

Name:ADM No.:Class

232/2

PHYSICS

PAPER 2

(THEORY)

TIME: 2 HOURS

JAN 2021

MARANDA HIGH SCHOOL POST MOCK I 2021

Kenya Certificate of Secondary Education (K.C.S.E)

INSTRUCTIONS TO CANDIDATES: -

- Write your **name** and **admission number** in the spaces provided above.
- This paper consists of **two** sections; **A** and **B**
- Answer **all** the questions in section **A** and **B** in the spaces provided
- All working **must** be clearly shown.
- Mathematical tables and electronic calculators may be used.

(Take Speed of light, $c = 3.0 \times 10^8$ m/s; Planck's constant, $h = 6.63 \times 10^{-34}$ Js)

For Examiners' Use Only:

SECTION	QUESTIONS	MAXIMUM SCORE	CANDIDATE'S SCORE
A	1-15	25	
B	16	11	
	17	12	
	18	11	
	19	12	
	20	09	
TOTAL		80	

This paper consists of 13 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing

SECTION A (25 MARKS)

1. Explain why sharp shadows support the theory that light travels in straight lines. (1 mark)

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2. a) Give one reason why radioactive disintegration is different from ordinary chemical changes? (1 mark)

.....

3. **Figure 1** below shows part of a circuit containing three capacitors of $4\mu\text{F}$, and $5\mu\text{F}$ and $6\mu\text{F}$ respectively.

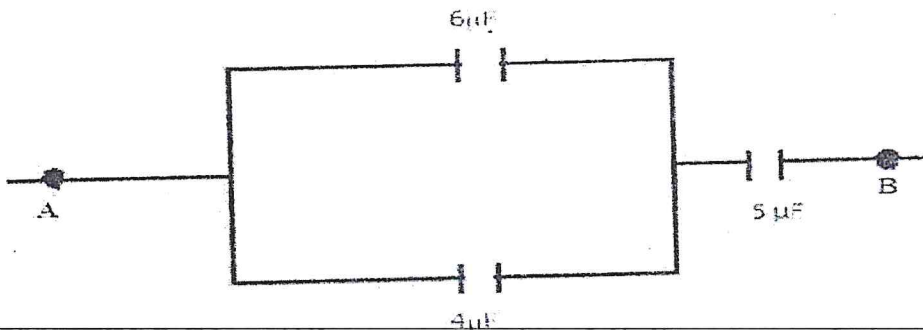


Fig.1

Determine the P.d across the $5\mu\text{F}$ capacitor given that the total charge stored in the capacitors is 0.0000052 C . (2 marks)

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4. State one causes of power loss in long distance transmission wires and how these loses can be minimized (1mk)

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5. State the meaning of the term “threshold frequency” as used in photoelectric emission.
(1 mark)

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6. **Figure 2** below shows the path of light passing through a rectangular block of perspex, placed in air.

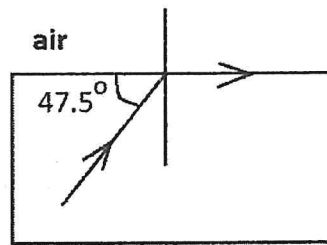


Fig.2

Calculate the refractive index of the Perspex.

(2 marks)

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7. Two similar razor blades are placed one on a wooden block and the other on a soft iron block as shown in **Figure 3** below

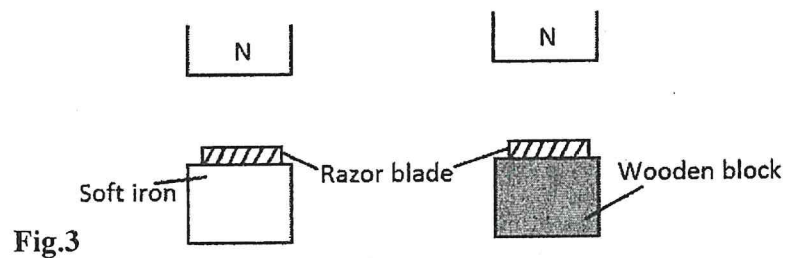


Fig.3

It was observed that the razor blade on the wooden block was attracted to the magnet while the other on the soft iron block was not. Explain.
(2 marks)

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9. **Figure 4** below shows two parallel current carrying conductors **P** and **Q** placed close to one another. Current flows in the opposite directions.

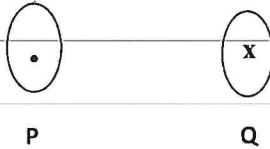


Fig.4

Sketch on the figure the magnetic field pattern formed by the two conductors. (1mk)

10. The table in **figure** below shows part of the electromagnetic spectrum in order of decreasing wavelength

A	B	INFRA RED RADIATION	VISIBLE LIGHT	C	D
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- (a) How are waves **C** produced? (1mk)

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- (b) State one use of the wave **D** (1mk)

.....

11. A house has a lighting circuit operated from a **240V** mains supply. Four bulbs rated **40W 240V** and six bulbs rated **100W 240V** are switched on for **5** hours a day. Determine the monthly bill for the consumer given that the cost of electricity is at shs. 5.50 per unit. (Take 1 month = 30 days and the standing charge is sh. 150) (2mks)

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12. **Figure 5** below shows an eye defect

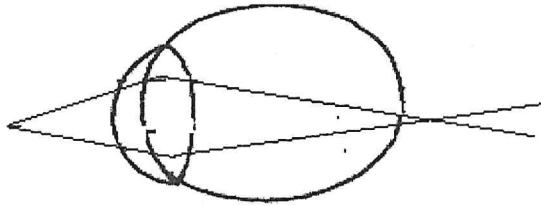


Fig.5

Use a ray diagram to show how the defect above could be corrected. (2mks)

13. A girl standing at a distance claps her hands and hears an echo from a tall building 2 seconds later. If the speed of sound in air is 340m/s, determine how far the building is. (2mks)

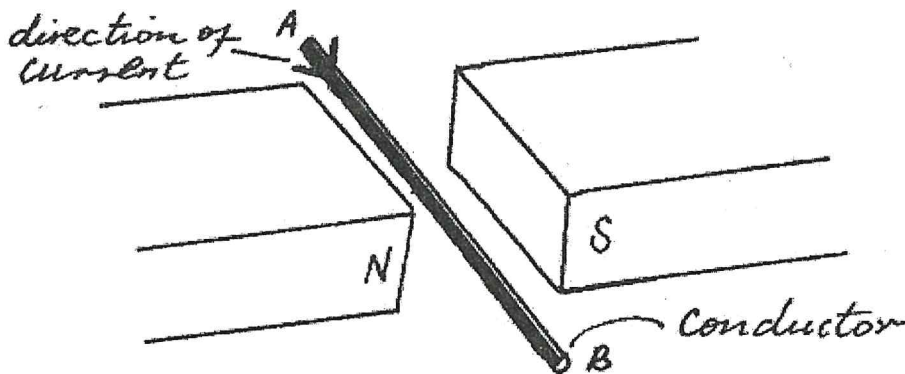
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14. A current-carrying conductor **AB** is in a magnetic field as shown in the figure below.



- (a) Indicate the direction of force **F** acting on the conductor. (1mk)

(b) State **two** factors that determine the direction of the force F .

(2mks)

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15. **Figure 6** below shows a wave form of voltage displayed on the screen of a C.R.O.

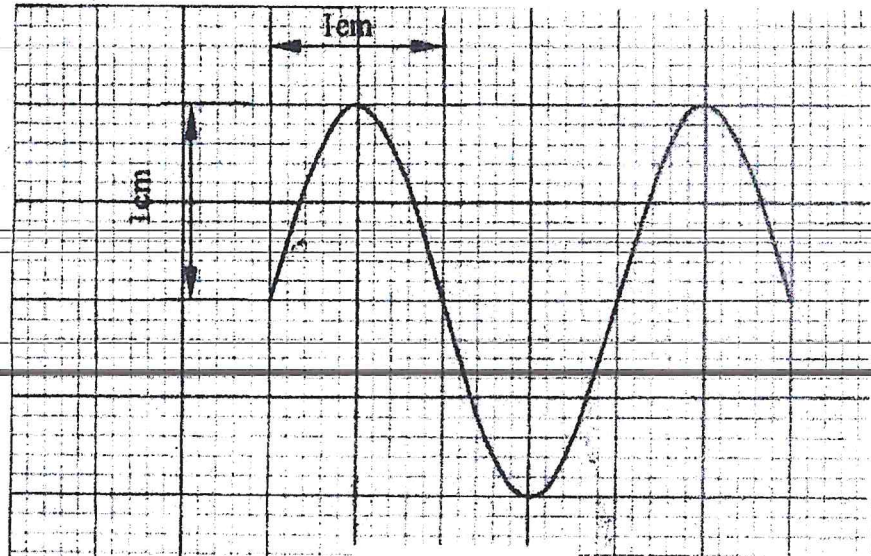


Fig 6

If the Y- Gain calibration is 7.5V per cm and the time base is 2.0 ms per cm.

Determine

I. The peak to peak voltage of the input signal.

(2 mks)

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II. The frequency of the signal.

(1 mks)

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SECTION B (55 marks)

Answer all questions in the spaces provided

16

- a. List two sources of back ground radiation in Radioactivity (2mks)

- b. A radioactive isotope ${}_{90}^{232}\text{Tl}$ emits two alpha particles and two beta particles as a result of four successive disintegration. If the daughter product is represented as ${}^{\text{A}}_{\text{Z}}\text{Y}$. Work out the values of A and Z. (2 marks)

- c. A certain radioactive material has the average count rate of 82 counts per second. After a time of 210 seconds, the count rate had dropped to 19 counts per second. The average background count rate remained constant at 10 counts per second. What is the half- life of the material (3mks)

- d. Differentiate between nuclear fusion and nuclear fission as used in radioactivity (2mks)

- e. State any two properties of beta particles (2mrks)

17.

- a) Define the term electromagnetic induction (1 mark)

- b) State **two** factors that determine magnitude of e.m.f induced in a coil. (2mrks)

c) State Lenz's a law of electromagnetic induction.

(1mark)

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d) **Figure 7** below shows a bar magnet being moved into a coil of insulated copper wire connected to a centre-zero galvanometer.

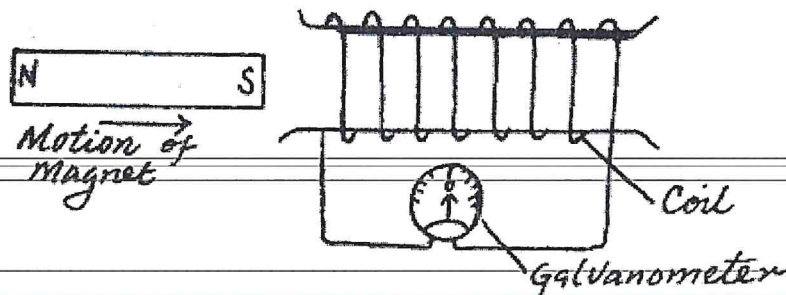


Fig. 7

- i. Show on the diagram the direction of induced current in the coil. (1mark)
- ii. State and explain clearly what is observed on the galvanometer when the S-pole of the magnet is moved into and then withdrawn from the coil. (2marks)

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e) A transformer has 1000 turns in the primary and 50 turns in the secondary winding. The alternating e.m.f connected to the primary is 240V and the current is 0.5A. The transformer is 100% efficient. Determine the:

- i. secondary e.m.f (2marks)

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- ii. Current in the secondary winding. (2marks)

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f) **Figure 8** below shows a simple d.c generator

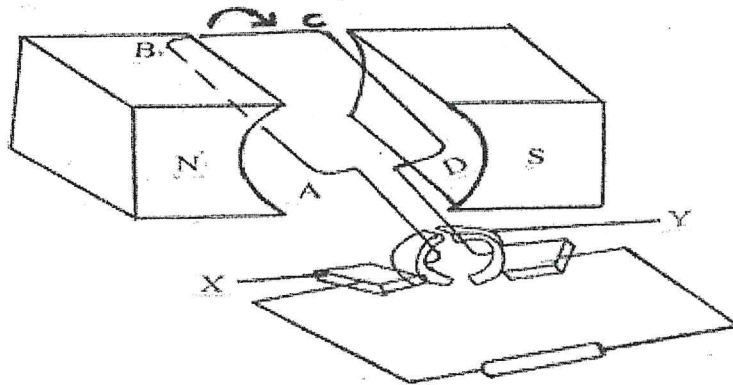


Fig. 8

The coil is rotated in a clockwise direction; indicate using an arrow on the figure the direction of the induced current as the coil passes the position shown. (1mk)

18. a)

i) What is the meaning of the term Photo-electric effect. (1mk)

.....

ii) The minimum frequency of light which will cause Photoelectric emission from a metal surface is 5.6×10^{14} Hz. If the metal surfaces irradiated with electromagnetic waves source of frequency is (6.8×10^{14} Hz). Determine.

I The work function of the metal surface ($h = 6.63 \times 10^{-34}$ JS) (1mk)

.....

II The energy of the source radiation. (2mks)

.....

III The maximum kinetic energy of the Photoelectrons produced in eV. (2mk)

b). **Figure 9** below shows the variation of photoelectric current with applied voltage when two different surfaces **a** and **b** are illuminated with light a certain frequency. Use the information in the figure to answer the questions below.

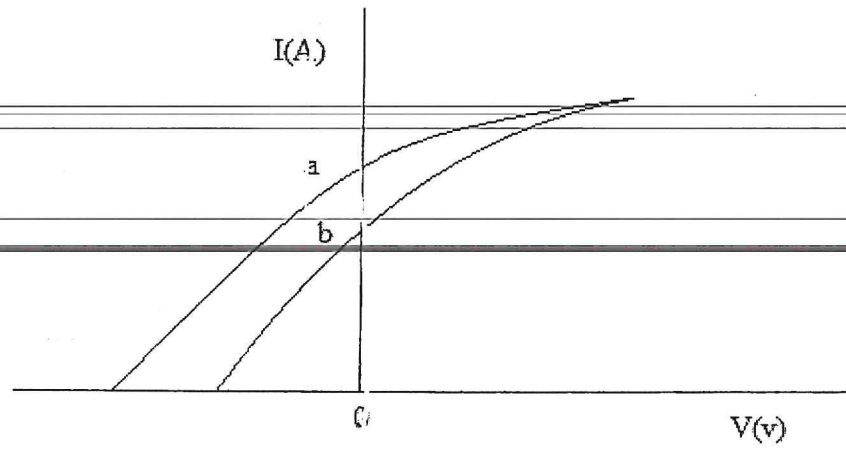


Fig 9

i) State and explain between surface **a** and **b** which one has a higher work function. (3mrks)

ii) on the space provided sketch the graph of photoelectric current against applied voltage when light of two different intensity but same frequency is used to illuminate a given surface. (2mrks)

19. (a) State the Ohm's law

(1mark)

(b) You are provided with the following apparatus; a coil of nichrome wire, two dry cells, ammeter, voltmeter, connecting wires, switch and rheostat.

(i) Draw a circuit diagram that can be used to verify Ohm's law (1mark)

ii) Describe how the measurements obtained can be used to verify Ohm's law

(3marks)

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(c) Study **Figure 10** below and answer the questions that follow

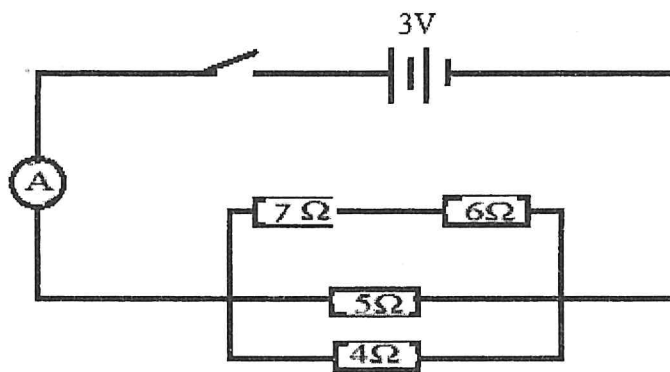


Fig. 10

Determine:

(i) The combined resistance

(3 marks)

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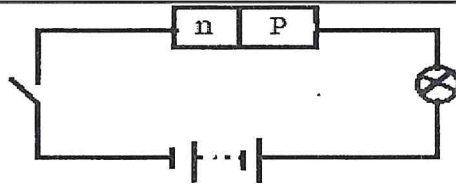
(ii) The total current flowing through the 6Ω resistor (2 marks)

(iii) Voltage across the 7Ω resistor (2marks)

20. a) Using a diagram explain how doping produces a p-type semi-conductor. (3 marks)

(ii) What is biasing? (1 mk)

(iii) The diagram below shows a circuit with a p-n junction and a very low power bulb.



State with reason the observations made on the bulb when the switch is closed. (2 mrks)

b) i) what is rectification. (1mk)

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ii) In the space provided below draw a complete circuit to show half wave rectification.

(2mrks)

