



MASENO SCHOOL MOCK - 2022

Kenya Certificate of Secondary Education



232/2

Paper 2

PHYSICS

(Theory)

Sept. 2022 - 2 Hours

Name Admission Number

Class Date Candidate's Signature.....

Instructions to candidates

- Write your name and admission number in the spaces provided above.
- Write your class, the date of examination and sign in the spaces provided above.
- This paper consists of **two** sections **A** and **B**.
- Answer **all** the questions in sections **A** and **B** in the spaces provided.
- All working must** be clearly shown.
- Silent non-programmable electronic calculators may be used.
- This paper consists of **12 printed pages**.
- Students should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.
- Students should answer the questions in English. Take $g = 10\text{m/s}^2$

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

SECTION A (25 marks)

Answer all the questions in this section in the spaces provided

1. a) State the property of light demonstrated by formation of shadows. (1 mark)

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- b) One modification on a pinhole camera to take still photographs is painting the inside of the box black. Give a reason for this. (1 mark)

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2. Explain the origin of static charges. (2 marks)

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3. A convex mirror has a wider field of view than a plane mirror. Use diagrams to illustrate. (2 marks)

4. State two advantages of connecting lamps in parallel in a lighting circuit. (2 marks)

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5. Give one similarity and one difference between ultraviolet radiation and infrared radiation.

Similarity (1 mark)

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Difference (1 mark)

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6. Explain the difference between semiconductors and insulators in terms energy band theory. (2 marks)

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7. a) **Figure 1** shows circular waves incident on a curved surface. Complete the figure to show the reflected wavefronts. (1 mark)

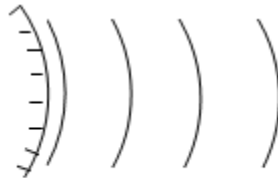


Figure 1

b) State one property of a wave which remains the same as water moves from a shallow water region to a deep region. (1 mark)

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8. An X-ray tube has an accelerating potential of 100kV. Calculate the maximum frequency in its X-ray beam. ($h = 6.63 \times 10^{-34} \text{ Js}$; $e = 1.6 \times 10^{-19} \text{ C}$) (2 marks)

9. State one application of the following; (2 marks)

a) soft magnetic material

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b) hard magnetic material

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10. **Figure 2** shows rays of light incident on air-medium interface and their corresponding emergent rays.

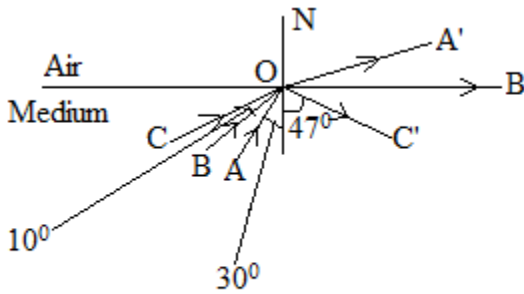


Figure 2

Determine the;

- a) critical angle. (1 mark)

- b) refractive index of the medium. (2 marks)

11. The type of shadows formed is determined by the sources of light and opaque objects. State any other factor. (1 mark)

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12. An object is set up 10cm in front of a mirror of focal length 20cm. A virtual and magnified image is formed. Giving a reason, state the type of the mirror used. (2 marks)

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13. In a filament lamp, the bulb is evacuated. Give a reason why it is necessary to fill it with an inert gas. (1 mark)

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SECTION B (55 marks)

Answer all the questions in this section in the spaces provided

14. a) Define the term “work function”. (1 mark)

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- b) i) Distinguish between thermionic emission and photoelectric emission. (1 mark)

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- ii) State one factor which affects the rate of each of the above types of emission. (2 marks)

I. Thermionic emission;

II. Photoelectric emission;.....

- c) A metal surface has a work function of 4.85 eV. Calculate the maximum kinetic energy in joules of the electrons emitted when the metal is irradiated with UV light of frequency 1.75×10^{15} Hz.

($h = 6.63 \times 10^{-34}$ Js; $1\text{eV} = 1.6 \times 10^{-19}$ J) (2 marks)



- d) (i) **Figure 3** shows the pattern produced by a voltage source on a CRO screen. On the same figure, draw the pattern produced by the same voltage when the time base is switched off. (1 mark)

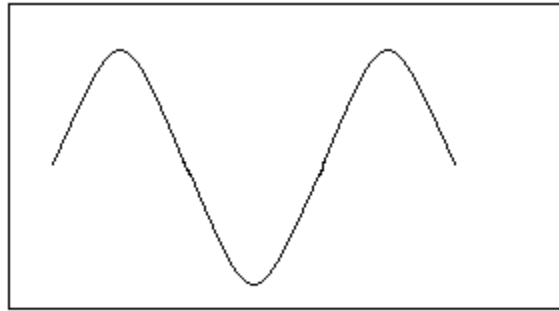


Figure 3

- (ii) The cathode ray tube (C.R.T.) of a television uses magnetic fields for the deflection of the cathode rays.

I. Define cathode rays (1 mark)

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II. Explain why magnetic fields are preferred to electric fields in a television tube. (2 marks)

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e) Explain why the tube of a cathode ray oscilloscope is made of thick glass wall. (1 mark)

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15. (a) A 10 F capacitor is charged by an 80 V supply and then connected across an uncharged 20 F capacitor. Calculate the;

(i) Final p.d across each capacitor. (2 marks)

(ii) Final charge on each capacitor. (2 marks)

(iii) Initial and final energy stored by the capacitors. (2 marks)

(iv) Account for the difference in energy in (iii). (1 mark)

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(b) **Figure 4** shows voltage – current relating for a certain battery used in an electrical circuit.

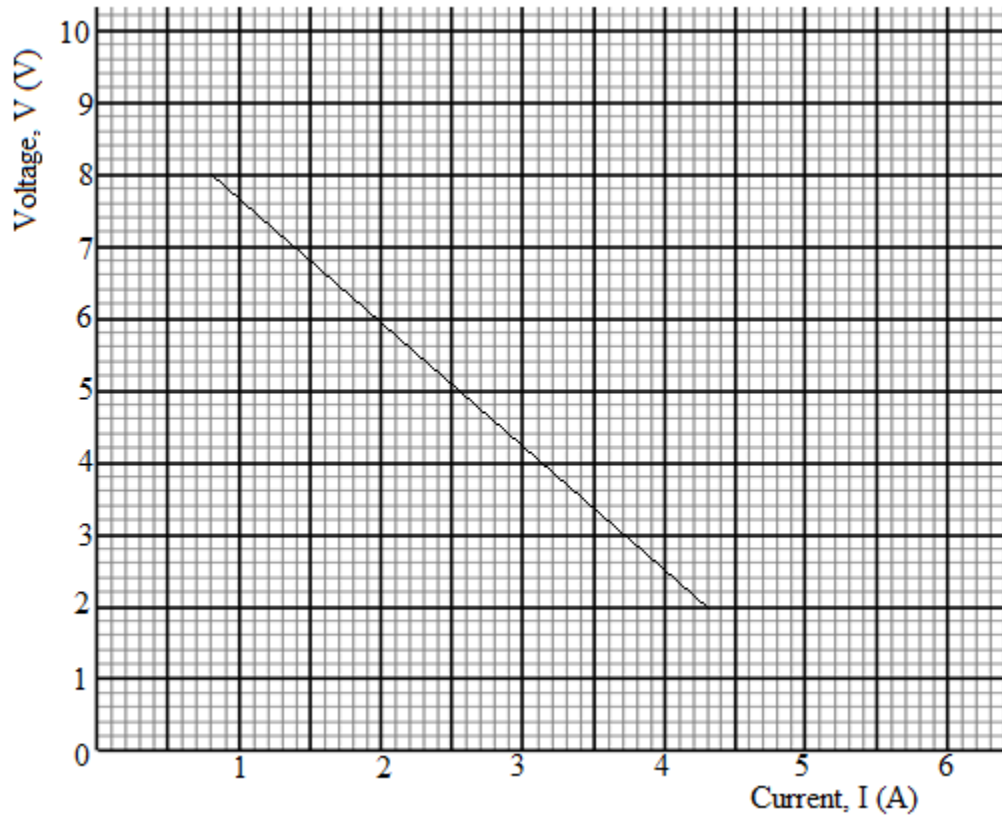


Figure 4

Given that the equation of the graph is $V = E - Ir$, from the graph, determine

- (i) The e.m.f, E , of the battery. (2 marks)
- (ii) The internal resistance, r , of the battery used. (3 marks)

16. a) **Figure 5** shows a motor connected to a magnetic switch called a relay operated by an ordinary switch S_1 . Use the information in the figure to answer questions that follow:

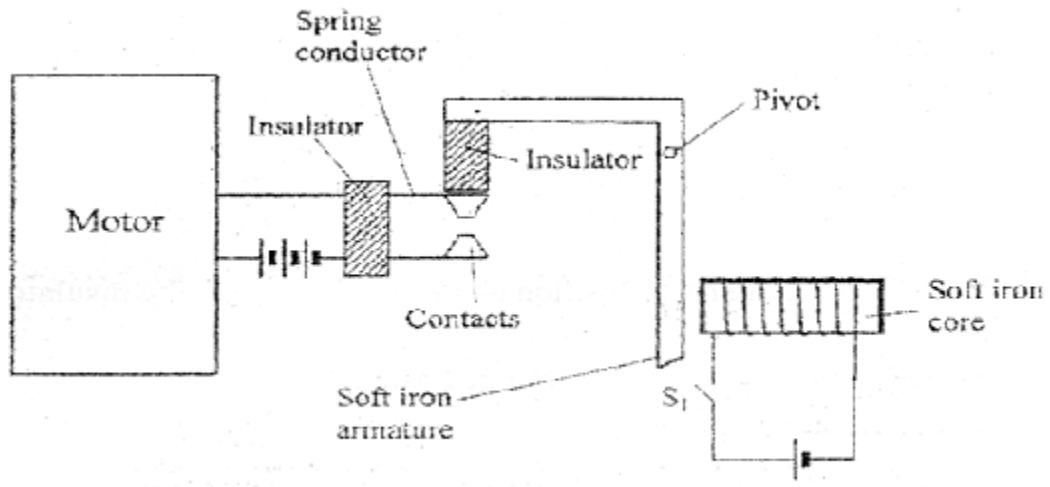


Figure 5

(i) Explain how the relay switches on the motor when S_1 is closed. (3 marks)

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(ii) State with a reason the effect on the motor if the iron core is replaced with a steel core and switch S_1 is put on and then off. (2 marks)

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b) State two advantages of a circuit breaker over a fuse. (2 marks)

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c) **Figure 6** shows an induction coil used to step up voltage.

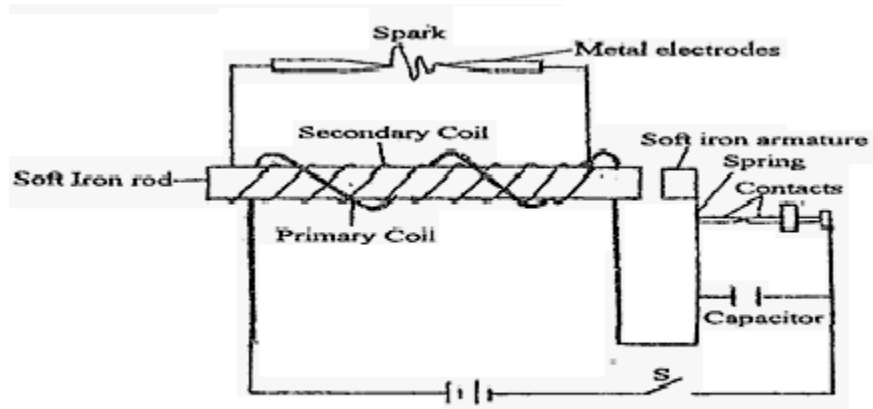


Figure 6

(i) Give a reason for the following;

I) winding the secondary turns on top of the primary turns. (1 mark)

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II) primary coil is made of thick wire while the secondary coil is made of thin wire. (1 mark)

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III) using platinum as contacts. (1 mark)

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(ii) State one difference between the induction coil and a step-up transformer. (1 mark)

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

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17. a) Define the term “half-life”. (1 mark)

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b) The activity of a radioactive source is initially 450 counts per second. After 72 hours, it reduces to 100 counts per second. If the background count per second is 50, determine the half-life of the substance. (3 marks)

c) Explain why the nuclide of carbon-12 is stable while that of carbon-14 is unstable. (1 mark)

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d) **Figure 7** shows an X-ray tube.

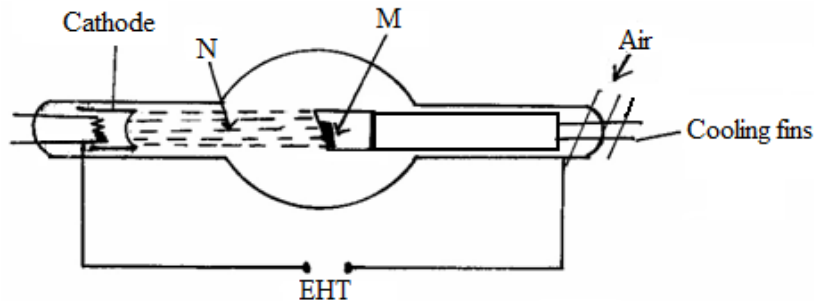


Figure 7

(i) Give a reason why M is set at an angle of 45° relative to the electron beam. (1 mark)

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(ii) State one property for parts labelled M and N. (2 marks)

M.....
 N.....

e) The tube above is operated at an anode potential of 2 kV and a current of 10 mA, determine number of electrons hitting the target per second. (2 marks)

18. a) **Figure 8** shows wavefronts in a ripple tank approaching a shallow region in the tank.

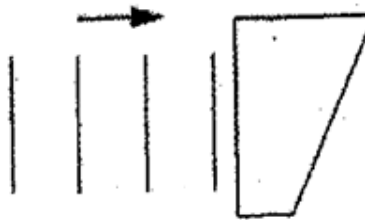


Figure 8

Complete the diagram to show the wavefronts as they pass over the shallow region and after leaving the region. (2 marks)

b) State two differences between travelling and standing waves. (2 marks)

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c) Give the main reason why diffraction of light wave is a rare occurrence. (1 mark)

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d) Explain why decrease in temperature decreases the speed of sound in solids. (2 marks)

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e) You are provided with a surveyor’s tape measure, a stop-watch and a hard smooth wall. Describe an experiment to determine the speed of sound in air. (3 marks)

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