NAME____ADM.NO.________CLASS__________

INDEX NO.________________SIGNATURE:_____________

DATE:__________________

232/2
PHYSICS
Paper 2
2 Hours

K A S S U J. E .T.E XA M I N A T I ON 2016

Instructions to Candidates

1. *Write your name, index number, class and admission number in the spaces provided above.*
2. *This paper consists of **TWO** sections: Sections **A** and **B**.*
3. *Answer **ALL** the questions in sections **A** and **B** in the spaces provided.*
4. *ALL working **MUST** be clearly shown.*
5. *Mathematical tables and electronic calculators may be used.*

For Examiner's Use Only

SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
A	1-10	25	
B	11	10	
	12	13	
	13	08	
	14	12	
	15	12	
TOTAL SCORE		80	

This paper consists of 12printed pages.
Students 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. In **figure 1** two mirrors M1 and M2 are inclined at right angles to each other.

Diagram drawn to scale

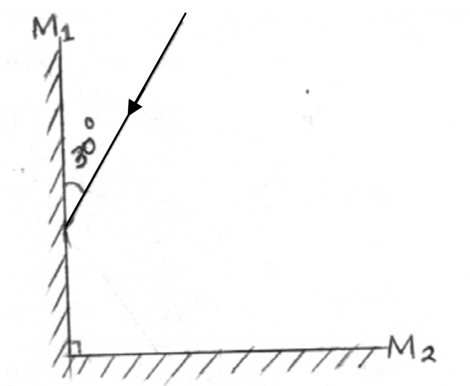


Figure 1

Trace the reflection of the ray through the two mirrors and find the angle between the incident ray and reflected ray of mirror M2. (2 marks)

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

a) State the charge on rod X after rubbing (1 mark)

b) Explain how rod X acquired the charge stated in (a) above. (1 mark)

3. An iron ring is placed between two magnets as shown in **figure 2.**

Iron ring

Figure 2.

(a)Sketch the magnetic field pattern between the poles and mark the neutral point, Xon the diagram . (2 marks)

(b) State one application of the concept tested above. (1mark).

4. A charge of 180 Coulombs flows through a lamp every minute. Calculate the number of electrons involved. (Take charge of an electron e, $=1.6 \times 10^{-19}$C). (2 marks)

5. **Table 1** shows radiations and their respective frequencies.

Type of radiation	Yellow light	Gamma rays	Radio waves	Micro waves
Frequency (Hz)	1×10^{15}	1×10^{22}	1×10^{6}	1×10^{11}

Table1

a) Arrange the radiation in order of increasing energy. (1 mark)

b) State the reason why radio waves signals are easier to receive than TV signals in a place surrounded by hills. (1 mark)

6. **Figure 3**shows a metal rod PQ connected to a d.c supply and placed between two magnets.

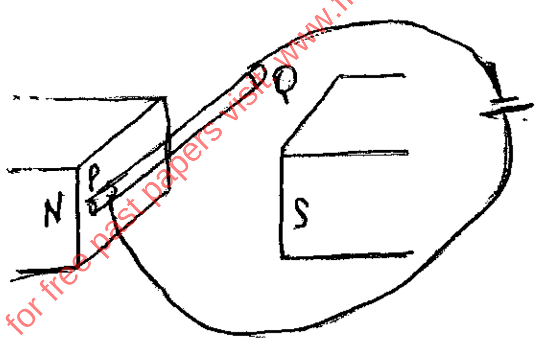


Figure 3

a) Indicate on the diagram the direction of force on rod **PQ** and magnetic field pattern between the two magnetic poles only. (2 marks)

b) State **one** way in which the direction of force can be made to change. (1mark)

7. An explosion in a quarry takes place at a distance of 70m from an observer. An echo from a cliff 50m beyond the source of the explosion is heard by the observer 0.5 seconds after he sees the flash from explosion. Calculate the velocity of sound in air. (3 marks)

8. (a) **Figure 4**below shows the path of a ray of light through a triangular prism **ABC** of refractive index 1.50. is parallel to **AC**.

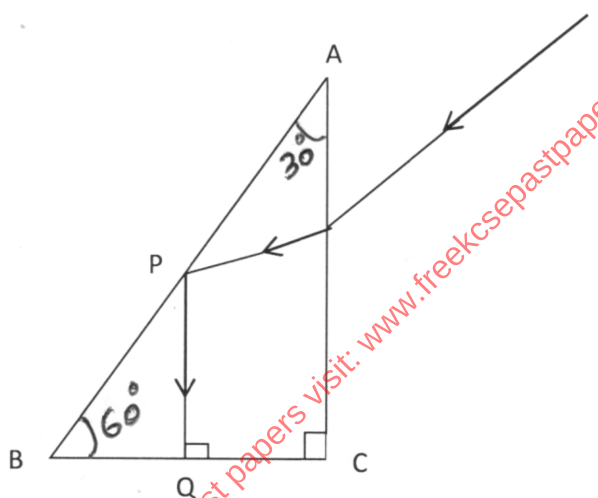


figure 4

Determine the angle of incidence on the side **AC.** (3marks)

b) **Figure 5** shows the image formed by convex mirror

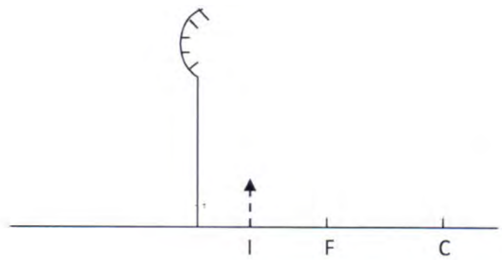


figure 5.

Sketch rays on the diagram to show the position of object (2 marks)

9.In an experiment to study interference in sound waves two identical loudspeakers are connected to an audio frequency generator so that they act as coherent sources L_1 and L_2 as shown in **figure 6.**

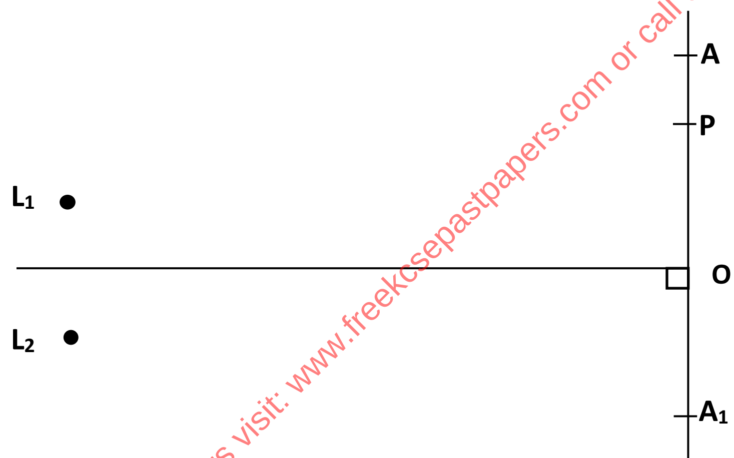


Figure 6

An observer walking several metres ahead and a long a line to **L_1 L_2** identifies points**A**and**A_1**as the first positions of loud sound on either side after the loud sound at the middle position **O** between the two sources. (2 marks)

(a) Explain the meaning of the term coherent source. (1 mark)

(b) Name the type of interference occurring at the points **O,A,** and **A_1**. (1 mark)

10. Distinguish the n-type and p-type semiconductors. (1 mark)

SECTION B: 55 MARKS

11. a) **Figure 7** shows a source of α,β and r-radiation placed infront of a set of barriers A,B and C

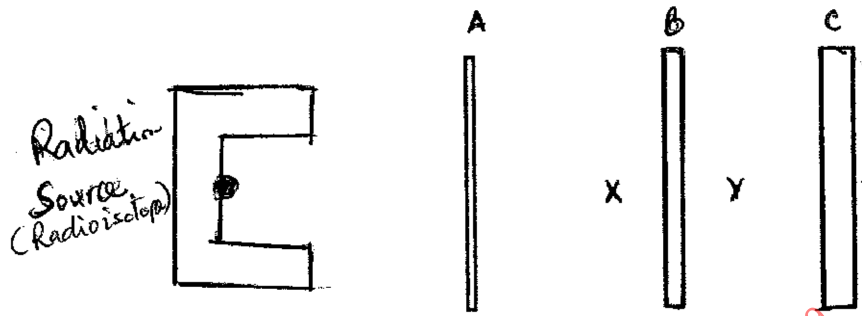


Figure 7

A is a thick sheet of paper, B is a thin sheet of aluminium foil and C is a thin sheet of lead. Name the radiation detected in the regions marked X, Y and Z. (3 marks)

X……………………………………………………………

Y……………………………………………………………

Z……………………………………………………………

b) The **figure 8** below shows the features of a diffusion cloud chamber used for detecting radiation.

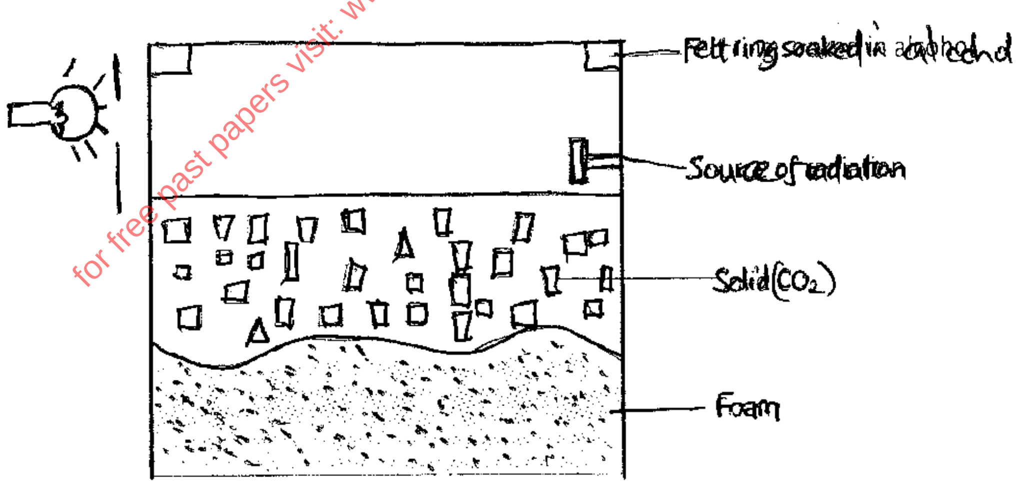


Figure 8

i) Explain how radiation from the source is detected in the chamber. (4marks)

ii) What type of radiation can the device detect? (1mark)

c) The count rate recorded for a certain source is 256 counts per second. What count rate is recorded 20 days later, if the half-life of the source is 5 days. (2marks)

12. (a) A house has five rooms each with 240V,60W bulbs.If the bulbs are switched on from 7:00pm to 10:30 pm;

(i) Calculate the power consumed in the month of April in Kilowatt-hours.(2marks)

(ii) Find the cost per month for lighting these rooms at Ksh6.70 per unit. (2marks)

(b) A student designed a transformer to provide power to an electric bell marked 24W,6V from a mains supply 240V. He wound coils, 50 turns and N turns on an iron ring core. When he connected the coil of 50 turns to the bell and N turns coil to the a.c source, he found out that the transformer was only 80% efficient.Find;

(i) The value of N. (2marks)

(ii) The current in the primary coil. (2marks)

(c) The **figure 9**. shows a connection to the three- pin plug.

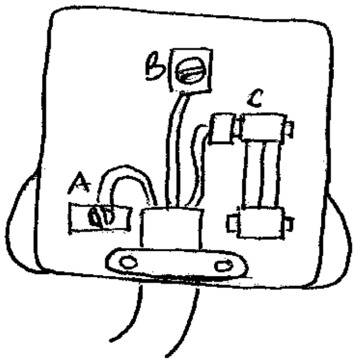


Figure 9

(i) Name the cables A, B and C and state their colours. (3marks)

A…………………………………………………………………………………………

B…………………………………………………………………………………………

C…………………………………………………………………………………………

(ii) Why is the fuse connected to cable C.? (1mark)

(iii) State **one** reason why in domestic wiring system appliances are connected in parallel. (1 mark)

13. **Figure 10** Shows an electric circuit with four capacitors A,B,C and D8 µF ,3µF,6 µF and 15 µF respectively connected to 12V battery.

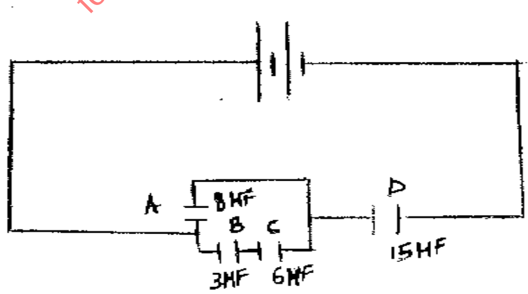


Figure 10

(a) Determine ;

(i) the effective capacitance. (3 marks)

(ii) the charge of capacitor D. (2 marks)

(iii) the total energy stored. (2 marks)

(b) Explain **one** factor that determine the capacitance of a parallel plate capacitor.

(1 mark)

14. (a)**Figure 11**shows the features of a cathode ray tube.

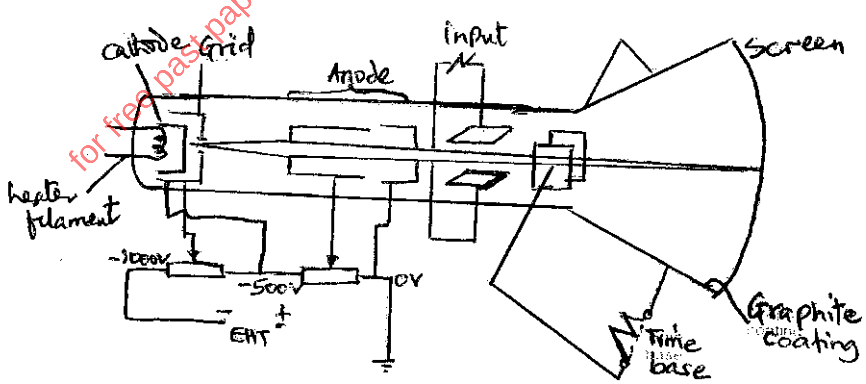


Figure 11

(i) Explain how the electrons are produced in the tube. (1 mark)

(ii) What is the purpose of the anodes? (2 marks)

(iii) Why is the tube evacuated? (1 mark)

(b) **Figure 12**shows the voltage of an a.c. generator on the screen of a C.R.O.

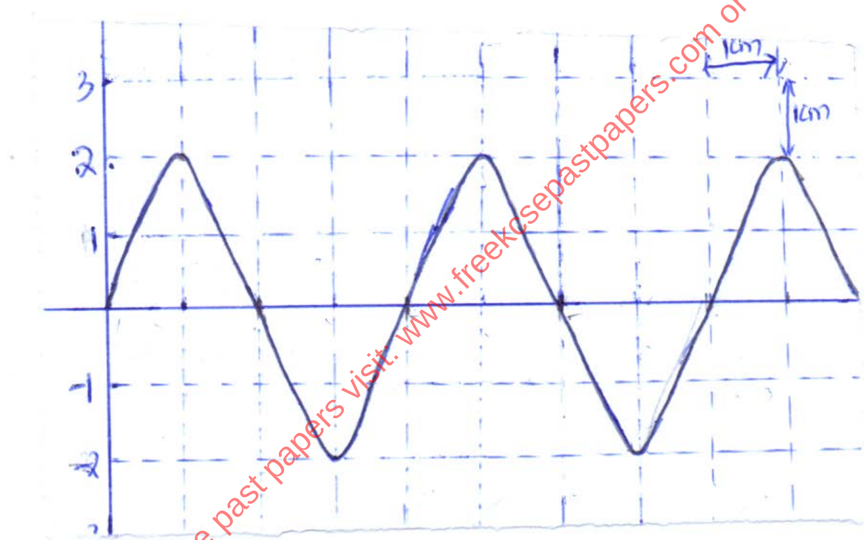


Figure 12

If the time base calibration is 20 milliseconds/cm and the y- gain is 5V/cm , calculate;

(i) the frequency of the generator. (2 marks)

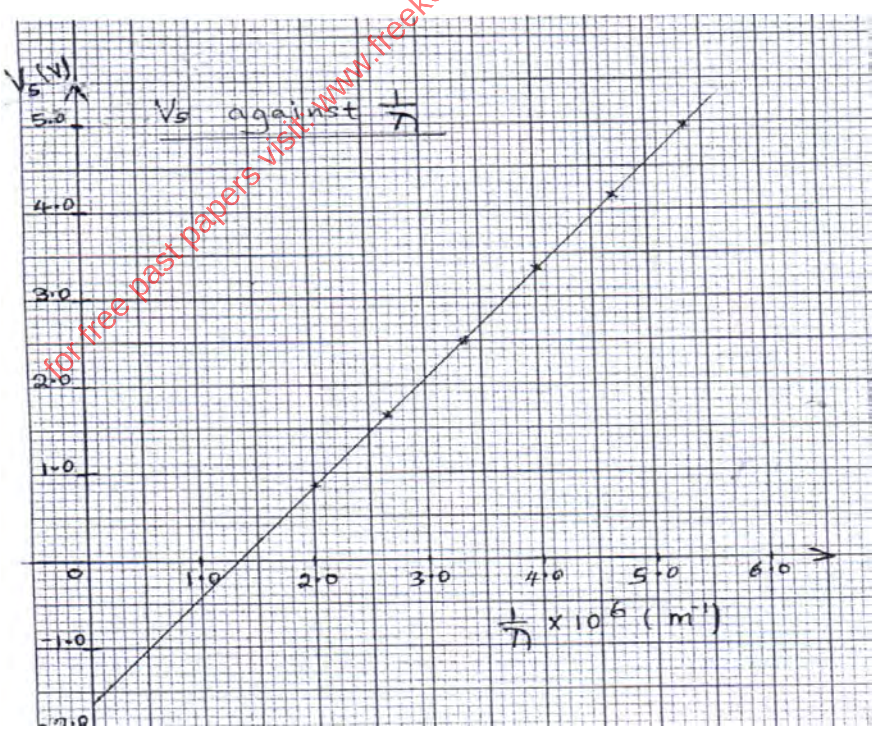
(ii) the peak voltage of the generator. (2 marks)

(c) A potential difference of 40kV is applied across an x-ray tube. Given that the charge of an electron is $1.6 \times 10^{-19} C$ and the mass of an electron is $9.1 \times 10^{-31} kg$ and Planck's constant = 6.63×10^{-34}Js;

(i) What is the effect of increasing the potential difference across the x-ray tube? (1 mark)

(ii) Calculate the velocity with which the electrons strike the target. (3 marks)

15. A Form 4 student carried out on experiment to investigate photoelectric effect. From the results a graph of stopping potential V_s (y-axis) against the inverse of the wavelength $\frac{1}{\lambda}$ was plotted and was as shown below.



The equation of the graph is $V_s = \frac{hc}{e\lambda} - \frac{hc}{e\lambda_0}$

Where: c = $3.0 \times 10^8 ms^{-1}$,speed of light in air

e= $1.6 \times 10^{-19} C$, charge of an electron

h = is the Planck's constant.

(a) From the graph, determine;

(i) The slope s of the graph. (2 marks)

(ii) The Planck's constant h. (2 marks)

(iii) The threshold wavelength λ_o (2 marks)

(iv) The threshold frequency f_o (2 marks)

(v) The work function W_o in electron volts (e.v) (2 marks)

(b) On the same graph, sketch a graph which would be obtained if the student used a metal with greater threshold frequency, explain your answer. (2 marks)

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