THE KENYA NATIONAL EXAMINATIONS COUNCIL
Kenya Certificate of Secondary Education

232/2 Paper 2

PHYSICS – (Theory)

Dec. 2022 – 2 hours

Name ..... Index Number .....

Candidate's Signature ..... Date .....

Instructions to candidates

(a) Write your name and index number in the spaces provided above.
(b) Sign and write the date of examination in the spaces provided above.
(c) This paper consists of **two** Sections; **A** and **B**.
(d) Answer **all** the questions in Sections **A** and **B** in the spaces provided.
(e) **All** working **must** be clearly shown in the spaces provided in this booklet.
(f) Non-programmable silent electronic calculators may be used.
(g) **This paper consists of 16 printed pages.**
(h) **Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**
(i) **Candidates should answer the questions in English.**

For Examiner's Use Only

Section	Questions	Maximum Score	Candidate's Score
A	1–13	25	
B	14	09	
	15	09	
	16	13	
	17	12	
	18	12	
	Total Score	80	

© 2022 The Kenya National Examinations Council

CamScanner

SECTION A (25 marks)

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

1. **Figure 1** shows three cardboards A, B and C with holes placed between a source of light and an observer.

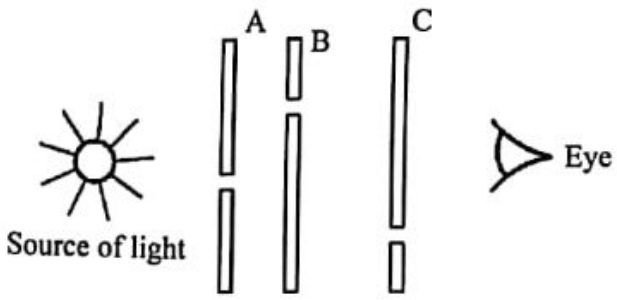

Figure 1

Explain what is observed. (2 marks)

.....

.....

.....

.....

2. State how a polythene rod acquires a negative charge when it is rubbed by a piece of cloth. (1 mark)

.....

.....

.....

3. State **one** device that can be used to detect microwaves. (1 mark)

.....

.....

CS Cam

CamScanner

4. **Figure 2** shows an incomplete circuit.

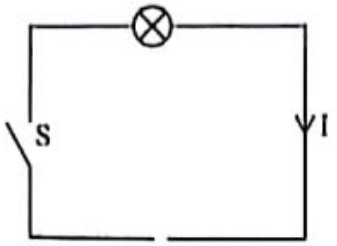

Figure 2

Complete the circuit by inserting a cell so that the current I flows in the direction shown when the switch S is closed. (1 mark)

5. State the basic law of magnetism. (1 mark)

.....

.....

6. **Figure 3** shows a vertical object O placed in front of a concave mirror whose principal focus is at F.

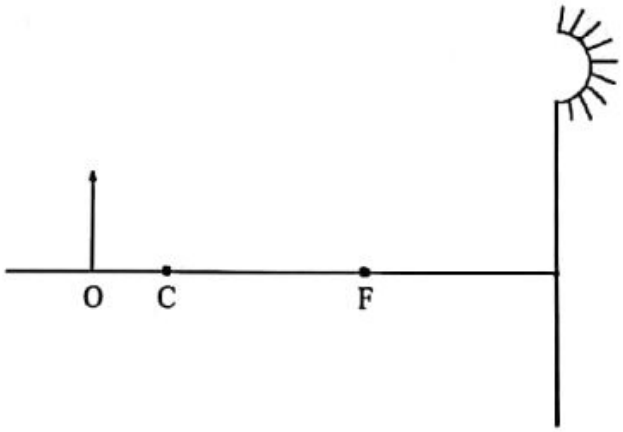

Figure 3

Draw a ray diagram to show how the image is formed. (3 marks)

CamScanner
CamScanner

7. State **two** properties of soft iron that makes it suitable for use as the core of the electromagnet of an electric bell. (2 marks)

.....

.....

8. (a) State **one** reason why sound travels faster at sea level than on high mountains. (1 mark)

.....

.....

.....

(b) State **one** condition necessary for two progressive waves to form a standing wave. (1 mark)

.....

.....

.....

9. Two students stand 300 m from a wall. One bangs two pieces of wood together and at the same time, the other starts a stop watch. They hear an echo after 1.8 seconds. Determine the speed of sound in air. (3 marks)

.....

.....

.....

.....

CamScanner

CamScanner

10. During an experiment to investigate the relationship between the angle of incidence *i*, and angle of refraction *r* for a ray of light travelling from air to glass, the values of sin *i* and sin *r* were determined.

(a) On the axes provided, sketch the graph of sin *i* against sin *r* for the values that were obtained. (1 mark)

(b) State how the refractive index of the glass can be obtained from the graph. (1 mark)

.....

.....

11. **Figure 4** shows a circuit consisting of two resistors of 4 Ω and 8 Ω, a cell and voltmeters V_1 and V_2.

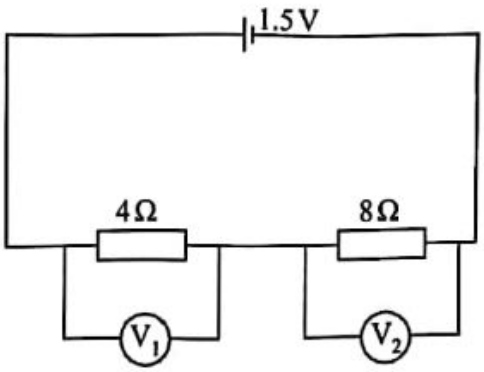

Figure 4

It is observed that voltmeter V_2 shows a higher reading than V_1. Explain this observation. (2 marks)

.....

.....

.....

.....

CamScanner

12. A heating element is rated 3kW, 240V. Determine the resistance of the element. (3 marks)

.....

.....

.....

13. State two characteristics of images formed by diverging lenses. (2 marks)

.....

.....

.....

CamScan

CamScanner

SECTION B (55 marks)

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

14. (a) State Lenz's law of electromagnetic induction. (1 mark)

.....

.....

.....

(b) **Figure 5** shows a magnet held near a stationery solenoid.

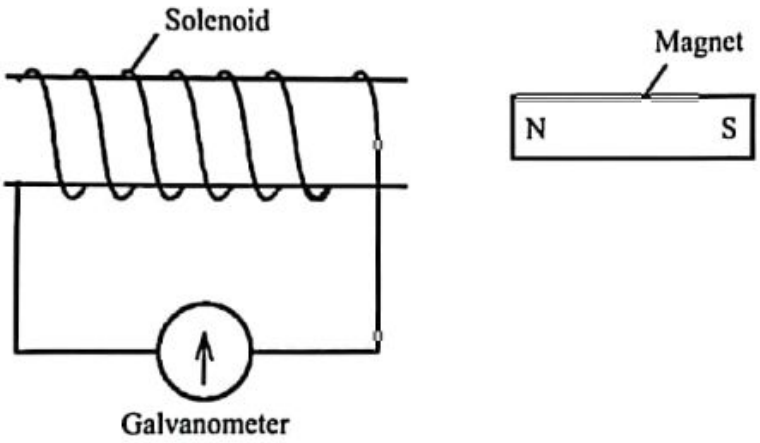

Figure 5

State what will be observed on the galvanometer when the:

(i) north pole end is pushed into the solenoid (1 mark)

.....

.....

.....

(ii) magnet is held stationary inside the solenoid (1 mark)

.....

.....

.....

CamScanner

(iii) north pole end is pulled out of the solenoid (1 mark)

.....

.....

.....

(c) Explain what would be observed if the North pole of the magnet is now moved into the solenoid at a higher speed. (3 marks)

.....

.....

.....

.....

.....

.....

(d) State two causes of energy losses in a transformer. (2 marks)

.....

.....

.....

.....

CamScanner

15. (a) State the function of the ring main circuit in a domestic wiring system. (1 mark)

.....

.....

.....

(b) **Figure 6** shows a circuit consisting of switches S_1, S_2, S_3 and three identical lamps L_1, L_2 and L_3 connected to the mains supply through a fuse.

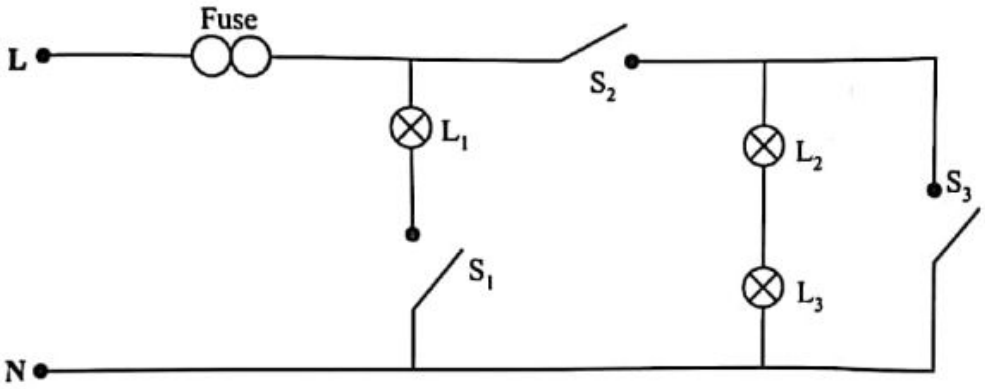

Figure 6

(i) Identify **two** faults in the circuit. (2 marks)

.....

.....

.....

.....

(ii) State the reasons for the answers in 15(b)(i). (2 marks)

.....

.....

.....

.....

CamScanner

(iii) Describe how the brightness of lamps L_1, L_2 and L_3 compare when the switches S_1 and S_2 are closed. (2 marks)

.....

.....

.....

.....

.....

(iv) Explain the answer in 15(b)(iii). (2 marks)

.....

.....

.....

.....

.....

.....

16. (a) **Figure 7** shows a circuit consisting of a cell in series with a galvanometer and two metal plates A and B.

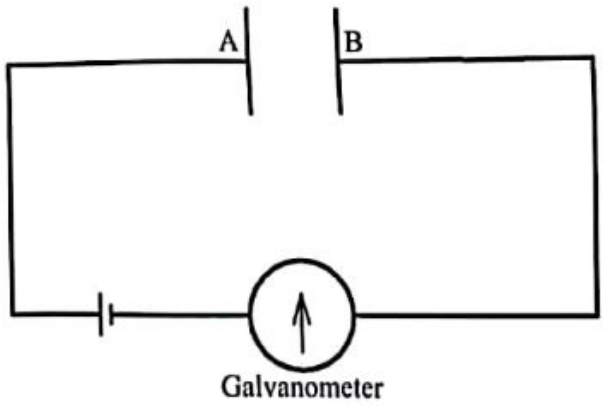

Figure 7

CamScanner

CamScanner

(i) It is observed that when a beam of UV radiation falls on plate H, the galvanometer deflects. Explain this observation. (3 marks)

.....

.....

.....

.....

(ii) Explain what would be observed on the galvanometer when a more intense beam of UV radiation is used. (2 marks)

.....

.....

.....

.....

.....

(b) (i) State with a reason how the intensity of an X-ray beam can be increased in an X-ray tube. (2 marks)

.....

.....

.....

.....

CamScan

CamScanner

(ii) Figure 8 shows the trace of an AC signal on the screen of a Cathode Ray Oscilloscope (CRO).

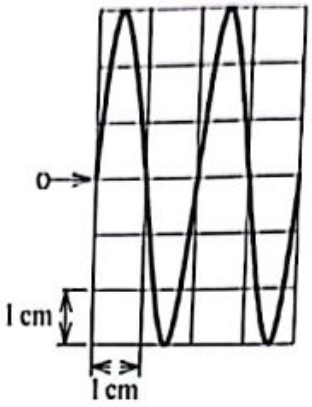

Figure 8

Given that the time base setting is 8.5 milliseconds per cm. Determine the:

I. wavelength of the AC signal (1 mark)

.....

.....

II. frequency of the AC signal (3 marks)

.....

.....

.....

(iii) State the functions of the following parts of a Cathode Ray Oscilloscope:

I. The grid (1 mark)

.....

.....

II. The filament (1 mark)

.....

.....

.....

CamScanner

17. (a) State one hazard of radioactivity. (1 mark)

.....

.....

(b) **Figure 9** shows a decay curve of a radioactive element.

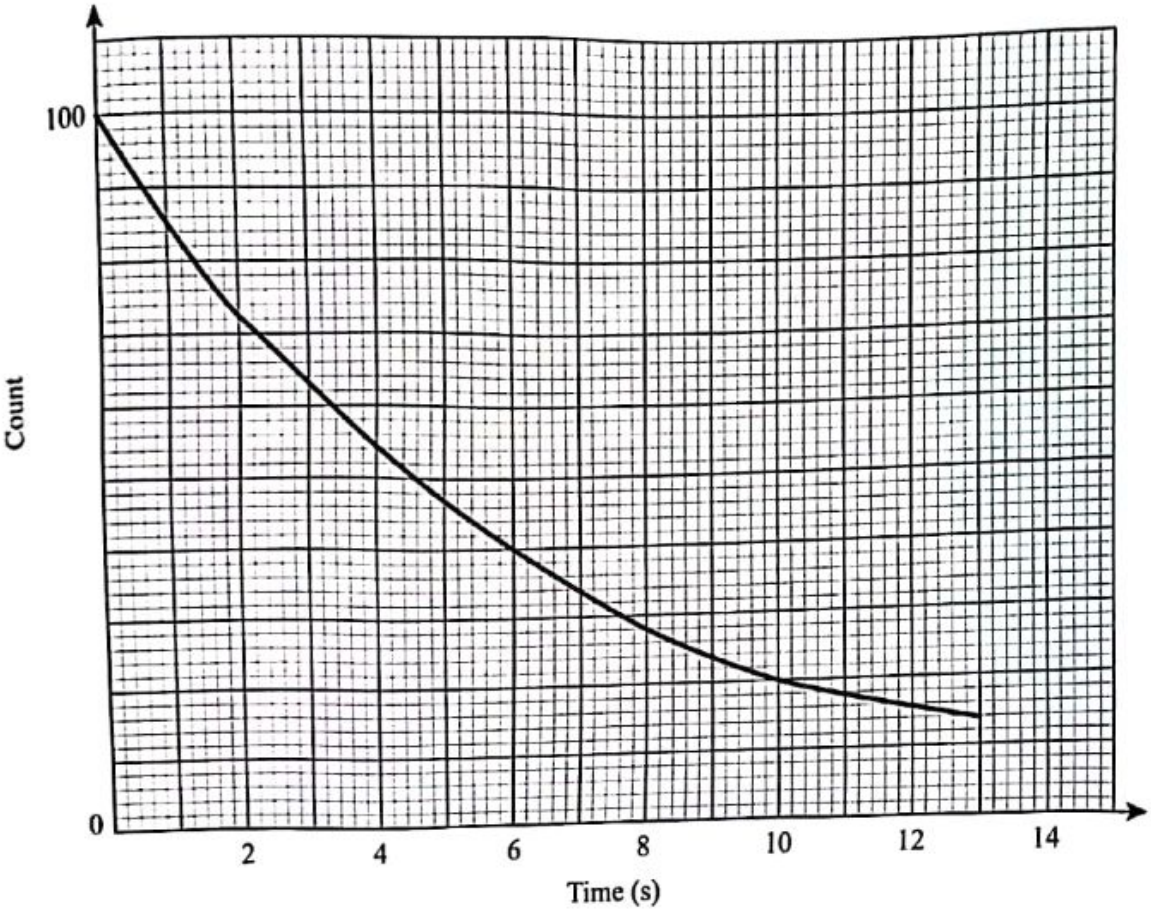

Figure 9

From the graph determine:

(i) the half life of the element (1 mark)

.....

(ii) the number of half lives it will have undergone when the count is 12.5 (2 marks)

.....

.....

CamScanner

(c) (i) State the effect of doping on a semiconductor. (1 mark)

.....

.....

(ii) Explain how doping produces an n-type semiconductor from a pure semiconductor. (3 marks)

.....

.....

.....

.....

(iii) **Figure 10** shows a circuit consisting of two galvanometers G_1 and G_2, two switches S_1 and S_2, a cell and two diodes D_1 and D_2.

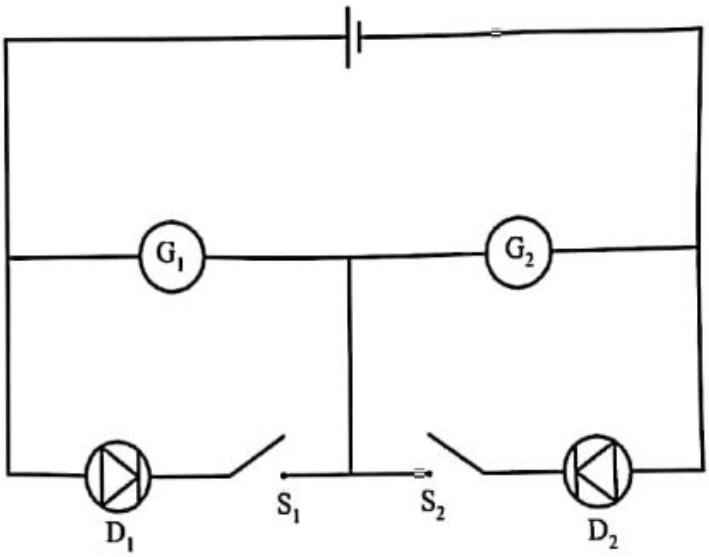

Figure 10

Explain what is observed when S_1 and S_2 are closed. (4 marks)

.....

.....

.....

.....

CamScanner
CamScanner

18. (a) Explain the effect on resistance of a diode when the forward bias voltage is increased. (2 marks)

.....

.....

.....

.....

(b) **Figure 11** shows a circuit consisting of a 12 V battery, 1.5 kΩ resistor, a Light Dependent Resistor (LDR) and a lamp of negligible resistance. The circuit can be used as a light detector.

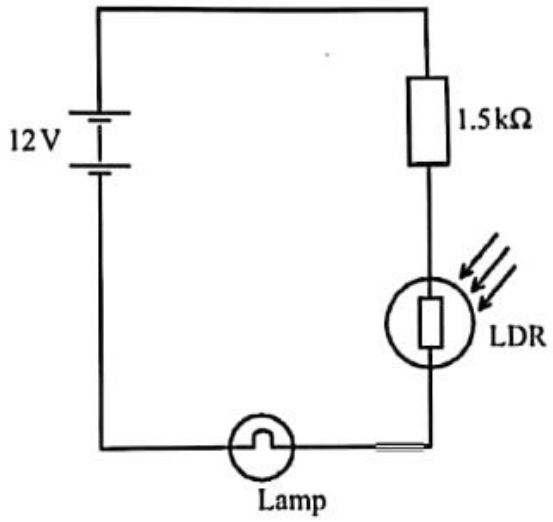

Figure 11

(i) Explain what would be observed if the lighting conditions are changed from total darkness to bright light. (3 marks)

.....

.....

.....

.....

CamScanner

590

(ii) If the resistance of the LDR in bright light is $1 \times 10^1\ \Omega$, determine the potential difference across the 1.5 kΩ resistor. (3 marks)

.....

.....

.....

.....

(c) State the function of a capacitor in rectification of an alternating voltage. (1 mark)

.....

.....

.....

.....

(d) **Figure 12** shows two capacitors of 2.5 μF and 10 μF in series with a 12 V battery.

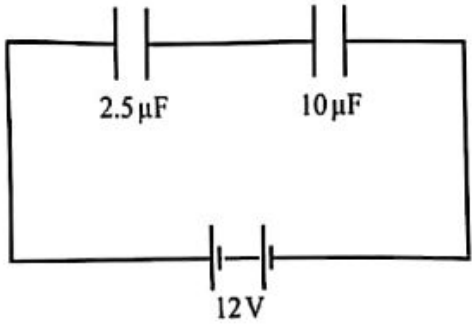

Figure 12

Determine the total charge stored by the capacitors. (3 marks)

.....

.....

.....

.....

0296

THIS IS THE LAST PRINTED PAGE.

CamScanner
CamScanner