

Name:

Index No:

232/2
PHYSICS (Theory)
PAPER 2

SIGNATURE:

18TH JULY 2014
Time: 2 Hours

DATE:



ALLIANCE GIRLS' HIGH SCHOOL
K.C.S.E. MOCK EXAMINATIONS

Instructions to Candidates:

- (a) This paper consists of two sections: A and B.
- (b) Answer **ALL** the questions in section A and B in the spaces provided.
- (c) **ALL** workings **MUST** be clearly shown in the spaces provided in this booklet.
- (d) Non programmable silent electronic calculator and KNEC mathematical table may be used.
- (e) This paper consists of 16 printed pages.
- (f) Candidates should check the question paper to ascertain that all pages are printed as indicated and that no questions are missing.

For Examiner's Use Only

SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE SCORE
A	1-13	25	
B	14	10	
	15	11	
	16	13	
	17	11	
	18	10	
	TOTAL SCORE	80	

SECTION A (25 MARKS)

Answer ALL the questions in this section in the spaces provided after each question.

1. Figure 1 shows an object in front of a plane mirror.

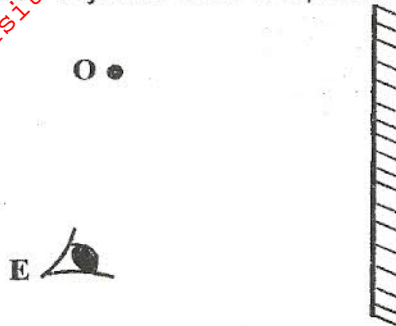


Figure 1

Draw a pair of rays on the diagram above to locate the position of the image, I of the object O as seen by the eye, E. (2 marks)

2. Figure 2 shows an electric circuit in which the ammeter has negligible resistance. When the switch S is closed, the ammeter reads 0.10 A. Determine the internal resistance of the cell. (3 marks)

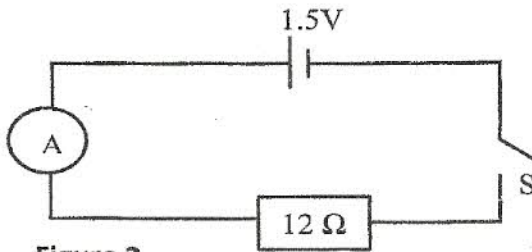


Figure 2

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3. A highly positively charged rod is gradually brought close to the cap of a negatively charged electroscope. It's observed that the leaf initially decreases and then increases. Explain this observation. (2 marks)

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4. **Figure 3** shows a circuit containing a battery, two identical bulbs P and Q and a thermistor.

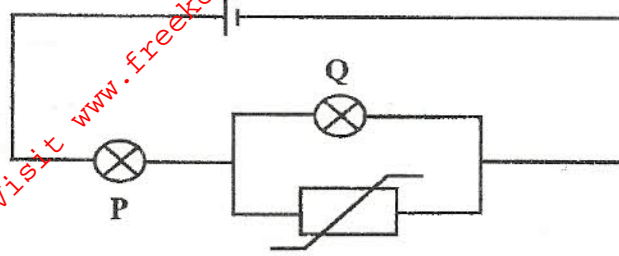


Figure 3

State and explain what will happen to the **brightness** of bulb P when the thermistor is steadily heated. (2 marks)

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5. A lady holds a concave mirror a short distance from her face as shown in **Figure 4**.

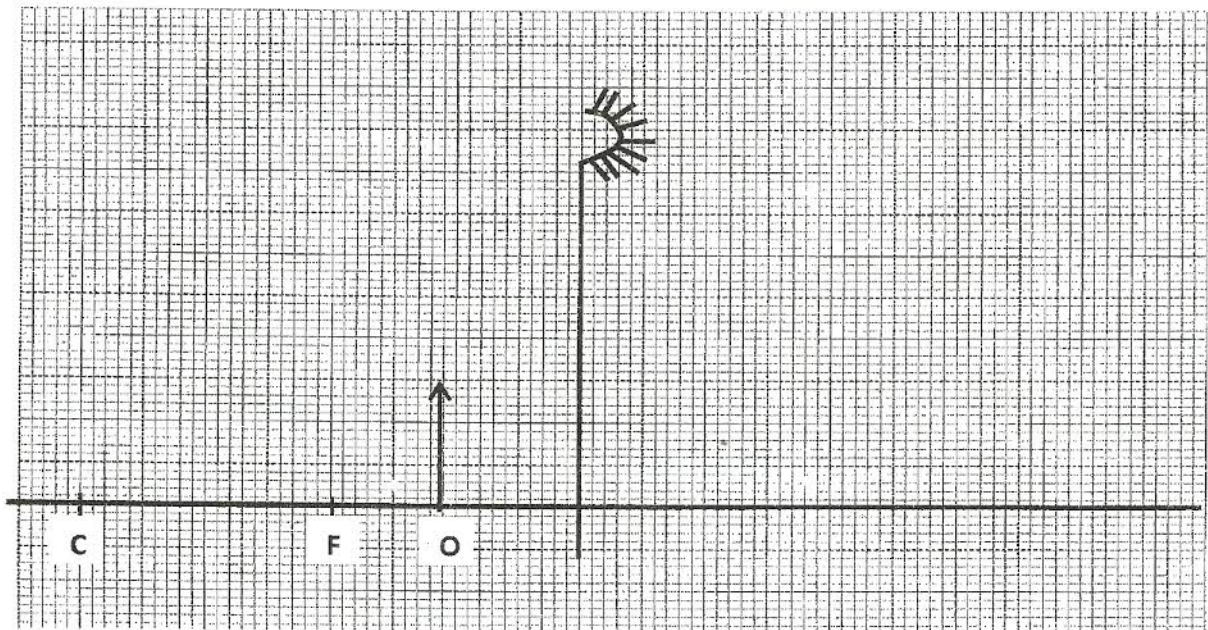


Figure 4

Given that her face represented by object O is as shown on the graph above:

- a) **Draw a ray diagram** to show how the image of her face is formed. (2 marks)

b) State **one** characteristic of the image formed.

(1 mark)

6. A pin is placed at the bottom of a beaker of depth 14.5cm. The beaker is then filled with kerosene. By using another pin on the side of the beaker and observing from the top, the distance of the image of the pin in the beaker is found to be 4.5cm from the bottom. Determine the **refractive index** of kerosene. (2 marks)

7. Figure 5 below shows the paths taken by three radiations A, B and C from a radioactive source through an electric field.

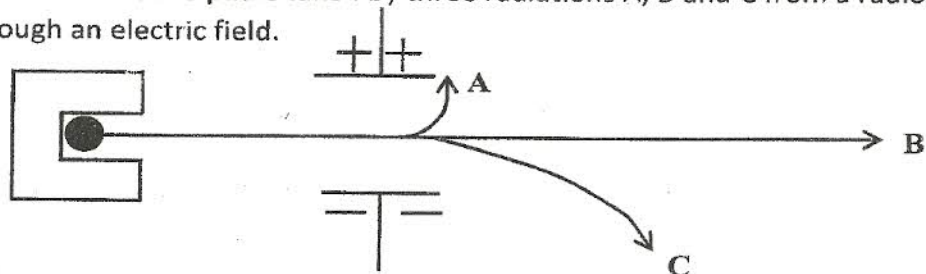


Figure 5

Explain why radiation B is not deviated by the electric field.

(1 mark)

8. Figure 6 shows an alternating current (a.c) connected across a diode D and a resistor R.

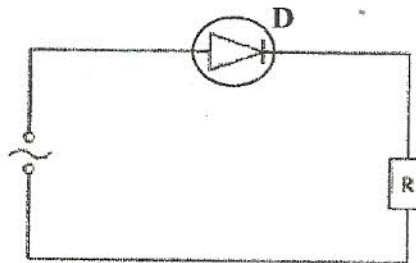
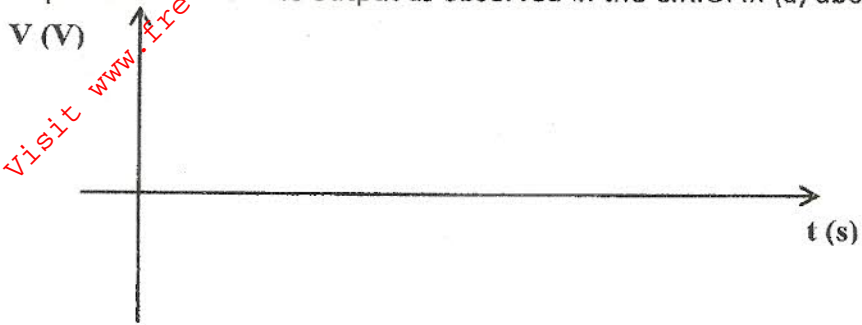


Figure 6

- (a) Show on the diagram where a C.R.O. can be connected to display the output voltage. (1 mark)
- (b) On the axes provided sketch the output as observed in the C.R.O. in (a) above. (1 mark)



9. The two conducting balls shown in **Figure 7** are identical and contain the number of excess electrons indicated. The two balls are made to touch. **Determine** how much charge in coulombs each will have. ($e = 1.6 \times 10^{-19} \text{ C}$) (2 marks)

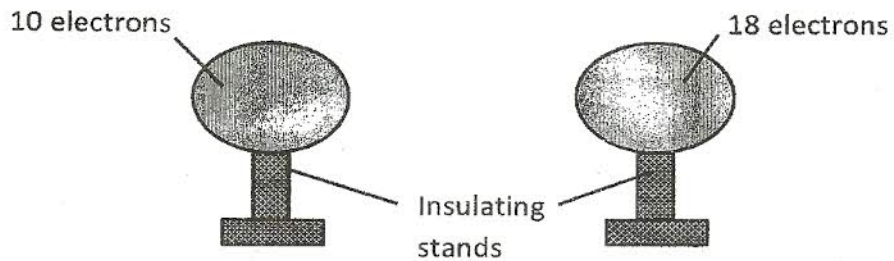


Figure 7

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10. In a C.R.O. a waveform given in **Figure 8** was displayed on the screen the Y-gain was set at 5V/cm and time base calibration is 20 milliseconds per cm.

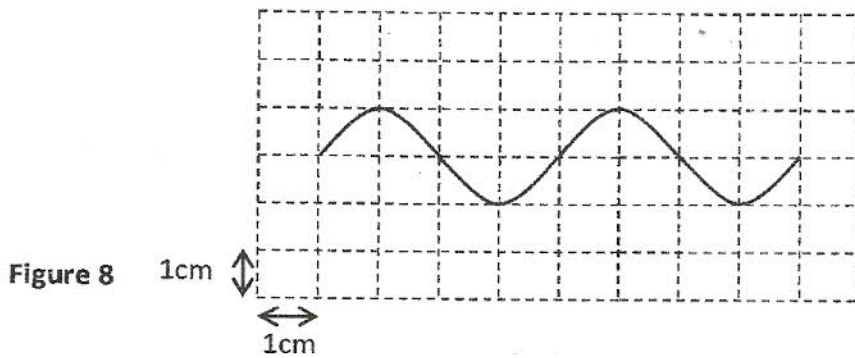


Figure 8

Determine the frequency of the voltage:

(2 marks)

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11. The conductivity of a metallic conductor decreases with increase in temperature whereas the conductivity of a semiconductor increases with increase in temperature. Explain. (2 marks)

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12. Figure 9 shows the cross section of a conductor held between two bar magnets.



Figure 9

Indicate with an arrow on the diagram the **direction** in which the conductor should be **moved** in order to cause current to flow as shown. (1 mark)

13. Electricity can be dangerous. Safety devices such as fuses are often used in circuits and electrical appliances. Give **one** other **example** of an electrical safety device. (1 mark)

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SECTION B (55 MARKS)

Answer ALL the questions in this section in the spaces provided after each question.

14. (a) State **one** difference between light and sound waves. (1 mark)

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- (b) Briefly **describe** how sound is propagated in air. (1 mark)

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- (c) **Figure 10** shows a set up made by a Form 2 student at Alliance Girls' High School to study an aspect of a wave.

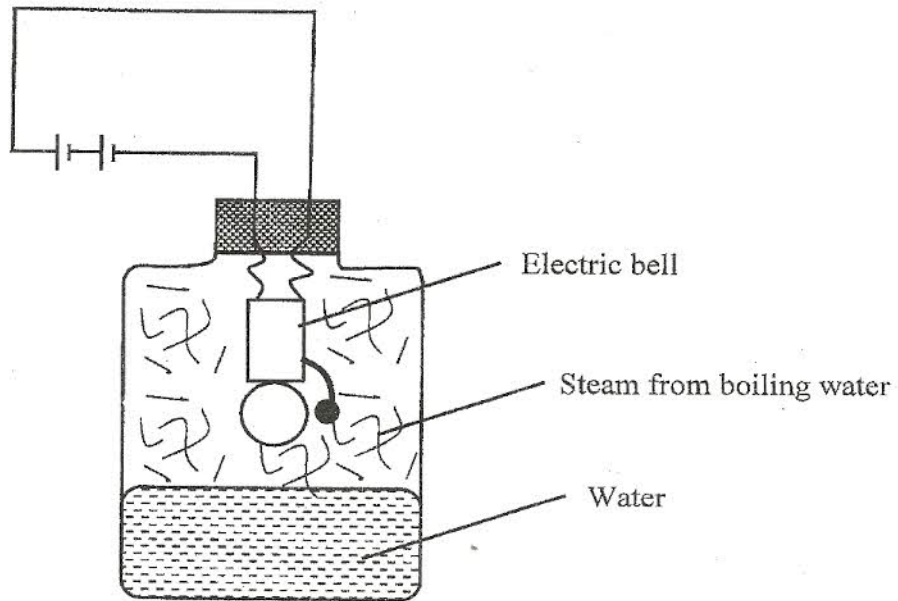


Figure 10

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

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

(1 mark)

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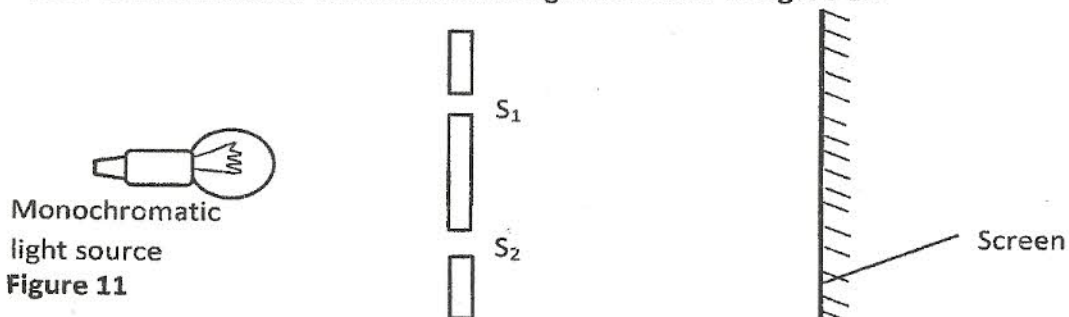
(d) A girl standing on a level ground between two high walls claps her hands. She hears an echo from one wall after 0.7s and from the other wall 0.2s later. Determine the distance between the two walls. (Speed of sound in air = 330 ms^{-1}) (3 marks)

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(e) In an experiment to observe the interference of light waves, a double slit was placed close to the source of monochromatic light as shown in Figure 11.



(i) State the function of the double slit.

(1 mark)

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(ii) State the observation made on the screen.

(1 mark)

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(iii) Explain the observation made on the screen.

(1 mark)

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15. (a) Give **one advantage** of transmitting mains electricity as a.c. and not d.c. (1 mark)

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(b) **Figure 12** shows part of a wiring circuit for a house.

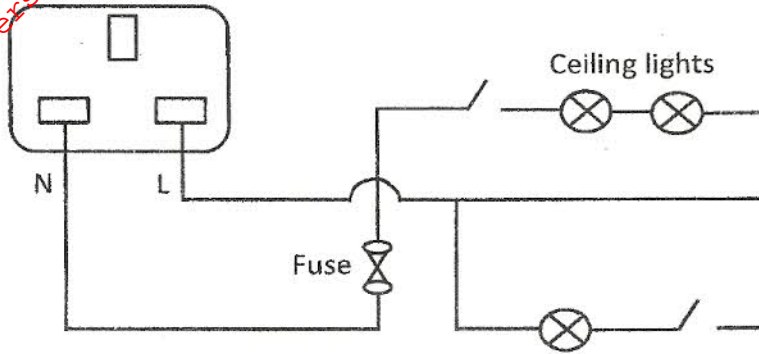


Figure 12

Correct two faults made in the wiring.

(2 marks)

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(c) **Figure 13** shows a connection to a three pin plug.

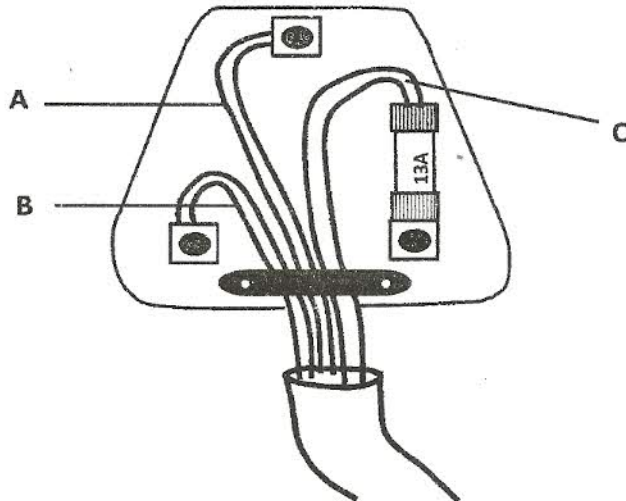


Figure 13

(i) State the colours of the leads labelled A, B and C. (3 marks)

A

B

C

(ii) Give a reason why the earth pin is normally longer than the other two pins. (1 mark)

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(iii) State the function of the fuse. (1 mark)

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(iv) In a house, there is a cooker rated 6kW. The mains potential is 240V and the fuses available are 35A, 30A, 15A, and 13A. Determine the fuse that would be suitable for the cooker. (3 marks)

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16. (a) Figure 14 shows a photocell. Study it and answer the questions below.

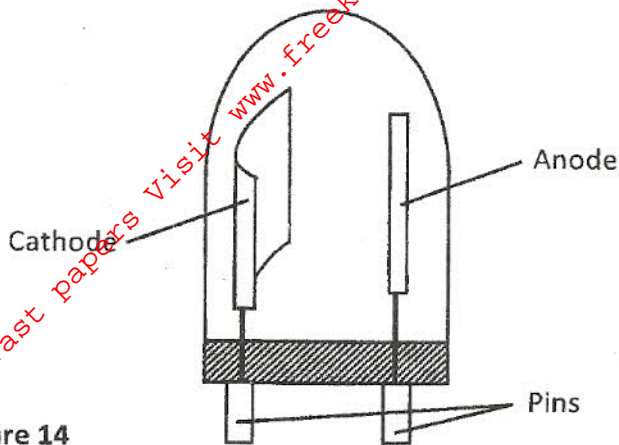


Figure 14

(i) Explain how the photocell works. (1 mark)

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(ii) State two factors that determine the speed of the photoelectrons emitted by the cathode. (2 marks)

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(iii) State one application of a photocell. (1 mark)

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(b) Figure 15 shows the relation between the stopping potential, V_s , and the frequency, f , of radiation when a certain metal surface is illuminated with light of different frequencies.

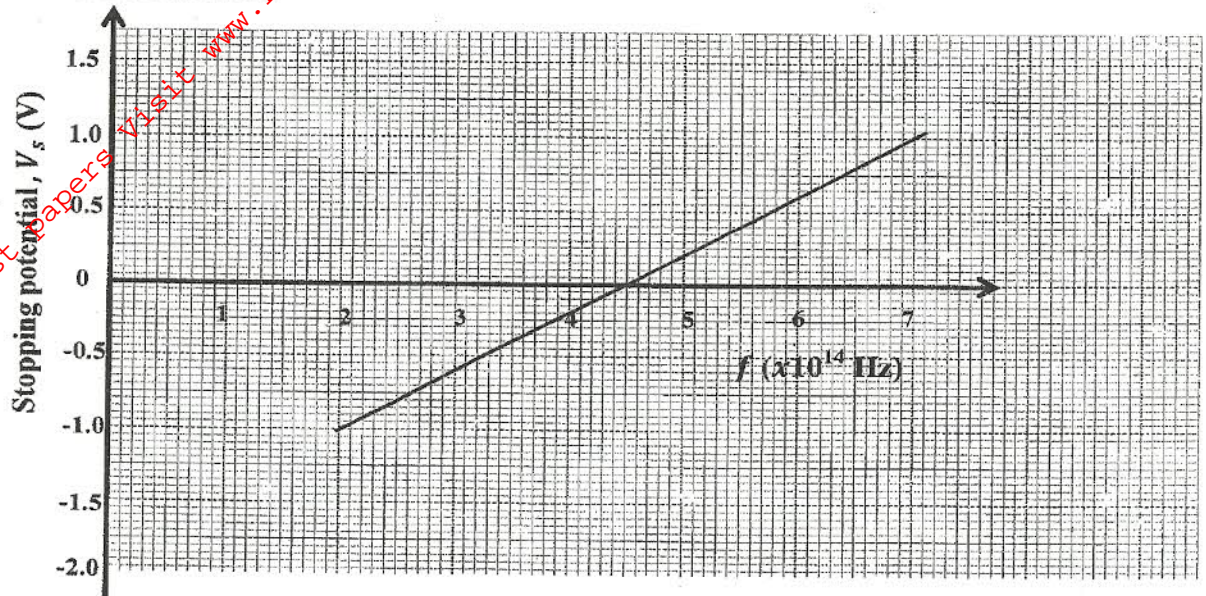


Figure 15

From the graph determine the:

- i) Threshold frequency, f_0 , of the metal surface. (1 mark)

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- ii) Planck's constant, h . (3 marks)

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- iii) Work function, W_0 , of the metal surface. (2 marks)

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(c) Sodium metal has work function of 2.3 eV. If it is irradiated with light of frequency 7.0×10^{14} Hz, calculate the **maximum kinetic energy** for the emitted electrons. (charge of an electron, $e = 1.6 \times 10^{-19}$ C, Planck's constant, $h = 6.63 \times 10^{-34}$ Js) (3 marks)

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17. (a) Figure 16 shows the features of a diffusion cloud chamber used to detect radiations from radioactive sources.

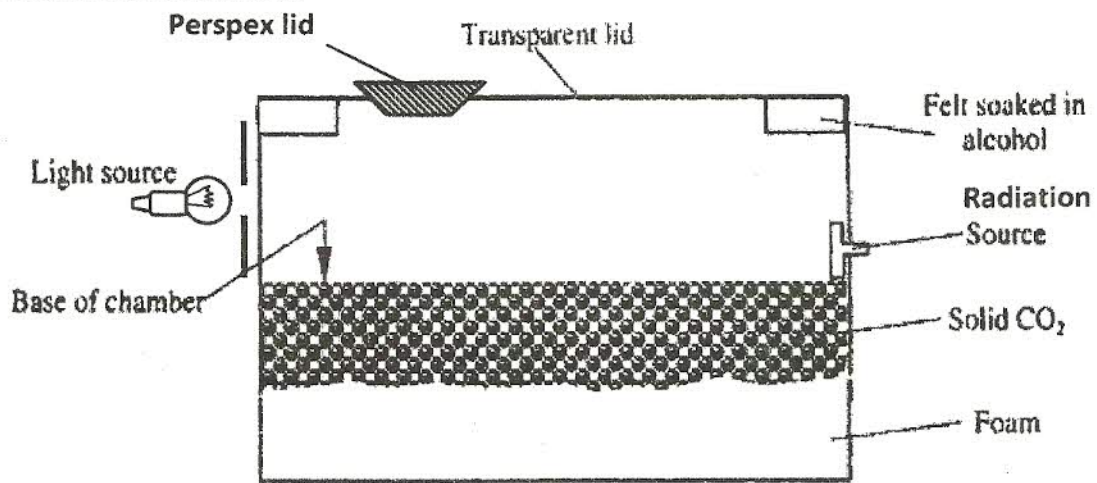


Figure 16

(i) State the function of the following materials in the chamber. (2 marks)

I. Alcohol.

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II. Solid CO₂.

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(ii) Explain why the base of chamber is painted black. (1 mark)

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(iii) As the chamber continues to detect radiations, the perspex lid is rubbed frequently with a piece of cloth. Give a reason for this. (1 mark)

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(iv) Explain how radiations from the radioactive source are detected in the chamber. (2 marks)

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(v) A leaf electroscope can also be used as a detector of radiation. State two advantages of the diffusion cloud chamber over the leaf electroscope as a radiation detector. (2 marks)

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(b) When carrying out experiments using radioactive substances, it is observed that a counter connected to the *Geiger Müller* (GM) tube registers some readings even in the absence of a radioactive source.

(i) State the radiations responsible for the count registered in the absence of the radioactive source. (1 mark)

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(ii) State any two possible sources of these radiations.

(2 marks)

18. (a) State Faraday's law of electromagnetic induction.

(1 mark)

(b) Figure 17 shows a simplified illustration of an e.m.f. generator.

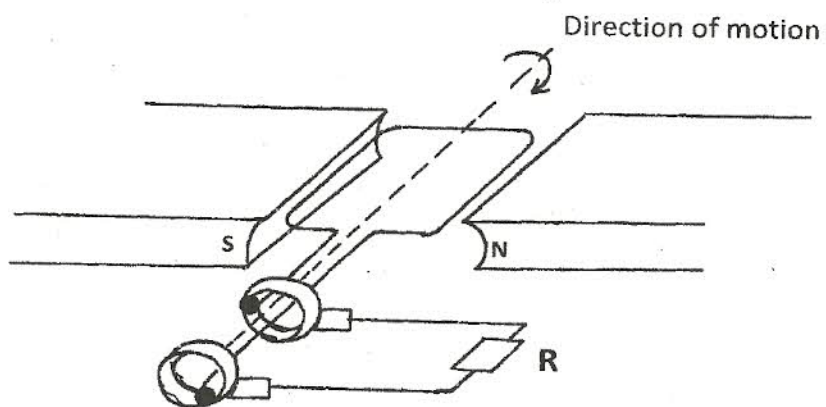
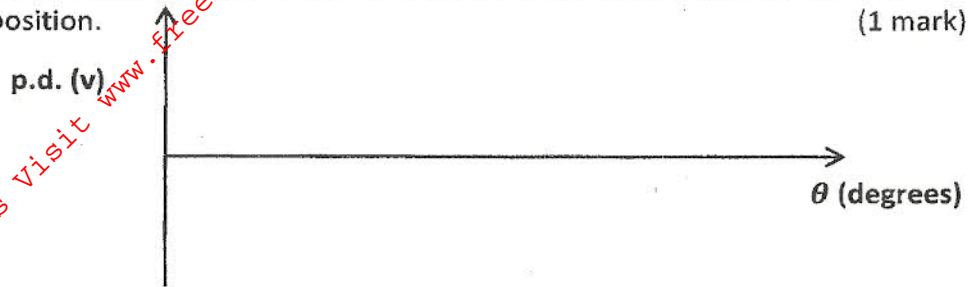


Figure 17

i) Show the **direction** of induced current through **R** when the coil is in the position shown in the diagram. (1 mark)

ii) State **two** ways of increasing the amount of induced current in this set up. (2 marks)

- iii) On the axes below sketch a graph to show how potential difference across R varies with the angle of inclination, θ . The coil is initially in the vertical position. (1 mark)



- (c) Figure 18 shows a step-down transformer connected to a 240V mains socket. The efficiency of the transformer is 60% and a current of 50A flows through P.

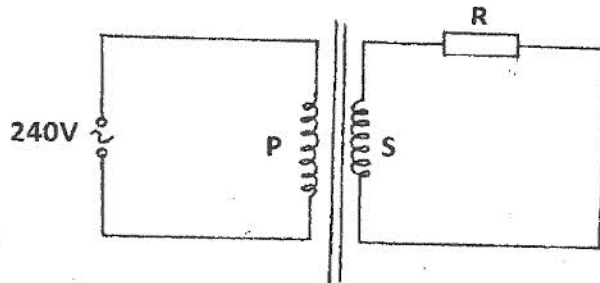


Figure 18

Given that the primary coil has 4000 turns while the secondary coil has 1500 turns, calculate the current through S. (3 marks)

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- (d) State **one similarity** and **one difference** between an induction coil and a step-up transformer. (2 marks)

Similarity:

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Difference:

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