YESMARK TUITION SERVICES

232/2
PHYSICS
PAPER 2
DEC 2015
TIME: 2 HOURS

INSTRUCTIONS TO THE CANDIDATES:

- Write your **name and index number** in the spaces provided above. Sign and write the date of examination in the spaces provided above.
- This paper consists of two sections; A and B Answer ***all*** the questions both in section **A** and **B** in the spaces provided
- Mathematical tables and silent electronic calculators ***may*** be used

For Examiners' Use Only

SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
Section A	1-9	25	
Section B	10	12	
	11	11	
	12	13	
	13	12	
	14	7	
	TOTAL	80	

This paper consists of 12 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing

SECTION A (25 MARKS)

1. Complete the ray diagram in **figure 1** below to show the location of the object and the image. (2mks)

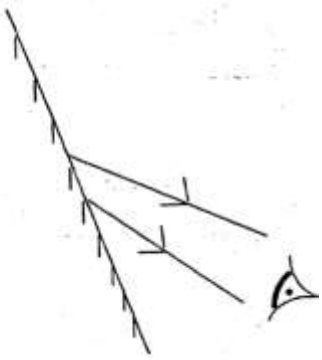


Fig. 1

2. Why is repulsion a sure way of testing polarity of a magnet. (1mk)

3. What is the resistance of a copper wire of length 10m and diameter 2mm given that the resistivity of copper is $1.6 \times 10^{-8}\ \Omega$ m (2mks)

4. **Figure 2** below shows an image of an object placed in front of a concave mirror.

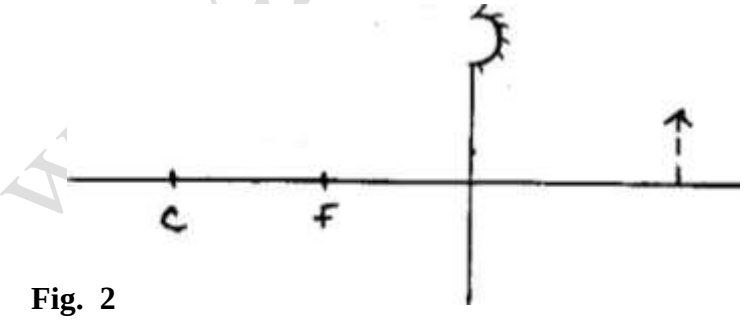
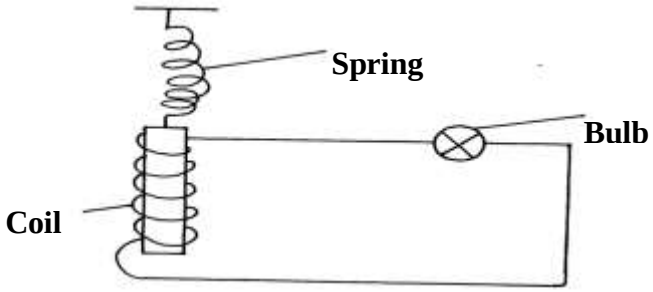


Fig. 2

Complete the diagram to locate the position of the object – hence determine the magnification. (2mks)

5. **Figure 3** below shows a magnet made to oscillate inside a coil connected to a bulb.

Fig 3



(i) Explain what's observed. (2mks)

(ii) How can the arrangement be designed to make the bulb light longer? (1mk)

6. Power is transmitted to a factory via a transformer. The input voltage to the transformer is 11KV. The transformer changes this to 415V for use in the factory. The power input to the transformer is 800KW.

(i) Calculate the current in the secondary coil of the transformer. (3 mks)

(ii)What assumption have you made in your calculation? (1 mk)

7. **Figure 4** below shows the features of a diffusion cloud chamber used for detecting radiations from radioactive sources.

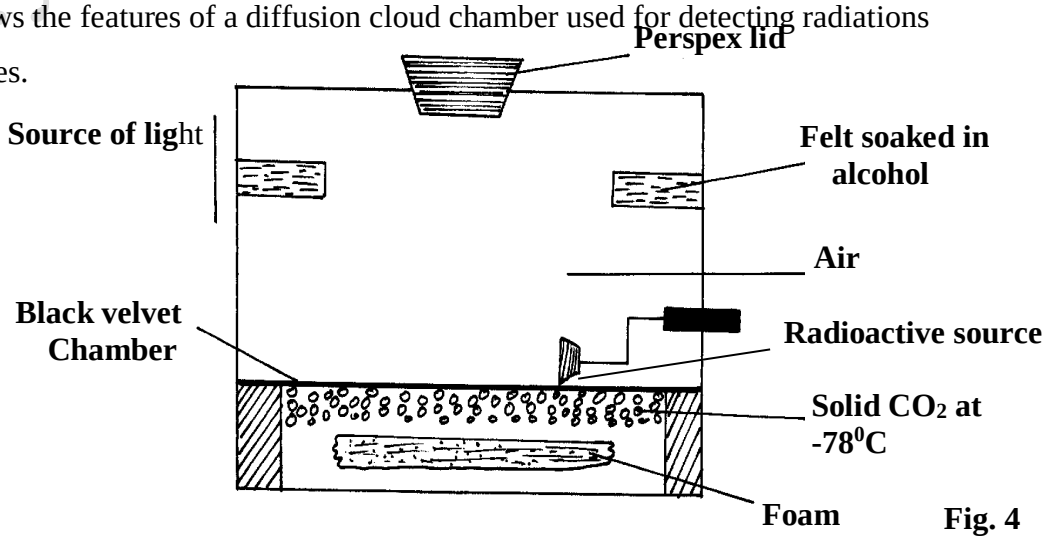


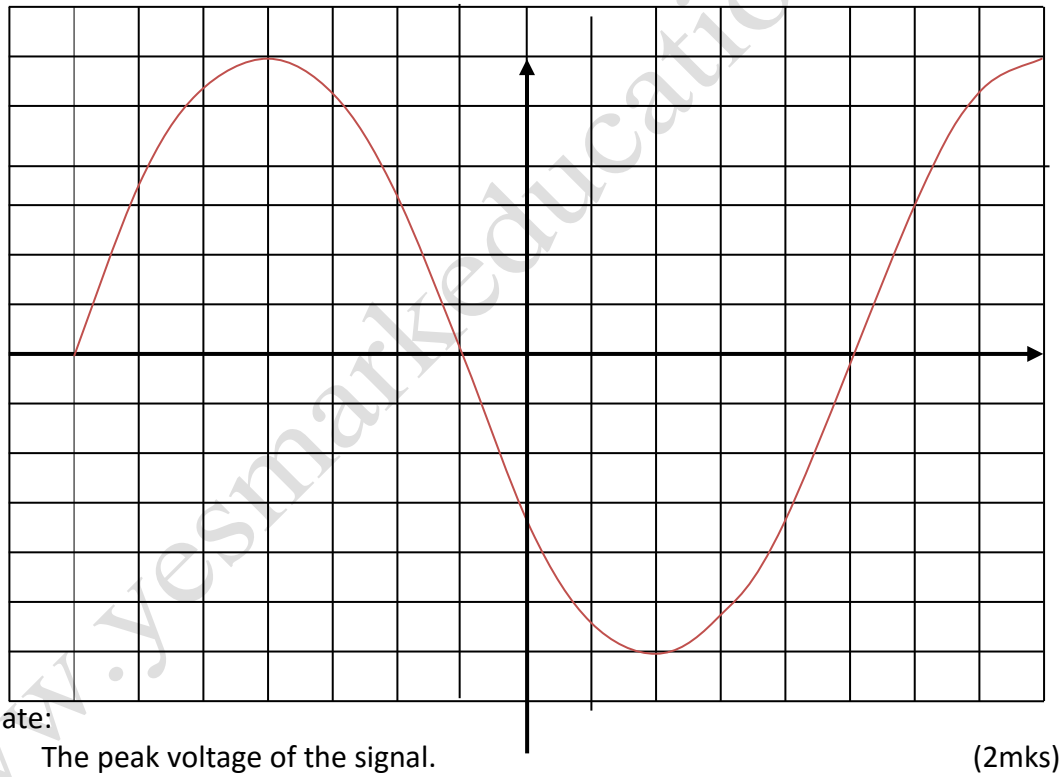
Fig. 4

(i) State the function of the Perspex lid. (1mk)

(ii) Explain how the radiation from the radioactive source is detected in the chamber. (3mks)

8. **Figure 5** below shows a signal displayed on the Y-plate of a C.R.O. If the sensitivity of the Y-gain is 200V/cm and the time base control is set at 40ms/cm.

Fig 5



Calculate:

i) The peak voltage of the signal. (2mks)

ii) The frequency of the signal. (2mks)

9. **Figure 6** below shows a circuit diagram for full wave rectification

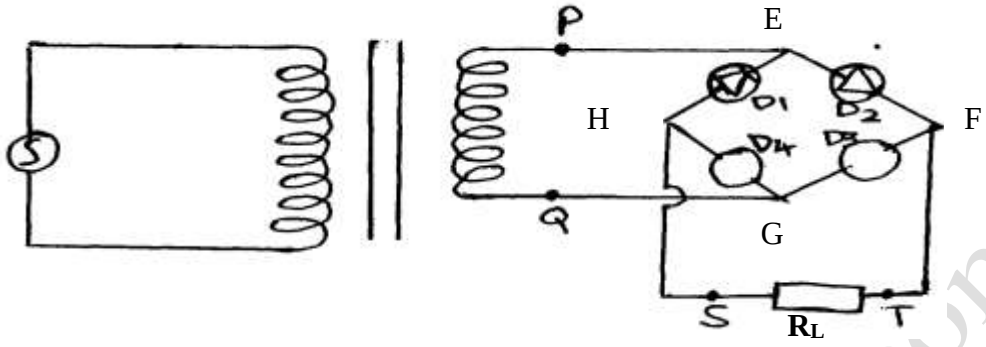


Fig. 6

(i)Draw the diodes D_3 and D_4 on the diagram to complete the circuit (1mk)

(ii) Explain how a rectified output is produced from the set-up when an a.c input is connected across PQ (3mks)

SECTION B (55 MARKS)

10. (a) **Figure 7** shows a pair of parallel plates of a capacitor connected to a battery.

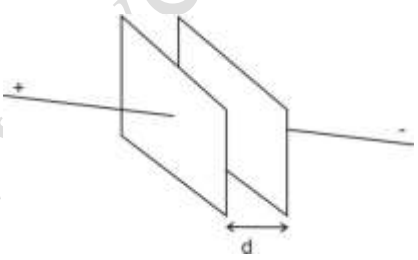
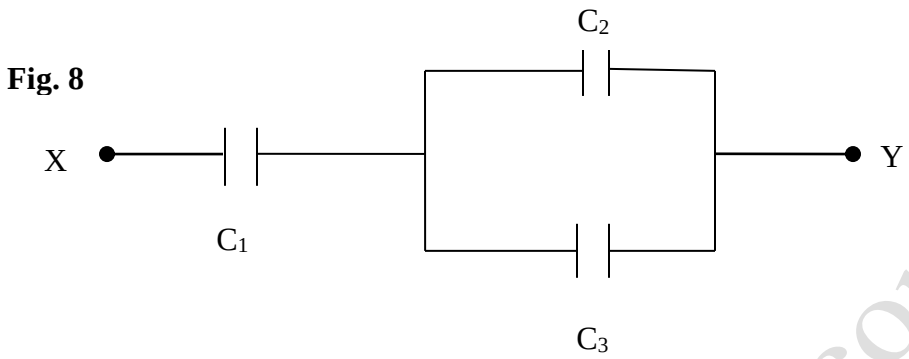


Fig. 7

State with reason the effect of reducing the distanced, d on the potential difference between the plates (2mks)

(b)**Figure 8** below shows a circuit containing three capacitors C_1, C_2 and C_3.

Fig. 8

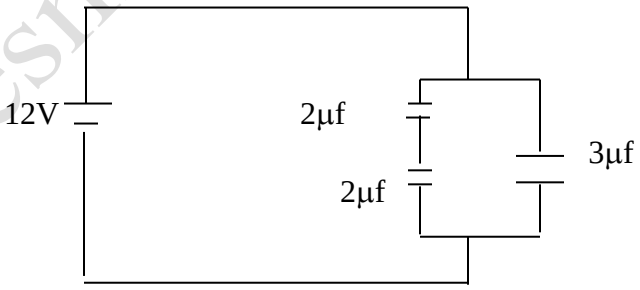


(i)Write an expression for the effective capacitance between X and Y. (2mks)

(ii)If $C_1 = 6\mu F$, $C_2 = 4.5\mu F$ and $C_3 = 7.5\mu F$, Calculate the effective capacitance. (2mks)

(c) **Figure 9** below shows capacitors connected to a DC supply.

Fig 9



Determine

(i) The charge stored in the 3µf capacitor. (3mks)

(ii) The resultant capacitance of the arrangement. (3mks)

11. (a) **Figure 10** below shows the profile of a transverse wave.

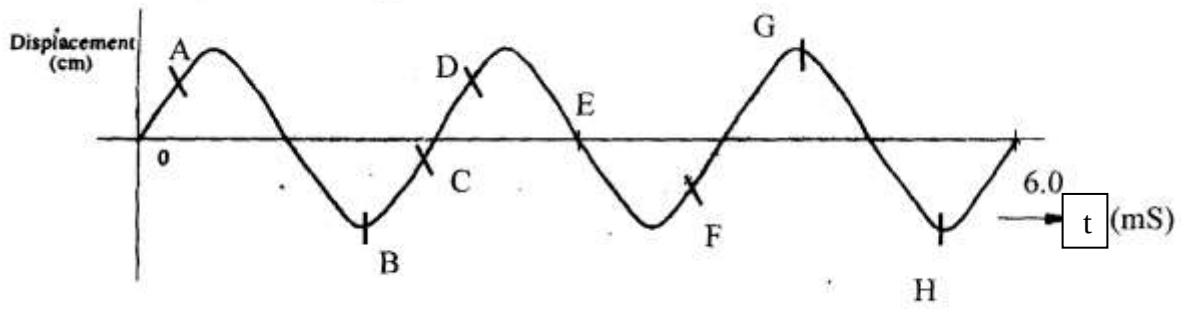


Fig 10

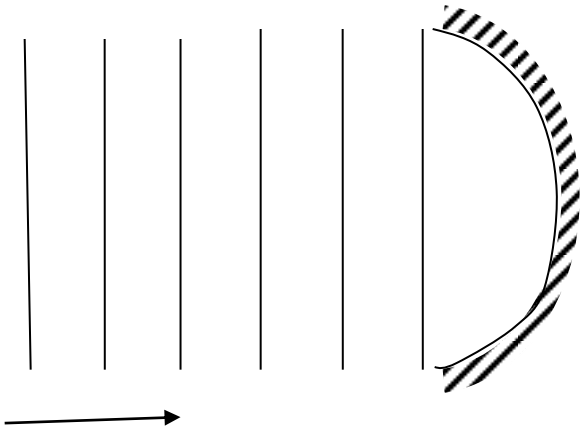
i) Identify **two** sets of points that represent points that are in phase. (2mks)

ii) Determine the frequency of the wave. (2mks)

(b) Complete the wave motion in **Figure 11 (i) and (ii)**. (4mks)

(i)

Figure 11(i)



Incident wave

(ii)

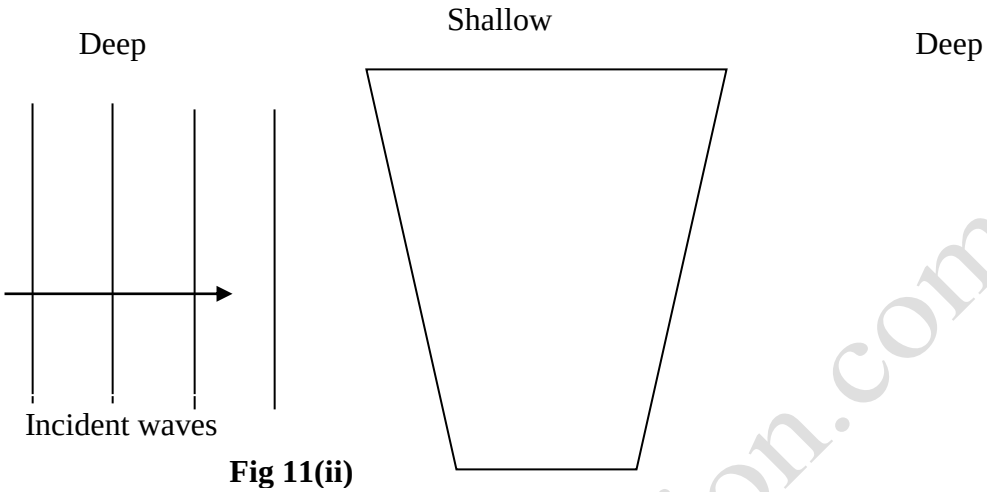


Fig 11(ii)

(c)**Figure 12** below shows an open tube with a wave produced by a vibrating tuning fork.

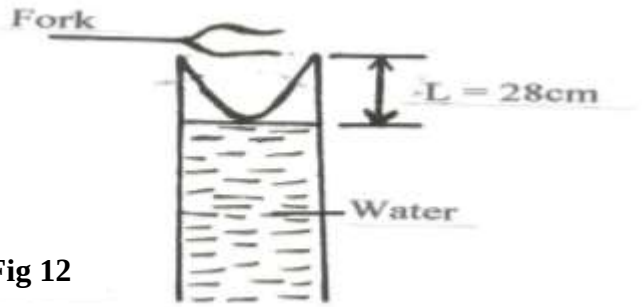


Fig 12

The first loud sound is heard when L = 28cm and the second loud sound is heard when L = 88cm. Find the velocity of sound given that the frequency of the fork is 280H**z**.

(3mks)

12. **Figure 13** below shows two converging lenses L_1 and L_2 placed 7 cm apart. The focal length of L_1 is 1.2 cm and that of L_2 is 2.4 cm. An object 5mm is placed 1.5cm from the lens L_1. An observer positions his eye as shown.

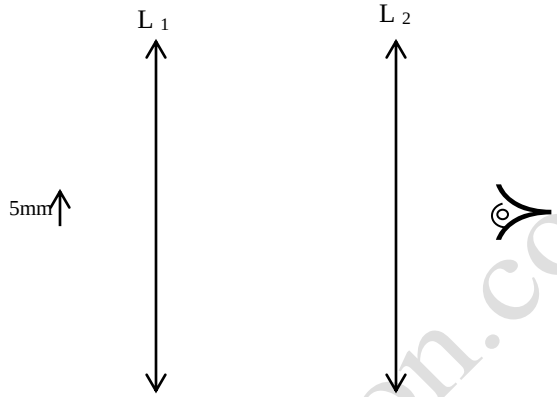


Fig 13

(a)Calculate the distance between the final image and the lens L_2 (3mks)

(b) Determine the total magnification . (2mks)

(c) State the application for the above arrangement. (1mk)

(d) What name is given for lens L_2 in the arrangement shown (1mk)

(e) Determine the power of lens L_1 (2mks)

(f) **Figure 14** below is a human eye with a certain defect

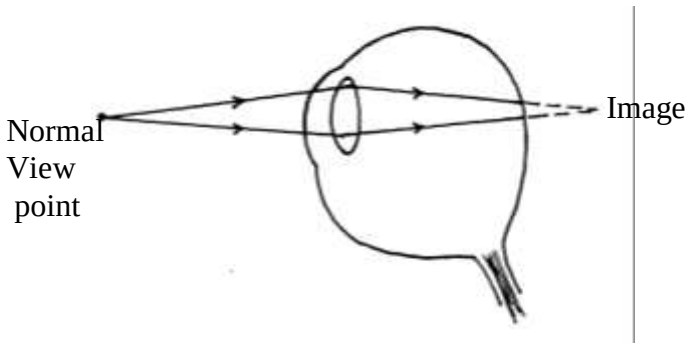


Fig. 14

(i) Name the defect (1mk)

(ii) On the same diagram, sketch the appropriate lens to correct the defect and sketch rays to show the effect of the lens. (2mks)

(iii) State the possible cause of the defect. (1mk)

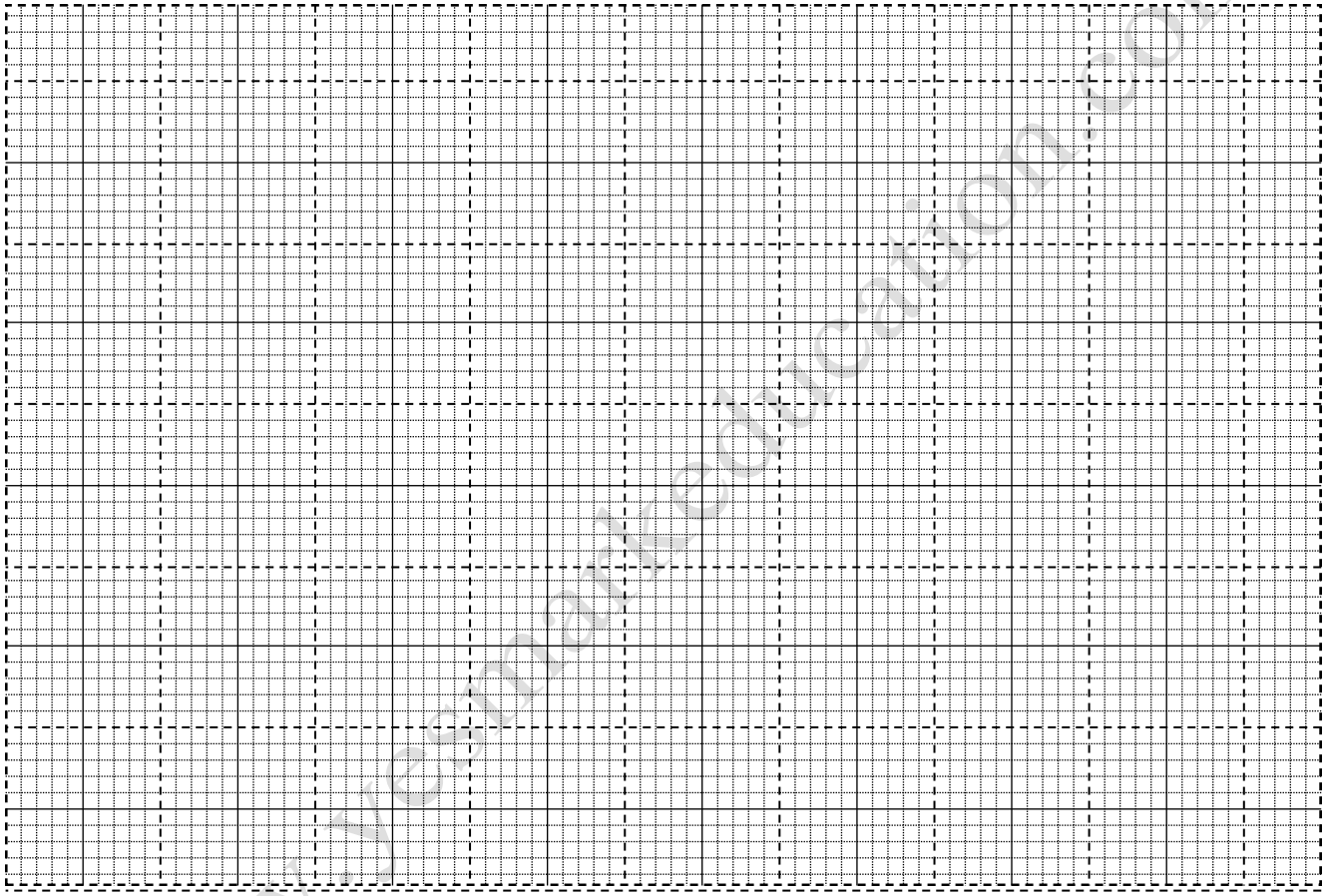
13. a) i) What is photoelectric effect? (1mk)

ii) You are provided with the following; a photo cell; a source of UV light, a rheostat, a source of e.m.f, a millimeter, a voltmeter and connecting wires. Draw a circuit diagram to show how photoelectric effect may be demonstrated in the laboratory (2mks)

b) In a photoelectric effect experiment, a certain surface was illuminated with radiation of different frequencies and stopping potential determined for each frequency. The following results were obtained:

Frequency (f) (x 10^{14} H_z)	7.95	7.41	6.88	6.10	5.49
Stopping potential, (V_s), (V)	1.35	1.15	0.93	0.62	0.36

i)Plot a graph of stopping potential (Y-axis) against frequency (4mks)



ii) Determine plank's constant, h and the work function of the surface given that $EV_s = hf - hf_o$, where e = 1.6 x10^{-19} C (2mks)

c) A surface whose work function Q = 6.4 x 10^{-19} J is illuminated with light of frequency 3.0 x10^{15} H_z. Find the minimum K.E of the emitted photo electrons
(use value of h obtained in **b(ii)** above) (3mks)

14. **Figure 15** shows the circuit of a modern X-ray tube

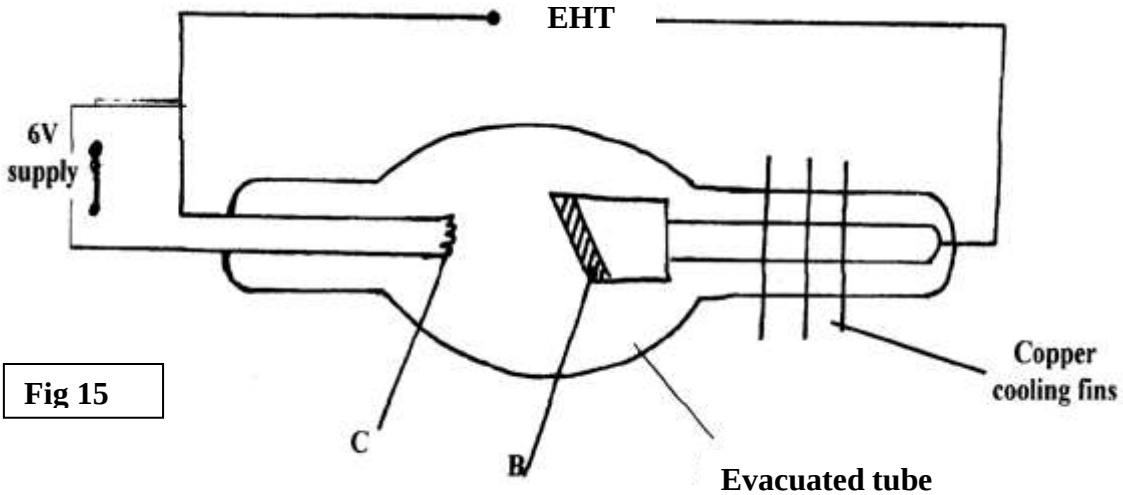


Fig 15

(i)Indicate the path of the X-ray beam supplied by the tube (1mk)

ii) Name the part labeled **C** and state its function (2mks)

iii) If the tube above is operated at an accelerating potential of 100kV and only 0.05% of the energy of the electrons is converted to X – rays, calculate the wave length of the generated X-rays. (Take electric charge e = 1.602 x10^{-19}C, planks constant, h = 6.63 x 10^{-34} Js, and speed of light c = 3.0 x 10^{8}m/s) (4mks)