KCSE MOCKS

PHYSICS PAPER 2

Consists 3 KCSE Mock set Exams.

(Class of KCSE March 2021)

For Marking Schemes Contact Mr Machuki 0795491185

Kenya Educators Contacts:

+254795491185

kenyaeducators@gmail.com

For more e-learning resources contact Kenya Educators via the contacts above.

FOR MARKING SCHEMES CALL/TEXT/WHATSAPP 0795491185

PRE-MOCK 1

NAME…….…… INDEX NO…….....……..…..

SCHOOL……. CANDIDATE'S SIGNATURE……..…..

DATE…….……..

232/2
PHYSICS
(THEORY)
PAPER 2
TIME: 2 HOURS

KCSE PRE-MOCK 1

Kenya Certificate of Secondary Education

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 workings must be clearly shown.
*(f) Non-programmable silent electronic calculators and KNEC Mathematical tables **may be** used.*

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FOR EXAMINER'S USE ONLY:

Section	Question	Maximum Score	Candidate's Score
A	1 – 13	25	
B	14	10	
	15	13	
	16	12	
	17	08	
	18	12	
Total Score		80	

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Turnover

SECTION A: (25 MARKS)

*Answer **ALL** questions in this section in the spaces provided:*

1. State **two** conditions under which a pinhole camera may form an image on its screen which has the same size as the object. (2mks)

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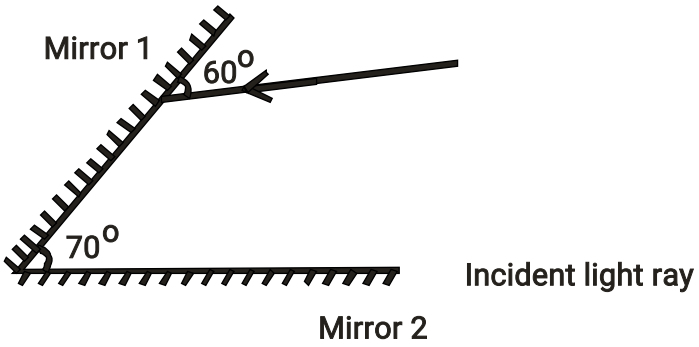
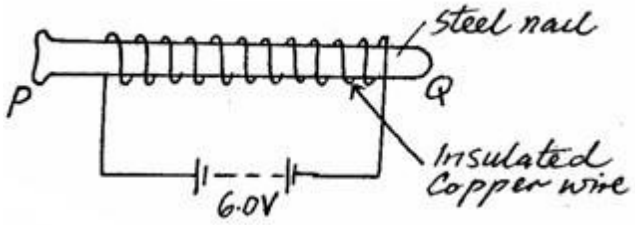
2. The figure below shows a ray of light incident on the surface of one plane mirror.



Sketch the path of the ray on the diagram after striking mirror 2 indicating all the angles. (2 marks)

3. A steel is to be magnetized by electrical method as shown below. Identify the pole **P** and **Q** of the resulting magnet. (1mk)



P: _

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Q: _

4. A small chain is often seen hanging at the back of a petrol carrying lorry. State and explain its significance. (2mks)

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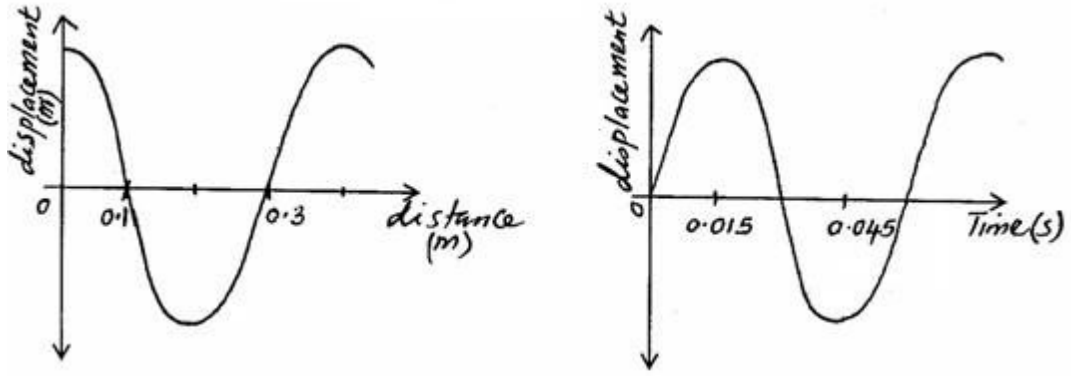
……

5. The figure **below** shows two waveforms representing the same wave motion.



Determine the velocity of the wave. (3mks)

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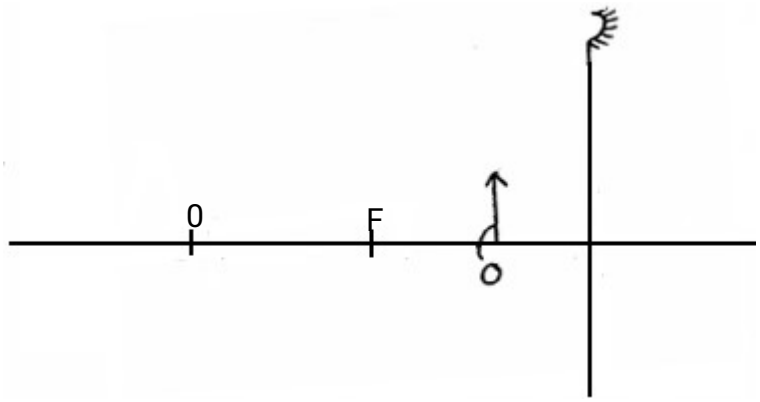
6. An object O is placed in front of a concave mirror and on the principal axis, as shown in the figure **below**. Complete the light ray diagram to locate the position of the image. (3mks)



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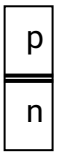
7. Arrange the following radiations in order of increasing wavelengths. (1mk)
Infrared, blue light, ultraviolet, radiowaves, -rays.

……

8. The figure **below** shows a block diagram of a p-n junction diode.



On the same diagram, show how a cell may be connected so that it is reverse biased. (1mk)

9. 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. (3mks)

……
……
……
……
…

10. What do you understand by polarization as used in a simple cell? (1mk)

_____

_____

_____

11. State how the defect mentioned in question 10 above is minimized in a simple cell. (1mk)

_____

_____

_____

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

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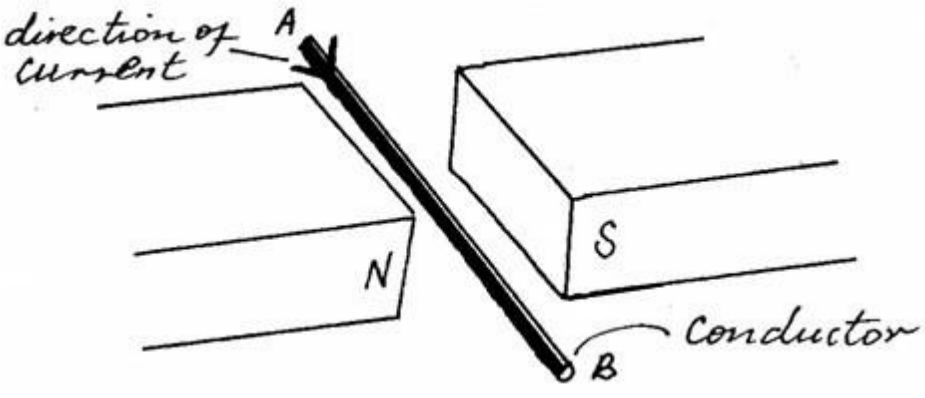

(a) Indicate the direction of force F acting on the conductor. (1mk)

(b) State **two** factors that determine the direction of the force F. (2mks)

_____

_____

_____

_____

13. You are given three resistors of values 5 , 8 and 12 . Show in a circuit diagram how you would connect them so as to give:

(a) an effective resistance of 9.8 . (2mks)

(b) the least effective resistance. (2mks)

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SECTION B: (55 MARKS)

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

14. (a) Define refractive index. (1mk)

_____

_____

_____

(b) The critical angle of a certain material medium is 43.2º. Determine the refractive index of the material. (2mks)

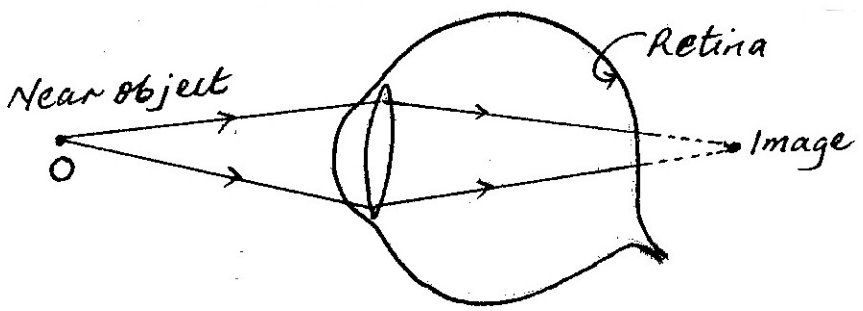
(c) (i) What do you understand by the term accommodation? (1mk

_____

_____

_____

(ii) The diagram **below** shows a certain defect of vision. Name the defect. (1mk)



_____

(iii) On the figure **below** show how the defect can be corrected. (2mks)

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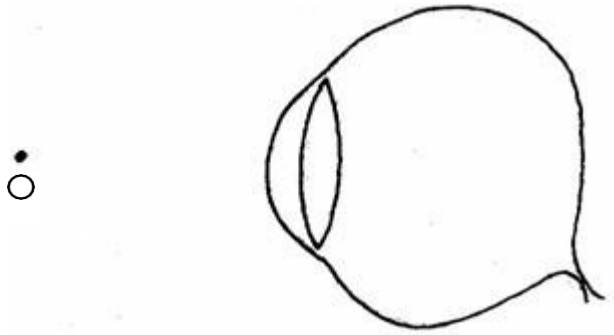

(d) An object is placed 40cm in front of a concave lens of focal length 20cm; determine the position of the image. (3mks)

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

_____

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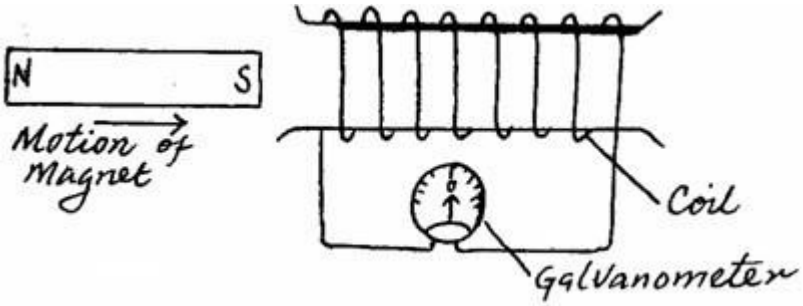
(ii)

A bar magnet is moved into a coil of insulated copper wire connected to a centre-zero galvanometer, as shown in the figure **below**.



(i) Show on the diagram the direction of induced current in the coil. (1mk)

(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. (4mks)

_____

_____

_____

_____

(b) A transformer has 800 turns in the primary and 40 turns in the secondary winding. The alternating e.m.f connected to the primary is 240V and the current is 0.5A.

(i) Determine

I the secondary e.m.f (2mks)

II the power in the secondary if the transformer is 95% efficient. (2mks)

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(ii)

Explain how energy losses in a transformer are reduced by having:

I a soft-iron core. (2mks)

_____

_____

_____

_____

II a laminated core. (1mk)

_____

_____

_____

16. (a) (i) Distinguish between thermionic emission and photoelectric emission. (2mks)

_____

_____

_____

_____

(ii) State **one** factor which affects the rate of each of the above types on. of emissi Thermionic emission. (1mk)

_____

_____

Photoelectric emission. (1mk)

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(ii)

_____

_____

(b) Sodium has a work function of 2.3eV. Given that: Planck's constant h = 6.63 10^{-34}JS, velocity of light in vacuum, C = 3.0 10^{8}m/s, 1 electron-volt (1eV) = 1.6 10^{-19} C and mass of an electron, m_e = 9.1 10^{-31}kg, calculate:

(i) its threshold frequency. (2mks)

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the maximum velocity of the photoelectrons produced when the sodium is illuminated by light of wavelength 5.0 10^{-7}m. (4mks)

(iii) the stopping potential V, with the light of this wavelength. (2mks)

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17. (a) State **two** advantages of using a Cathode Ray Oscilloscope (C.R.O) as a voltmeter over the ordinary voltmeter. (2mks)

(b) An X-ray operates at 30000V and the current through it is 2mA. Given that the charge of an electron is 1.6 10^{-19}C, h = 6.63 10^{-34}JS, speed of light, C = 3.0 10^{8}m/s, calculate:-

(i) the maximum kinetic energy of the electrons when hitting the target. (2mks)

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(ii)

Edit with WPS Office

(ii)

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

(iii) the minimum wavelength of the X-rays emitted. (2mks)

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18. (a) A radioactive carbon-14 decays to nitrogen by beta particles as shown **below**. $14C = \quad N + 0\ e$

6 7 y

Determine the values of and y. (2mks)

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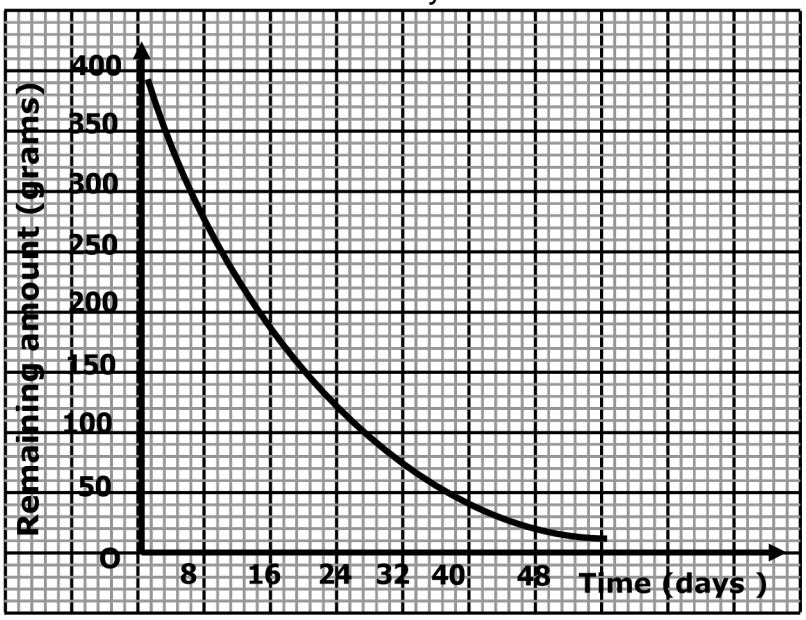
b) The graph below shows radioactive decay of iodine.



Use the graph to determine the:-

(i) Fraction of the amount remaining after 16.2 days. (2mks)

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(iii) Determine the half – life of iodine.

(2mks)

(iv) Mass remaining after 17 days.

(1mk)

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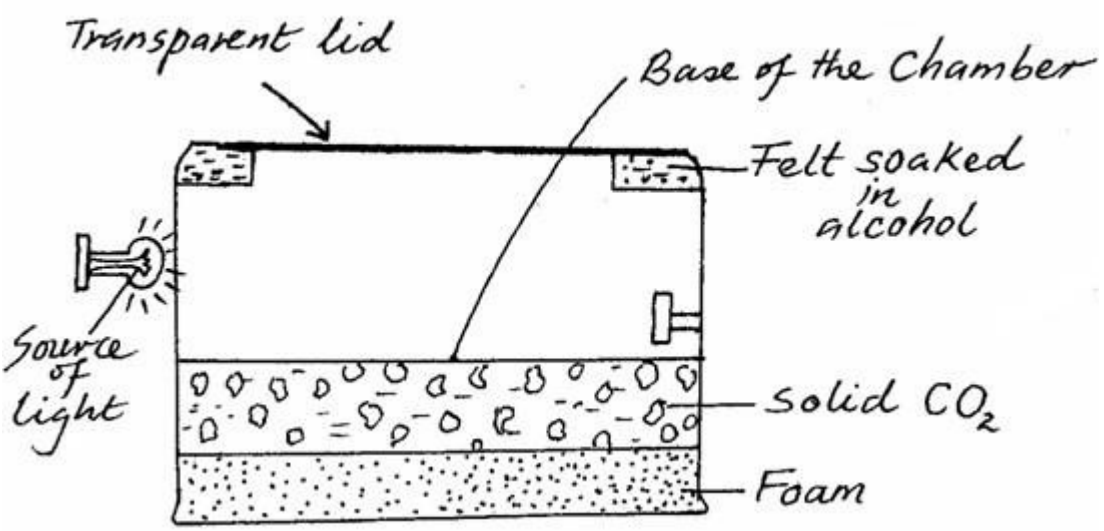
c) The figure **below** shows the cross-section of a diffusion cloud chamber used to detect radiation from radioactive sources.



(i) State the function of the following:

I Alcohol. (1mk)

_____

_____

_____

II Solid CO_2. (1mk)

_____

_____

_____

(ii) Explain briefly how the diffusion cloud chamber can be used to detect and identify alpha particles. (3mks)

_____

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THE END

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MOCK 1

NAME:……. INDEX NO:…….. ……

SCHOOL…… SIGNATURE:…….....

231/2
PHYSICS
PAPER 2 (THEORY)
TIME: 2 HOURS

KCSE MOCK 1

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

INSTRUCTIONS TO CANDIDATES

(a) Write your name and index number in the spaces provided above.
(b) Sign and write the date of the examination in the spaces provided above.
(c) This paper consists of 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.
(f) Mathematical tables and electronic calculators may be used.

Take g = 10N/kg

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SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
A	1-11	25	
B	12	9	
	13	11	
	14	13	
	15	9	
	16	5	
	17	10	
TOTAL SCORE		80	

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.

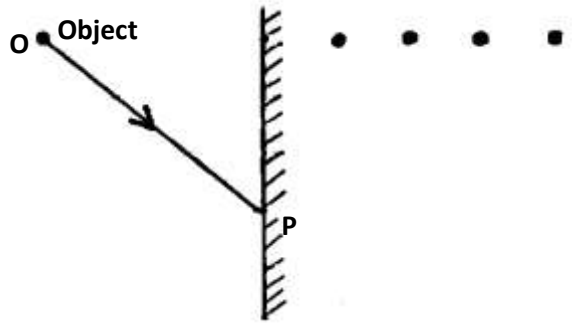


Fig. 1

(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.

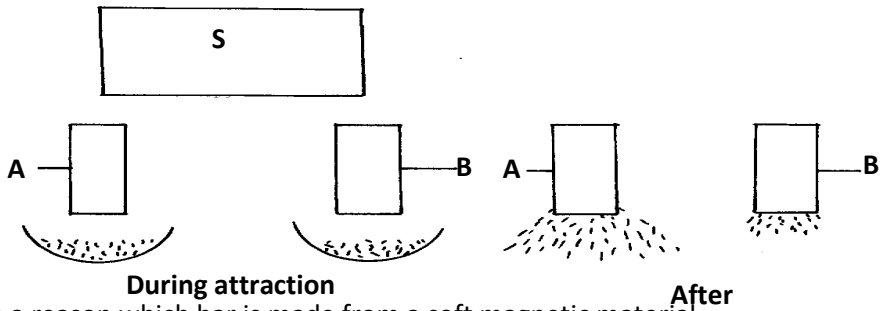
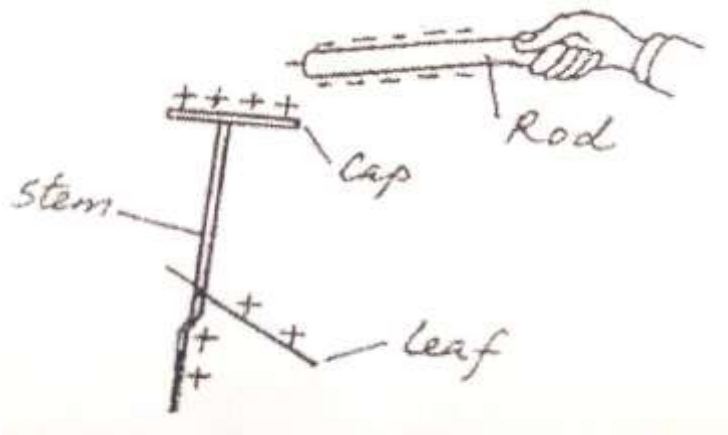


Fig. 2

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.

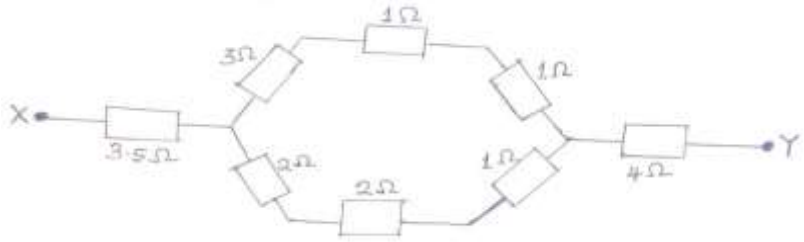


Explain this observation (2 marks)

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.



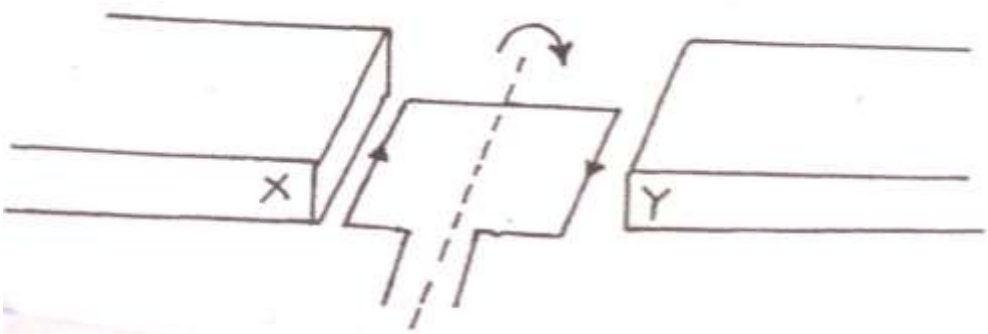
Calculate the effective resistance of the network. (3 marks)

7.State:

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

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

8. 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)

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

(2 marks)

10. (b) An element **R** decays by giving off an alpha particle. Complete the equation below showing the values of **a** and **b** (2mk)

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

a = _____ b = _____

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

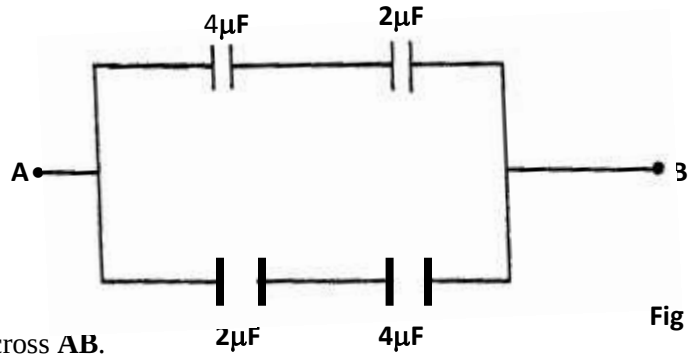


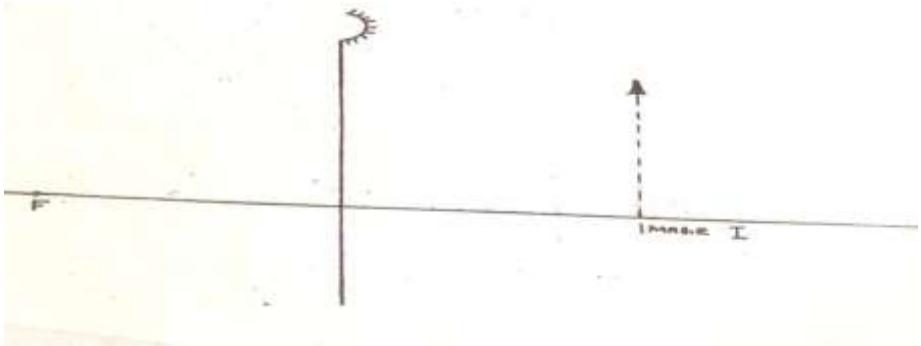
Fig 13

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

<u>Section B (55 marks)</u>

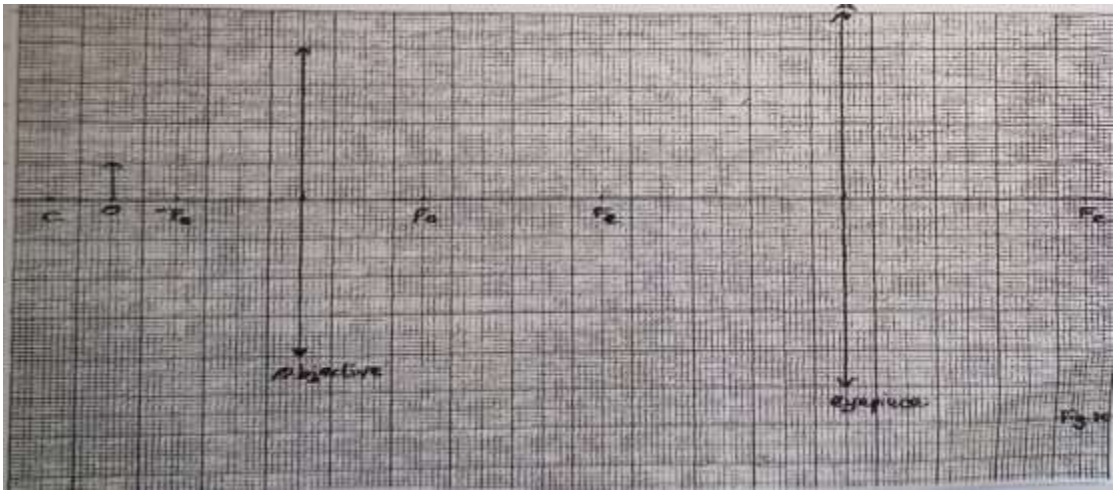
Answer all questions in the spaces provided

12a) The figure below shows and image I formed by a concave mirror



Determine its magnification M. (3 marks)

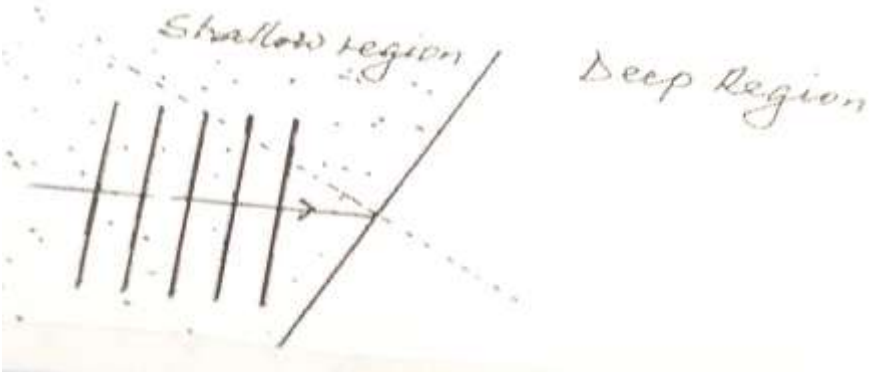
b) The figure below shows lenses of a compound microscope. The focal length of the objective lens is 2 cm and that of eyepiece lens is 4cm. The two lenses are 9cm apart. An object 1 cm high is placed 3cm from the objective lens.



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

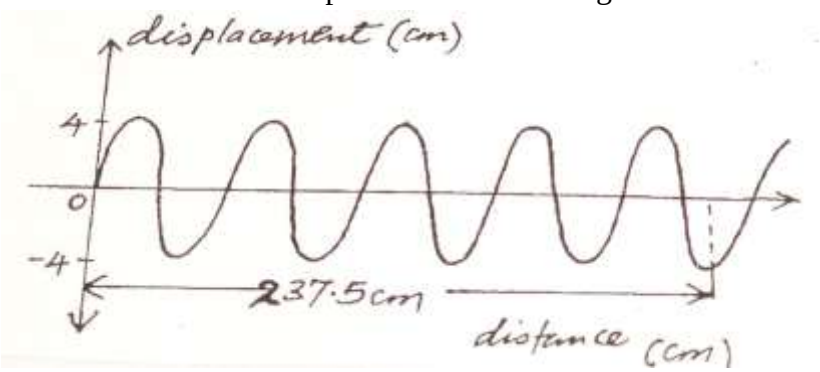
(ii) Find the magnification obtained by this arrangement (2 marks)

13. (a) The figure below shows water wave fronts 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 figure 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.



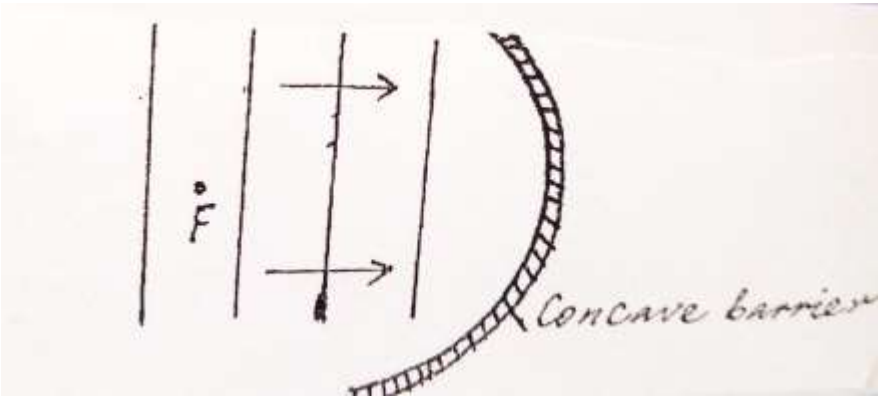
Determine:

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

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

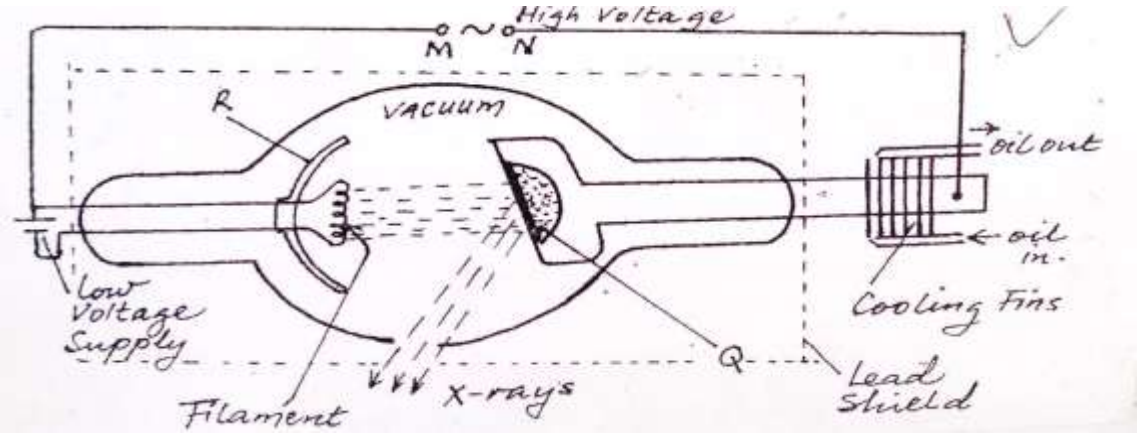
(iii) The frequency of the vibrator (2 marks)

(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)

14. 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)

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

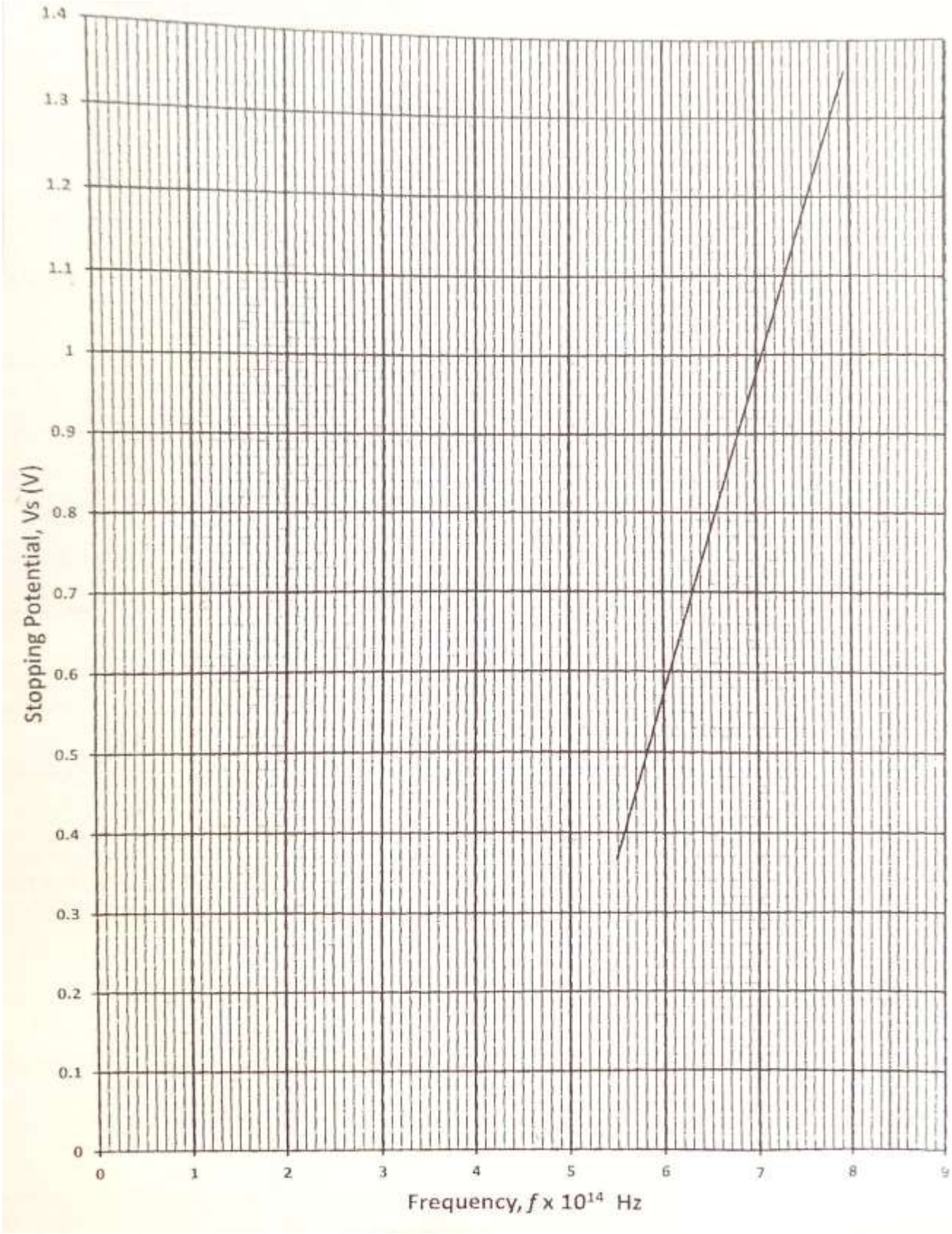
(c) A radiation falls on photosensitive material state how the following changes affect the emitted photoelectrons:

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

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

(a) The figure below shows a graph of stopping potential (voltage) V, against frequency f, of a radiation falling on a photosensitive surface.

Given that $eV_s = hf - hf_o$ where h= plants constant, f_o = threshold frequency i.e frequency when $V_s = 0$ and e is the charge on an electron = 1.6×10^{-9}C. Use the graph to determine;



(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 W_o of the surface given that $W_o = hf_o$ for the surface (2mrk)

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

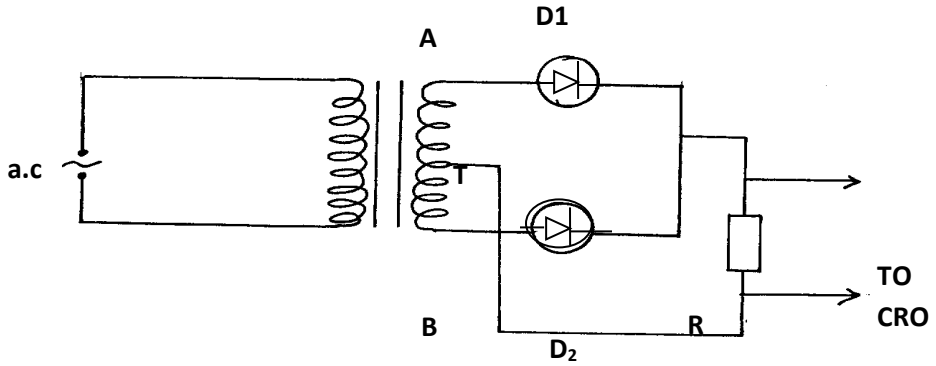


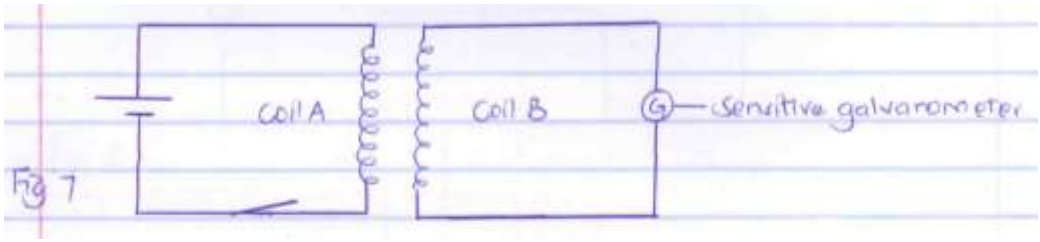
Fig 16.

(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)

17. 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.



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

i) Determine the secondary voltage 3mks)

ii) 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)

POST MOCK 1

NAME: ……CLASS:…..…… ADM NO:……

SIGNATURE:…… DATE:……

232/2
PHYSICS
PAPER 2

KCSE POST MOCK 1

The Kenya Certificate of Secondary Education
Physics Paper 2

Instructions to candidates

- ***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.***

SECTION	QUESTION	MAX MARKS	CANDIDATE'S SCORE
A	1 – 12	25	
B	13	10	
	14	10	
	15	09	
	16	16	
TOTAL		80	

SECTION A (25 Marks)

*Answer **ALL** questions in this section.*

1) Figure 1 shows the V-I characteristic curve of a torch bulb.

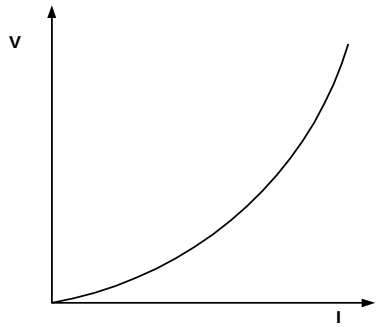


Fig.1

Explain the shape of the graph. (2 marks)

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2) The size of the pinhole camera is increased. State and explain what happens to the image.

……(1 mark)

3) Define the term sensitivity (1 mark)

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4) Why is concave mirrors used as a saloon mirror? (1 mark)

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5) Figure 2 shows a graph of magnetisation against magnetising current for two materials A and B.

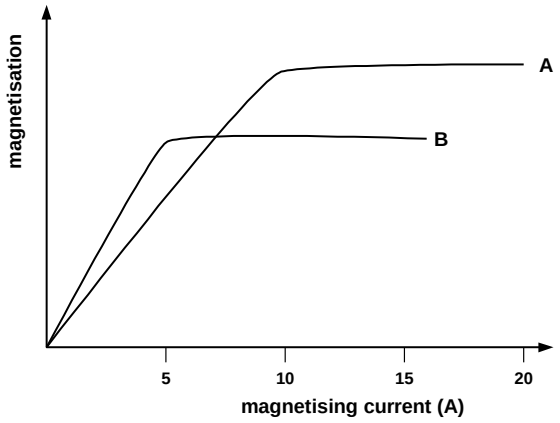

Fig. 2

a) State with a reason, the material which is more suitable for use in a transformer to concentrate the magnetic fields. (2 marks)

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……..……..……..……..……

b) Determine the current required to obtain saturation for the material which is suitable for making a permanent magnet. (1 mark)

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6) A beaker of height 10 cm is filled with water. An optical pin which is at the bottom of the beaker is then viewed from the top of the beaker. How far does the pin appear from the surface, if the refractive index of water is $\frac{4}{3}$) (2 marks)

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7) An electric heater takes 4 minutes to heat some water to boiling point. How long would it take if the current flowing through it is doubled? (2 marks)

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8) (a) **State** Ohm's law (1mark)

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(b) The figure 3 below shows part of the scale of a voltmeter, which is being used in an experiment to measure potential difference across a resistor.

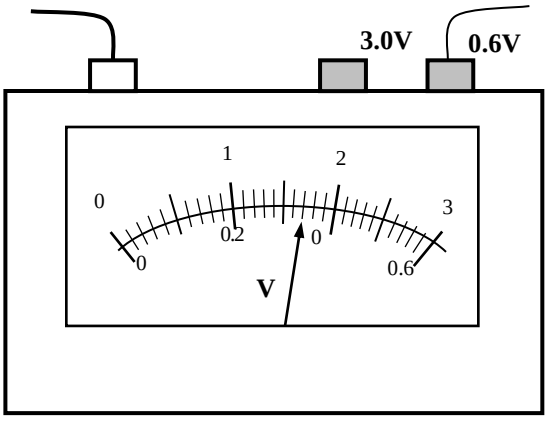

Fig.3

(i) State the accuracy of the upper and the lower scales of the voltmeter. (2 marks)

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(ii) Record the reading shown by the lower scale of the voltmeter. (1 mark)

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9) The figure 4 shows region of electromagnetic spectrum.

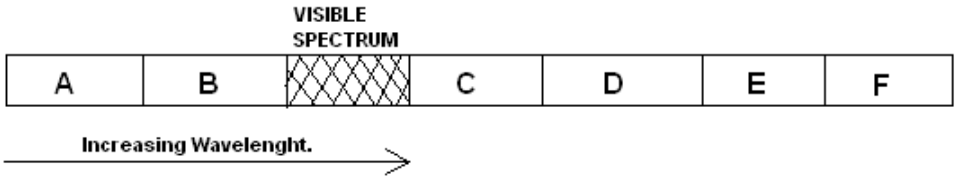

Fig.4

Name the region that representsand give one use of each. (4marks)

(a) Ultraviolet

(b) Infrared

(c) X- ray

(d) Radio wave

10) State one advantage of optical fibre cable over conventional copper cables as used in telecommunication. (1 mark)

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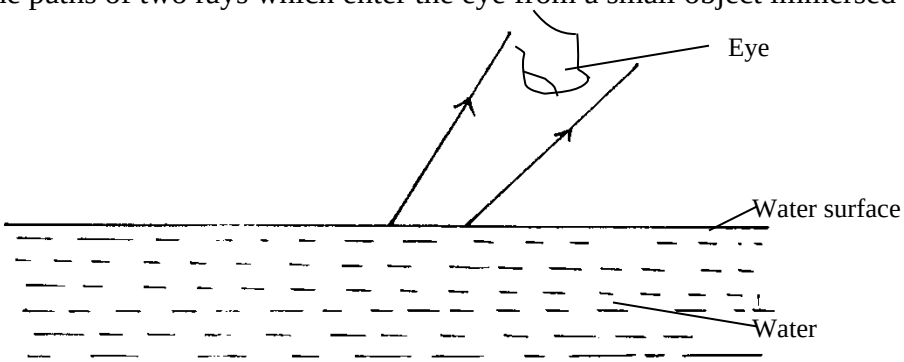
11) Fig 5. below shows the paths of two rays which enter the eye from a small object immersed in water.

Fig. 5



Draw rayson the diagram to show a possible position of the object and itsactual position.

(2marks)

12) State two conditions necessary for total internal reflection to occur. (2marks)

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SECTION B(55 Marks)

*Answer **ALL** questions in this section.*

13) (a) (i) Define capacitance. (1 mark)

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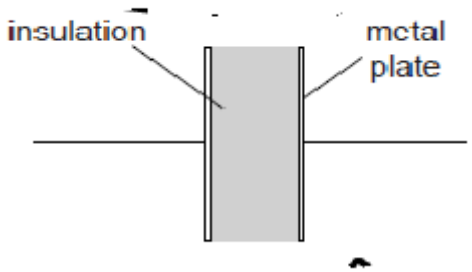
(ii) A capacitor is made of two metal plates, insulated from one another, as shown in the Fig 6.

Fig. 6



Explain why the capacitor is said to store energy but not charge. (2 marks)

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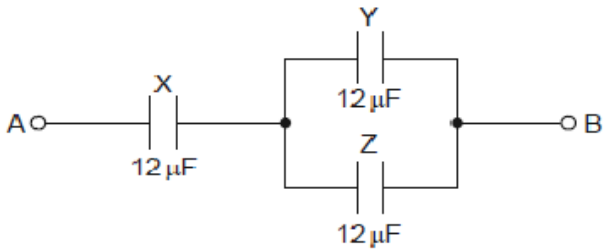
(b) Three uncharged capacitor X, Y and Z, each of the capacitance 12 microfarads, are connected as shown in Fig 7s below

Fig. 7



A potential difference of 9.0V is applied between points A and B. Calculate the combined capacitance of the capacitors X,Y and Z. (3 marks)

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(c)Explain why, when the potential difference of 9.0V is applied, the charge on one plate of capacitor X is 72 microcoulombs. (2 marks)

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(d) Determine ;

I . the potential difference across capacitor X, (2 marks)

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II. the charge on one plate of capacitor Y. (2 marks)

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14) A wire was connected to a battery and it was found that the energy converted to heat was 30J when 20 coulombs of charge flowed through the wire in 5 seconds.

Calculate;

(i) the p.d between the ends of the wire. (2marks)

……

……

(ii) the current flowing through the wire. (2marks)

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(iii) the resistance of the wire. (2marks)

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(iv) the average power development in the wire. (2marks)

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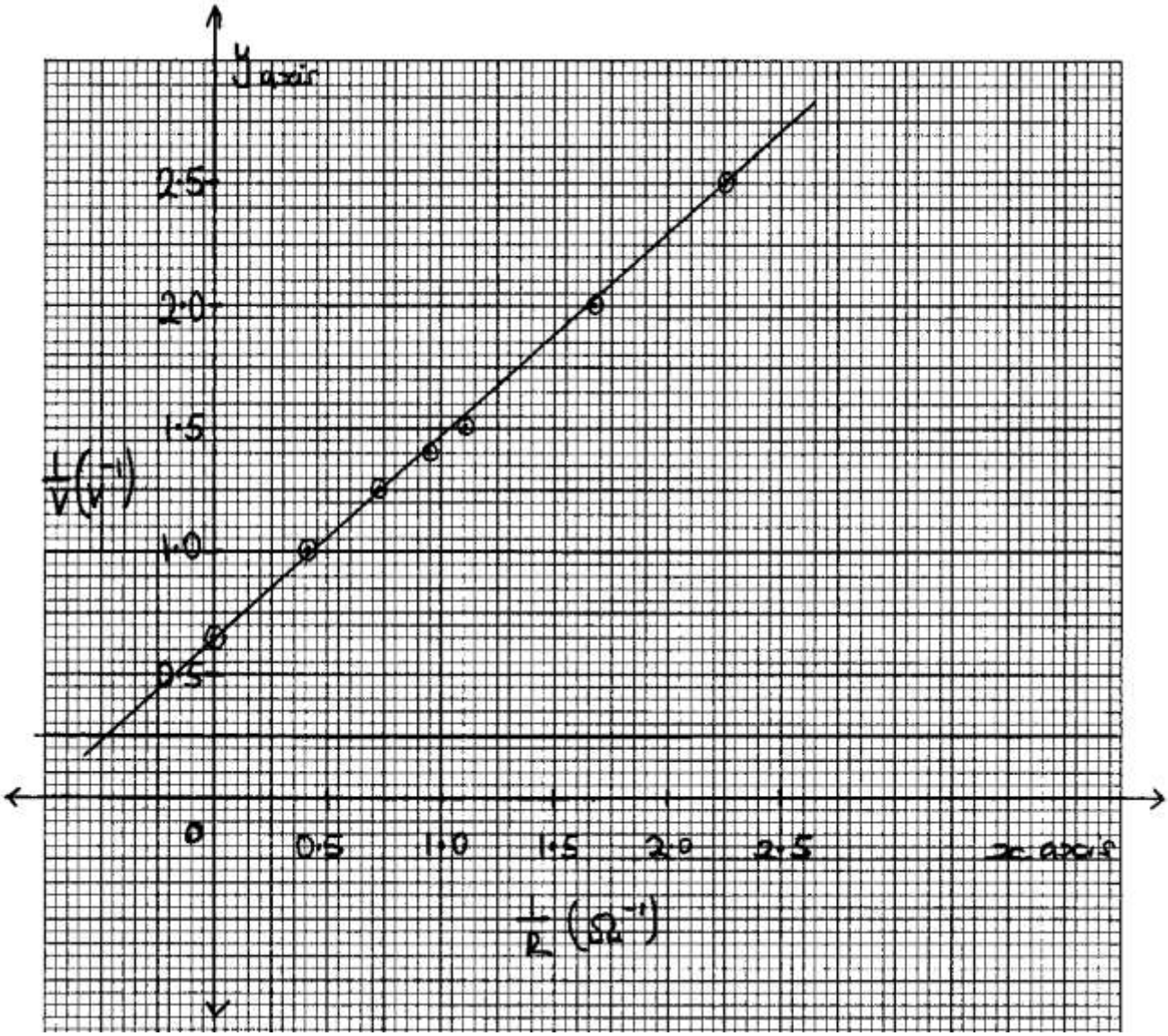
The graph below shows results obtained in an experiment to determine the e.m.f.(E) and the internal resistance, r, of a cell.



Given that the equation of the graph is $\frac{E}{V} = \frac{r}{R} + 1$

Use the graph to determine the values of:-

(i) E (2marks)

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……

ii) r (3marks)

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15) Thefigure8 belowshowstwographswhichrefertothesamewave.

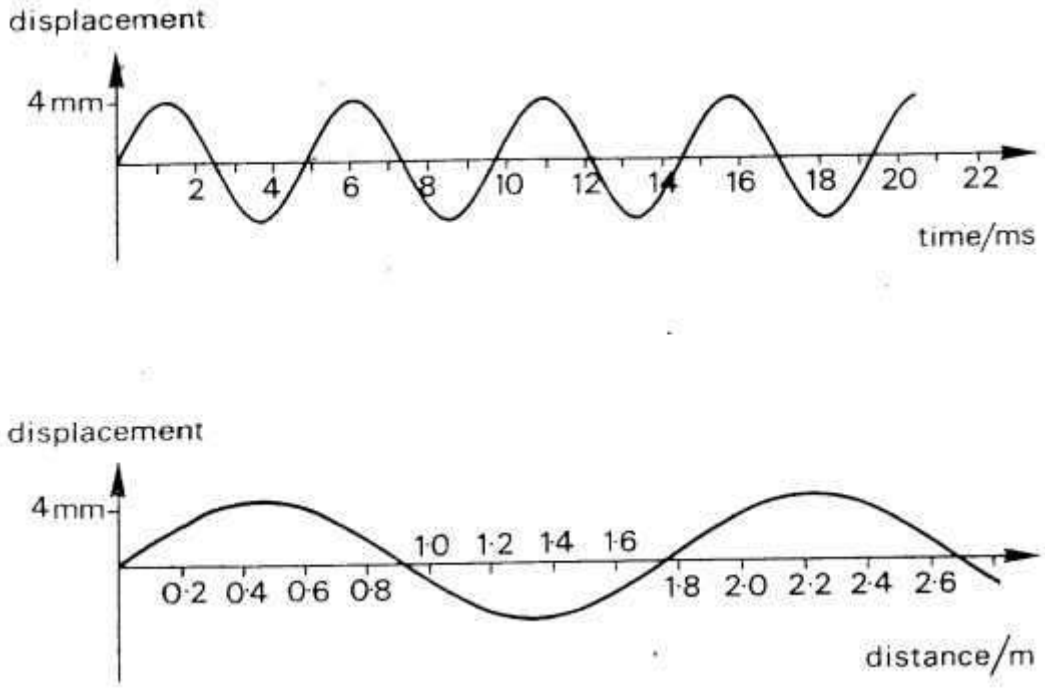

Fig. 8

i) Calculatethespeedofthewave. (4marks)

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……

ii) Distinguishbetweenprogressiveandstationarywaves. (2marks)

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ii) Figure9 belowshowsastationarywaveon astringstretchedbetweentwopointsAandFwhich areadistance*L* apart.

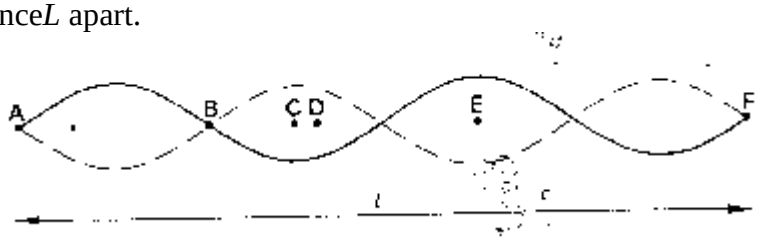

Fig. 9

DescribetheoscillationsofthepointsB,C,Dand E.Comparetheseoscillationsintermsof theirrelativephasesand amplitudes. (3marks)

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iii) Whatisthewavelengthintermsof*L*. (1mark)

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16) **i)**Statethecharacteristicsofimagesformedbya pinholecamera. (2marks)

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ii) Whatistheeffectsontheimage whenthecameraiselongated? (2mark)

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The **figure 10** below shows how a white light behaves when it is incident on a equilateral glass prism.

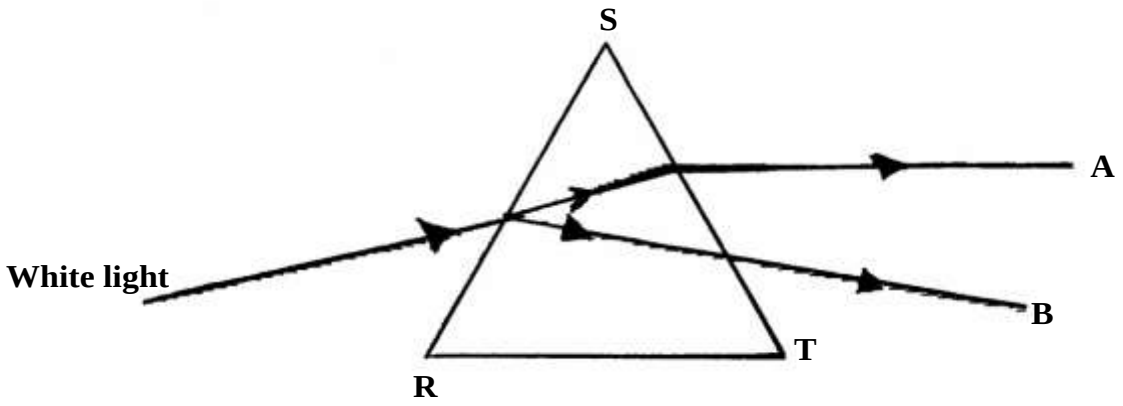

Fig. 10

iii) Explain why it split into different colours between A and B. (3 marks)

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……

iv) Suppose the white light is incident on the face SR normally, **State** and **explain** the observation.

(3 marks)

……

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17) (a) **Define** the term principal focus in relation to a thin convex lens (2marks)

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(b) **Distinguish** between a real and a virtual image. (2marks)

……

(c) The Fig.11 below shows an arrangement of lenses, L_o and L_e used in a compound microscope F_o and F_e are principal foci of L_o and L_e respectively.

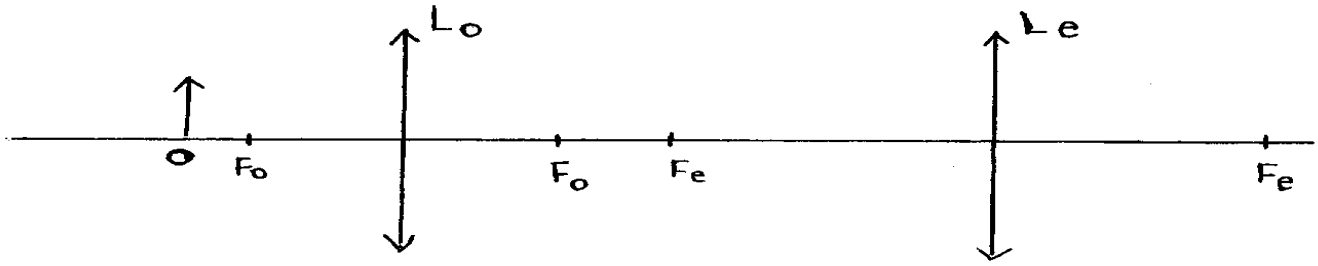

Figure 11

Draw the rays to show how the final image is formed in the microscope (3marks)

(d) The table below shows the object distance, U and the corresponding image distance, V for an object placed

U (cm)	20	25	30	35	40	45
V (cm)	60.0	37.5	30.0	26.3	24.0	22.5
$1/u$ (cm^{-1})						
$1/V$ (cm^{-1})						

(i) **Complete** the table and plot a graph of $1/V$ against $1/u$ (7marks)

(ii) **Determine** the focallength of the lens. (2marks)