NAME:……..…. INDEX NO:……

SCHOOL:…….CANDIDATE'S SIGNATURE:…….

DATE:…….

231/2
PHYSICS (THEORY)
PAPER 2
JUNE-2016
TIME: 2 HOURS

CENTRAL YEARLY MEETING OF FRIENDS (CYMF) -2016

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

231/2
PHYSICS (THEORY)
PAPER 2

INSTRUCTIONS TO CANDIDATES:

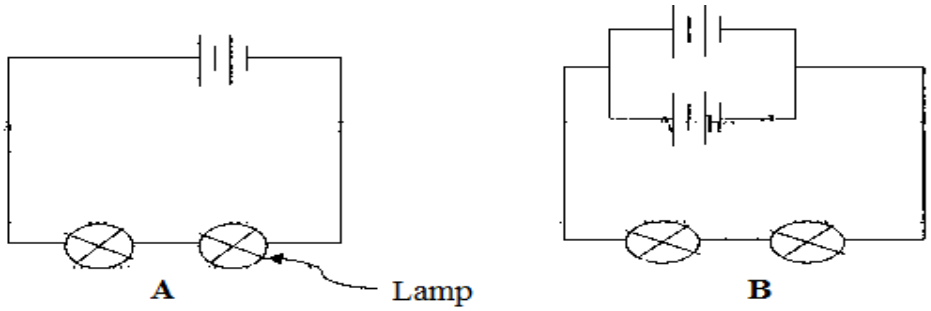
1. Write your name, school, admission number and index number is the spaces provided above.
2. Sign and write the date of examination in the spaces above.
*3. Answer **ALL** the questions in section A and B in the spaces provided.*
*4. All working **MUST** be clearly shown.*
5. Non-programmable silent electronic calculators and KNEC mathematical tables may be used.
6. This paper consists of 15 pages.
7. Candidates should check the question paper to ascertain that ALL the pages are printed and that no questions are missing.

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 (25MKS)

(Answer ALL questions in this section)

1. In the figure below the lamps in the two circuits, A and B are identical and the cells have the same electromotive force.



Explain why the lamps in B may glow brighter than those in A when the circuits are closed at the same time. (2 marks)

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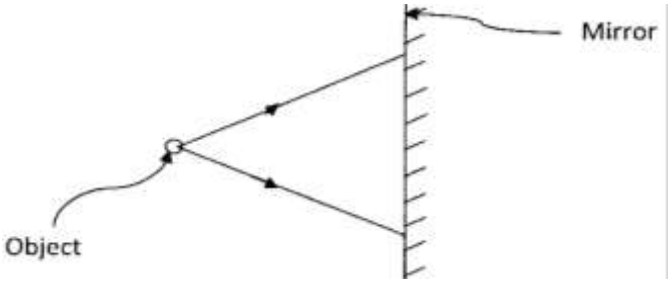
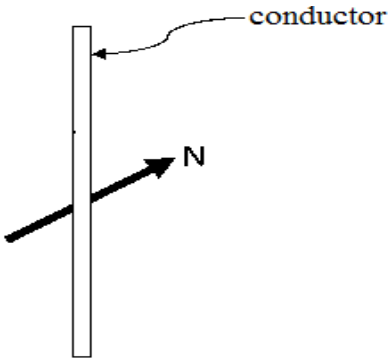
2. The figure below shows two rays drawn from an object on to the mirror.



Complete the ray diagram to show the position of the image. (2 mks)

3. (a) A compass needle is placed below a current carrying conductor as shown below.



Indicate on the diagram the direction of the current. (1 mark)

(b) State the difference between a soft magnetic material and a hard magnetic material. (1 mark)

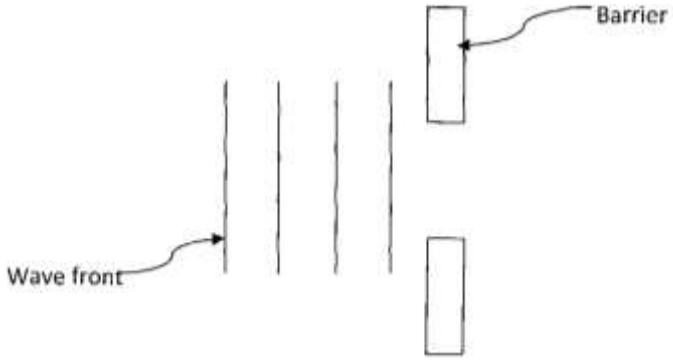
……

……

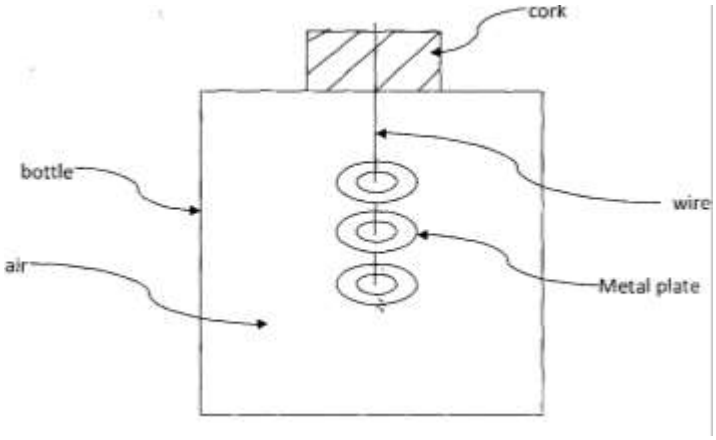
4. (a) Define diffraction with respect to waves. (1 mark)

……

(b) In the diagram below the size of the aperture at the barrier is 10cm while the distance between two consecutive wave fronts is 3cm. If the waves are moving towards the barrier, draw the wave fronts as they appear after passing through the aperture. (2 marks)



5. The figure below shows a set up used to study sound waves.



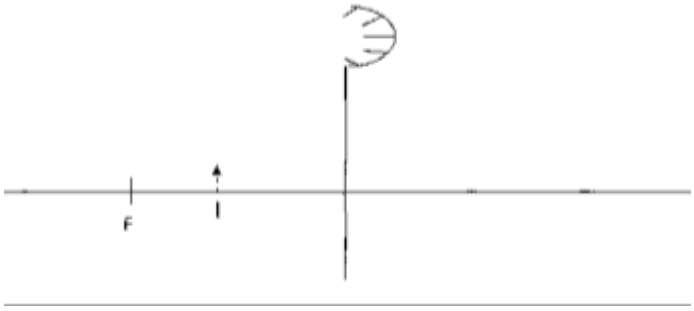
It is observed that when the bottle is shaken sound from the metal plates is heard. State and explain the observation that would be made if a little hot water is poured into the bottle then the cork is tightly replaced and the bottle shaken. (2 marks)

……

……

6. The figure below (drawn to scale) shows the image I, formed by a convex mirror. F is the virtual principal focus of the mirror.

Using ray diagrams locate the position of the object and draw the object. (3 marks)



7. State and explain two factors affecting the strength of an electromagnet. (2mks)

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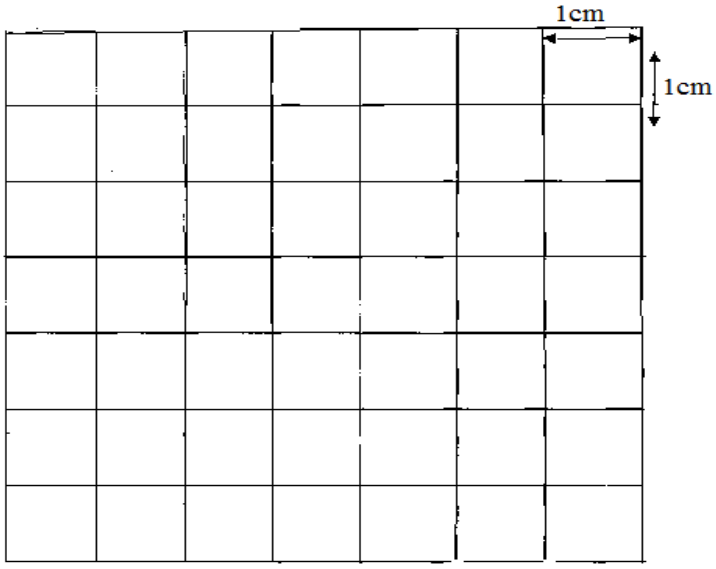
8. An alternating voltage of peak value 15v and frequency 25Hz is applied to the terminals of a Cathode ray oscilloscope. The Y-gain is set at 5 v/cm and the time base at 10 ms/cm. Draw the trace observed on the screen. (2 marks)



9. Name all the radiations of the electromagnetic spectrum which have higher wavelengths than the visible light. (1 mark)

……

(b) State the radiation that is detected using a blackened bulb of a thermometer. (1 mark)

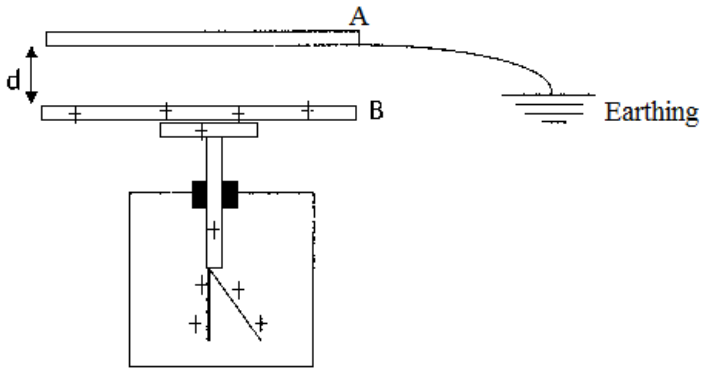
……

10. Your house is supplied with 240 v from a power source which is fitted with a 13 A safe fuse. What is the maximum number of 60w bulbs that can be fitted in the house? (2mks)

11. A resistance wire is 2m long and has a cross-sectional area of 0.50 mm^2. If its resistance is 2.60 Ω , calculate its resistivity. (3 marks)

SECTION II

12. (a) The figure below shows a charged electroscope and two aluminum plates A and B arranged as shown.

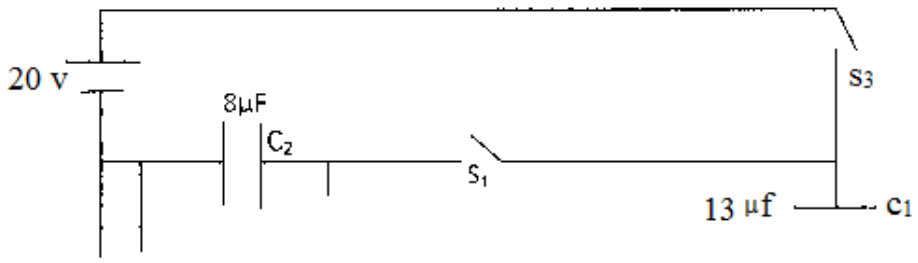


State and explain the observations made on the leaf divergence when plate A is moved closer to B. (2 marks)

……

……

(b) The figure below shows a circuit having the following components: a 20 v p.d. source, a voltmeter, three switches S_I, S_2 and S_3 and two capacitors C_1 and C_2 of capacitances l3μF and 8μF respectively.

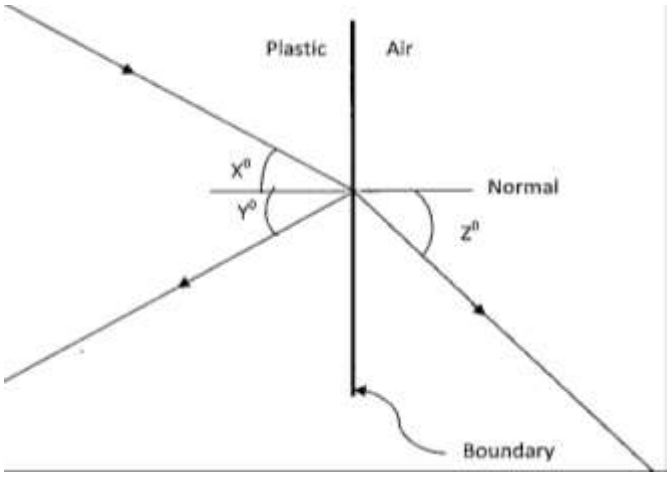


(i) Determine the charge on C_1 when switches S_2 and S_3 are closed while s_1 is open. (2 marks)

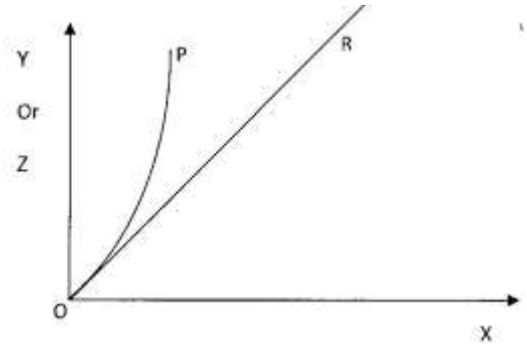
(ii) After some time S_3 is opened and both s1 and S_2 Are closed. Find the maximum voltage,V, recorded by the voltmeter. (2 marks)

(iii) Calculate the energy stored in C_2. (2 marks)

13. (a) The diagram below (drawn to scale) shows a ray of light incident on the boundary between air and a transparent plastic block. At the boundary the ray can take either of the two directions indicated on the diagram.



The two graphs below represent the variations of angles Z and Y for different sizes of incident angle, X.



(i) What process is represented by:

(I) Line OR…….. (1 mark

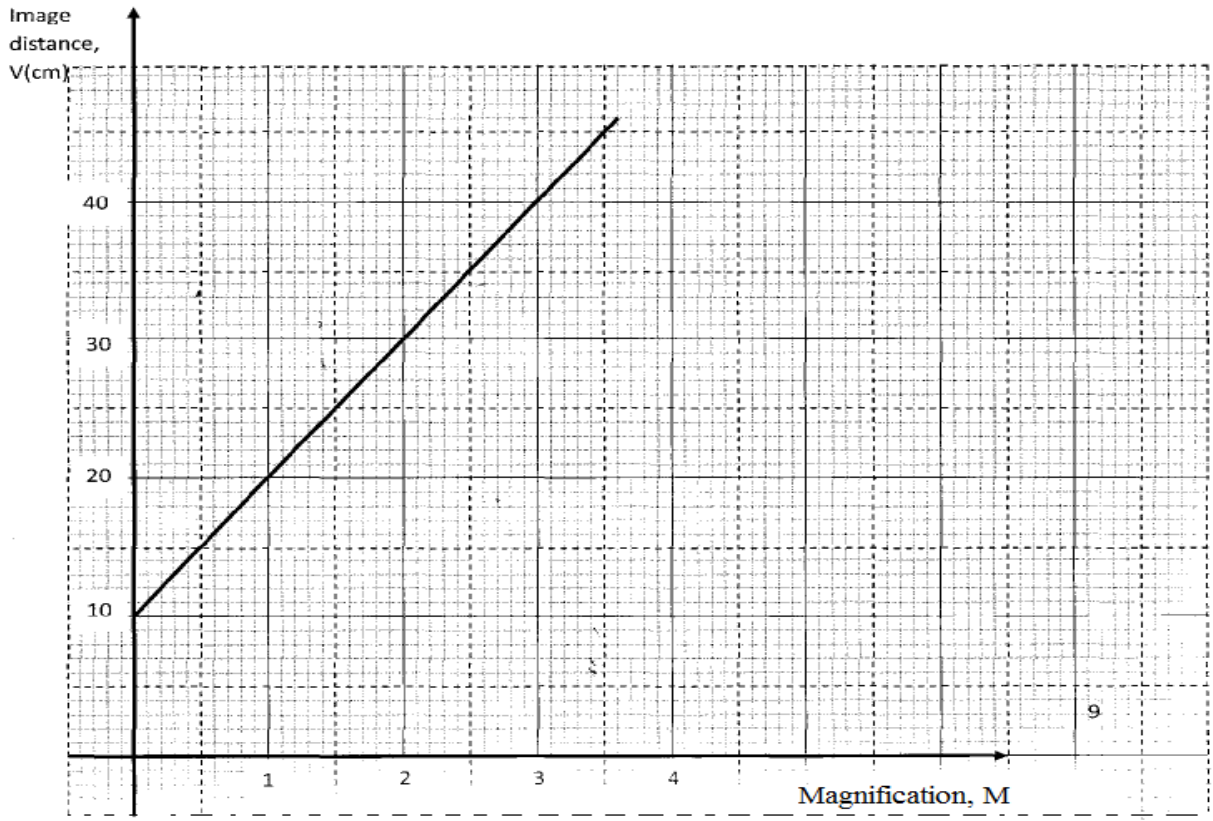
(II) Curve OP…… (1 mark)

(ii) For the plastic material, determine:

(I) The refractive index (2mks)

(II) The critical angle (2mks)

b. The following graph shows the variation of image distance, v, with magnification, m, for a converging lens.



0 Using the graph and the equation $\frac{v}{f}$ = M + 1 to determine:

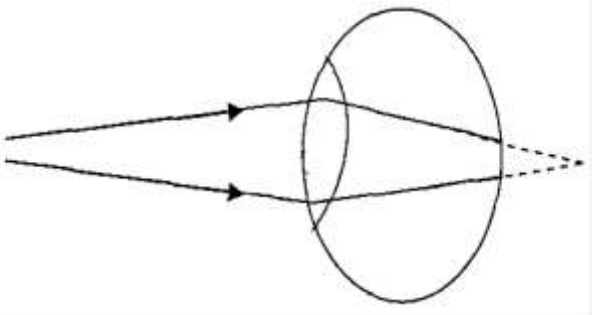
(i) The object position when the image position is 45cm. (2 marks)

(ii) The focal length of the lens. (2 marks)

(iii) The power of the lens. (2 marks)

c) The following figure 4 shows an eye defect. (2marks)

Fig 4



Name the defect and illustrate on the same diagram how the defect could be corrected. (3mks)

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14. a) What do you understand by the term mutual induction? (1 mark)

……

……

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

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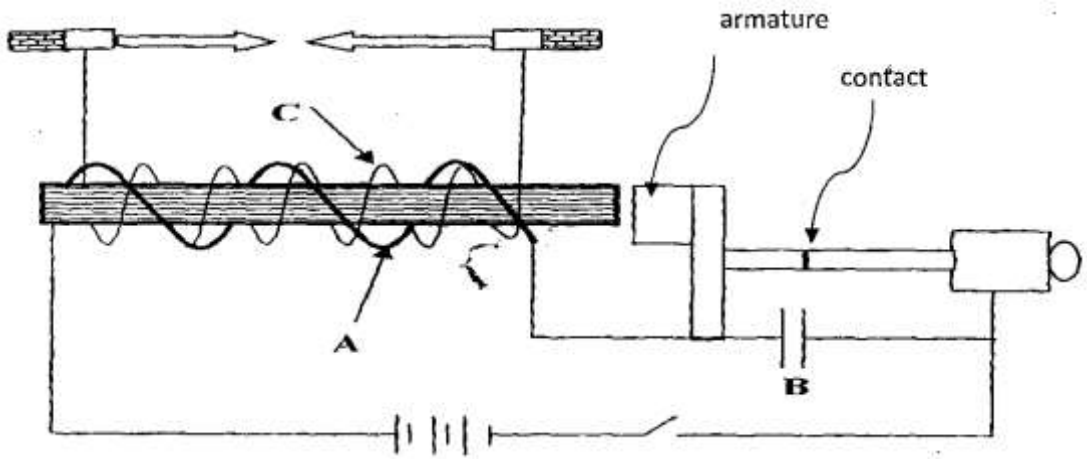
c) The diagram below shows an induction coil used to produce sparks.



(i) Name parts labeled A and B. (2 marks)

A……

B……

(ii) Briefly explain how the induction coil works.

……

……

……

d) A transformer is used on a 240V a.c supply to deliver 12A at 120V to a heating coil. If 20% of energy taken from the supply is dissipated in the transformer. Calculate the current in the primary coil. (2 marks)

(e) (i) Define doping (1 mark)

……

……

(ii) With the help of a diagram, describe how a p-type semiconductor is made. (3 marks)

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(iii) Explain what happens to the depletion layer when a diode is forward biased. (2 marks)

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ii) Threshold frequency. (1mk)

(b) Figure 11 shows Ultra-violet light striking a polished Zinc plate placed on a positively charged gold-leaf electroscope.

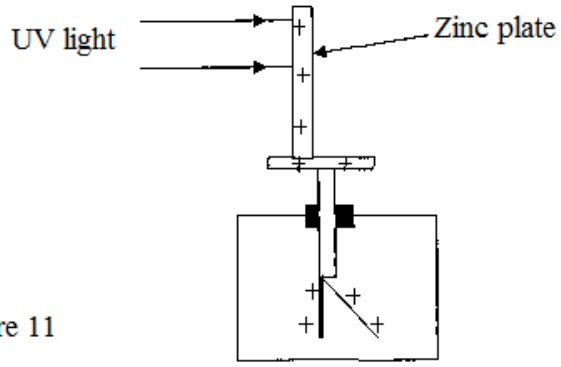


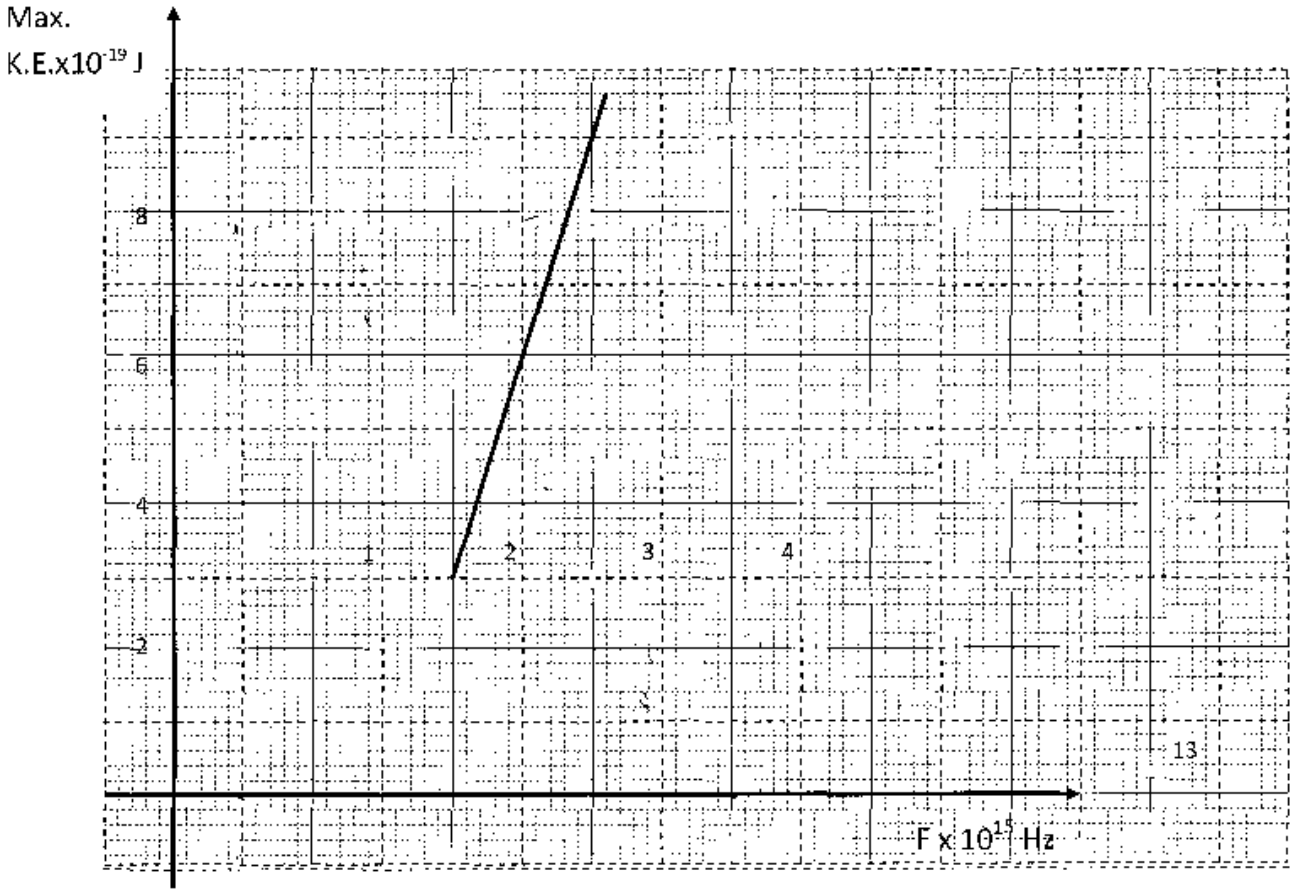
figure 11

(i) Explain the observations that the leaf did not fall.

……

……

ii) In an experiment using a photocell, U.V light of varying frequency but constant intensity was made to strike a metal surface. The maximum kinetic energy (KE_{Max}) of photoelectrons for each frequency, f, was measured. The graph shows how KE_{Max} varies with f.



Given that $KE_{Max}=hf - \emptyset$, determine the values:

(I) Constant h (2 marks)

II) Constant ∅ (2marks)

16. (a) A G.M tube may register some effect in the absence of a radioactive source. Explain this observation and state one cause. (2 marks)

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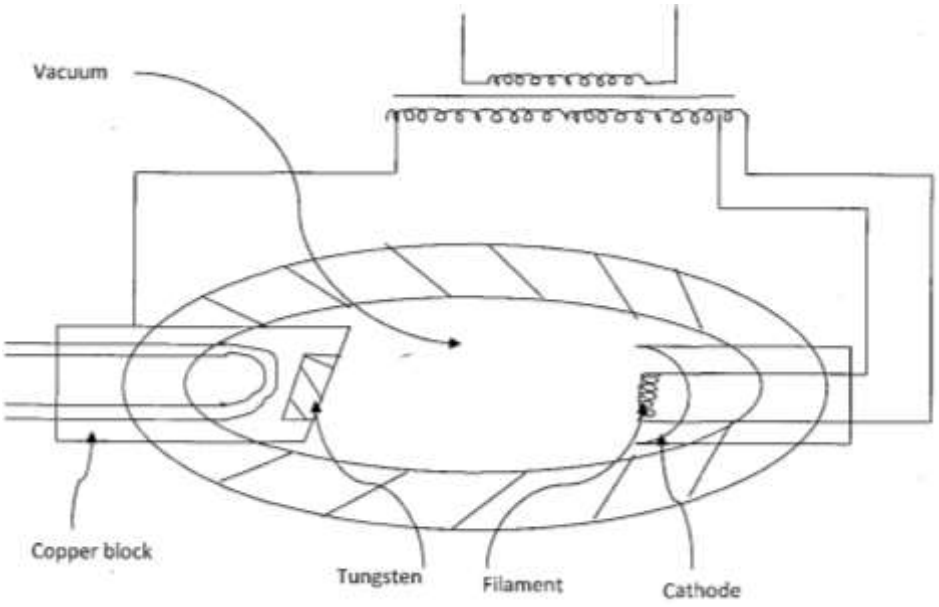
(b) A radioactive element A of half life 31 days decays to element B. A sample of A of mass 32g is kept in a container. Assuming B is stable, calculate the mass of B that will be in the container after 124 days. (3 marks)

(c) The figure below shows the features of an x-ray tube.



(i) Why is a thick copper block used at the 0KOanode? (1 mark)

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(ii) State how the strength of the X-rays can be increased. (1 mark)

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(iii) X-ray tube operates at 1000KV between the cathode and the anode. Calculate the maximum energy of the X-ray photons produced. (charge of an electron, e = $1.6x10^{-19}$ C). (2 marks)