# CAMEROON GENERAL CERTIFICATE OF EDUCATION BOARD

General Certificate of Education Examination

**JUNE 2018** **ORDINARY LEVEL**

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

*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 $s^{-2}$*

*Calculators are allowed.*

## SECTION I

**Answer all questions in one hour.**

1. (a) State
   (i) Faraday's law of electromagnetism. **(1 mark)**
   (ii) Lenz's law of electromagnetism. **(1 mark)**

   (b) A transformer in a radio set delivers 5 A at a voltage of 6 V from a socket connected to a 240 V line.
   (i) State whether this transformer is a step up or a step down transformer. A step down **(1 mark)**
   (ii) Assuming the transformer is 100% efficient, calculate the amount of current that enters the socket. **(2 marks)**

$\eta = \frac{I_s V_s}{I_p V_p} \times 100$ $I_p = \frac{I_s V_s 100}{\eta \times V_p} = \frac{5A \times 6V \times 100}{240 \times 100} = \frac{3000}{24000} = 0.125A$

2. (a) State the law of conservation of linear momentum. It state that when 2 or more close system collide, the sum of linear momentum is the same with the sum of linear momentum of after collision **(2 marks)**

   (b) A car of mass 1000 kg is travelling at 60 $ms^{-1}$.
   (i) Calculate its momentum. $m = 1000 \times 60 = 60000Ns$ **(2 marks)**
   (ii) If it crashes into a wall and is brought to rest in 0.5 s, calculate the force it exerts on the wall. **(2 marks)**

$f = \frac{m(v-u)}{t} = \frac{1000(60-0)}{0.5} = 120000N$

3. (a) (i) State Two physical properties of a conductor which affect its resistance. • cross sectional area • length of **(2 marks)**
   (ii) Calculate the total resistance of the circuit in figure 1. $R_T = R_1 + R_2 + R_3$ the resistance **(2 marks)**
   (iii) Calculate the current flowing through the 5 Ω resistor. $= 6 \cdot 2$ **(2 marks)**

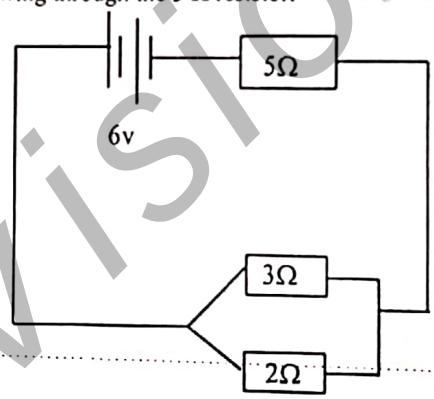



**Figure 1**

4. (a) (i) State the SI unit of temperature and its lowest value. Property is any physical property is any one that changes with a change in temperature **(2 marks)**
   (ii) What is the thermometric property of a liquid-in-glass thermometer? A thermometry **(1 mark)**

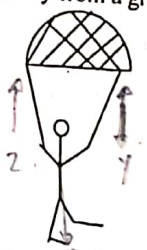
   (b) (i) State one use of a mercury-in-glass thermometer. used in hospitals **(1 mark)**
   (ii) A liquid-in-glass thermometer has a fine (narrow) bore, a thin walled bulb, and a blackened bulb. Explain the significance of the underlined words to the effective functioning of the thermometer. **(3 marks)**

A fine bore:

A thin walled bulb:

A blackened bulb:

5. (a) Figure 2.0 shows a parachutist falling freely from a great height until he attains a constant velocity.




Z = upthrust force (W)
Y = Air resistance (A)
X = weight (W)

Figure 2

(i) What name is given to this constant velocity? Terminal velocity (1 mark)
(ii) Copy figure 2.0 and indicate all the forces acting on it. (3 marks)
(iii) Which of these forces increases with speed? Air resistance (1 mark)
(iv) What is the net force on the body when the velocity in (i) is attained? Zero (1 mark)
(v) Explain what will happen to the time to attain the constant velocity if a larger parachute was used. (2 marks)

6. (a) (i) State the difference between distance and displacement. scalar quantity — vector quantity (2 marks)
(ii) Define velocity and state its unit of measurement. ($cms^{-1}$) (2 marks)
velocity is the rate of change of an object per unit time.

(b) Figure 3.0 shows a velocity-time graph for a cyclist in a race.

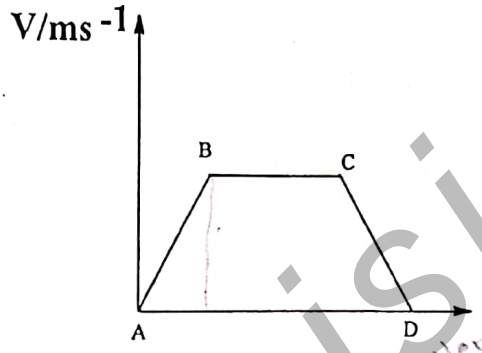



Figure 3

(i) Describe the motion of the cyclist in the section AB and BC. accelerates — constant velocity (2 marks)
(ii) State the significance of the gradient of the section AB. acceleration (1 mark)
(iii) Over which section of the graph does the cyclist attain maximum velocity? BC (1 mark)

## 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 the principal focus of a converging lens. A ray diagram may be used in your definition. (2 marks)
(ii) Name one optical instrument that uses a convex lens to produce a magnified image. (1 mark)
(iii) Draw a ray diagram to show how the image in (ii) above is formed. (4 marks)
(iv) State two other properties of the image formed (2 marks)

(b) Describe an experiment to determine the refractive index of a glass block. Include in your description:
- a list of apparatus needed
- a diagram of the set-up
- the procedure you will use
- the precautions to be taken

(6 marks)

(c) A converging lens has a focal length of 50 cm. An object is placed 80 cm from the lens and an image is produced on a wall 240 cm from the lens.
(i) Calculate the magnification of this image. (2 marks)
(ii) State the nature and orientation of this image. (2 marks)
(iii) What property of light is responsible for the formation of this image by the lens? (2 marks)

*OR 7 d, e, and f*

(d) (i) Define the specific latent heat of a substance. State its unit. (3 marks)
(ii) Name a substance with a high specific latent heat. State one use of this substance which is due to its high specific latent heat. (2 marks)
(iii) Explain why a burn from steam at 100 $^{0}$C is more severe than one from boiling water at the same temperature. (2 marks)

(e) (i) Describe an experiment to show that different materials (solids) conduct heat at different rates.
- A list of apparatus needed.
- A diagram of the set-up
- The procedure you will use
- The precautions to be taken

(5 marks)

(ii) Name three situations in which these differences in conductivity between different materials are put to use. (3 marks)

(f) A student noticed that when fire is burning in a firewood kitchen, cold air flows into the kitchen through the door while the smoke moves out through a hole high up in the wall.
(i) Name the phenomenon that causes this observation. (1 mark)
(ii) Briefly explain how this observation occurs. (3 marks)
(iii) Name one daily occurrence due to this phenomenon (1 mark)

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*Answer EITHER 8 a, b and c OR 8 d, e, and f.*

*Answer EITHER 8 a, b and c*

8. (a) (i) What is an elastic material? (1 mark)
(ii) State Hooke's law. (2 marks)

(b) A Coper wire is suspended vertically from the ceiling. Its lower end is being loaded. The length of the spring L (cm) as the load F(N) is being varied from the ceiling. Its lower end is being loaded. The length of the spring l(cm as the load F(N) is varied are shown in the table below:

| F/N | 0.0 | 2.0 | 4.0 | 8.0 | 10.0 | 14.0 | 16.0 |
|---|---|---|---|---|---|---|---|
| l/cm | 15.00 | 15.15 | 15.30 | 15.60 | 15.75 | 17.60 | 18.2 |
| E /cm | 0.00 | | | | | | |

(i) Complete the table by calculating the extension for each force, (the first one has been done for you). (2 marks)
(ii) Draw a graph of F(N) on Y-axis versus e(cm) on X-axis. (5 marks)
(iii) Determine the slope of your graph. (2 marks)
(iv) Determine from your graph what load will stretch the wire to a length of 15.7 cm. (2 marks)
(v) Name the type of energy stored in the stretched wire. (1 mark)
(vi) State with a reason whether this wire obeys Hooke's law. (2 marks)

(c) State the energy changes that occur from the moment a stone is released at a height to the moment it comes to rest on the ground. (3 marks)

*OR 8 d, e and f*

(d) $^{222}_{86}Ra$ is one of the isotopes of randon with a half – life of 3.8 days. It undergoes radioactivity by alpha particle emission resulting in a transmutation process.
Define each of the underlined terms or expressions. **(3 marks)**

(e) Alpha particle tracks in a cloud chamber are thick, straight and short, while beta-particles tracks are thin, wavy and long. State the reason for each of the characteristics underlined above. **(6 marks)**

(f) In the absence of a known radioactive source, a rate-meter indicated an average reading of 25 counts/min. The table shows how the reading of the rate meter varies with time in the presence of a known radioactive substance.

| Time (mins) | 0.0 | 2.0 | 4.2 | 8.6 | 12.0 | 18.4 | 22.0 |
|---|---|---|---|---|---|---|---|
| Readings (counts/Min) | 985 | 725 | 475 | 225 | 145 | 65 | 45 |
| Corrected count rate (counts/min) | 960 | | | | | | |

(i) What name is given to the count rate of 25 counts /min? **(1 mark)**

(ii) Complete the table by calculating the corrected count rates. One example has been done for you. **(2 marks)**

(iii) Draw a graph of the corrected count rate on the Y-axis versus time on the X axis. **(5 marks)**

(iv) Use the graph to determine the half-life of the radioactive source. **(3 marks)**

*Answer EITHER 9 a, b and c OR 9 d, e, and f.*

*Answer EITHER 9 a, b and c*

9. (a) Figure 4.0 shows a negatively charged polythene rod brought close to an uncharged suspended metal coated ball. It is observed that the ball moves.

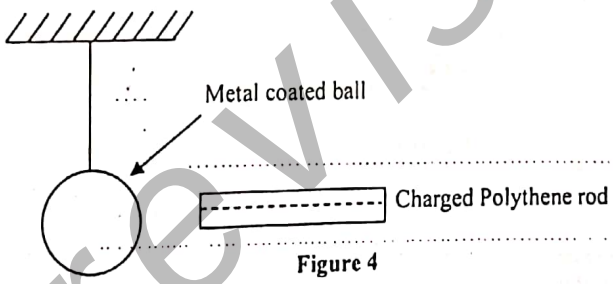


**Figure 4**

(i) In which direction does the ball move? **(1 mark)**

(ii) What type of force exists between them? **(1 mark)**

(iii) Name two factors that affect the magnitude of this force. **(2 marks)**

(iv) Explain how the movement in (i) comes about. **(2 marks)**

(v) Why is it easier to charge a polythene rod than to charge a copper rod? **(2 marks)**

(b) Figure 5 shows two conductors A and B.

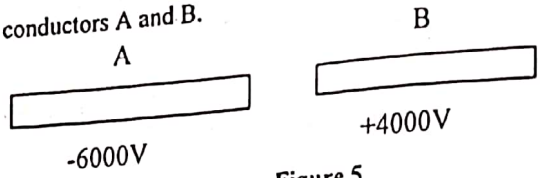


Figure 5

(i) What is the potential difference (p.d) between the two conductors? (2 marks)
(ii) If A and B are linked by a conducting wire, in which direction will the electrons flow? Explain. (2 marks)
(iii) When do the electrons stop flowing? (1 mark)
(iv) How much work must be done to bring a charge of $10^{-5}$ C from earth to the 4000V conductor? (2 marks)

(c) A current of 10 A flows in a conductor for 8s.
(i) What do you understand by a current of 10A? (2 marks)
(ii) Calculate the number of electrons that flow in the conductor, given that the charge of an electron is $1.6 \times 10^{-19}$ C. (3 marks)

*OR 9 d, e and f*

(d) List two ways by which electrical energy could be lost in a transformer and in each case explain how this loss could be minimised. (4 marks)

(e) Figure 6.0 shows a conductor AB placed in the magnetic field, N- S of two magnets and connected to a centre-zero galvanometer.

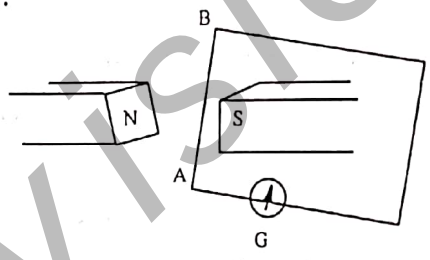


Figure 6

If the conductor AB is moved vertically up, it is observed that the galvanometer deflects.

(i) Explain why the galvanometer deflects? (3 marks)
(ii) If the direction of movement of the conductor is reversed, state and explain what is observed on the galvanometer. (3 marks)
(iii) State two factors that determine the magnitude of deflection. (2 marks)
(iv) Name any rule that could be used to determine the direction of the magnetic field lines about the straight current A carrying conductor. (1 mark)

(f) Distinguish between a hard magnetic material and a soft magnetic material giving an example of each (4 marks)

Figure 7.0 shows three rectangular metal blocks A, B, and C. Block A is a permanent magnet of known polarity, B is a magnetic material and C another permanent magnet.

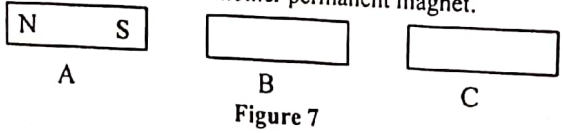


Figure 7

Explain how you would use block A to show a group of form 5 students that B is a magnetic material and C a permanent magnet. (3 marks)