Name ..... Index No. .....

232/2
PHYSICS
Paper 2
July/August 2014
Time: 2 Hours

Candidate's Signature .....

Date .....

WESTLANDS FORM 4 JOINT EXAMINATION
Kenya Certificate of Secondary Education

PHYSICS
Paper 2
July/August 2014
Time: 2 Hours

INSTRUCTIONS TO CANDIDATES

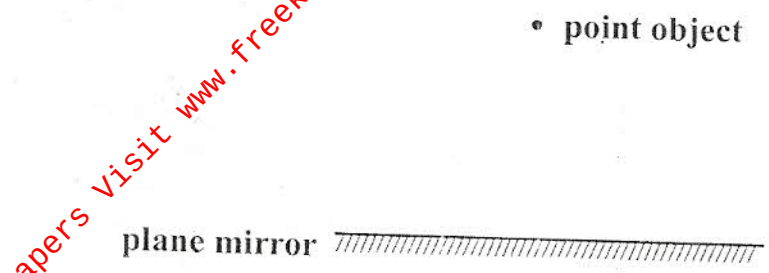
* Write your name and index number and date in the spaces provided above.
* This paper consists of two sections; A and B
* Answer **all** the questions in section A and B in the spaces provided.
* All working **must** be clearly shown.
* Non-programmable silent electronic calculators and KNEC mathematical tables may be used.

For Examiner's Use Only

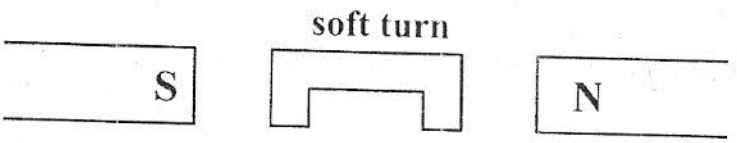
Section	Question	Maximum score	Candidate's score
A	1 - 13	25	
B	14	9	
	15	9	
	16	13	
	17	13	
	18	11	
Total		80	

SECTION I :

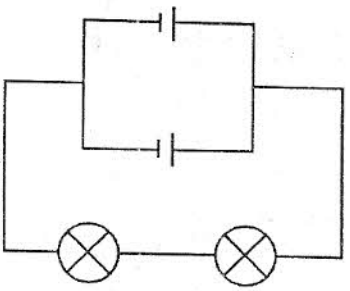
1. The figure 1 below shows a point object in front of plane mirror. Using the appropriate rays, locate the image of the point object. (2 marks)



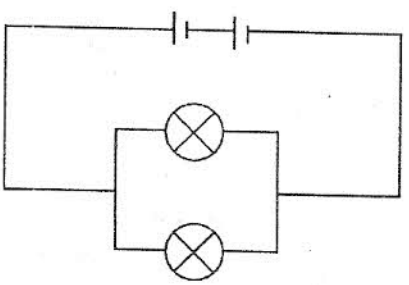
2. Sketch the magnetic field pattern in the diagram of figure 2 below. (2 marks)



3. A Form 1 student was investigating the brightness of bulbs when set up circuits. He used identical bulbs and cells. The circuits figure 3(a) and (b) were what he set up.



3(a)



3(b)

State and explain which set up had the bulbs brightest. (2 marks)

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4. a) State two factors that increases the electrical conductivity of a semi-conductor. (2 marks)

i) .....

ii) .....

b) Silicon is dopped with boron to form an extrinsic semi conductor. What are the majority charge carriers of the extrinsic semi-conductor ? (1 mark)

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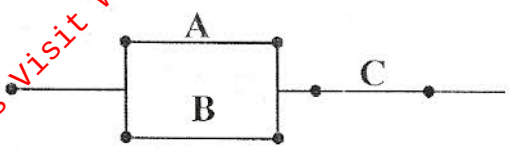
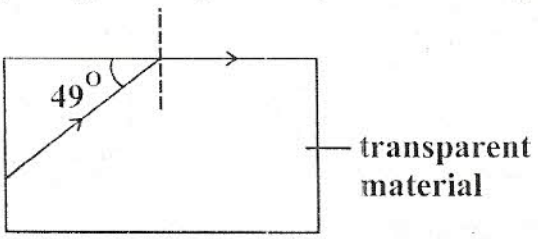
5. In figure 4 below A, B and C are identical wires of equal length and of 27Ω resistances arranged as shown.



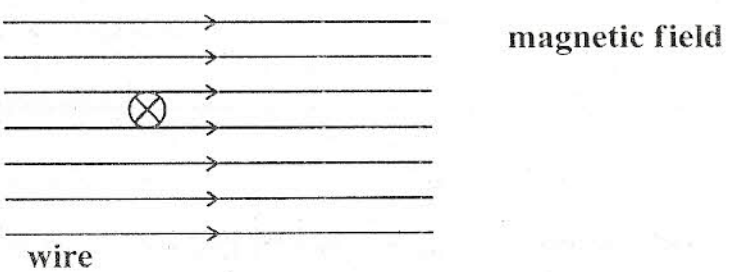
Determine their combined resistance. (2 marks)

6. The figure below shows a ray of light through a transparent material placed in air.



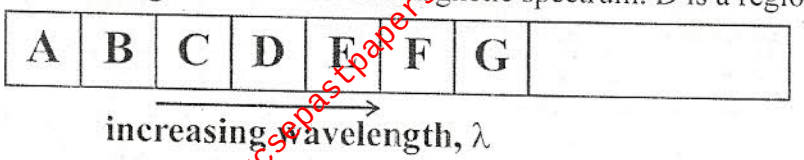
Calculate the refractive index of the transparent material. (2 marks)

7. The figure 5 below shows a wire in a magnetic field. A current is switched on to flow in the wire in the direction indicated.



Show the direction of motion of the wire. (1 mark)

8. The figure below shows regions of the electromagnetic spectrum. D is a region of visible light.



Indicate the region for the following. (2 marks)

i) γ - rays

ii) Infrared radiations

9. a) What is the purpose of the time-base in a cathode ray oscilloscope ? (1 mark)

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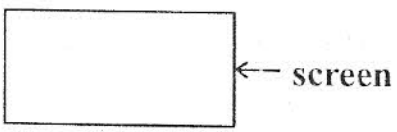
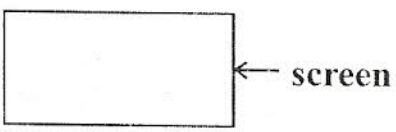
b) Sketch the trace seen on the screen of a C.R.O when the time base is switched off and

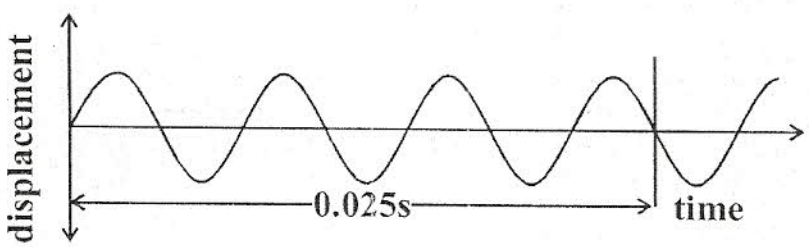
i) a d.c voltage applied across the y-plates (2 marks)



ii) an a.c. voltage is applied to the y-plates



10. Figure 7 below shows a displacement time graph of a wave. Determine the frequency of the wave. (2 marks)



11. When a highly positively charged rod is brought from high position towards electroscope, it is observed that the leaf divergence first decreases and then rises as the rod nears the cap. Explain. (2 marks)

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12. State the property of x-rays which makes it possible to detect cracks in bone. (1 mark)

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13. Draw a circuit diagram showing a junction diode in a reverse bias connection to a D.C cell. (1 mark)

SECTION B : (55 Marks)
Attempt all questions

14. a) Define :
i) work function (1 mark)

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ii) threshold wavelength (1 mark)

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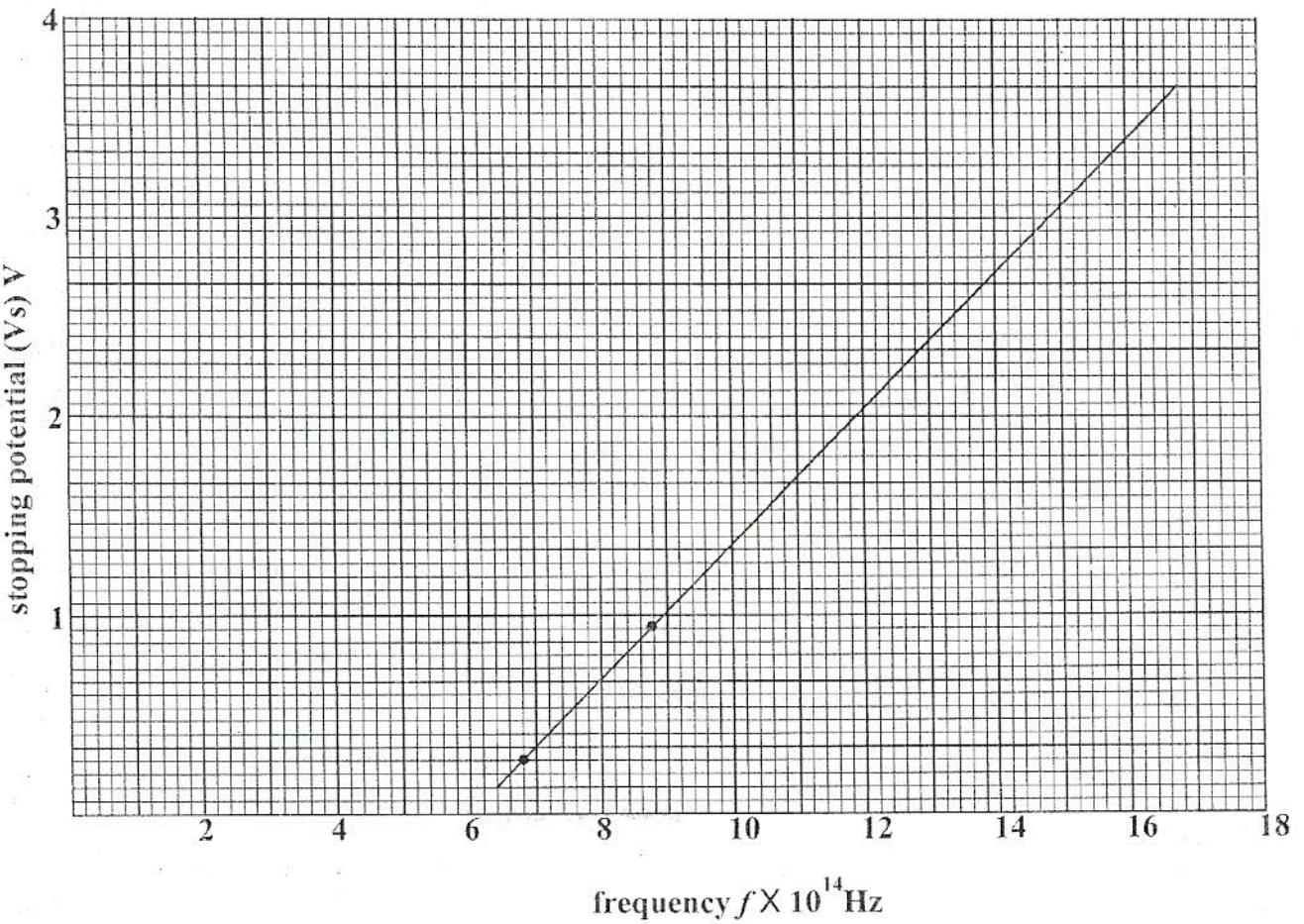
b) The graph below shows variation of stopping potential and frequency during photoelectric effect experiment.



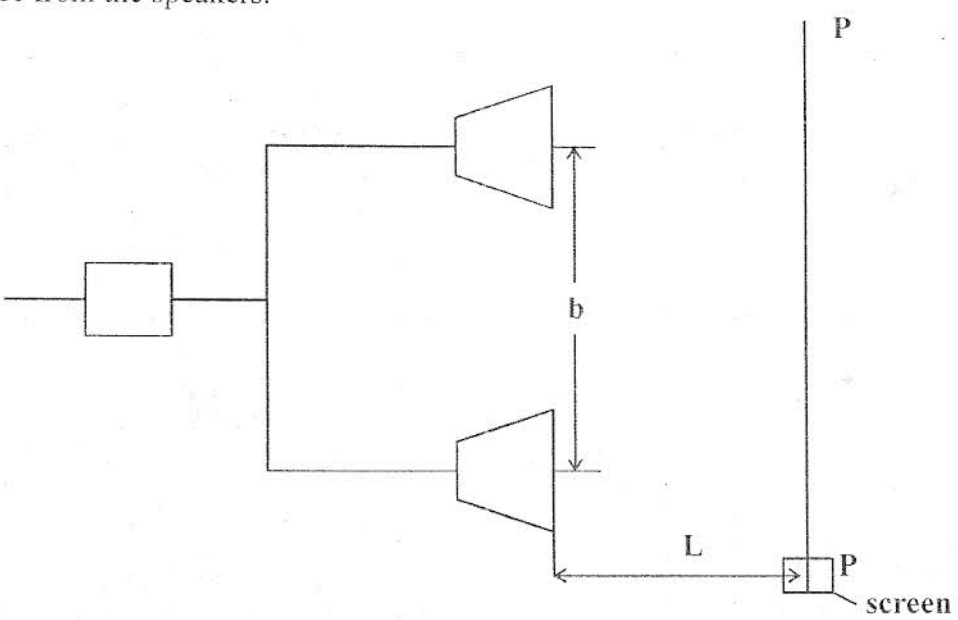
From the graph determine:

i) Plank's constant (3 marks)

ii) Threshold frequency (1 mark)

iii) Work function (3 marks)

15. a) The figure shows two speakers connected to an audio-frequency generator, placed in a table in a disco hall. The two speakers are separated by a distance b apart and perpendicular line PQ is L distance from the speakers.



Briefly state observations made by an observer :

i) Moving along PQ when generator is on (1 mark)

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ii) Moving along PQ when b is reduced (1 mark)

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iii)Moving PQ when frequency of generator is increased. (1 mark)

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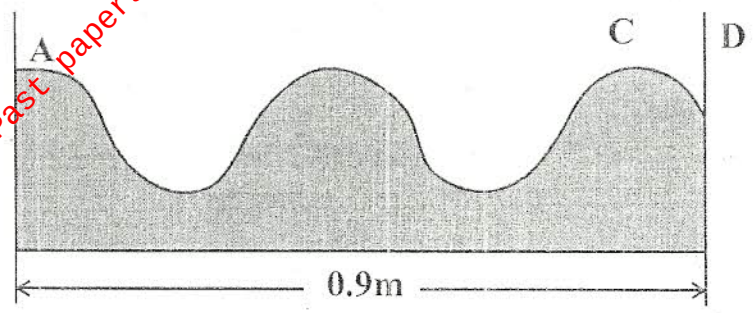
b) The diagram shown below is a side view of plane water waves travelling in a glass walled tank. The waves are produced by a horizontal metal strip vibrating to the left of A.



i) What is the wavelength of the wave ? (2 marks)

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ii) If the crest at A takes 1.5 seconds to reach C, what is the frequency of the wave ? (2 marks)

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iii)State giving the reason, whether the waves are longitudinal or transverse. (2 marks)

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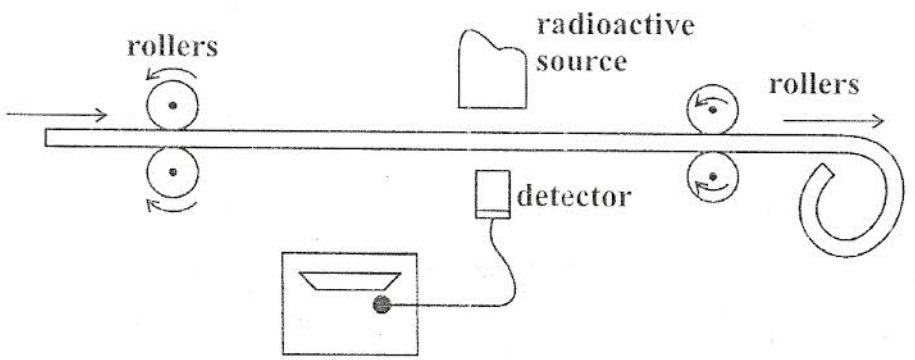
16. In factory which makes baking foil changes in the thickness of the foil are detected using a radioactive source and a de ector shown in the figure below. The source emits β-particles.



a) Explain how change in the thickness of the foil covering are detected. (2 marks)

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b) Explain why neither alpha or gamma sources would not be suitable for this application. (2 marks)

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c) An isotope of Uranium $^{235}_{92}U$ decays with the emission of alpha radiations to give an isotope of thorium (Th)

i) Name the particles which make up the nucleus of $^{235}_{92}U$ stating clearly how many there are of each in the nucleus. (2 marks)

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d) i) Study the decay series below and answer the following questions.

$$^{238}_{92}U \xrightarrow{a} {}^{234}_{90}Th \xrightarrow{b} {}^{234}_{92}U \xrightarrow{c} {}^{230}_{90}Th + Energy$$

i) Write down the particles emitted in each decay.

a .....

b .....

c .....

ii) Identify any isotopes in the decay series above. (1 mark)

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e) i) The isotope of thorium which is formed has a half life of 25 hours. What is meant by the half life of a radioactive element. (1 mark)

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ii) If 0.64mg of the thorium is isolated and placed in a lead container, after how long will the mass of thorium decrease to 0.04Mg. (2 marks)

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17. a) Draw a ray diagram showing how a converging lens may be used as a simple microscope. (3 marks)

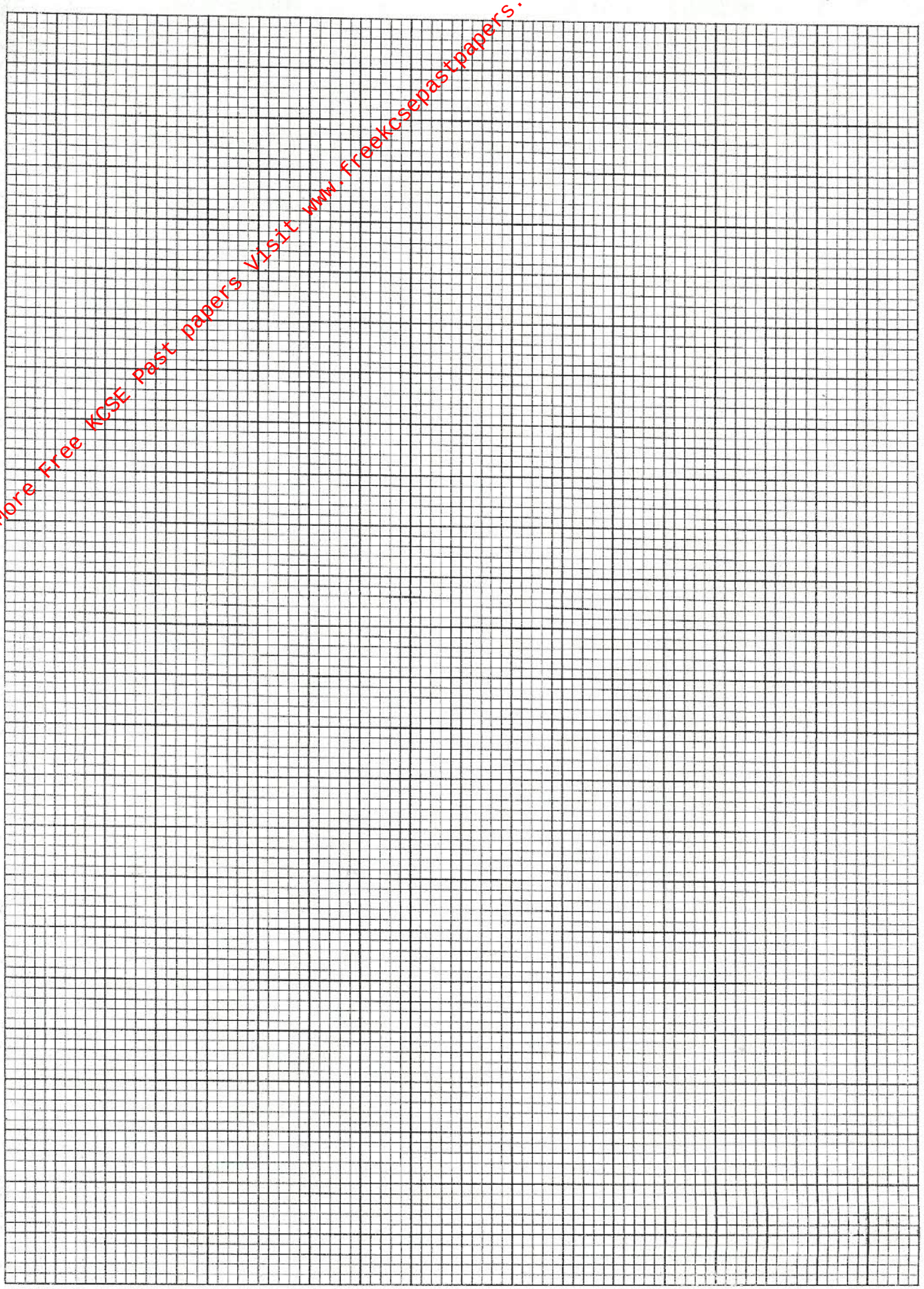
b) In an experiment to determine the focal length of a convex lens, a student obtained the results as shown in the table below.

U (cm)	12.5	16.0	18.0	24.0	30.0	40.0
V (cm)	50.0	27.0	22.5	17.0	15.0	13.0

i) Plot a graph of V (y-axis) against U (x-axis). (5 marks)
(Graph paper provided on page 10)

ii) Indicate on the graph a point where U = V and write down the value. (2 marks)

iii)Using the values in (ii) above, determine the focal length of the lens used. (3 marks)



18. a) i) State Lenz's law of electromagnetic induction. (1 mark)

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ii) State two ways in which power loss is minimised in transmission lines. (2 marks)

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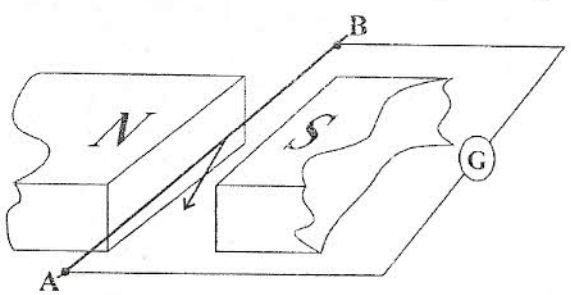
iii) A generator produces 150KW at a voltage of 5KV. The voltage is stepped up to 60KV and transmitted through cables of resistance 150W to a step-down transformer in a substation. If both transformers are 80% efficient, calculate :

I. current through the transmission cables (2 marks)

II. power lost during transmission (2 marks)

b) The figure below shows a conductor AB passing through a magnetic field and connected to a galvanometer.



The conductor moves slightly due effects of electromagnetic damping. Explain how the induced current causes the electromagnetic damping. (1 mark)

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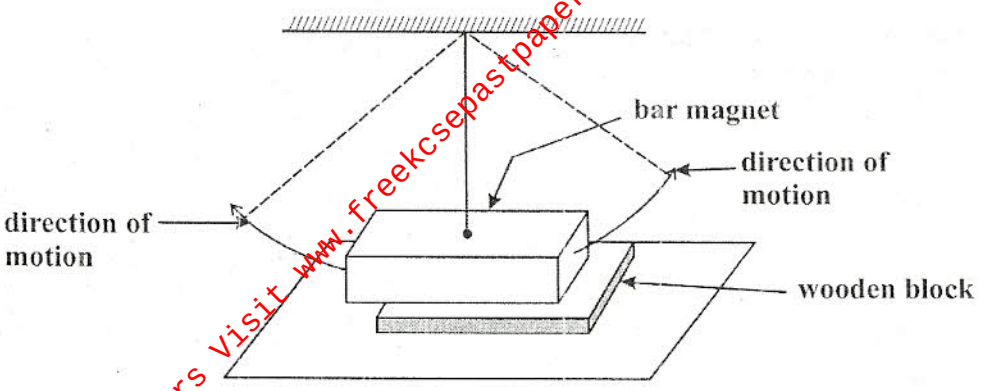
ii)



The figure shows oscillating over a wooden block with a time of t_1 for 20 oscillations. The wooden block is now replaced with a copper plate and a time t_2 for 20 oscillations recorded. State and explain which time for 20 oscillations is greater. (2 marks)

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iii) Explain how lamination of cores minimises energy losses in transformer. (1 mark)

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