FORM FOUR CLUSTER KCSE MODEL1

PHYSICS PAPER 2 QUESTIONS

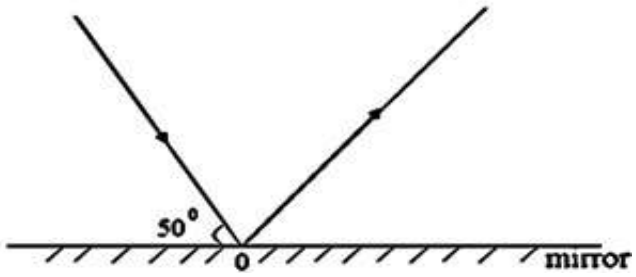
SECTION A (25 Marks)

Answer all questions in this section

1. A small chain is often seen hanging at the back of a petrol carrying lorry. State and explain its significance. ……
……

2. Figure 1.show a ray of light incident on a plane mirror at point 0.The mirror is rotated clockwise through an angle of 150 about an axis perpendicular to the paper.

Fig.1



Determine:

(a) The angle through which the reflected ray rotates. (1mk)
(b) The angle between the two rays. (2mks)

3. Figure 2a shows two undercharge metal spheres, A and B in contact mounted on insulating supports. A positively charged rod is brought near the two as shown below.

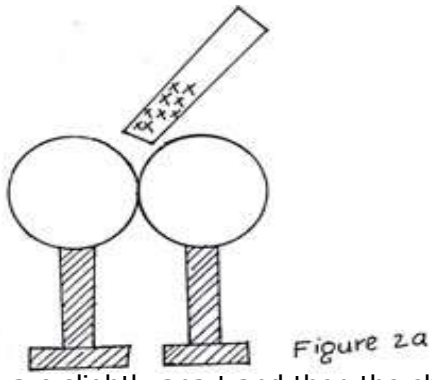
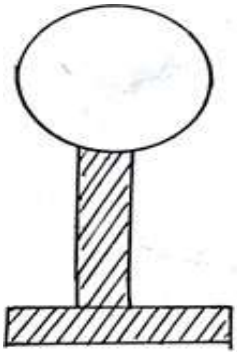


Figure 2a

The sphere are slightly apart and then the charged rod removed. On the Figure 2b below indicate the resulting charges on each sphere.



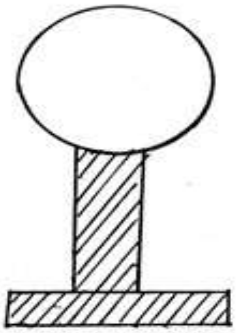


Figure 2b

4. The voltmeter in Figure 3 (a) and the ammeter in figure 3 (b) below read 2.1 v and 0.35 A respectively.

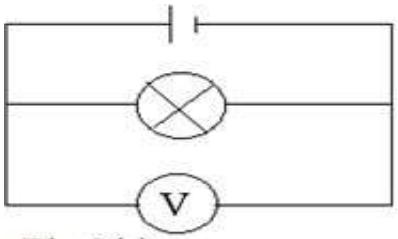


Fig 3(a)

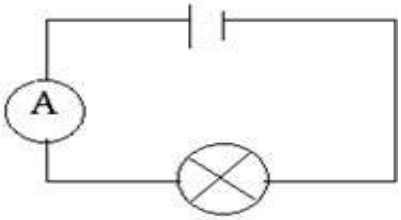


Fig 3(b)

Determine the reading in the voltmeter and ammeter in figure 3(c) and 3(d) respectively. (The lamps are identical) and the cells have negligible internal resistance.

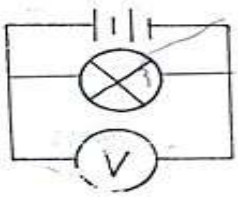


Fig 3(c)

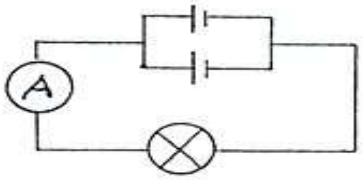


Fig 3(d)

5. A steel rod is magnetized as shown in the figure 4 below. Identify the pole P and Q of the resulting magnet.

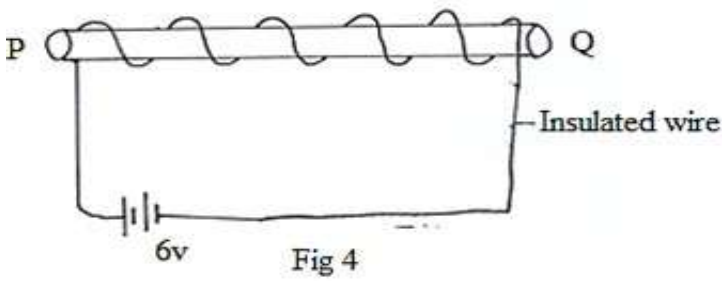


Fig 4

6. Figure 5 shows a network of capacitors whose effective capacitance across A and B is 3 F · Find
the value of x.

7. Figure 6 shows two parallel rays incident on a concave mirror, F is the focal point and C the centre of curvature.
Sketch on the same diagram the path of the rays after striking the mirror.

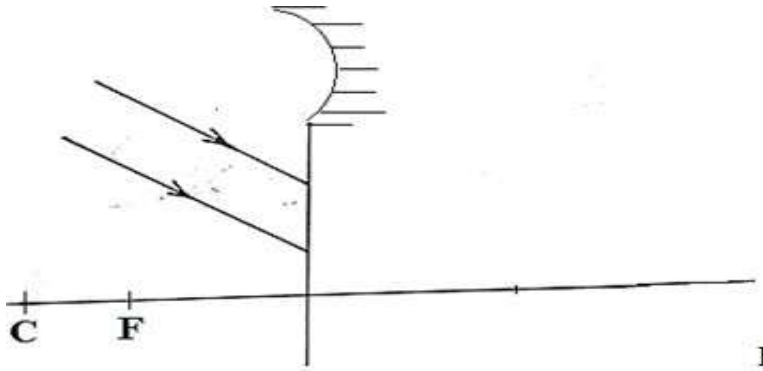


Fig 6

8. Figure 7 shows metal P and Q placed a solenoid connected to a D.C supply.

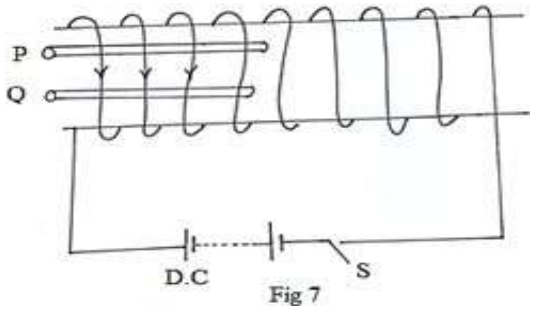


Fig 7

(a) State what would be observed when the switch is closed. Explain your observation. (2mks)
.....
.....

(b) What would be observed if the D.C supply is replaced by an A.C supply? (1mk)
.....
.....

9. Figure 8 (a) and 8(b) shows two wave fronts representing the same wave motion. Determine its velocity.

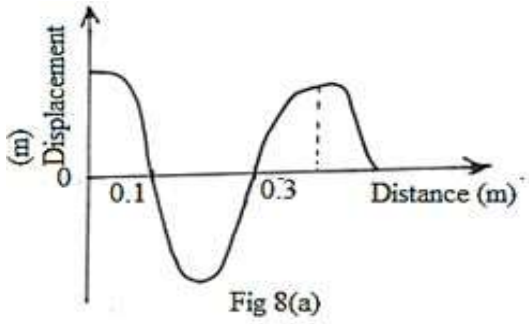


Fig 8(a)

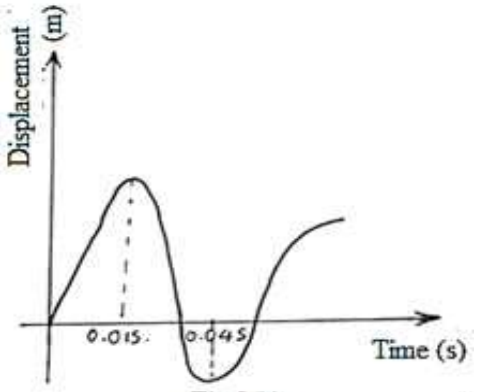


Fig 8(b)

10. The following is a part of a radioactive series

$$^{238}_{92}u \xrightarrow{(i)} ^{234}_{90}Th \xrightarrow{(ii)} ^{234}_{91}po$$

Identify the radioactive particles in stage (i) and (ii)

. .....

.....

11. State one difference between sound waves and electromagnetic waves.

.....

.....

12. The figure 9 below shows part of the electromagnetic spectrum.

radio waves	A	infrared

Fig 9

(a) Identify radiation A. (1mk)

.....

(b) How can A be detected? (1mk)

.....

SECTION B (55 Marks)

Answer all questions in this section

13. Fig 10. Shows the path of a ray of light through a triangular glass prism. The speed of light on the prism is

$2.8 \times 10^{8} ms^{-1}$

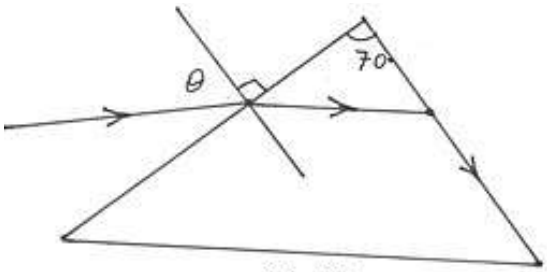
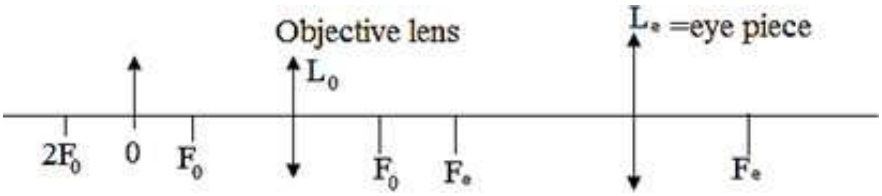


Fig 10

(a) Determine the refractive index of the glass prism (speed of light is $3.0 \times 10^8 ms^{-1}$)

(b) On the same diagram indicate the critical angle, C and determine its value. (3mks)

(c) Fig 11 shows an object O placed in front of an objective lens LO whose focal length fo is less than fe, the focal length of the eyepiece is Le. Complete using ray constructions how the arrangement would produce a compound microscope to form magnified virtual image.(2mks)



(d) A nail is placed 25 cm from the objective lens of focal length 15 cm. On the other side of the objective lens another converging lens of local length 30 cm is placed as the eye piece. The distance between the two lenses is 52.5 cm. Find the

(i) position of the first image. (2mks)

(ii)Position of the final image from the eye piece. (2mks)

14. (a) State Ohm's law. (1mk)

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.....

(b) The circuit in Fig 12 shows two cells each of emf E volts and internal resistance 0.5 ohms supplying current to a network of resistors.

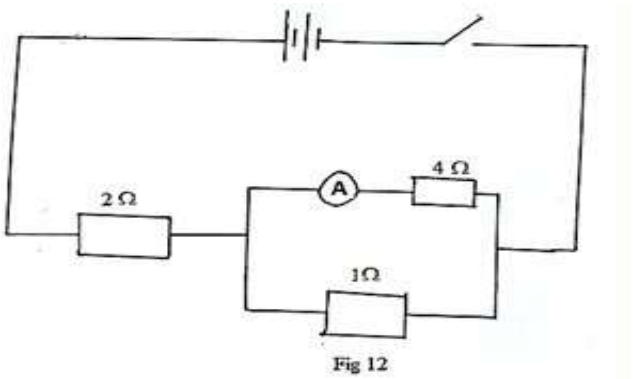
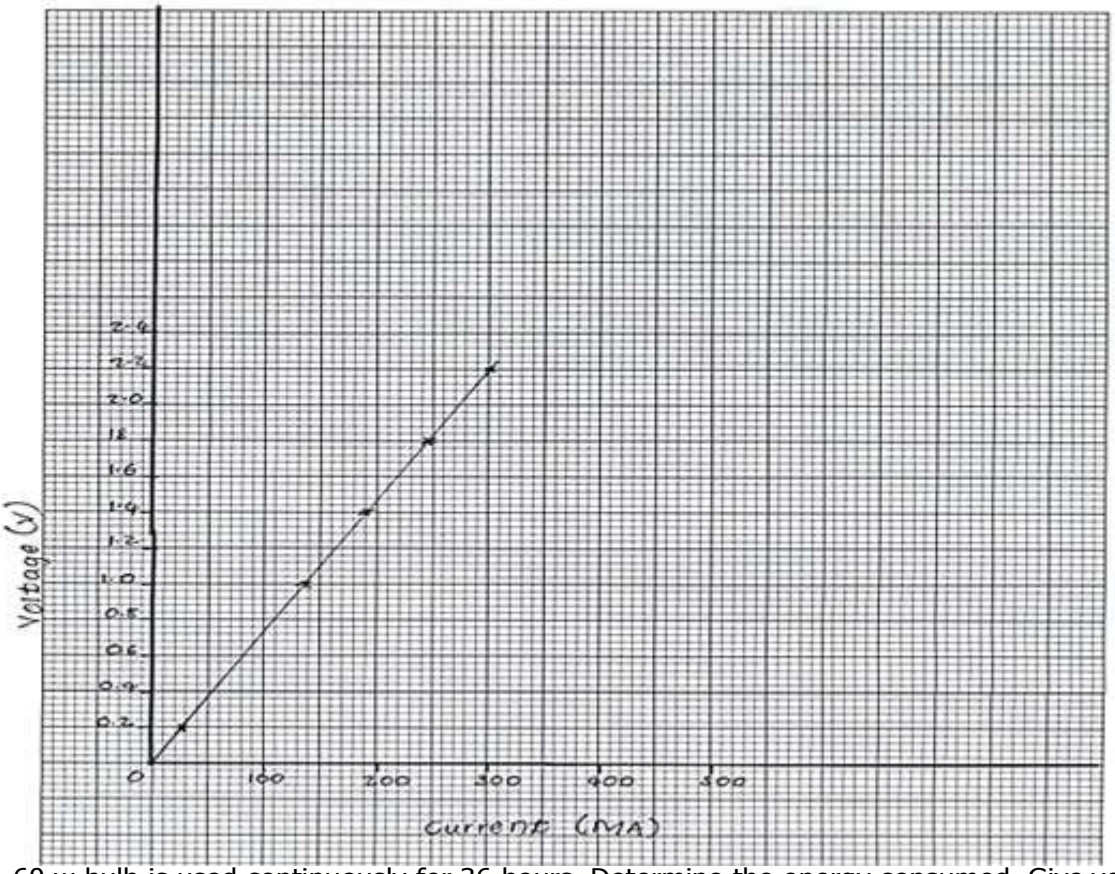


Fig 12

When switched on the ammeter reading is found to be 0.2 Amperes. Determine the value of E. (4mks)

(c) Fig 13 shows a graph of voltage against current in milliamperes from an experiment done to investigate Ohm's Law
From the graph, determine the resistance of the wire. (3mks)



(d) A 60 w bulb is used continuously for 36 hours. Determine the energy consumed. Give your answer in kilowatt hour.(kwh) (3mks)

15. (a) Electrical energy is distributed as alternating current (a.c) at high voltage. Explain why?

(i) A very high voltage is necessary. (1mk)

.....
.....

(ii) Thick aluminium transmission lines are recommended to carry the current.

(1mk)

.....
.....

(iii) The power is transmitted in alternating voltage (a.c) (1mk)

.....
.....

(b) Fig. 14 shows the electric wiring of an electric cooker X, Y and Z are main wires.

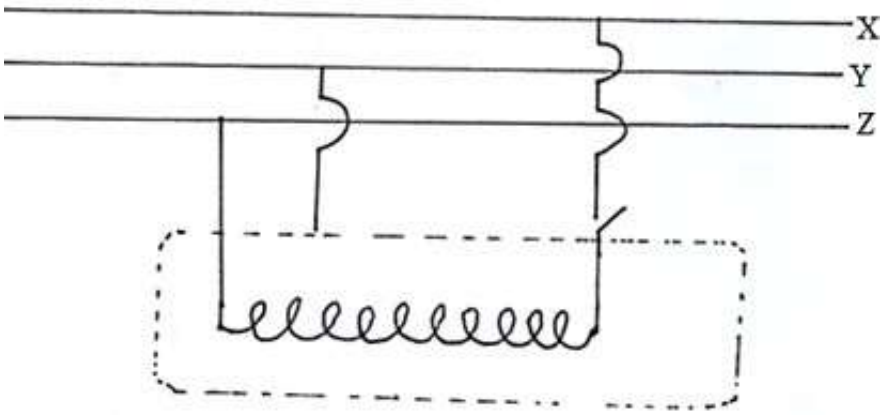


Fig.14

Identify Y and X giving reasons. (2mks)

X .....

Y .....

(c) State Leiz's law of electromagnetic induction. (1mk)

.....
.....

(d) A bar magnet is moved into a coil of an insulated copper wire connected to a zero centre galvanometer as shown in the figure 15.
(i) Show on the figure above the directions of induced current in the coil. (1mk)

(ii) State and explain what is observed on the galvanometer when the south pole

of the magnet is movedinto and then withdrawn from coil.

(2mks)

.....

.....

(e) A transformer has 800 turns in the primary and 40 turns in the secondary winding. The alternating voltage connected to the primary is 240 V and current of 0.5 A. Determine the:

(i) Power in the secondary if transformer is 95% efficient. (2mks)
(ii) Explain how power losses in a transformer are reduced by having (2mks)

- Soft iron core.

.....
.....

- Lamination
.....
.....

16. (a) The figure 16 below shows an X-ray tube. Use it to answer the questions which follow.

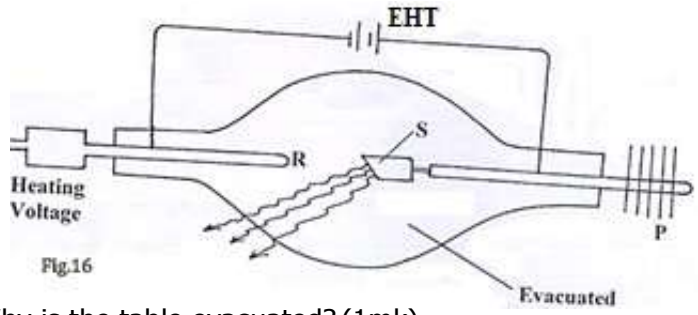


Fig.16

(i) Why is the table evacuated? (1mk)

.....
.....

(ii) How can the wavelength of the X-rays emitted from the tube be reduced? (1mk)
.....
.....

(b) X-rays are emitted when a tube operates at 3 x 10^2 and a current of 0.01 A is passing through It. Velocity of the electrons on hitting the target. (3mks)

$(Take\ e = 1.6\times10^{-19}\ C\ and\ M_e = 9\times10^{-31}\ kg)$

(c) What determines the energy of X-rays? (1mk)

.....
.....

(d) State two properties of X-rays. (1mk)

.....
.....

(e) Cathode ray tube is usually coated with graphite. State the function of graphite. (1mk)
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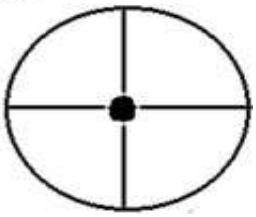
.....

(f) The figure 17 shows a spot on the screen of a C.R.O when the time base is off.

Fig 17



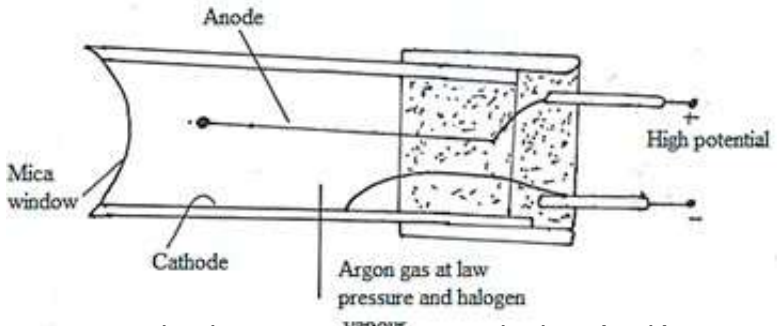
(i) State and explain what is observed on the screen when the anode potential is increased. (2mks)
.....
.....

(ii) On the same diagram sketch the appearance when the Y –plate is on with a.c connection. (1mk)

17. (a) Define the term radioactivity. (1mk)
.....

.....

(b) Figure 18 shows a Geiger miller (G.M) tube.



(i) Give a reason why the mica window is made thin. (1mk)

.....
.....

(ii) Explain how the radiation entering the tube through the windows is detected by the tube. (2mks) .....
.....
.....

(iii) What is the purpose of the halogen vapour. (1mk)

.....

(c) A surface whose work function Q =6.4 x 10^{-19} J is illuminated with light of frequency 3.0 x 10^{-15} Hz .Find the minimum K.E of the emitted polar electrons (h=6.4 x 10^{-34}) (4mks)