



THE KENYA NATIONAL EXAMINATIONS COUNCIL
Kenya Certificate of Secondary Education



Paper 2

232/2

PHYSICS (Theory)

Nov. 2023 - 2 hours

Serial No.
27719618

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 12 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	Question	Maximum Score	Candidate's Score
A	1 - 14	25	
	15	11	
B	16	10	
	17	13	
	18	11	
	19	10	
Total Score		80	



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SECTION A: (25 marks)



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

- 1 State with a reason the effect of reducing the heater current on the x-rays produced in an x-ray tube. (1 mark)
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- 2 State **one** property of a magnet. (1 mark)
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- 3 State the importance of using the correct colour codes in the domestic wiring system. (1 mark)
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- 4 Using the energy band theory, explain the difference between conductors and semi-conductors. (3 marks)
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- 5 State **one** quantity that must be kept constant for Ohm's law to hold. (1 mark)
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- 6 **Figure 1** shows an object placed near the eye of a long sighted person.

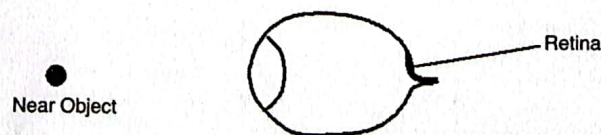


Figure 1

Complete the diagram to show where the image is formed.

(2 marks)

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- 7 **Figure 2** shows a student using a small plane mirror to view her image.

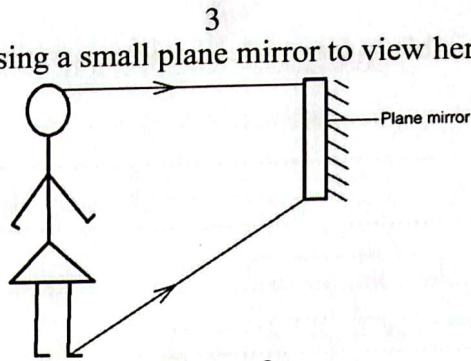


Figure 2

Explain why the student is able to see her face but not her legs in the mirror.

(2 marks)

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- 8 **Figure 3** shows a coil made from tungsten being used to heat some water in a beaker at a constant voltage.

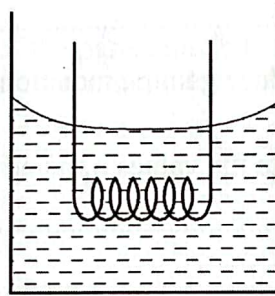


Figure 3

State **two** ways in which the coil can be improved so that the water boils in a shorter time.

(2 marks)

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- 9 Describe how a cathode ray oscilloscope may be used to measure the voltage of an alternating signal.

(3 marks)

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- 10 Explain why it is not advisable to leave a lead acid accumulator in the discharge condition for a long time. (2 marks)

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- 11 State two properties that distinguish electromagnetic waves from mechanical waves. (2 marks)

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- 12 Thorium element decayed to produce gamma radiation as shown in the equation below:  (2 marks)
- $${}^a_{90}\text{Th} \rightarrow {}^{230}_b\text{Th} + \gamma$$
- State the values of a and b.

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- 13 A student observed a rainbow when it was raining and the sun was shining. Explain how dispersion of white light by rain drops leads to the formation of the rainbow. (2 marks)

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- 14 State the reason why sound waves get refracted away from the ground on a hot day. (1 mark)

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SECTION B: (55 marks)

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

- 15 (a) **Figure 4** shows a gold - leaf electroscope.

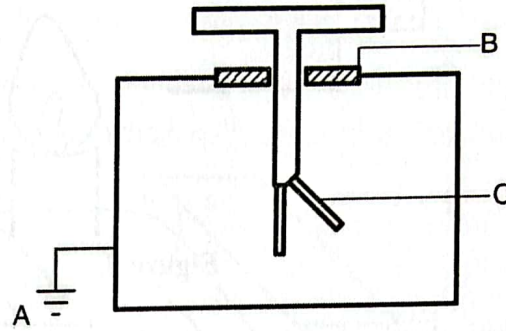


Figure 4



- (i) Identify the part labelled A.

(1 mark)

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- (ii) State the function of the parts labelled.

- (I) B

(1 mark)

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- (II) C

(1 mark)

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- (b) A highly negatively charged rod is slowly brought close to a lightly positively charged gold leaf electroscope.

- (i) State what is observed on the gold leaf.



(1 mark)

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- (ii) Explain the observation made in b(i).

(2 marks)

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- (c) **Figure 5** shows a thin wire connected to a highly positively charged rod and placed close to a candle flame.

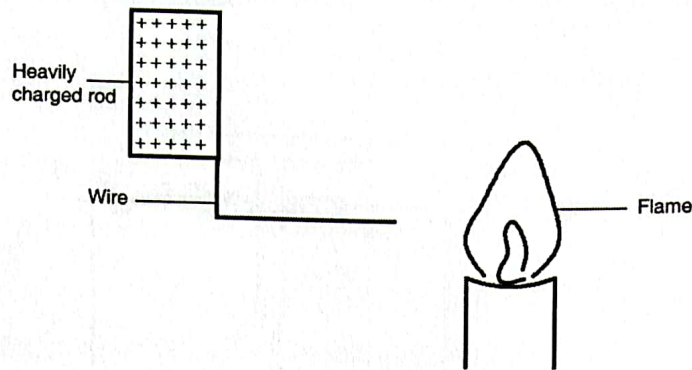


Figure 5.

- (i) State what is observed on the flame when the wire is brought closer.

(1 mark)

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- (ii) Explain the reason for the observation in c(i)

(1 mark)

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- (d) **Figure 6** shows an arrangement of three capacitors in a circuit.

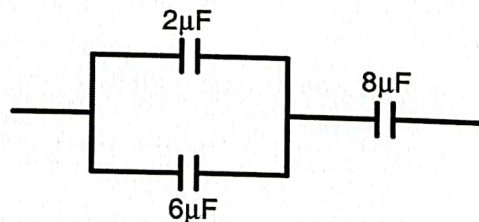


Figure 6

Determine the effective capacitance of the arrangement.

(3 marks)

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16 (a) State Fleming's left hand rule.

(1 mark)

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(b) Figure 7 shows an electric motor with a coil ABCD in the magnetic field.

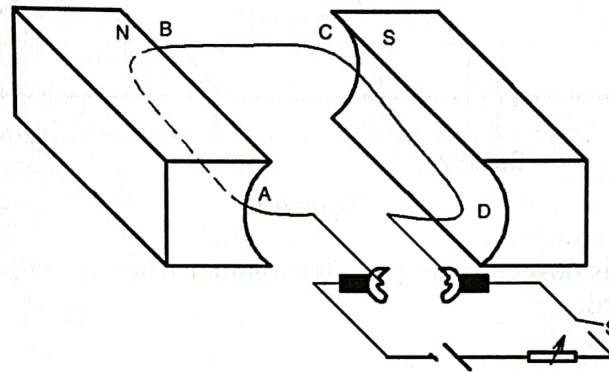


Figure 7

(i) Indicate with an arrow on the coil ABCD, the direction of the current I when switch S is closed. (1 mark)

(ii) State the direction in which the coil rotates when the switch is closed. (1 mark)

(iii) Explain what makes the coil to rotate. (3 marks)

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(iv) State **three** ways in which the power of this motor can be increased. (3 marks)

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(v) State the purpose of the rheostat in the setup. (1 mark)

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- 17 (a) **Figure 8** shows a setup that may be used to investigate photoelectric effect. In the setup, a UV source is placed close to the window.

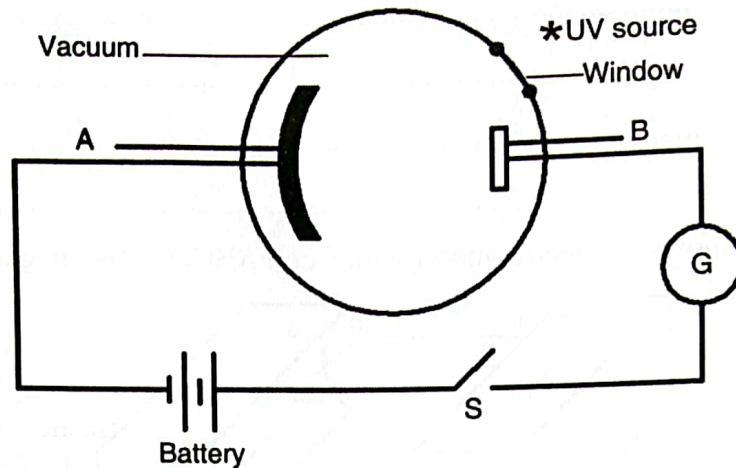


Figure 8

- (i) Explain what is observed on the galvanometer when the window is opened and the switch is closed. (3 marks)

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- (ii) Explain why parts A and B are placed in a vacuum. (2 marks)

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- (b) A photon of red light has a wavelength of $8.0 \times 10^{-1} \text{ m}$. Determine the energy it contains. (Planks constant h is $6.63 \times 10^{-34} \text{ Js}$ and the speed of light c is $3.0 \times 10^8 \text{ ms}^{-1}$) (3 marks)

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- (c) A metal surface has a work function of 4.5 eV. (Planks constant h is 6.63×10^{-34} Js and the electronic charge e is 1.6×10^{-19} C).

Determine the;



- (i) work function of the metal in joules (J).

(2 marks)

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- (ii) maximum wavelength of a radiation that will cause electrons to be emitted from the surface. (3 marks)

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- 18 a) Figure 9 shows the image produced by a concave mirror of focal length 20 cm.

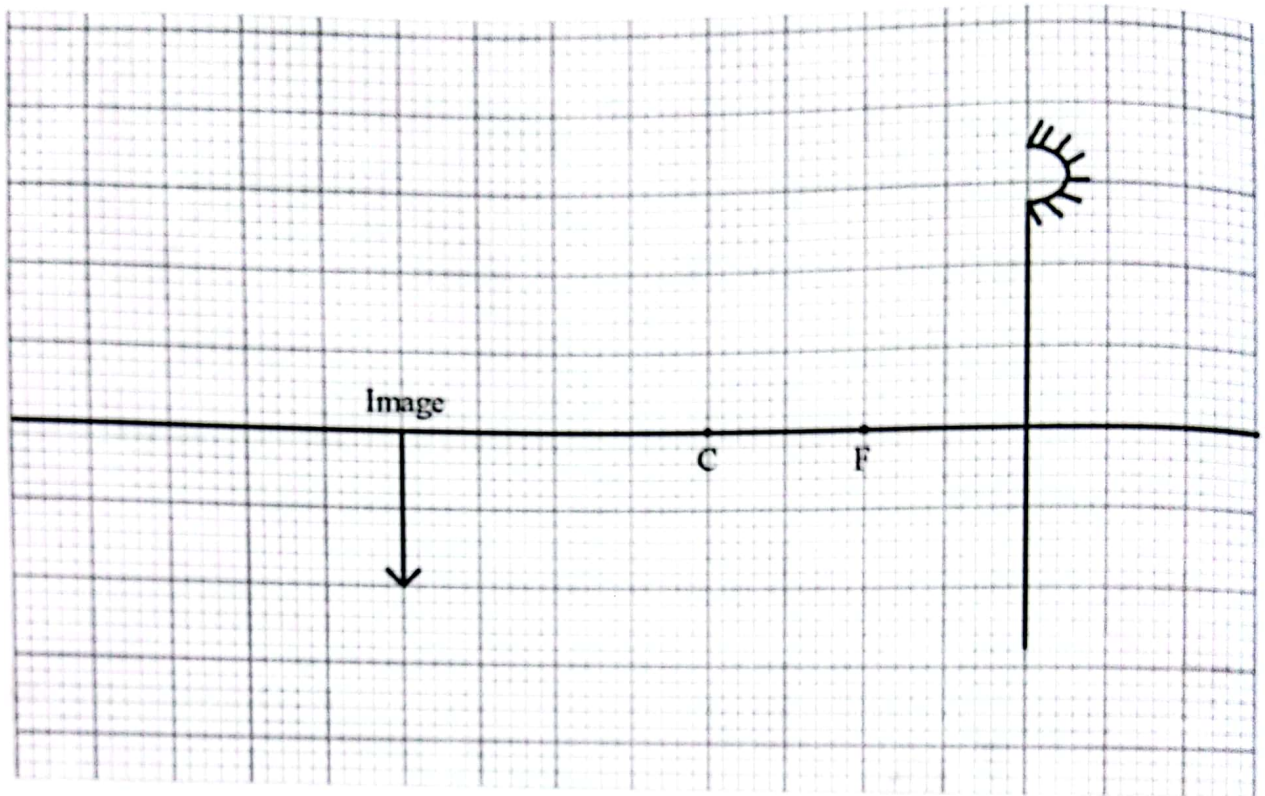


Figure 9

- (i) On the same diagram draw rays to show the position of the object. (3 marks)
- (ii) Given that the diagram is drawn to scale, determine the:
- (I) distance of the object from the mirror; (1 mark)

- (II) magnification. (3 marks)

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- (b) **Figure 10** shows a ray of light incident at the pole of a convex mirror.

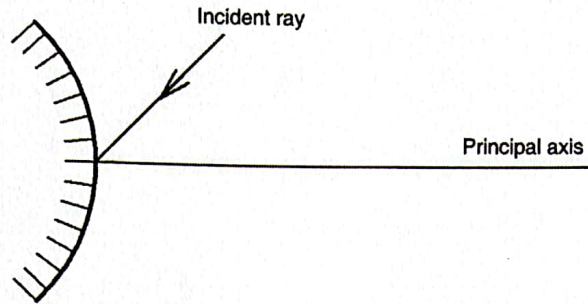


Figure 10

- (i) Complete the diagram to show how the ray may be used to locate the image formed by the mirror. (2 marks)
- (ii) State any **two** characteristics of the image formed. (2 marks)

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- 19 (a) A cliff obstructs an observer from seeing an approaching car. Explain how the sound from the car reaches the observer before the car emerges. (2 marks)

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- (b) **Figure 11** shows a displacement - time graph for a certain wave motion.

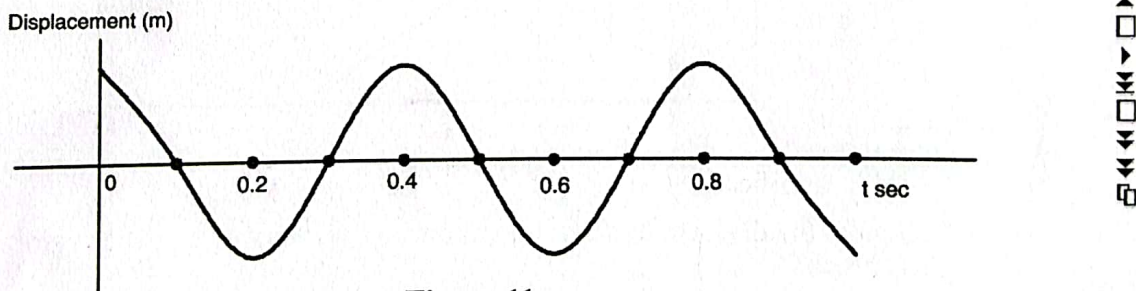


Figure 11

- (i) Determine the:
- (I) period T ; (1 mark)

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(II) frequency f . (2 marks)

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- (ii) On the same axis draw a wave whose frequency is twice the one obtained in part (II). (2 marks)

- (c) (i) State the meaning of the term “refraction”. (1 mark)

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- (ii) **Figure 12**, shows a rectangular glass block, dipped in a ripple tank in which plane water waves are generated.

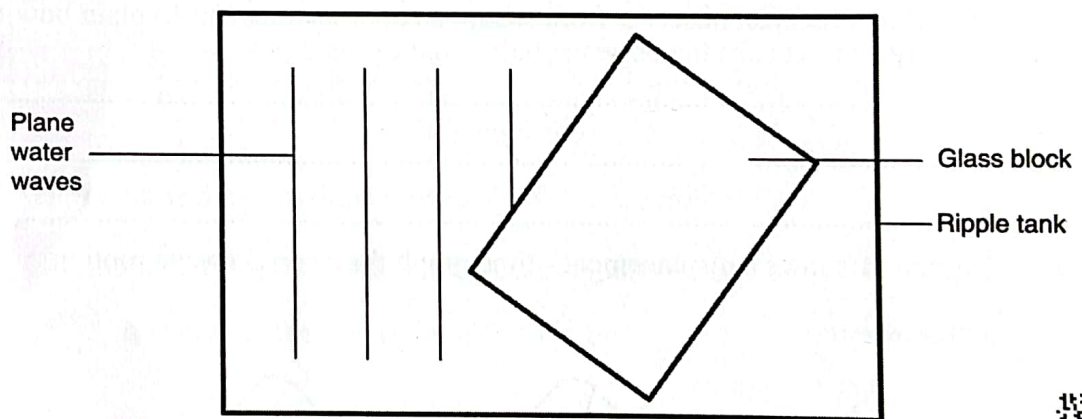


Figure 12

Complete the diagram to show how the water waves move in the region that has the glass block.

(2 marks)

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