PHYSICS PAPER 2

EXPECTED QUESTIONS IN KCSE

Comprises 6 KCSE prediction set exams (Class of KCSE March 2022).

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PREDICTION 1

232/2
PHYSICS
FORM 4 2021
PAPER 2
2 HOURS

INSTRUCTIONS TO CANDIDATES

- *Write your name and index number in the spaces provided above*
- *Sign and write the date of the examination in the spaces provided*
- *Mathematical tables and electronic calculators may be used.*

For Examiner's Use Only

Section	Question	Maximum Score	Candidates' Score
A	Q1 – Q12	25	
B	Q13 Q14 Q15 Q16 Q17	11 12 11 10 11	
		80	

This paper consists of 14 printed pages.

Candidates should check the question paper to ensure that all the

Pages are printed as indicated and no questions are missing.

SECTION A (25 MARKS)

1. a) A plane mirror suspended on a vertical wall makes an angle of 60^0 with the wall. Determine the angle of reflection for a ray incident on the mirror and parallel to the horizontal.

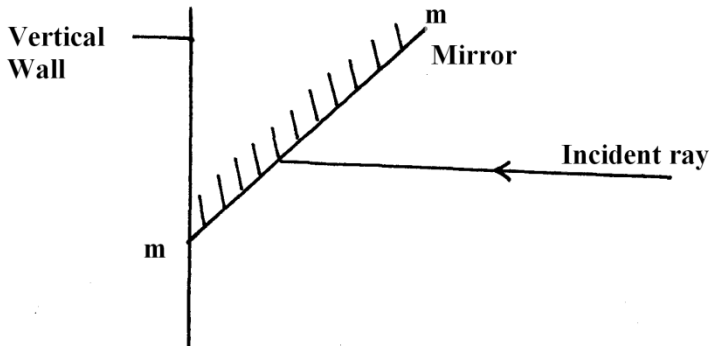

Fig. 1

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b) During total eclipse of the sun, both light and heat are observed to disappear simultaneously. Explain (1 mark)

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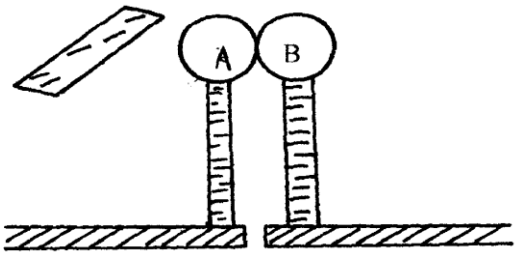
2. Two identical sphere A and B each standing on an insulated base are in contact .A negatively charged rod is brought near sphere A as shown below.



In what way will **A** differ from **B** if separated while the rod is held close to A ? (2mks)

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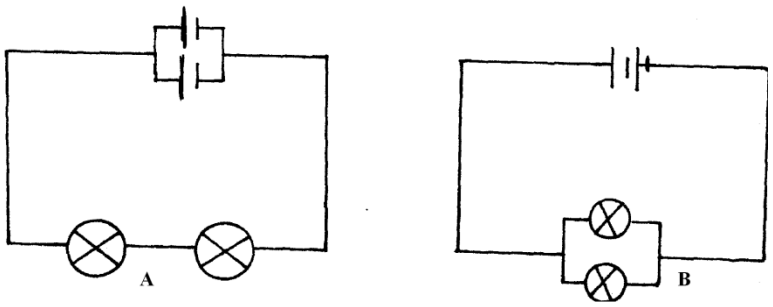
3. A student was investigating the brightness of bulbs when set up in circuits. He used identical bulbs and cells. He set up circuit A and B consisting of two bulbs and two cells as shown below.



State and explain which set – up had the bulbs brighter (2mks)

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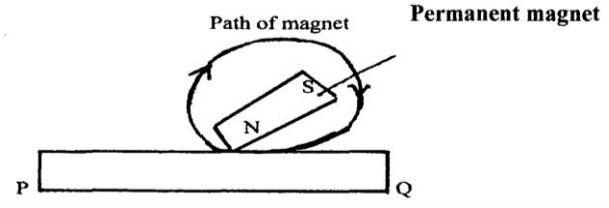
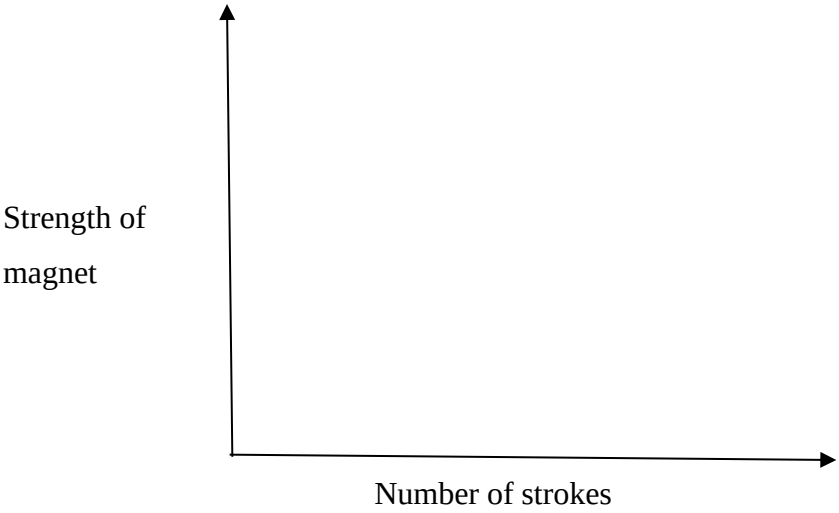
4. (i) The diagram below show a ferromagnetic material being magnetized by the method shown.

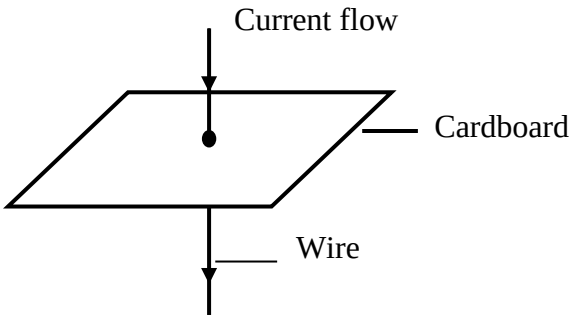


Identify the polarity of P (1mk)

(ii) On the axes given below , sketch a graph to show how the strength of the magnet being created varies with the number of strokes. (1mk)



5. Figure below shows a current carrying vertically right wire at right angle to a cardboard. Iron fillings are sprinkled on the card and card slightly tapped.



Draw and indicate the direction of the magnetic field pattern displayed on the card. (2 mks)

6. When a germanium crystal is doped with arsenic, it becomes an N-type semiconductor. Explain how this change occurs. (2 mks)

(Number of electrons in the outermost shell for germanium = 4, Arsenic = 5)

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7. The following is a part of a radio – active series.

$$^{210}_{83}X \xrightarrow{r} {}^{210}_{84}y \xrightarrow{\alpha} {}^{c}_{d}z$$

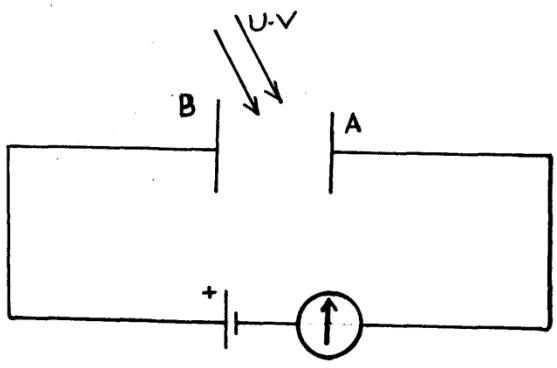
Identify the radiation r , find the values of C and d

r……(1mk)

c……..(1/2mk)

d……..(1/2mk)

8. The figure below shows a set up to demonstrate photoelectric effect. Use it to answer Questions 8(a) and (b).



a) What observation will be made when UV light shines on plate A. Explain.

(2mks)

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b) What is the effect of introducing a barrier between plates A and B. (1mk)

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9. 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) (3 mks)

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10. The chart below shows an arrangement of different parts of the electromagnetic spectrum.

P	Q	R	Ultra violet	S	Gamma rays

Name the radiation represented by letter Q and state one use of the radiation. (2 mks)

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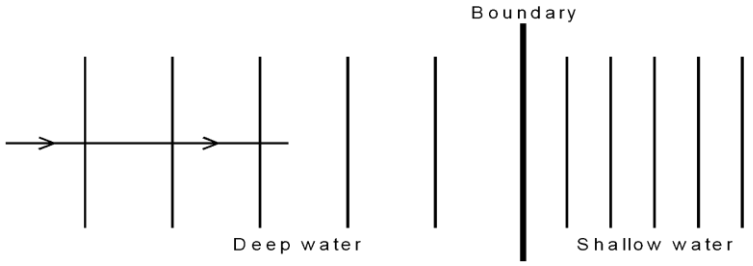
11. Plane water waves produced in a ripple tank are passed from a region of deep water into a region of shallow water. The figure below shows the top view of the tank.



a) State what happens at the boundary to the frequency of the waves. (1 mk)

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b) The waves have a speed of 24cm/s in the deep water. Consecutive waves crests are 0.08m apart in the deep water. Calculate the frequency of the source producing the wave. (2 mks)

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12. State one advantage and one disadvantage of a convex mirror when used as a driving mirror (1mk)

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SECTION B (55 MARKS)

13. The image formed by a convex lens is erect. On Figure 10 below, draw the object and using ray diagram, locate and draw the erect image. (3mks)

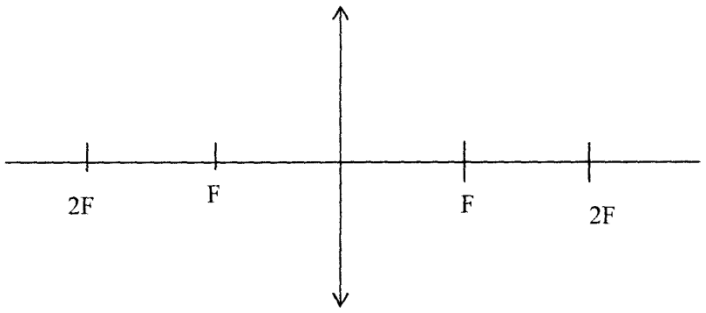

Figure 10

(a) Apart from being erect, state two other characteristics of the image. (2mks)

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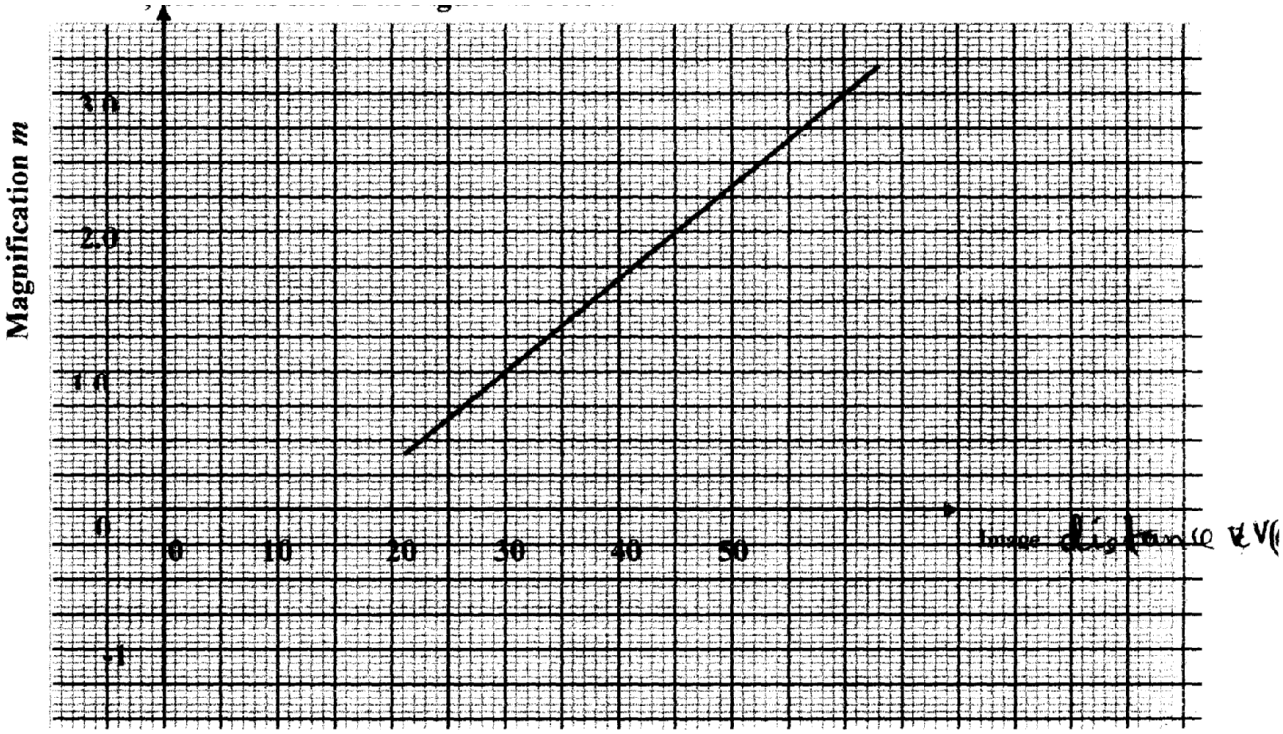
(b) In an experiment to determine the focal length of a converging lens using the lens formula, several values of image distance corresponding to value of object distance U were determined and a graph of magnification m against image distance v,plotted as shown in **Figure 11** below



The equation of the graph can be represented by the equation

$$m = \frac{V}{f} - 1$$

(i) What does the gradient of the graph represent? (1mk)

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(ii) Determine the focal length of the lens. (2mks)

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(iii) Find the value of object distance for which the image is not magnified. (1mk)

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c) An object of height 10.5cm stands before a diverging lens of focal length 20cm and a distance of 10cm from the lens. Determine the image distance. (2 mks)

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14. (a) The refractive index of glass is $3/2$ and that of water is $4/3$. Calculate the refractive index of glass with respect to water. (2 mks)

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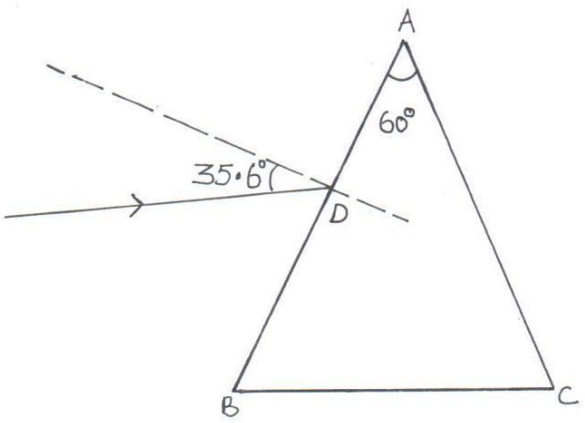
(b) The figure below shows a ray of light incident at an angle of 35.6° at point D on the first face of a glass prism ABC. The refractive index of the prism

is 1.6.



(i) Determine the angle of refraction at point D. (2 mks)

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(ii) Find the angle of incidence of the refracted ray on the face AC to 1 decimal point. (2 mks)

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(iii) Complete the ray diagram to show the emergent ray from the face AC. (2 mks)

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(iv) State **two** conditions necessary for total internal reflection to occur. (2 mks)

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(c) 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. (2 mks)

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15. a) State one application of a capacitor. (1 mk)

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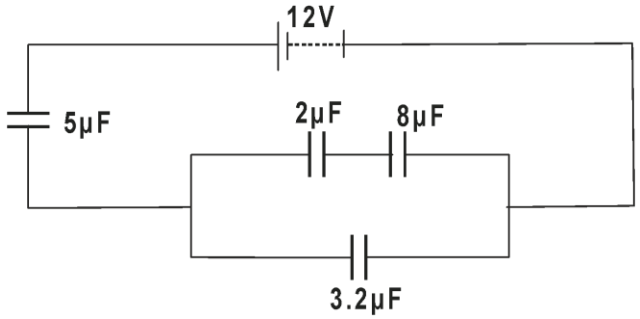
b) Figure 7 shows four capacitors connected to a battery of 12 volts.



Calculate:

i) Effective capacitance. (2 mks)

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ii) Charge on 3.2 μF (2 mks)

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iii) Potential Difference across 5 μF (2 mks)

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iv) The energy stored by 2 μF (2 mks)

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(c) What are effects on capacitance of a parallel plate capacitor when :

(i) Increasing the area overlap of the plates ? (1mk)

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(ii) Increasing the distance of separation between plates ? (1mk)

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16. a) State Lenz's law of electromagnetic induction. (1mk)

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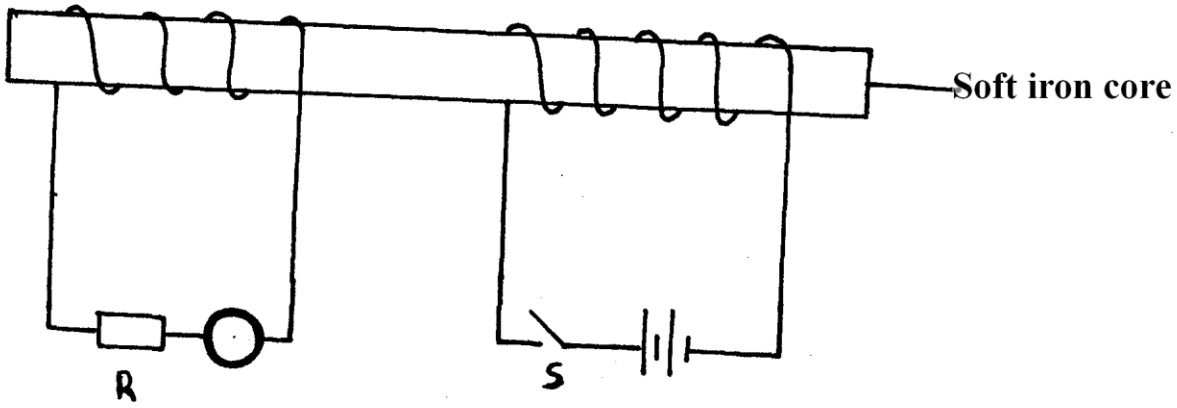
b) The figure shows two coils of insulated copper wires wound on a single soft iron core. One coil is connected to a battery through a switch and the other is connected to a resister through a galvanometer.



It is observed that as the switch is closed, the pointer of the galvanometer deflects momentarily. The same as when the switch is opened.

i) Explain why the pointer deflects momentarily. (2mks)

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ii) State one way in which the current through R can be increased. (1mk)

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c) i) State one way in which power is lost in a transformer. (1mk)

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ii) A transformer uses 240V ac supply to deliver 9A at 80V to a heating coil.
If 10% of the energy taken from the supply is lost in the transformer itself,
What is the current in the primary winding? (2mks)

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d) **Figure 8** , shows the voltage – current relating for a certain battery used in the electrical circuit in a above

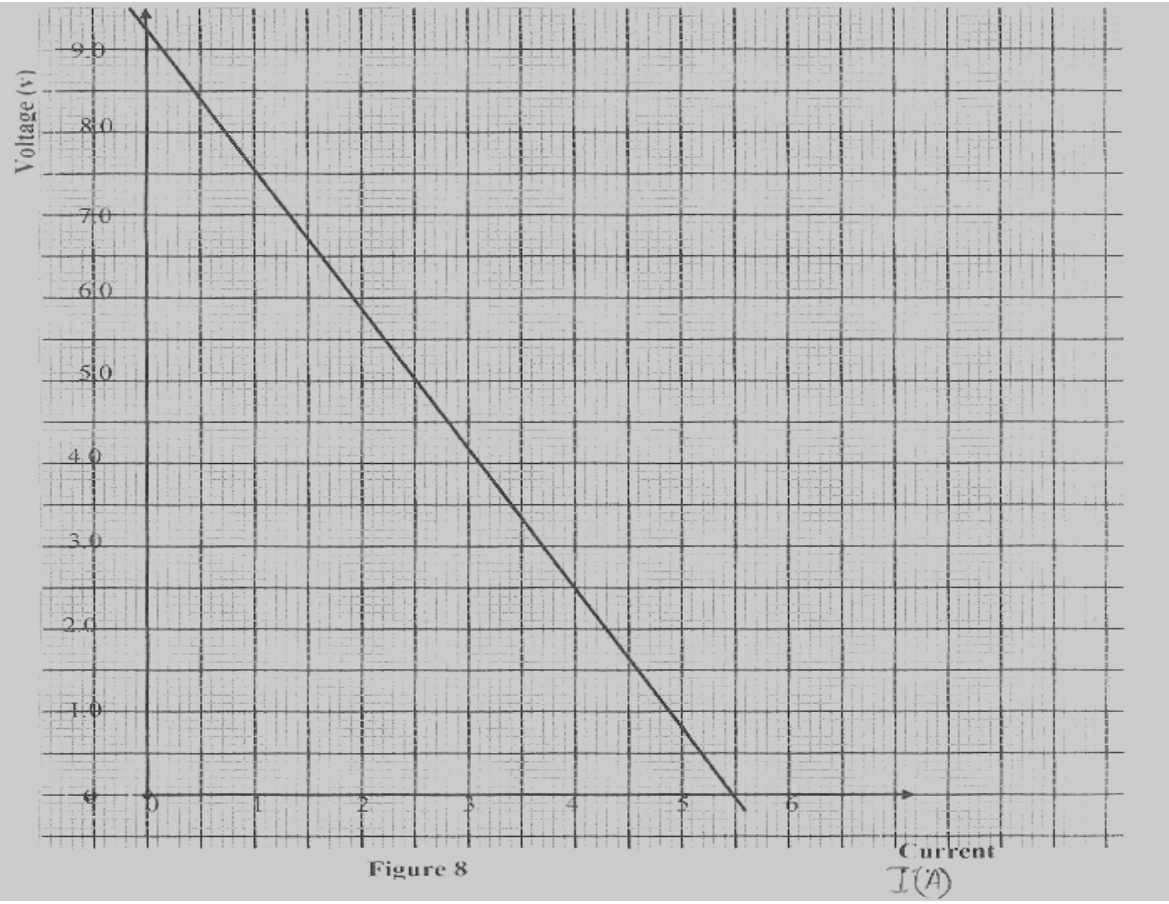

Figure 8

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

(i) The e.m. fof the battery. (1mk)

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(ii) The internal resistance of the battery used. (2mks)

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17. a) During the operation of an X-Ray tube, the target becomes very hot. Explain how this heat is caused. (1 mk)

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(b) What property of lead makes it suitable for use as a shielding material in an X-Ray tube? (1 mk)

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c) In a certain X- ray tube electrons are accelerated by p.d of 12 kV. Assuming all energy goes to produce X-rays, determine the frequency of the X-rays produced (Planck's constant $=6.63\times10^{-34}$ Js. Charge of an electron$=1.6\times10^{-19}$C) (2 mks)

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d) X-Rays are used in detecting cracks inside metal beams. State the type of X-rays used for this purpose and state the reason. \ (2 mks)

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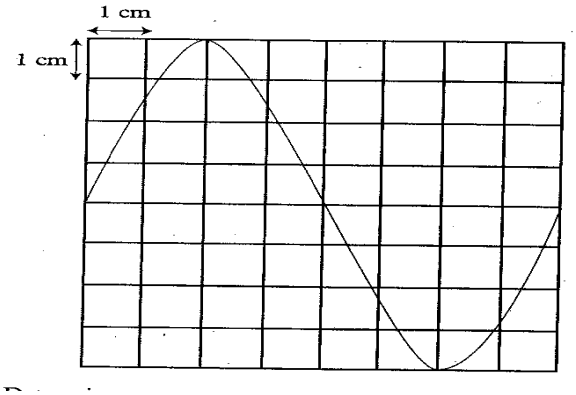
e) The figure below shows the waveform of a voltage displayed on the screen of a C.R.O.

The Y-gain was 5V/cm and time base control was 10ms/cm.



Determine the:

i) Peak to peak voltage of the Y- input (1 mk)

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ii) Period of the signal (2 mks)

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iii) Frequency of the signal. (2mks)

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THIS IS THE LAST PRINTED PAGE

PREDICTION 2

NAME_____ **INDEX NO** _____

CANDIDATE'S SIGNATURE_____

DATE_____

232/2
PHYSICS
THEORY
PAPER 2
2 HOURS

INSTRUCTIONS
Write your name and admission number in the space provided
Sign and write the date of the examination in the space provided above
This paper consists of two sections A and B.
Answer all the questions in the spaces provided.
All working must be clearly shown.
Mathematical tables and electronic calculators may be used.

For examiner's use only

SECTION	QUESTION	TOTAL MARKS	CANDIDATE'S SCORE
A	1-13	25	
B	14	11	
	15	13	
	16	11	
	17	10	
	18	10	
		GRAND TOTAL	80 MARKS

TOTAL CANDIDATE'S SCORE

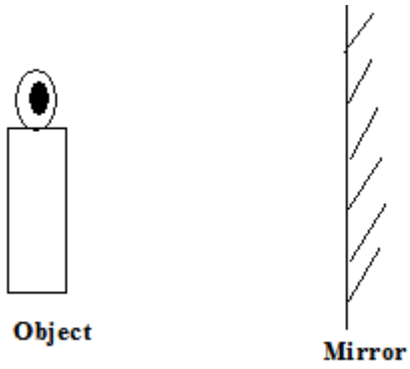
Section A [ ] + section B [ ] = [ ]

This paper consists of 9 printed pages

SECTION A (25 Marks)

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

1. Locate the position of the image of the object placed in front of a plane mirror shown below. (2 mks)



2. Show the magnetic field pattern of the current carrying conductors shown below. (2 mks)

3. State two factors that determine the strength of an electromagnet. (2 mks)

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4. State two advantages of using a convex mirror as a driving mirror. (2 mks)

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5. State two factors that affects the resistivity of an electrical conductor. (2 mks)

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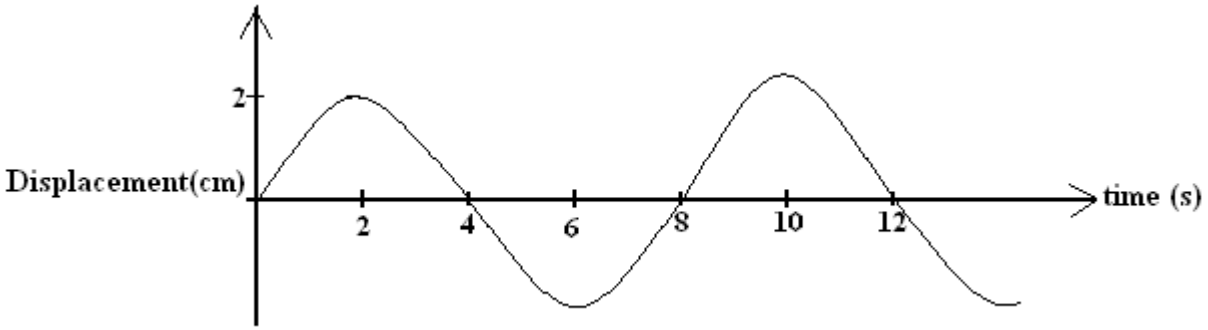
6. The figure below shows a wave in progress.



Determine the

a) Amplitude (1 mark)

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b) Frequency (2 marks)

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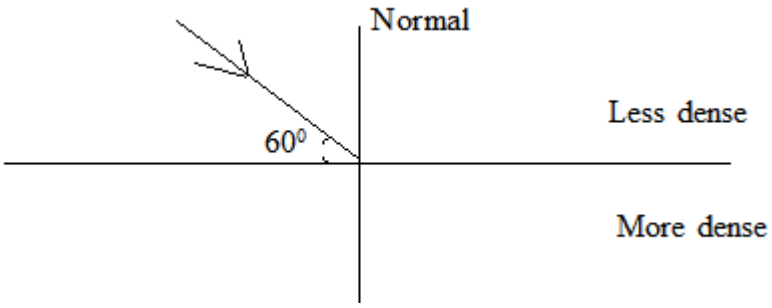
7. The figure below shows light travelling from less dense to more dense medium.



a) Show the direction of the refracted ray. (1 mark)

b) If the refractive index of the more dense medium is 1.4, calculate the angle of refraction. (3 marks)

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8. A current ,I, flowing through a wire of resistance ,R, is increased by seven times. Determine the factor by which the rate of heat production was increased. (3 marks)

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9. The wavelength of a radio wave is 1km. Determine its frequency if the speed in $3 \times 10^{8} ms^{-1}$ (2 marks)

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10. State two uses of gold leaf electroscope. (2 marks)

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11. Give a reason why soft iron is used as a core of the coil of an electric bell. (1 mark)

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12. State two differences between pinhole camera and the human eye. (2 marks)

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13. State two types of waves. (2 marks)

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SECTION B (55 MARKS)

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

14. a) Define the following terms.

i) Capacitor (1 mark)

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ii) Capacitance (1 mark)

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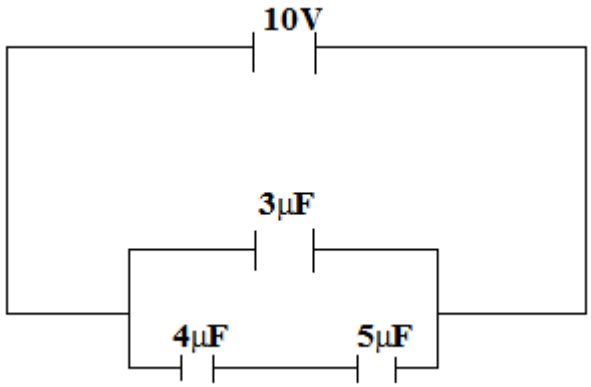
b) Three capacitors are connected to a 10v battery.



Calculate

i) the effective capacitance (3 marks)

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ii) the total charge (3 marks)

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c) State three factors that determine the capacitance of a capacitor. (3 marks)

i) .....

ii) .....

iii) .....

15. a) Define a resistor. (1 mark)

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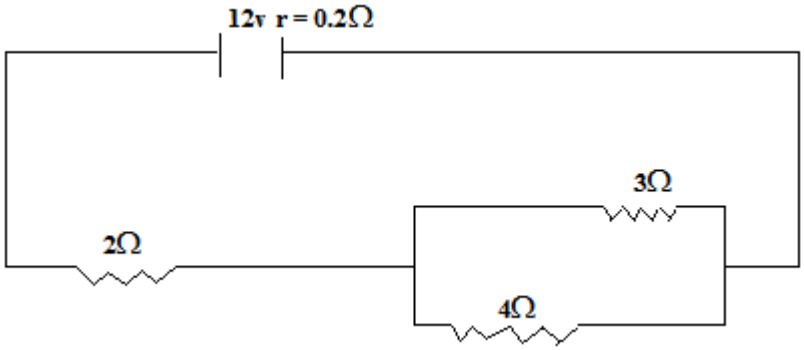
b) The figure below shows three resistors connected to 12v supply of internal resistance of 0.2Ω.



Calculate

i) the effective resistance. (3 marks)

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ii) the total current in the circuit. (2 marks)

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iii) the current through the 4Ω resistance. (3 marks)

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c) If the current flows for 2 minutes calculate the total energy dissiparted. (2 marks)

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d) State two applications of resistors in real life situation. (2 marks)

(i) .....

(ii).....

16. a) Explain briefly how a material acquires a positive charge. (3 marks)

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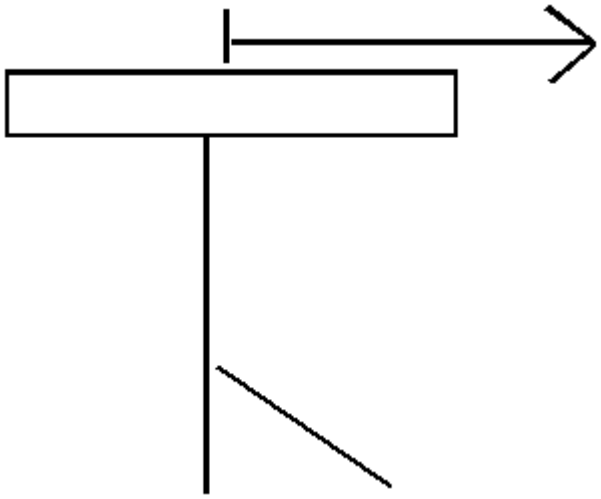
b) A steel pin is placed on the cap of a highly charge electroscope.



State and explain the observation that will be made on the gold leaf. (2 marks)

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c) State a reason why a candle flame is blown away when a highly charged metal is brought close to it. (2 marks)

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d) Explain briefly why it is not advisable to take shelter on a tree when it is raining. (2 marks)

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e) State two dangers of electrostatic charges. (2 marks)

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17. a) State two methods of magnetisation. (2 marks)

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b) Why is repulsion the surest way of identifying a magnet. (2 marks)

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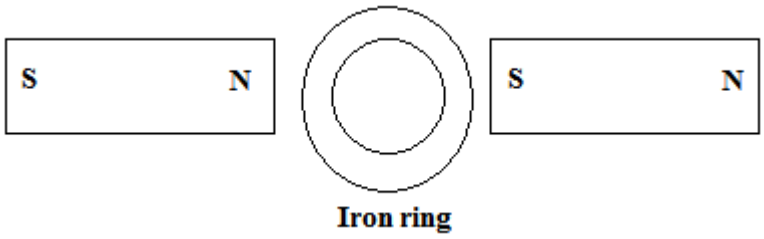
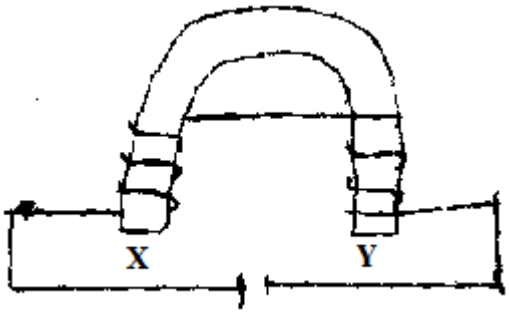
c) Complete the diagram below to show the magnetic field patterns. (2 marks)



d) i) The figure below in a U-shaped iron core. Indicate the polarity at X and Y. (2 marks)



ii) State two applications of such an electromagnet. (2 marks)

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18. a) A pin is placed at the bottom of a beaker containing a transparent liquid. When viewed from the top the pin appears nearer the surface than it actually is. Explain the observation. (2 marks)

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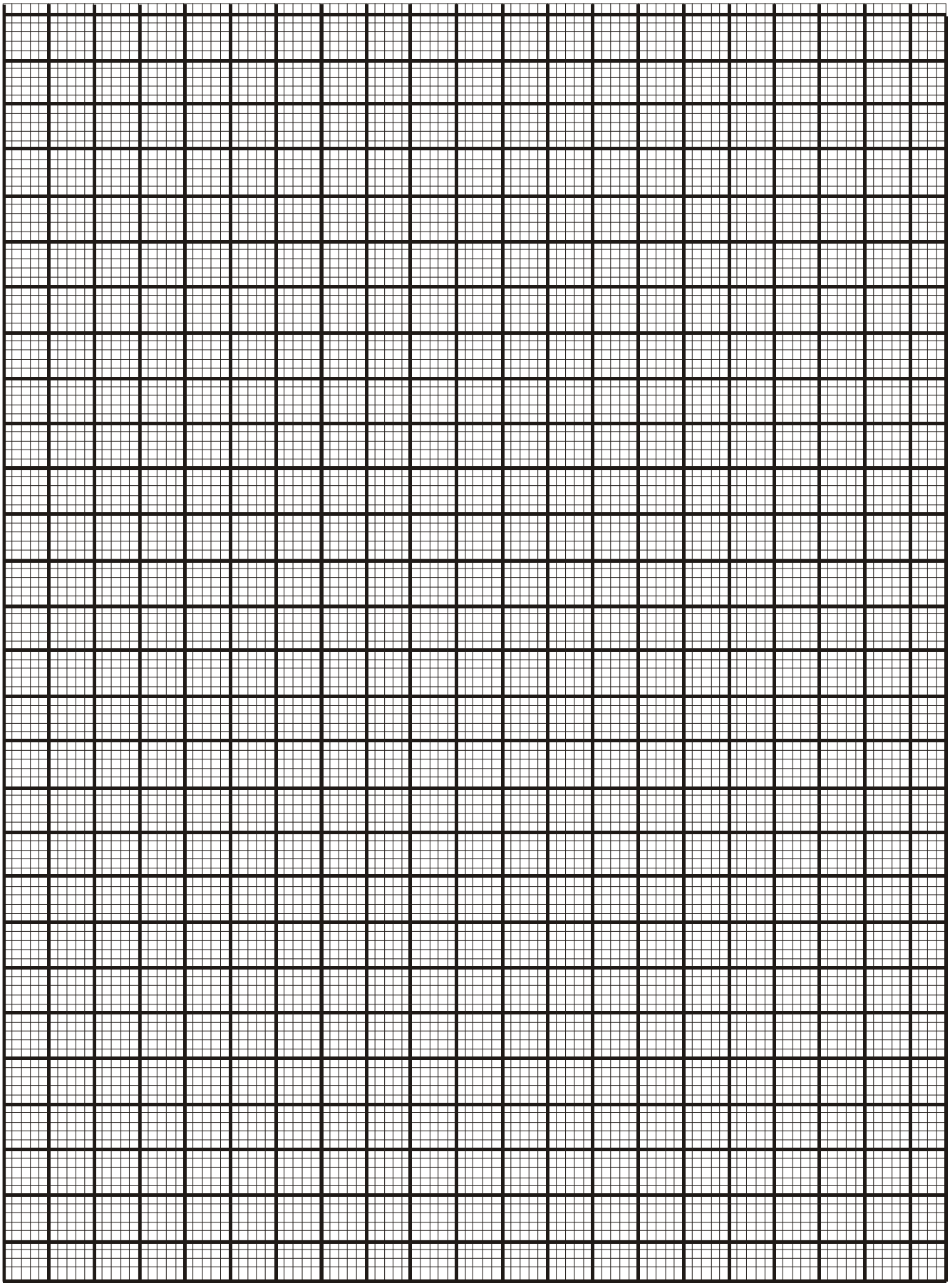
b) The table below shows the results obtained from such an experiment.

Apparent depth (cm)	2.21	3.68	5.15	6.62	8.09
Real depth cm	3.0	5.0	7.0	9.0	11.0

i) Plot a graph of real depth against apparent depth. (5 marks)



PREDICTION 3

NAME: …….. INDEX.NO: ……..…….

SCHOOL: ……CANDIDATES SIGN: ……..…..…

DATE: ……

232/2
PHYSICS
PAPER 2

KCSE PREDICTION 3

KENYA CERTIFICATE OF SECONDARY EDUCATION (KCSE)

TIME: 2 HOURS.

Instructions to candidates

1. *Write your name, index number and school in the spaces provided above.*
2. *Sign and write the date of examination in the spaces provided above.*
3. *This paper consist of **TWO** sections; **A** and **B**.*
4. *Answer **ALL** the questions in section **A** and **B** in the spaces provided.*
5. ***ALL** working **MUST** be clearly shown.*

FOR EXAMINERS USE ONLY

MAXIMUM SCORE	**80 MARKS**
CANDIDATE'S SCORE	

SECTION A – 25 MARKS (ANSWER ALL THE QUESTIONS)

1. Figure 1 below shows an object **O** placed in front of a plane mirror. A ray of light is drawn coming object **O** and striking the mirror at **P.** After striking the mirror, the ray of light is reflected.

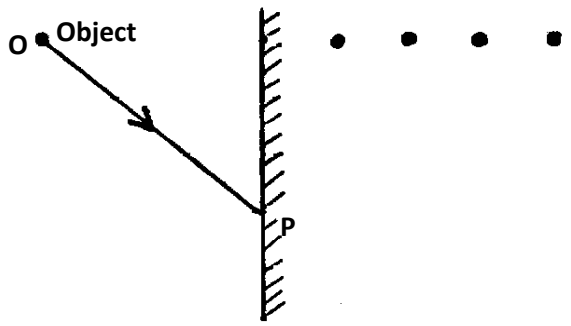


Fig. 1

(i) Which of the four dots represent correct position of the image of **O**? Label this dot **Q** (1mk)

(ii) By drawing a line on the diagram above to represent the reflected ray at **P**, mark the angle of reflection and label it **r**. (1mk)

2. An echo sounder of a ship received the reflected waves from a sea bed after 0.20s. Determine the depth of the sea bed if the velocity of sound in water is 1450m/s (2mks)

3. Figure 2 below shows a simple experiment using a permanent magnet and two metal bars **A** and **B**

Put close to the iron filings.

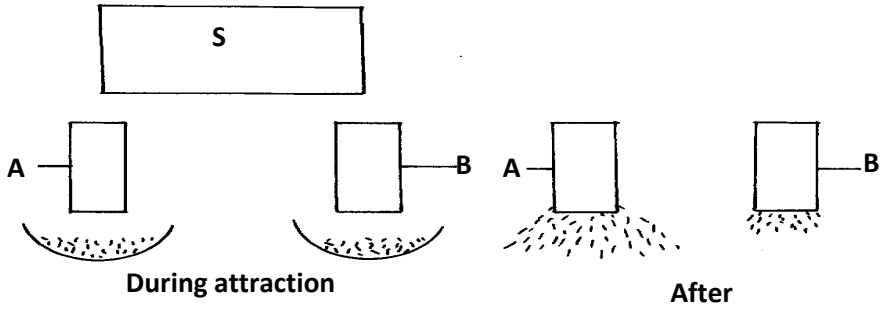
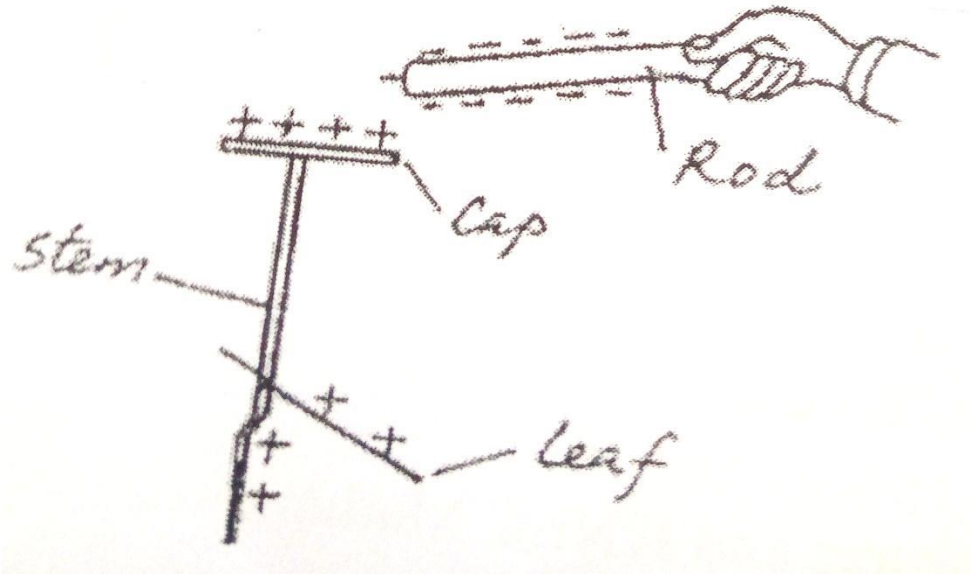


Fig. 2

State with a reason which bar is made from a soft magnetic material.

(2mks)

4. The figure below shows a highly negatively charged rod being brought slowly near the cap of a positively charged leaf electroscope. It is observed that the leaf initially falls and then rises.

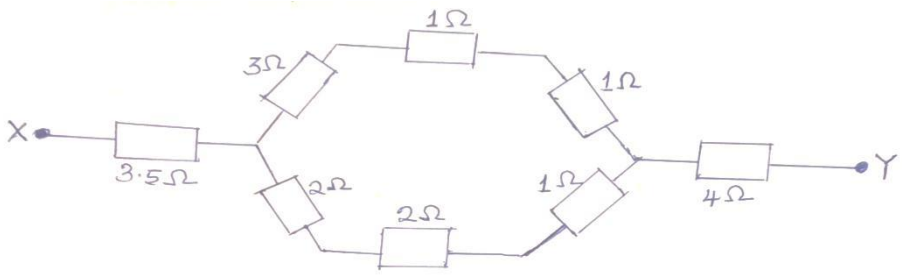


Explain this observation (2 marks)

5.(a) A generator capable of producing 100kw is connected to a factory by a cable with a total resistance of 5 ohms. If the generator produces the power at a potential difference of 5kv. What would be the maximum power available to the factory? (2 marks)

(b) State one cause of power loss in transmission of the main electricity (1 mark)

6.The figure below shows eight resistors forming a network in circuit between X and Y.



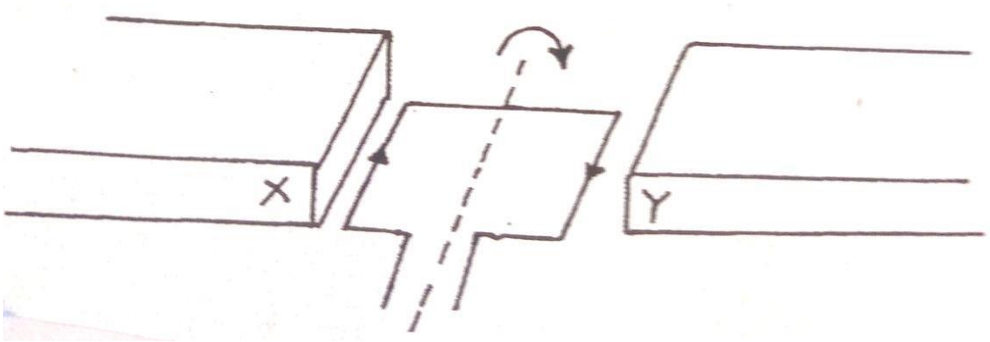
Calculate the effective resistance of the network. (3 marks)

7.State:

(a) One application of ultraviolet radiation (1 mark)

(b) One detector of the radiation in (a) above. (1 mark)

9. The figure below shows a rectangular coil in a magnetic fields rotating in a clockwise direction.



(i) Indicate the poles X and Y of the magnets. (1 mark)

(ii) Suggest one way of increasing the magnitude of the force in such a coil. (1 mark)

10. A battery is rated at 30Ah. For how long will it work if it steadily supplies a current of 3A.

(2 marks)

11. (b) An element **R** decays by giving off an alpha particle. Complete the equation below showing the

valves of **a** and **b**

(2mk)

$$^{236}_{72}R = {}^{a}_{b}V + {}^{4}_{2}He$$

a = _____ b = _____

12.) The circuit diagram in figure13 below shows four capacitors connected between two points **A**

and **B**

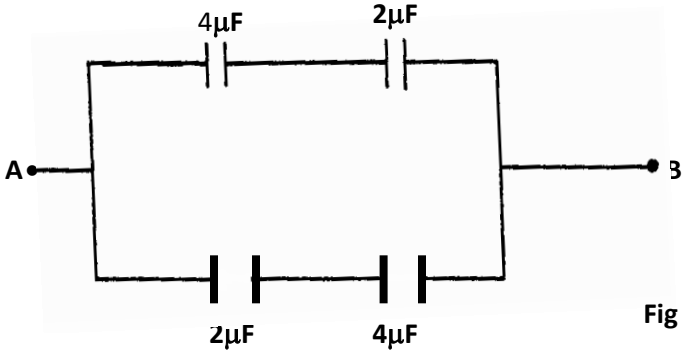


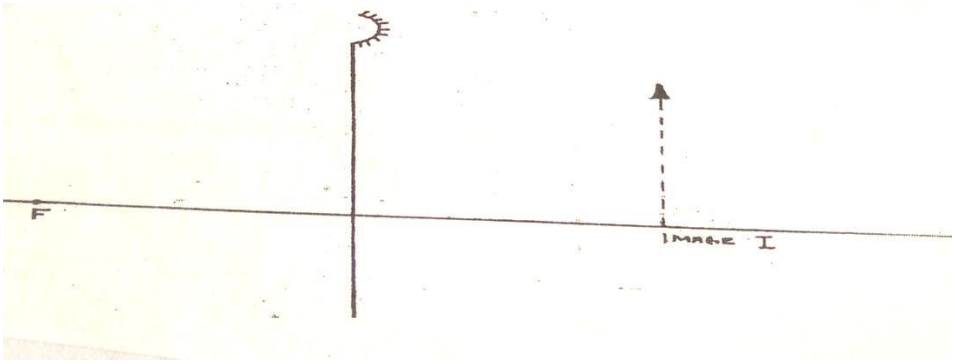
Fig 13

Determine the capacitance across **AB**. (3mks)

Section B (55 marks)

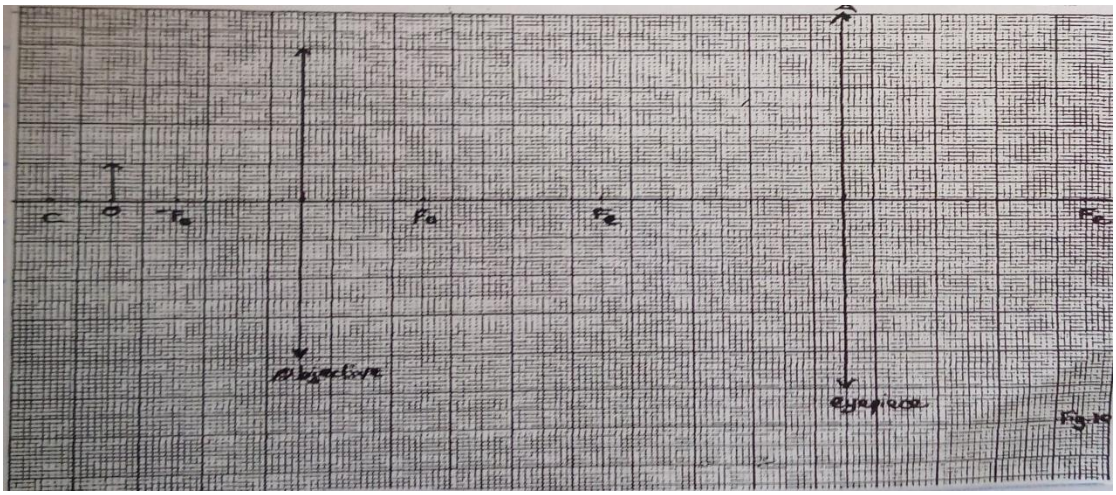
Answer all questions

13a)The figure below shows and image I formed by a concave mirror



Determine its magnification M. (3 marks)

b)The figure below shows lenses of a compound microscope. The focal length of the objective is 2 cm and that of eyepiece is 4cm. The two lenses are 9cm apart. An object 1 cm high is placed 3cm from the objective lens.

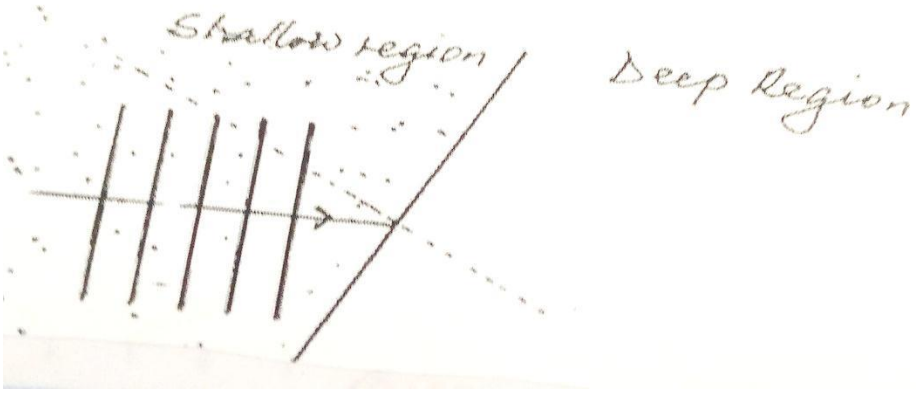


(i) Construct rays to show the position of the final image seen by the eye. (4 marks)

(ii) Find the magnification obtained by this arrangement (2 marks)

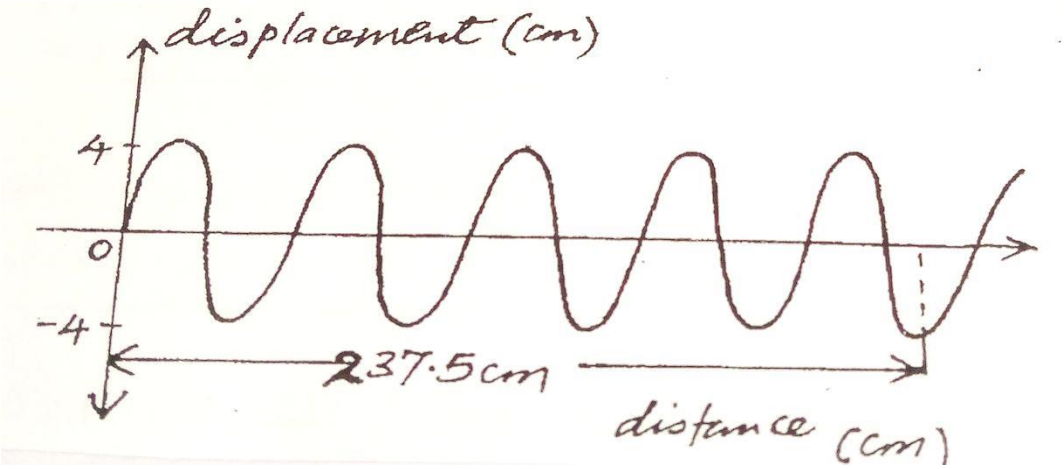
14.The figure below shows water wave fronts

(a) Approaching a boundary between a shallow and deep region. The speed of the waves in the shallow region is less than in the deep region.



On the same diagram complete the fare to show the wave fronts after crossing the boundary. (2 marks)

(b) A vibrator is used to generate water waves in a ripple tank. It is observed that the distance between the first crest and the midpoint to the fifth trough is 237.5cm. The waves travel 224.0cm in 6.0 seconds.



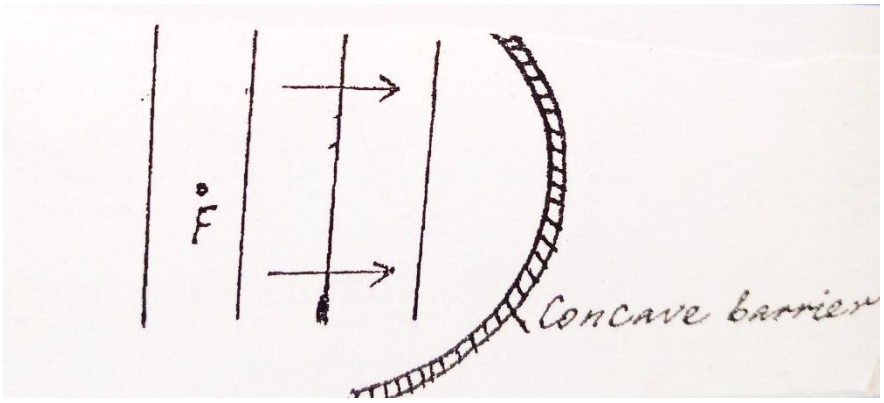
Determine:

(i) The wavelength of the waves (3 marks)

(ii) The speed of the waves (2 marks)

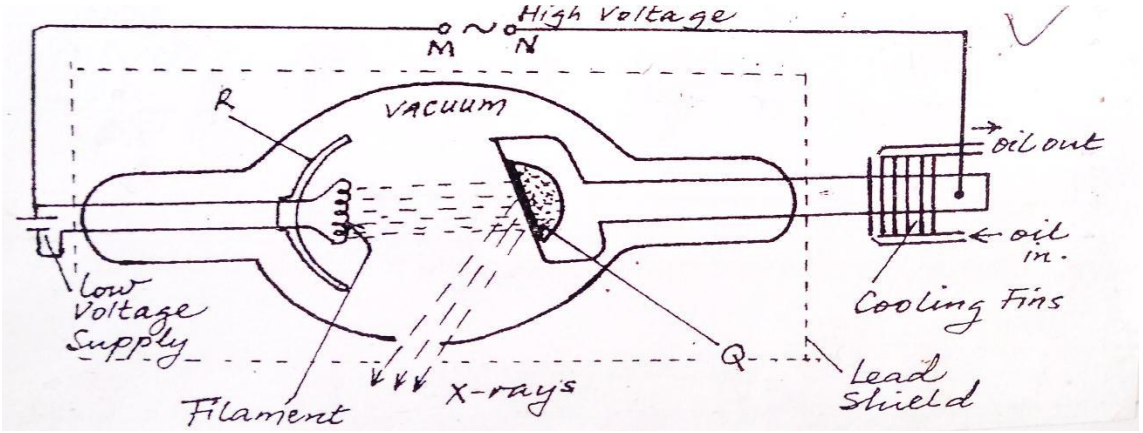
(iii) The frequency of the vibrator (2 marks)

(c) The plane water wave front are incident onto a concaved barrier as show in the figure below.



Show on the same diagram the nature of the reflected wave fronts. (2 marks)

15.The figure below shows the parts and circuit of a model X-ray tube.



(a) Name the parts labeled Q and R
(2marks)

Q

R

(b) State the suitable material for use in Q and give a reason for your answer (2marks)

(c) State the function of part R (1 marks)

(d) Describe how electrons, hence X-rays, are produced in the tube (2 marks)

(e) Explain why the glass tube is evacuated (2 marks)

(f) What property of lead makes its suitable material for shielding (1 mark)

(g) State how the following changes affect the nature of X-rays produced

(I) Increasing in potential across MN (1mark)

(II) Increasing the filament current (1 mark)

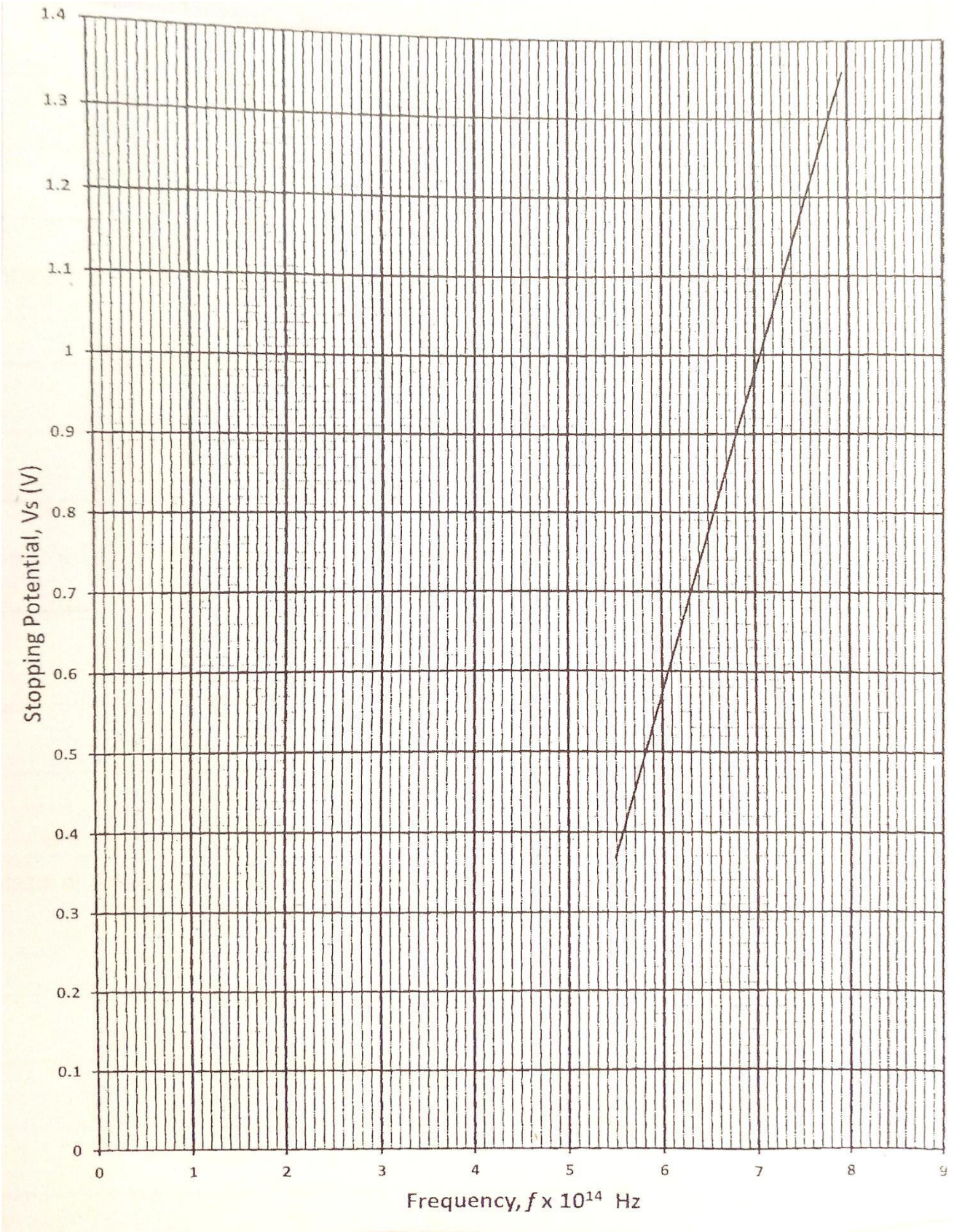
16(a) What is photoelectric emission? (1 mark)

(c) A radiation falls on photosensitive material state how the following changes affect the emitted photoelectrons:

(i) Increase in intensity of incident radiation. (1 mark)

(ii) Increase in the frequency of incident radiation (1 mark)

(d) The figure below shows a graph of stopping potential (voltage)V, against frequency f, of a radiation falling on a photosensitive surface.
Given that eVs = hf – hfo where h= plants constant, f_o = threshold frequency i.e frequency when $V_s = 0$ and e is the charge on an electron = 1.6 x 10^{-9}C. Use the graph to determine;


Stopping Potential, Vs (V)
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
1
2
3
4
5
6
7
8
Frequency, f x 10^14 Hz

(I) The threshold frequency for the surface (1 mark)

(II) The gradient of the graph, hence the value of plank's constant h. (3 marks)

(III) The work function Wo of the surface given that Wo = Hfo for the surface (2mrk)

17. A student connected a circuit as shown in figure 16 below hoping to produce a rectified out put

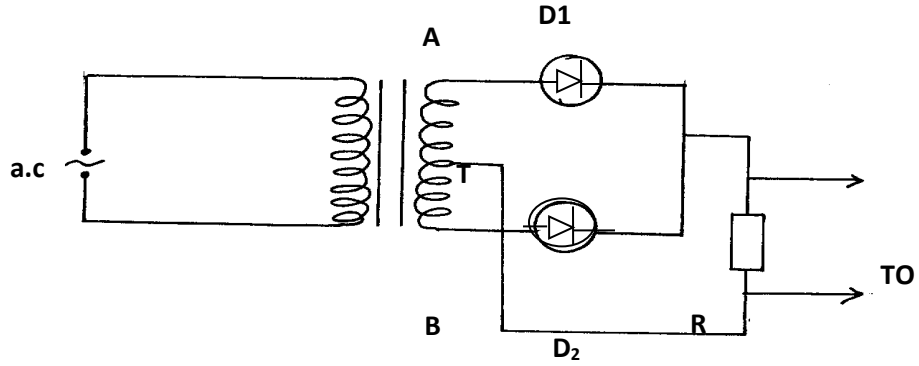


Fig 16.

(a) Sketch the graph of the output on the **CRO** screen (1mk)

(b) Explain how the output above is produced (2mks)

(c) Name other **two** uses of a junction diode (2mks)

20. Figure 7 shows two coils A and B placed close to each other. A is connected to a steady dc supply and a switch B is connected to a sensitive galvanometer.

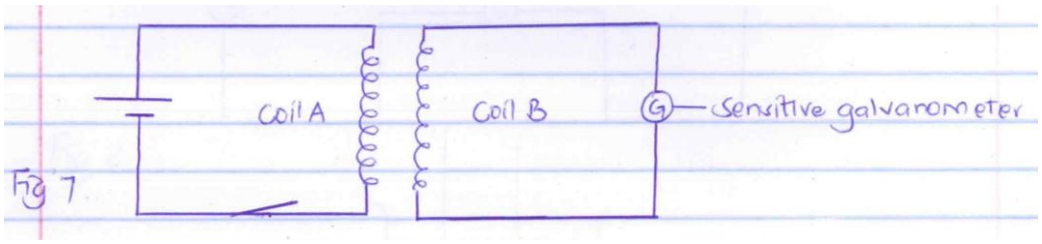


Fig 7

i) The switch is now closed. State the observation made on the galvanometer 2mks)

ii) Explain what would be observed if the switch is then open 2mks)

b) the primary coil of a transformer has 1000 turns and secondary coil has 200 turns the primary coil is connected to a 240v ac supply

ii) Determine the secondary voltage 3mks)

iii) Determine the efficiency of the transformer given that the current in the primary coil is 0.2A and in the secondary coil is 0.7A 3mks)

(a)

PREDICTION 4

NAME: ……..…CLASS:…..…ADM NO:……

SIGNATURE:……INDEX NO:……

DATE:……..

232/2
PHYSICS
PAPER 2
TIME: 2 HOURS

KCSE PREDICTION 4

Kenya Certificate of Secondary Education

Instructions to candidates

- Write your name, admission number, class, signature and date in the spaces provided at the top of the page.
- This paper consists of two sections A and B.
- Answer all the questions in the two sections in the spaces provided after each question
- All working must be clearly shown.
- Electronic calculators, mathematical tables may be used.
- All numerical answers should be expressed in the decimal notations.
- This paper consists of 14 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

SECTION	QUESTION	MAX MARKS	CANDIDATE'S SCORE
A	1 – 11	25	
B	12	10	
	13	10	
	14	8	
	15	16	

	16	**11**	
TOTAL		**80**	

SECTION A: (25 MARKS)

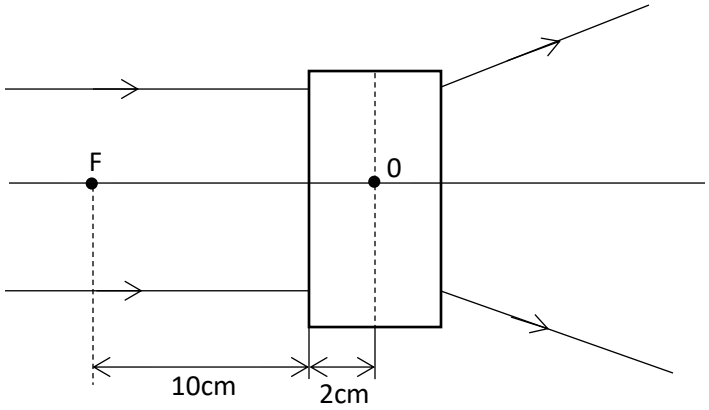
1. Explain why repulsion method is the best test for polarity of a magnet as opposed to attraction. (1 mark)

2. Define the following;

   (i) the direction of an electric field. (1 mark)

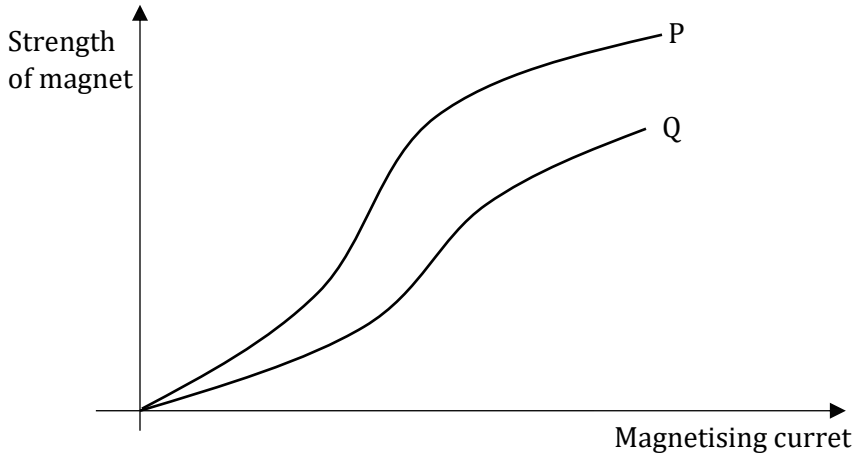
   (ii) the capacitance of a capacitor. (1 mark)

3. The diagram below shows a set of parallel rays of light incident on a thin lens and emerging out from the lens. The lens is placed inside a blackbox with narrow opening on both sides.



   (a) State the type of the lens in the box and explain your answer. (2 marks)

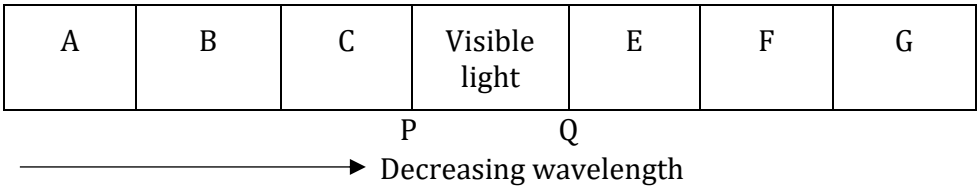
4. In an experiment to magnetize two substances P and Q using electric currents, two curves were obtained as shown below.



(i) Explain the difference between substances P and Q with reference to domain theory. (1 mark)

(ii) State and explain which of the two substances in (i) above would be suitable for use as a core of an electromagnet. (1 mark)

5. The letters in the figure below represents different types of radiations in the electromagnetic spectrum.



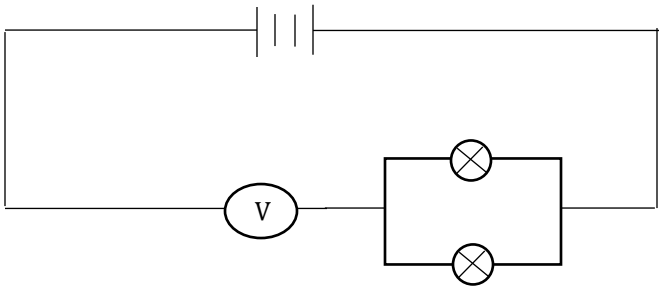
(i) Which colours of spectrum appears at P and Q?

P - …… (1 mark)

Q - …… (1 mark)

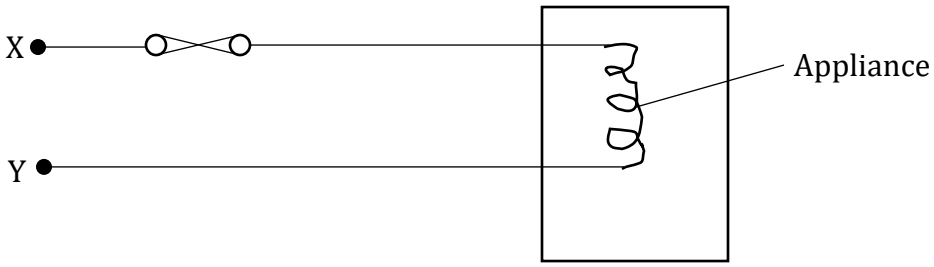
(ii) How is radiation marked C detected? (1 mark)

6. The diagram below shows a circuit that was connected by a form one student. Comment with a reason on the brightness of the bulbs. (2 marks)



7. A car battery requires topping up with distilled water occasionally. Explain why this is necessary and why distilled water is used. (2 marks)

8. The figure below shows the wiring in a modern mains appliance.



Identify the wires X, Y and Z. (2 marks)

X - ……

Y - ……

Z - ……

9. Three resistors of resistance 2.0Ω, 4.0Ω and 6.0Ω are connected together in a circuit. Draw a circuit diagram to show the arrangement to the resistors which gives;

(i) An effective resistance of 3.0Ω (2 marks)

(ii) A minimum resistance. (1 mark)

10. When rod X was rubbed with material Y, it was observed that the material acquired a negative charge.

(i) State the charge on the rod X. (1 mark)

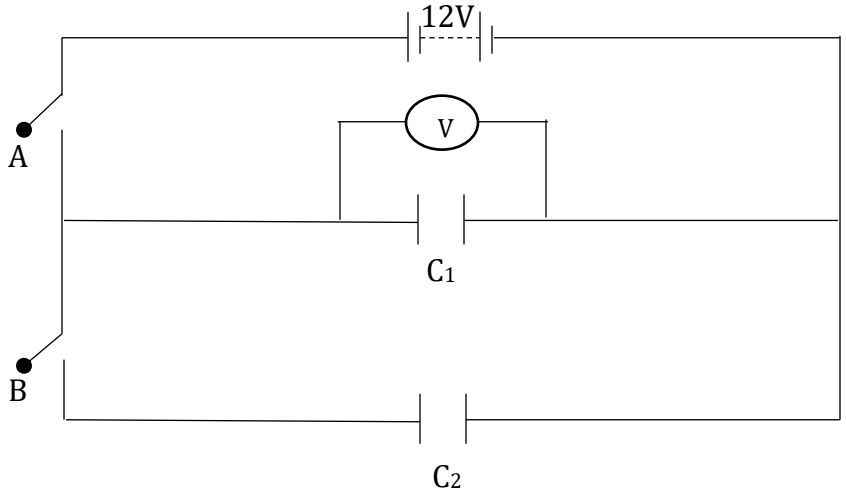
(ii) Explain how the rod X acquired the charge. (1 mark)

(iii) Explain briefly how you would test the nature of the charge on rod X using an electroscope. (2 marks)

11. Distinguish between intrinsic semi-conductor and extrinsic semiconductor. (2 marks)

SECTION B: (55 MARKS)

12. The following figure shows a circuit where a battery of an e.m.f. 12v, switches A and B, two capacitors C_1 = 9.0μF and C_2 = 3.0μF and a voltmeter connected as shown below.



(i) Determine the charge on C_1 when the switch A is closed and B open. (2 marks)

(ii) What is the voltmeter reading when switch A is closed and switch B open? (Assume capacitor C_1 is fully charged). (1 mark)

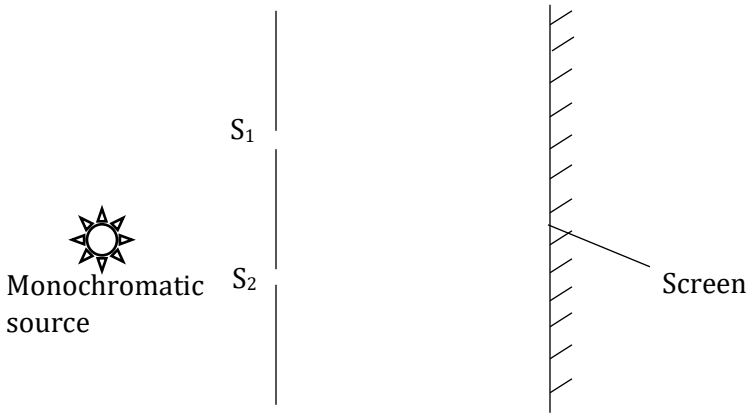
Switch A is now opened and switch B closed. Determine:

(iii) The effective capacitance of C_1 and C_2. (2 marks)

(iv) The voltmeter reacing V. (3 marks)

(v) The energy stored by C_1 (2 marks)

13. (a) In an experiment to study one of the properties of waves, a double slit was placed close to the source of monochromatic light as shown below.



(i) What property of waves is being investigated? (1 mark)

(ii) State the function of the double slit. (1 mark)

(iii) State and explain the observation made on the screen. (2 marks)

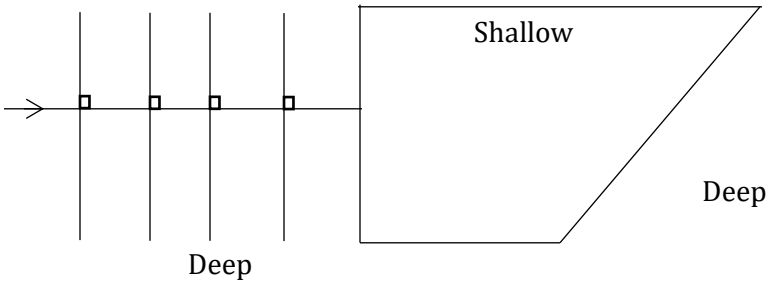
(iv) State what is observed on the screen when;

(I) the slit separation S_1 S_2 is decreased. (1 mark)

(II) White source of light is used in place of monochromatic source. (1 mark)

(III) S_1 and S_2 are made larger. (1 mark)

(b) The diagram below shows plane wave fronts in a ripple tank incident on a boundary between a deep to shallow region.



On the same diagram, sketch the wave pattern in and beyond the shallow region. (2 marks)

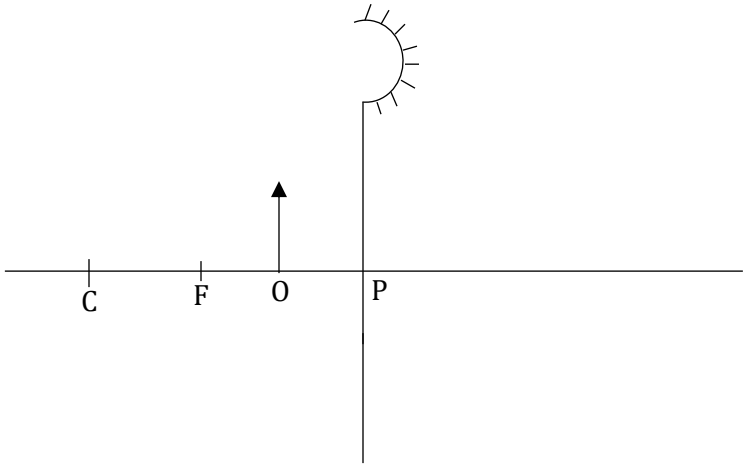
(c) The equation below represents a nuclear decay. (1 mark)

$$^{232}_{90}W \xrightarrow{A} {}^{228}_{88}X$$

Identify the radiation A.

A - ……

14. (a) The diagram below shows an object O placed infront of a concave mirror as shown.

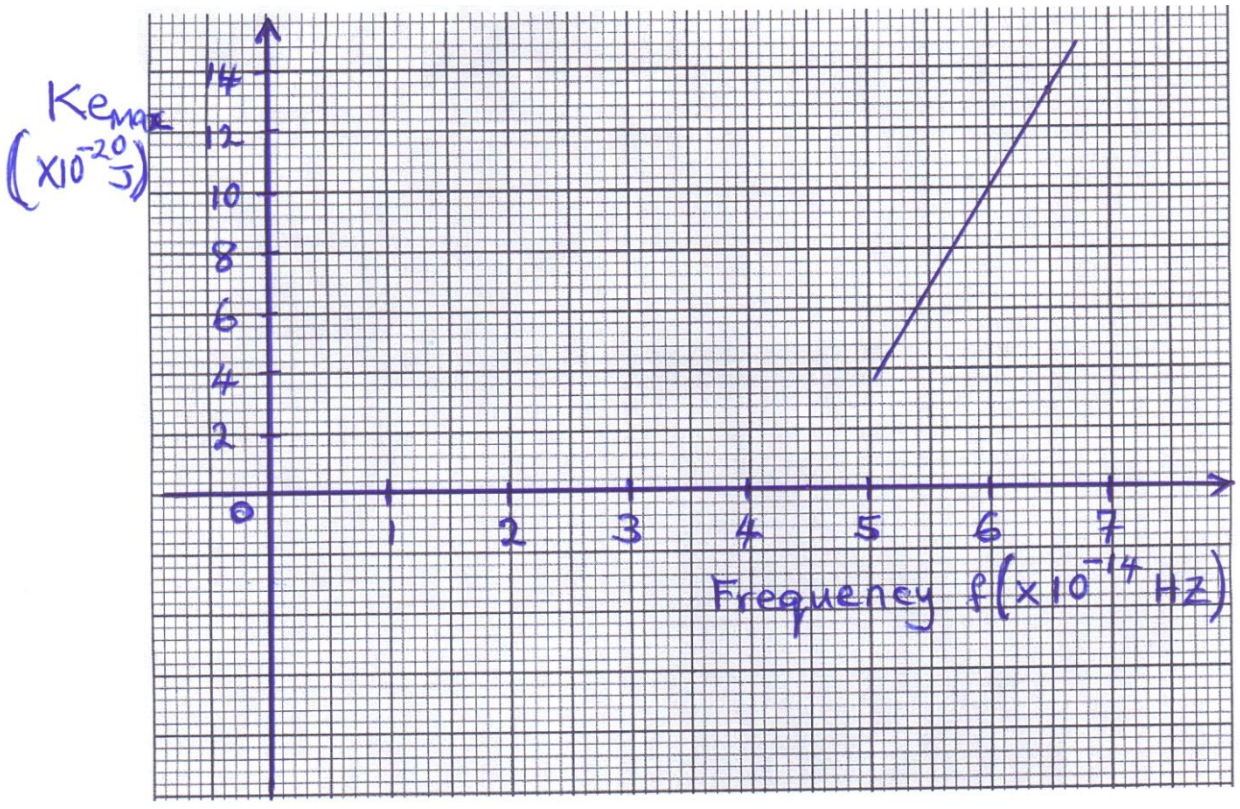


(i) Complete the diagram to show the image formed. (2 marks)

(ii) State two characteristics of the image formed. (1 mark)

(b) (i) State two factors that determine the speed by which electrons are emitted from metal surface by light falling on it. (2 marks)

(ii) In an experiment using a photocell, light of varying frequency but constant intensity was shone onto the surface of a metal. The maximum kinetic energy, $(Ke)_{max}$ emitted for each frequency, was determined. The graph below shows how Ke_{max} varies with frequency f.



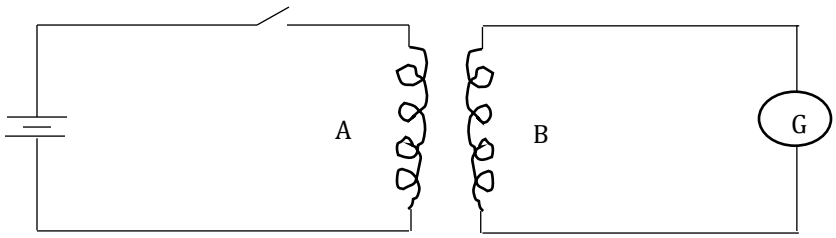
From Einstein's equation, $hf = \Theta + Ke_{max}$, where Θ is the work function. Determine.

(i) the threshold frequency, f_0 from the graph (1 mark)

(ii) the planks constant, h (2 marks)

15. (a) An electric cooker has an oven rated 3KW, a grill rated 2KW and two rings each rated at 500W. The cooker operates from 240V mains. What is the cost of operating all the parts for 30 minutes if electricity cost Ksh.6.50 per unit? (3 marks)

(b) Fig. below shows identical copper coils A and B placed close to each other. Coil A is connected to a d.c. power supply while coil B is connected to a galvanometer.



(i) State and explain what is observed on the galvanometer when the switch is closed. (2 marks)

(ii) State what is observed on the galvanometer when the switch is opened.
(1 mark)

(iii) State what would be observed if the number of turns of coil B is doubled.
(1 mark)

(c) A transformer with 2000 turns in the primary circuit and 150 turns in the secondary circuit has a primary circuit connected to a 800V ac source. It is found that when a heater is connected to the secondary circuit, it produces heat at the rate of 1000w. Assuming 90% efficiency, determine the;

(i) Voltage in the secondary circuit. (2 marks)

(ii) the current in the primary circuit. (2 marks)

(iii) Current in the secondary circuit (1 mark)

(d) A cell drives a current of 5A through a 1.6Ω resistor. When connected to a 2.8Ω resistor, the current that flows is 3.2A. Determine the e.m.f. (E) and internal resistance (r) of the cell. (4 marks)

16. (a) State how each of the following can be increased in an x-ray tube.

(i) Intensity of x-rays. (1 mark)

(ii) penetrating power of x-rays. (1 mark)

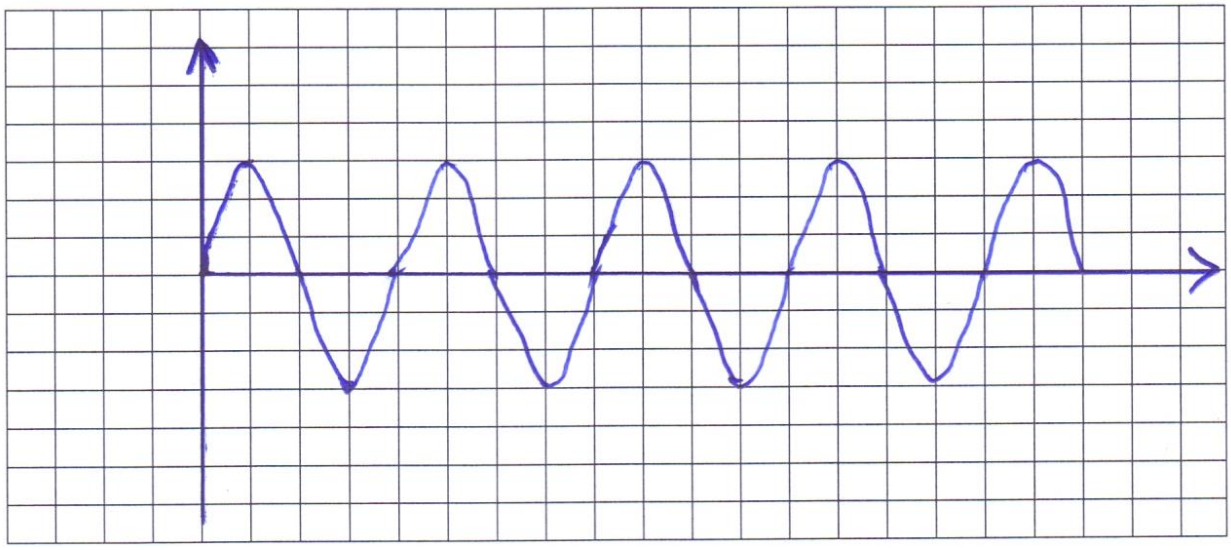
(b) An x-ray tube has an electron beam current of 10mA and is accelerated through a p.d of 60KV. The efficiency is 0.5%. Calculate;

(i) the input power (2 marks)

(ii) the quantity of heat produced per second. (1 mark)

(iii) the number of electrons hitting the target per second. (2 marks)

(c) The fig. below shows an a.c. signal on the C.R.O screen.



Determine:

(i) The frequency of the signal given that the time base is set at 10ms/div.
(2 marks)

(ii) The peak voltage of the signal given that the y-gain is set at 50v/div
(2 marks)

PREDICTION 5

Name:…….. ….. Index No. …….

School: …… …… Date: …… Sign……

KCSE PREDICTION 5

232/2
PHYSICS
PAPER 2
TIME: 2 HOURS

Instructions to candidates;

- Write your name, index number and name of your school in the spaces provided.
- This paper consists of two parts **A** and **B.**
- Answer all questions in section **A** and **B** in the spaces provided.
- All working **MUST** be shown in the spaces provided after questions.
- Mathematical tables and electronic calculators may be used.
- Candidates should check the question paper to ascertain that ascertain that all the pages are printed as indicated and that no questions are missing.

For examiners use only

Section	Question	Maximum score	Candidates score
A	1-12	25	
B	13	12	
	14	14	
	15	14	
	16	15	
	Total score	80	

SECTION A (25mks)

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

1. What is the purpose of a fuse in domestic wiring system? (1mrk)

……
……

2. Use the domain theory to explain briefly why a ferromagnetic material gets saturated when magnetized. (2mks)

……
……
……
……

3. The **figure 1** below shows an object placed some distance from a biconcave lens.

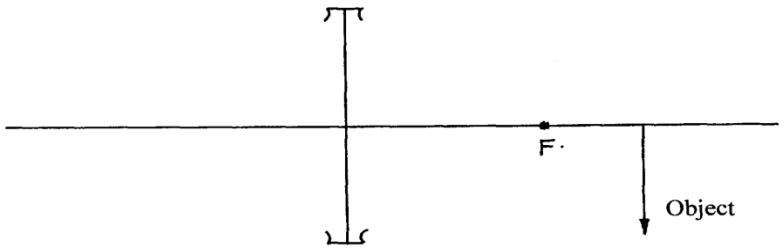


Figure 1

Construct the image on the diagram. (2mks)

4. What determines the hardness of X-rays? (1mk)

……
……

5. Distinguish between the terms ‘photoelectric’ and ‘thermionic’ effect. (2mks)

……
……
……
……

6. The **figure 2** below shows a light rod balanced due to the action of the forces shown. Q is a magnet of weight 4N and R is a permanent magnet which is fixed. Determine the force between Q and R and state whether it is attractive or repulsive. (3mks)

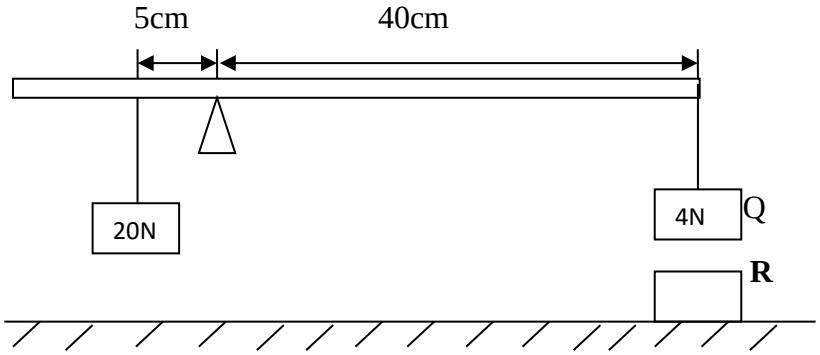


Figure 2

……
……
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……
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……..

7. Determine the ammeter reading when the potential difference of 3.0 volts is supplied across PQ in figure 3. (3mks)

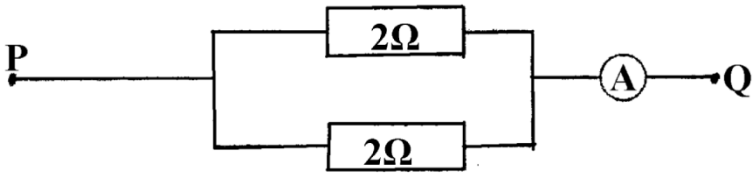

Figure 3

……
……
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8. The chart below shows an arrangement of different parts of the electromagnetic spectrum.

Radio	A	Visible	B	X – Rays	Gamma Rays

Name the possible radiations represented by letter **B**. (1mk)

………

9. A student stands at a distance 400m from a wall and claps two pieces of wood. After the first clap the student claps whenever an echo is heard from the wall. Another student starts a stopwatch at the first clap and stops it after the twentieth clap. The stopwatch records a time of 50 seconds. Find the speed of sound. (3maks)

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10. The **figure 4** below shows a plane mirror KL and an object B.

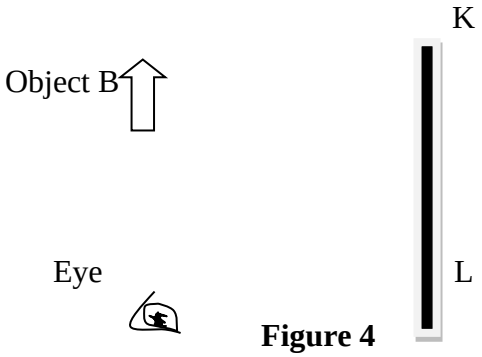

Figure 4

a) Complete the ray diagram to show how the person sees the image. (2mks)

b) State the nature of the image formed. (2mks)

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11. The following equation represents a decay series.

$$^{210}_{83}\text{Bi} \xrightarrow{x} {}^{210}_{84}\text{Po} \xrightarrow{\alpha} {}^{a}_{b}\text{Q}$$

Identify the radiation **x** and determine the values of **a** and **b.** (2mks)

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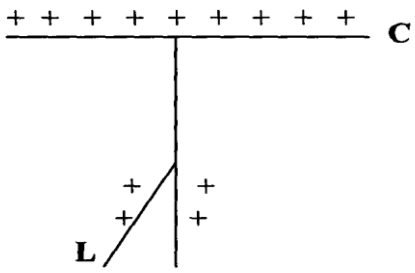
12. A gold leaf electroscope is positively charged as shown in the diagram below where **C** is the cap and **L** is the gold leaf. State and explain what happens to **L** when a positively charged rod is brought near **C** without touching it. (2mks)



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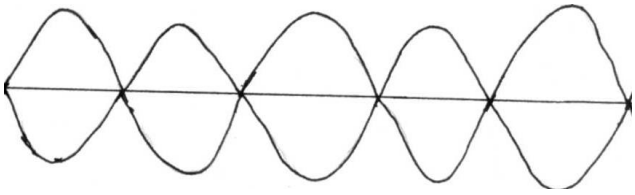
SECTION B (55 MARKS)

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

13. a) Differentiate between transverse and longitudinal waves. (2mks)

b) **Figure 5** shows a transverse stationary wave along a string



i). Label the n

ii). If the distance between an anti-node and consecutive node is 1.0×10^{-3}m, determine the wavelength of the stationary wave. (2mks)

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c). Five successive wave frequency in a ripple tank are observed to spread a distance of 6.4cm. If the vibrator has a frequency of 8 Hz, determine the speed of the wave. (3mks)

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d). The **figure 6** below shows a displacement-time graph for a wave motion

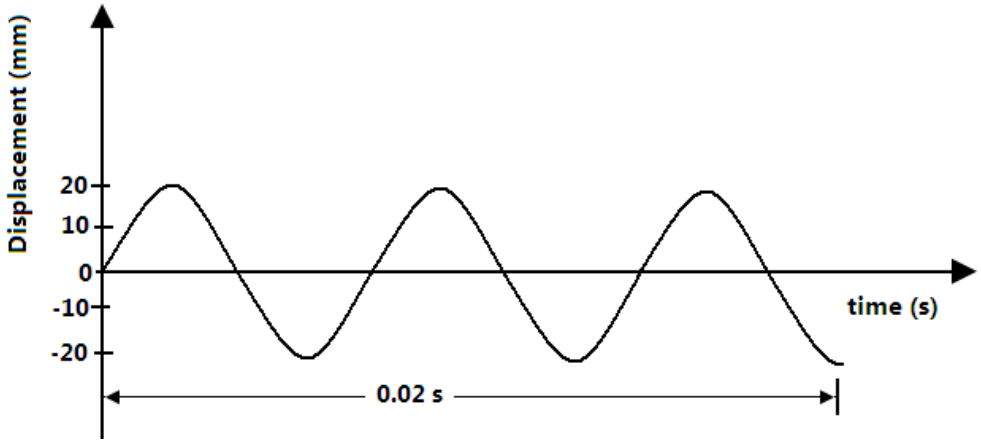

Figure 6

What is the frequency of the wave? (3marks)

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14. (a) What do you understand by the term **e.m.f** of a cell?. (1mk)

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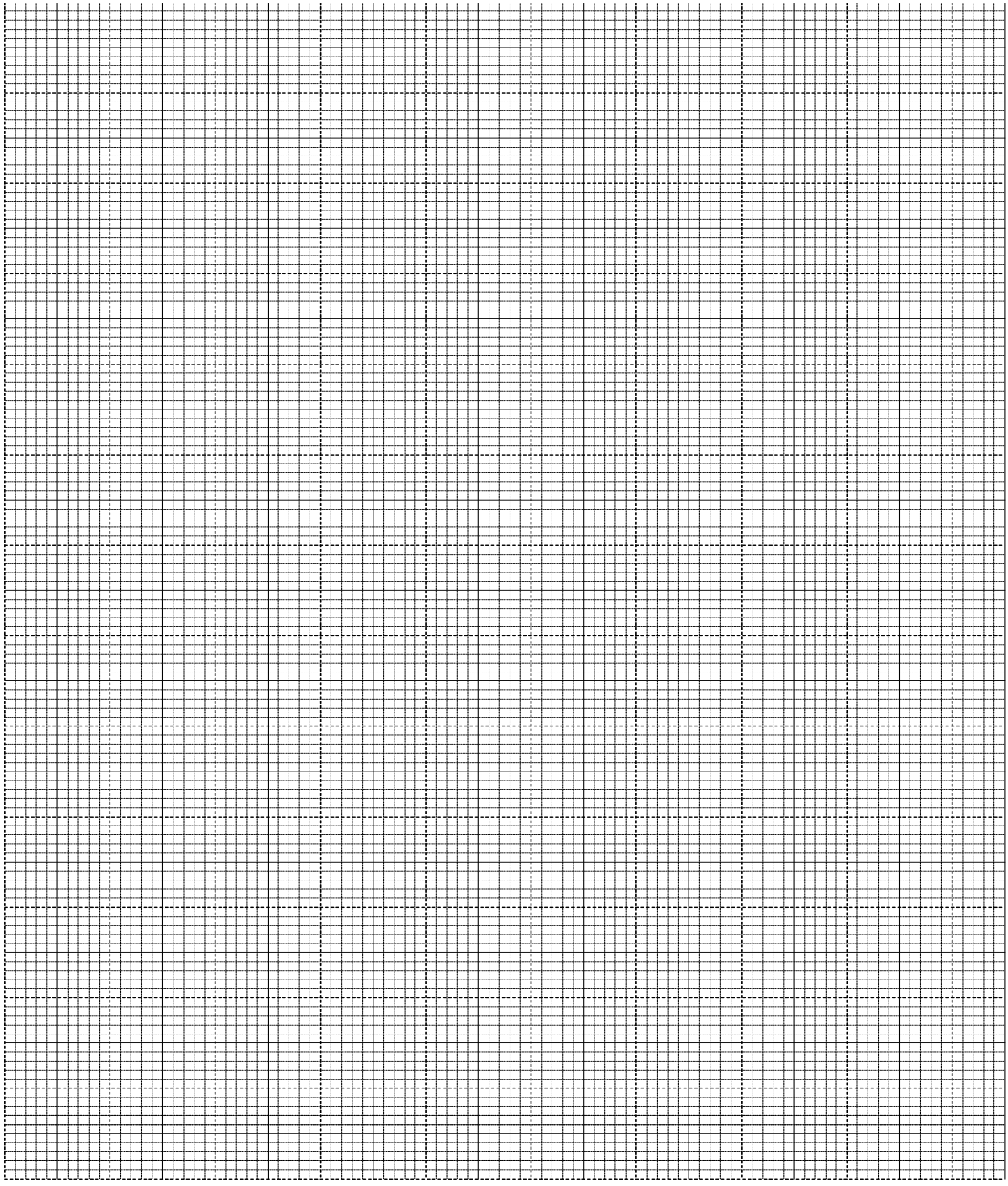
(b) A cell of e.m.f **E** and internal resistance **r** is used to pass a current through various resistors R Ohms and the values of current recorded in the table below.

R(Ohms)	1.6	2.1	2.5	3.6	5.0	8.0
I(A)	1.0	0.8	0.7	0.5	0.37	0.34
1/i(A^{-1})						

i. Complete the table for the values of **1/i** giving your answer to 3d.p. (3mks)

ii. Plot a graph of **1/i** versus **R.** (5mks)



iii. Given that the equation **E =I(R +r),** use your graph to determine the values of **E** and **r.** (5mks)

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15. a) State **three** factors that determine the capacitance of a parallel plate capacitor. (3marks)

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b) Three capacitors of capacitance 200μf, 300μF and 600μf are connected together in a circuit.

i. Draw a circuit diagram to show the arrangement of the capacitors which gives an effective capacitance of 100μf. (2marks)

c) The figure 6 below shows a circuit where a battery of e.m.f 6V , switches X and Y, two capacitors of capacitance 2 μF and 4 μFare connected.

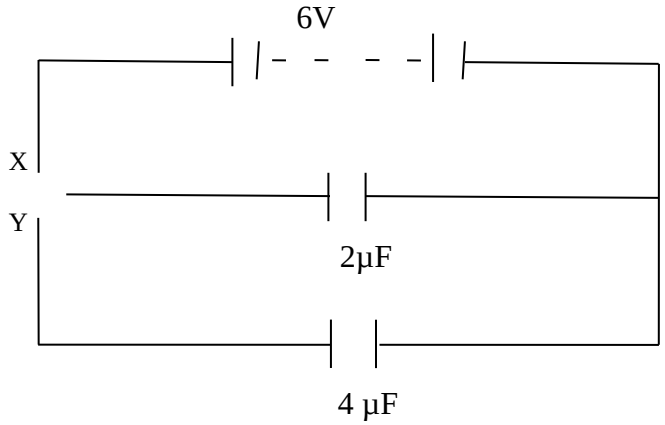

Figure 6

i. Determine the charge stored in the 2 μF capacitor when switch X is closed and switch Y is open. (3marks)

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ii. When switch Y is finally closed and switch X is open, determine the potential difference across each capacitor. (3marks)

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d) Briefly explain how the lightening arrester works. (3mks)

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16. (a) Define the term ‘work function’. (1mk)

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(b) List three factors which affect photoelectric effects. (3mks)

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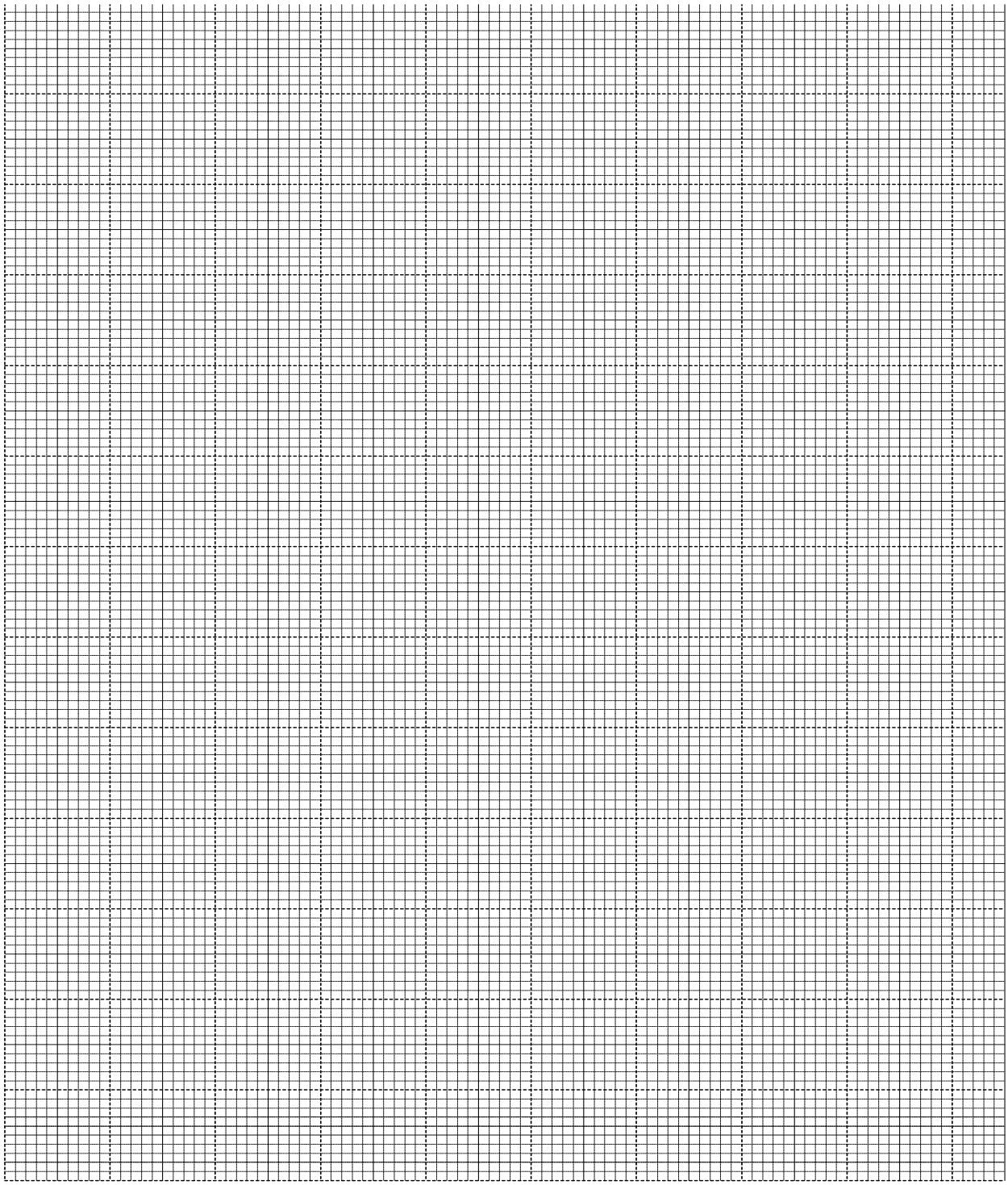
(c) The table below shows the stopping potential and the corresponding frequencies for a certain photocell.

Stopping potential V_s (V)	0.2	0.6	1.10	1.42	1.83
Frequency f ($\times 10^{14}$Hz)	4.0	5.0	6.0	7.0	8.0

Plot a graph of stopping potential against frequency. (5mks)



Use your graph to determine;

i) The threshold frequency.(2mks)

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ii) Plank's constant. (Take **e** to be 1.6×10^{-19}C) (2mks)

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iii) Work function. (2mk)

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PREDICTION 6

NAME……..……..…DATE……..……

INDEX NO. ……..……..SIGNATURE……

232/2
PHYSICS
PAPER 2
THEORY
TIME: 2HOURS

KCSE PREDICTION 6

KENYA CERTIFICATE OF SECONDARY EDUCATION

232/ 2
PHYSICS
PAPER 2
TIME: 2HOURS

INSTRUCTIONS TO CANDIDATES:

This paper consists of TWO sections. Sections A and B
Answer ALL the questions in section A and B
All working MUST be clearly shown.
Mathematical tables and Electronic calculators may be used.

Take acceleration due to gravity, g = 10ms^{-2}

FOR EXAMINER'S USE ONLY

SECTION	QUESTIONS	MAX SCORE	CANDIDATES SCORE
A	1-13	25	
B	14	12	
	15	10	
	16	12	
	17	12	
	18	09	
TOTAL SCORE		80	

This paper consists of 10 printed pages.
Candidates should check the question paper to ensure that all pages are printed as indicated and no questions are missing

SECTION A (25 MARKS)

Answer all questions in this section

1. State one reason why in the construction of car head lamps parabolic reflectors are preferred to spherical reflectors. (1mk)

2. It is common practice that once an accumulator is recharged the terminals are connected using a wire to assess its state of charge. How is this dangerous to the life of the accumulator? (1mk)

3. Two identical spheres A and B each standing on an insulating base are in contact. A negatively charged rod is brought near sphere A as shown in figure 1

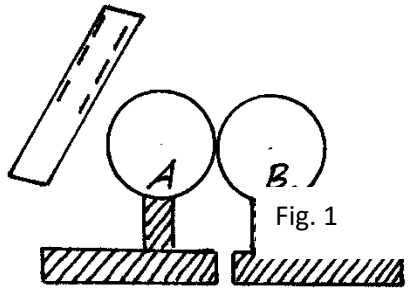


Fig. 1

In what way will A differ from B if separated while the rod is near? Explain. (2mks)

4. The ammeter in the circuit in figure 2 has negligible internal resistance. The cell has an internal resistance of 0.5Ω and an electromotive force of 3.0v.

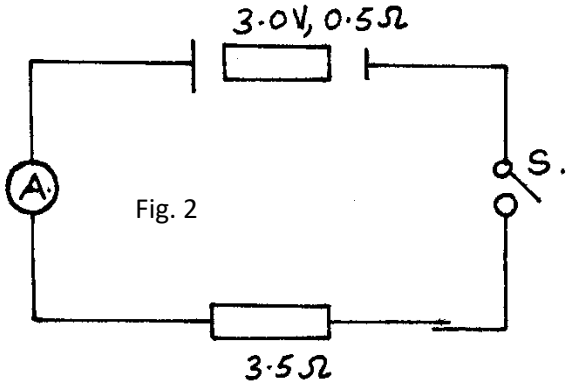


Fig. 2

Determine the value of current the ammeter registers when switch S is closed. (2mks)

5. Figure 3 represents a step down transformer of ratio 10:1. The turns are wound uniformly on the core and the primary coil is connected to a 250va.c supply. The lengths KL and MN are as indicated.

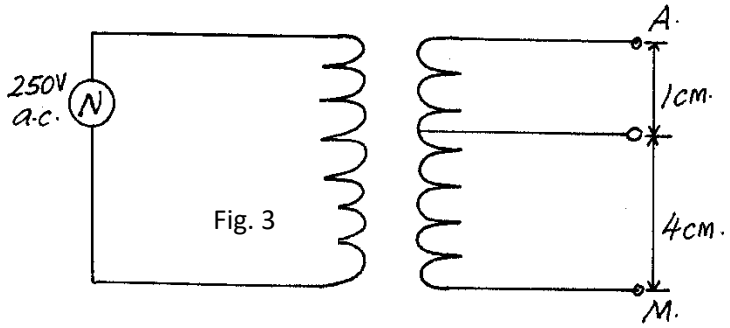


Fig. 3

Determine the p.d across LM. (4mks)

6. The diagram in figure 4 below shows a wire placed between the poles of two bar magnets.

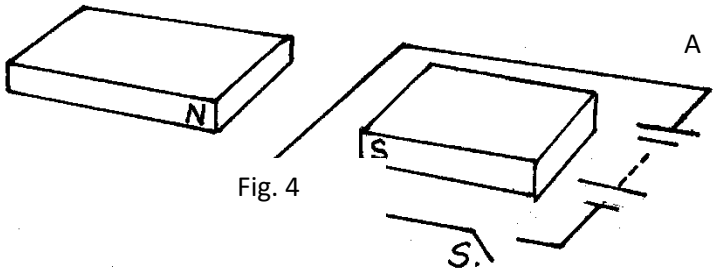


Fig. 4

Indicate with an arrow the force that acts on the section AB of the wire. (1mk)

7. An electric heater 480Ω is connected to a 240v main supply. Determine the energy dissipated in 4 minutes. (3mks)

8. A pin at the bottom of a beaker containing glycerine appears to be 6.8cm below the surface of glycerine. Determine the height of the column of glycerine in the beaker. (*take the refractive index of glycerine as 1.47*) (3mks)

9. A girl shouts and ears an echo after 0.6 seconds later from a cliff. If velocity of sound is 330m/s, calculate the distance between her and the cliff. (3mks)

10. What do you understand by 'doping' as applied with semiconductors? (1mk)

11. Arrange the following in order of decreasing wavelength Gamma radiation, Radio waves, Infrared and x-rays. (1mk)

12. Explain why soft iron keepers are suitable for storing magnets (2mks)

13. Figure 7shows a trace obtained on a cathode ray oscilloscope screen when an a.c is applied to the Y-plates and time base switched on.

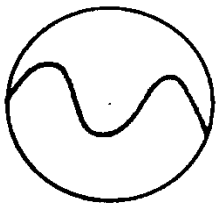


Fig. 7

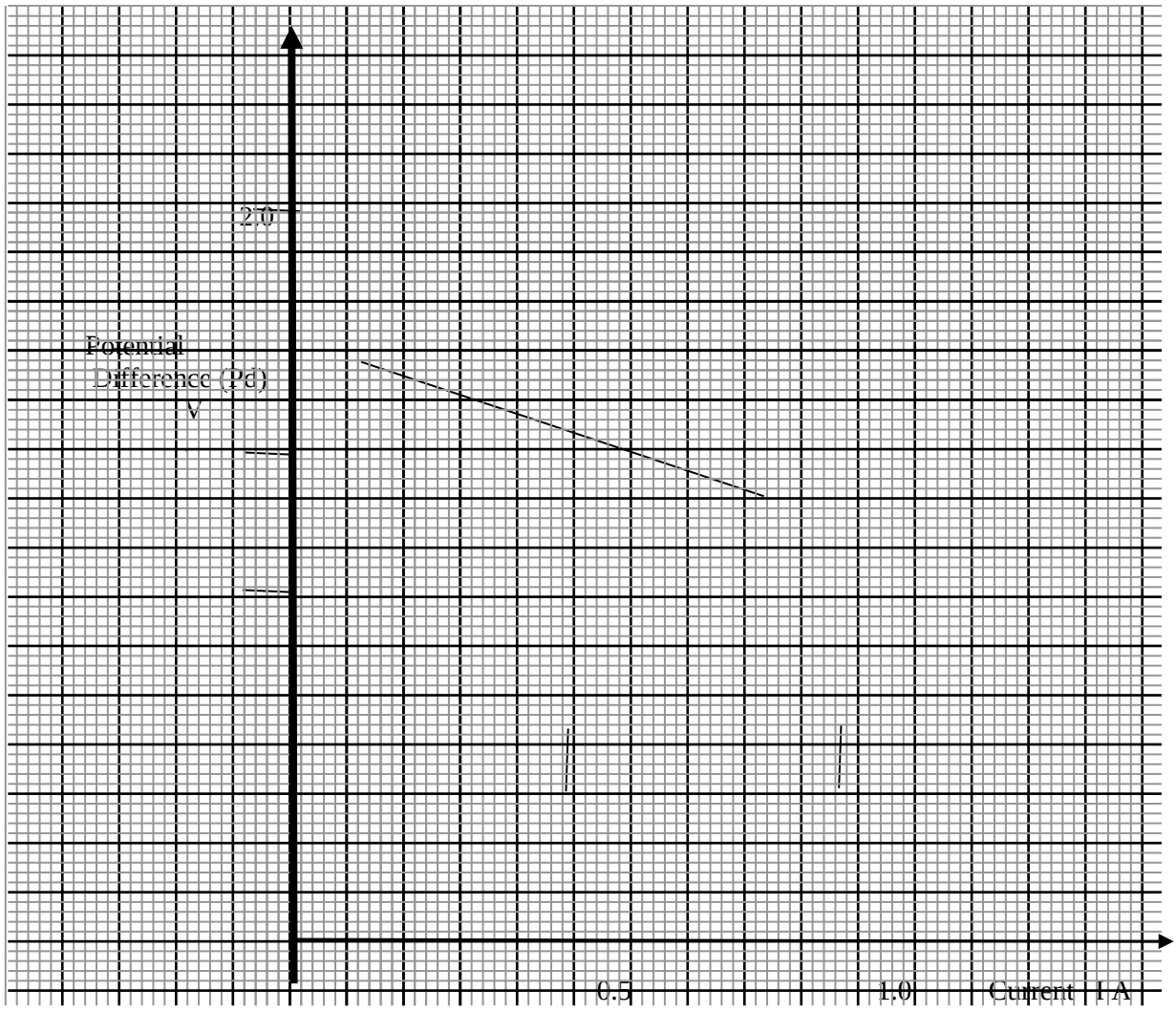
On the same figure draw a waveform showing what would be observed if the time base is doubled. (1mk)

SECTION B (55 MARKS)

Answer ALL the questions in this section in the spaces provided

14.(a) What is meant by an open circuit? (1mk)

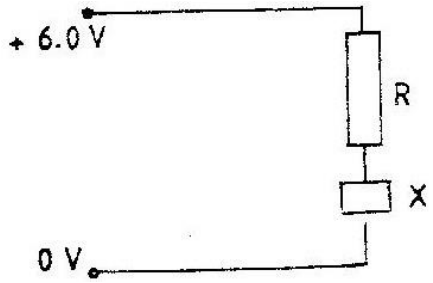
b) The graph in figure 5 shows the terminal voltage, V, of a certain battery varies with the current, I, being drawn from the battery.



(i) Write an expression relating the e.m.f. E, terminal voltage, V, current, I and the internal resistance, r, of the battery for the circuit drawn in (i) above. (1mk)

(ii) From the graph determine the; I internal resistance, r, of the battery. (2mks)

(b) When the device, X is connected in the circuit below, the voltage across it is 0.70 V.



Calculate the value of the resistance R. (3mks)

(c) The cell in figure 10 has an e.m.f of 2.1 V and negligible internal resistance.

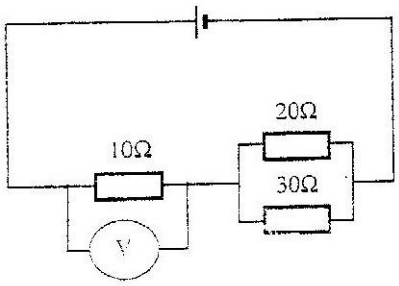


Figure 10

Determine the

(i) Total resistance in the circuit (2 marks)

(ii) Current in the circuit (1 mark)

(iii) Reading of the voltmeter (2 marks)

15. a) The figure 9 below shows magnetic relay circuit

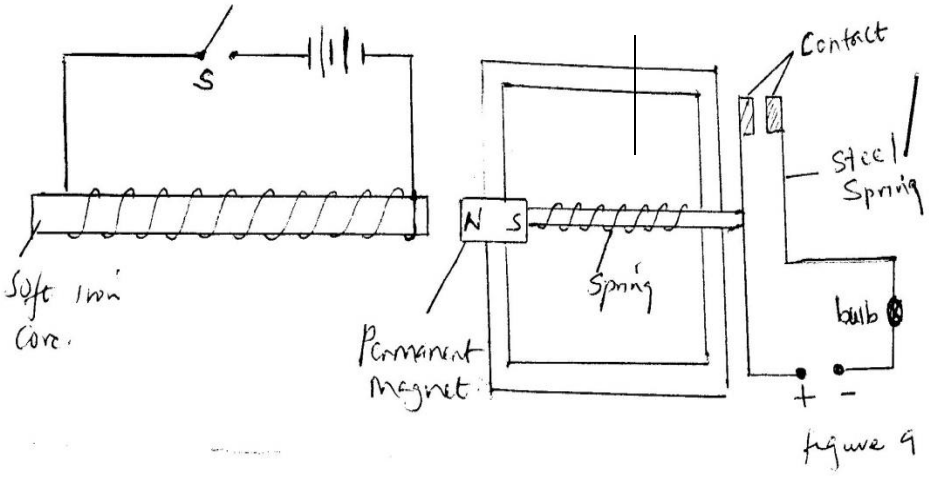
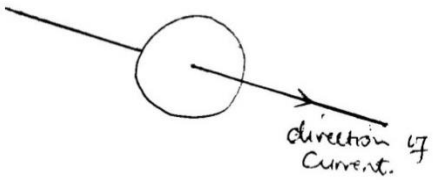


figure 9

Explain what will be observed when the switch is closed (4mks)

(b) The figure 10 below shows a current carrying conductor

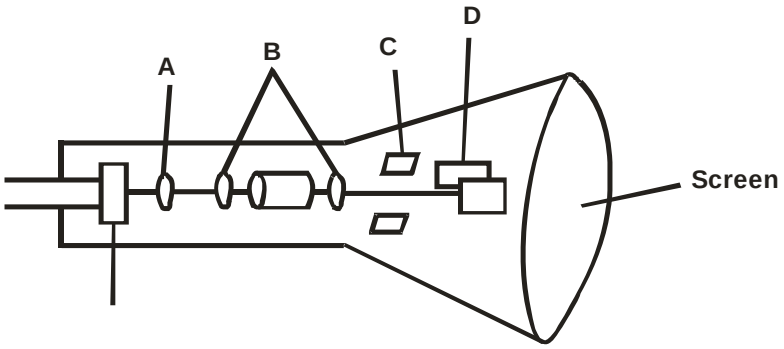


On the same diagram draw, the magnetic field pattern produced. (2mks)

(c) State two possible rules that can be used to predict the field direction produced in the above diagram. (2mks)

(d) List two applications of magnetic effect of electric current. (2mks)

16. a) The figure below represents a cathode ray oscilloscope (C.R.O)



b) Name the parts labelled A and B. (2mks)

A

B

c) What are the functions of parts labelled C and D? (2mks)

C

D

d) Explain how electrons are produced . (1mk)

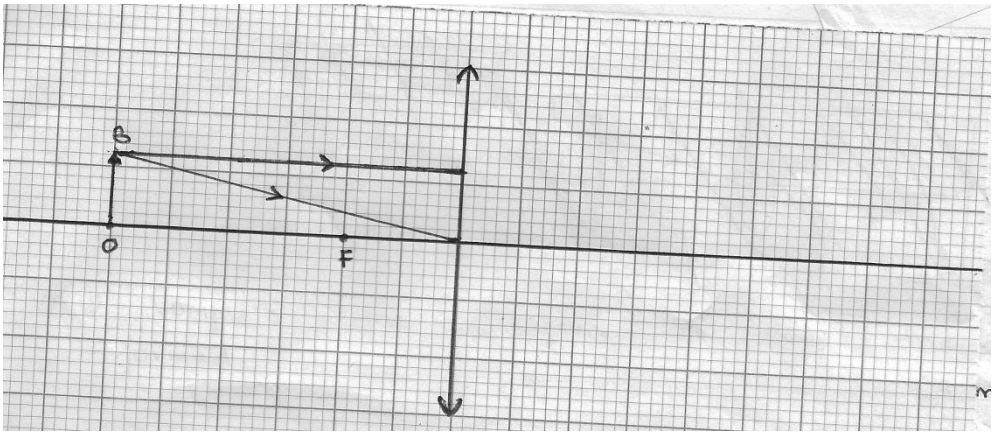
e) Give a reason why the tube is evacuated. (1mk)

f) The potential between the anode and the cathode of an X-ray tube is 80kv. Calculate;

i. The energy of an electron accelerated in the tube. (Electronic charge e = 1.6×10^{-19} C) (3mks)

ii. The velocity of electrons in the tube. (Mass of an electron = 9.11×10^{-31}kg) (3mks)

17 (a) The figure 12 below shows two rays starting from the top of an object OB incident on a converging lens of focal length 2cm.

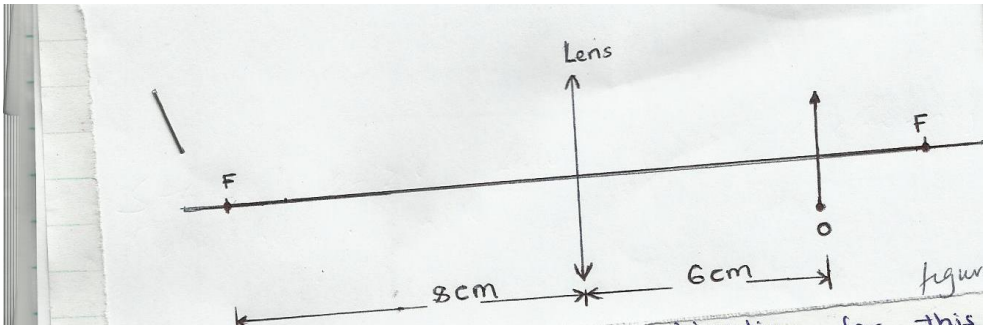


Complete the diagram to show the image formed (3mks)

(b) Add one or more incident ray from B and draw the corresponding refracted ray (1mk)

(c) Calculate the magnification produced by the lens (2mks)

(d) The figure 13 below shows an object placed at right angles to the principal axis of a thin converging lens.



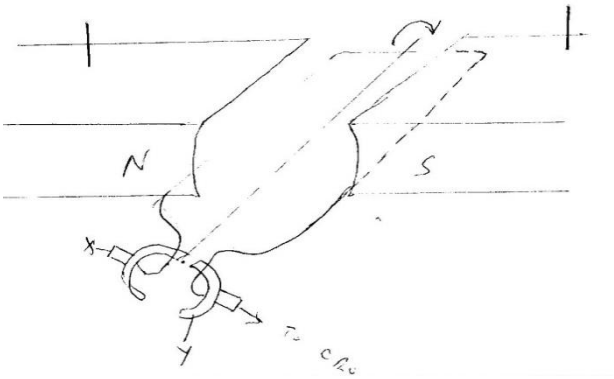
i. Calculate the position of image formed (3mks)

ii. Give an application for this arrangement of a lens. (1mk)

iii. Describe the nature of the image formed (2mks)

18 (a) State Lenz's law of electromagnetic induction (1mk)

(b) The figure 14 below shows a diagram of a simple electric generator



State three factors that would affect the value of the voltage output (3mks).

(c) A transformer supplies a current of 13.5A at a voltage of 48v to a device from an AC main supply 240V. Given that the transformer is 80% efficient, calculate;

i. Power supplied to the transformer (3mks)

ii. Current in the primary coil (2mks)