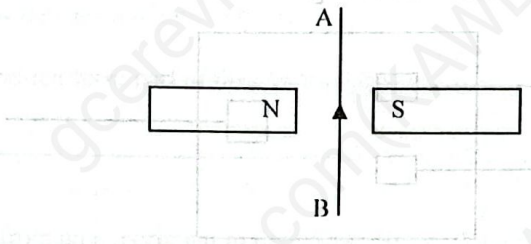


**Figure 5**

(i) State the law which is used to determine the direction of the force on the conductor. **(2 marks)**

(ii) State any three ways by which the force on the coil can be increased. **(3 marks)**

(iii) State the direction in which the conductor AB will move. **( 1 mark)**

(iv) State one device whose functioning depends on the application of the set up in figure 5 **( 1 mark)**