NAME…….. INDEX NO…….....

232/2 **CANDIDATE'S SIGN……**
PHYSICS
PAPER 2 **DATE…….……...**
(THEORY)
JULY/AUGUST, 2016
TIME: 2 HOURS

KIRINYAGA CENTRAL SUB-COUNTY EFFECTIVE FORTY JOINT EXAMINATION – 2016

Kenya Certificate of Secondary Education
PHYSICS
PAPER 2
(THEORY)
TIME: 2 HOURS

INSTRUCTIONS TO THE CANDIDATE:

(a) Write your **name** and **index number** in the spaces provided above.
(b) **Sign** and write the **date** of examination in the spaces provided above.
(c) This paper consists of **two** Sections **A** and **B**.
(d) Answer **all** the questions in sections **A** and **B** in the spaces provided.
(e) All working **must** be clearly shown in the spaces provided.
(f) 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 – 12	25	
B	13	09	
	14	12	
	15	09	
	16	09	
	17	07	
	18	09	
Total Score		80	

SECTION A: (25 MARKS)

Answer all the questions in this section in the spaces provided.

1. State **one** property of light that a pinhole camera illustrates. (1 mark)

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2. It is observed that when a rod A is brought near the cap of a negatively charged electroscope, the divergence of the leaf decreases. State **two** deductions that can be made about rod A from this observation. (2 marks)

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3. State the purpose of manganese (IV) oxide in a dry cell. (1 mark)

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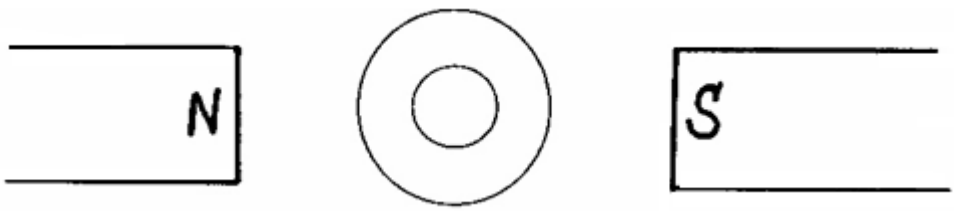
4. A soft iron ring is placed between two poles of a magnet as shown in the figure below.



(a) Show on the figure the magnetic field pattern between the poles. (2 marks)

(b) State **one** application of soft iron in magnetism. (1 mark)

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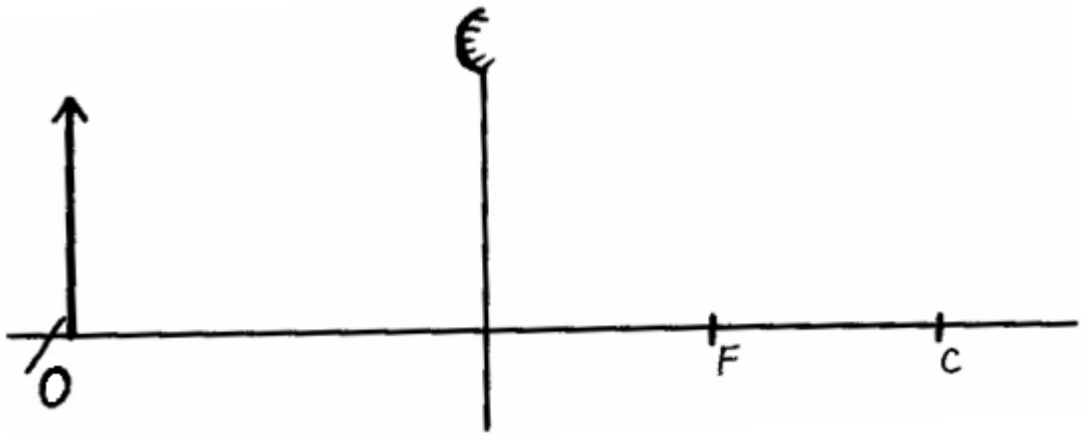
5. An object O is placed in front of convex mirror as shown in the diagram below.

(a) Complete the diagram to locate the position of the image, 1. (3 marks)



(b) State **one** practical application of a convex mirror. (1 mark)

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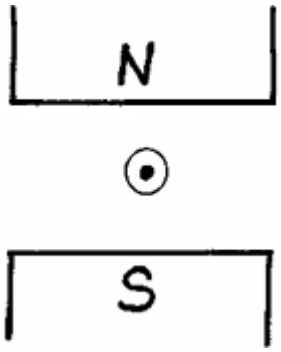
6. The figure below shows a wire carrying current whose direction is out of the paper. The wire is placed in a magnetic field.



(a) Indicate on the figure the direction of the force F, acting on the wire. (1 mark)

(b) State what would be observed on the wire if the direction of the current is reversed (i.e. into the paper). (1 mark)

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7. Explain how doping a pure semi-conductor produces on n-type semi-conductor. (3 marks)

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8. State **one** example of a transverse-progressive wave. (1 mark)

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9. The following reaction is part of a radioactive series.

Error! Bookmark not defined.

$$^{210}_{83}A \xrightarrow{z} {}^{210}_{84}B \xrightarrow{(Gamma)} {}^{x}_{y}C$$

(a) Identify the radiation **z**. (1 mark)

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(b) Determine the values of χ and **y**. (2 marks)

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10. State:

(a) **two** applications of microwaves. (2 marks)

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(b) **one** detector of infrared radiation. (1 mark)

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11. State **one** factor that affects the speed of sound in a solid. (1 mark)

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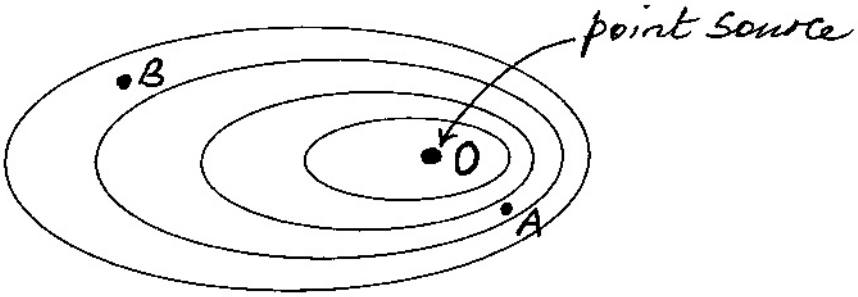
12. The figure shown below illustrates crests of circular water wave-fronts radiating from a point source O in a pond.



State how the depth of the pond at **A** compares with that at **B**. (1 mark)

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SECTION B: (55 MARKS)

13. (a) State the meaning of the term critical angle as applied in refraction of light. (1 mark)

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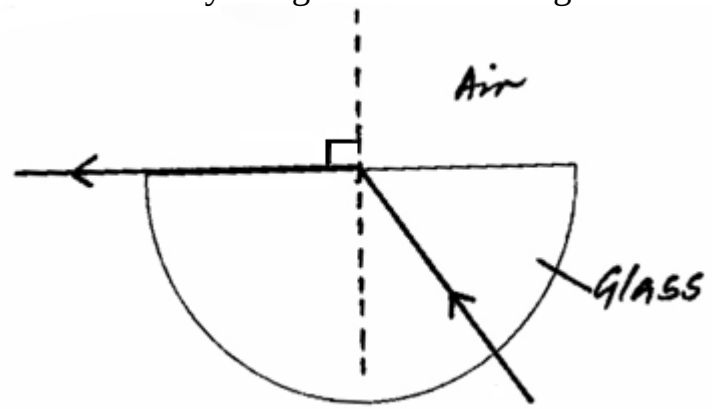
(b) The figure shows a ray of light incident on a glass-air interface.



(i) Show on the diagram the critical angle, **c**. (1 mark)

(ii) Given that the refractive index of the glass is ${}_a\eta_g$, and that the critical angle **c** = 42°, determine the value of is ${}_a\eta_g$. (3 marks)

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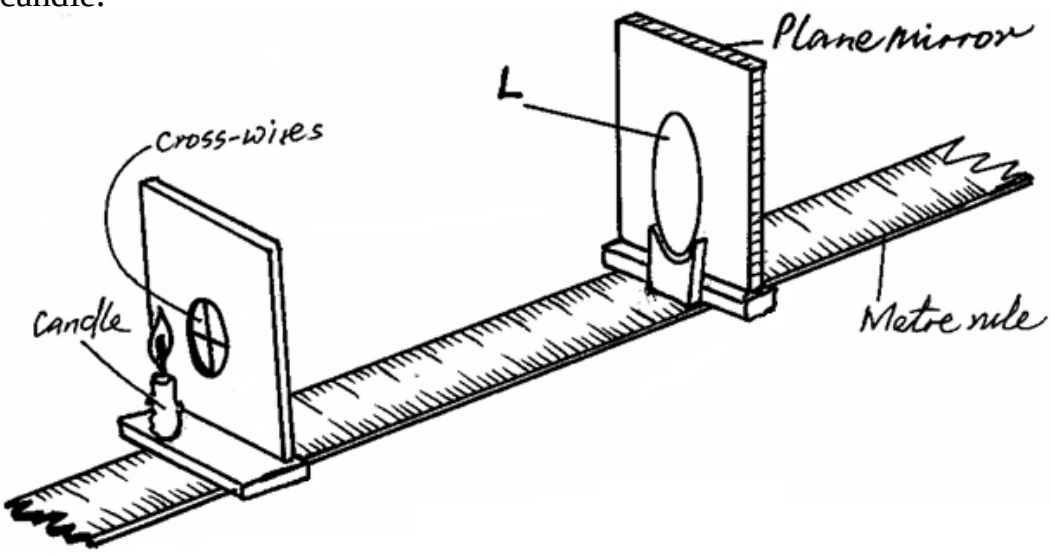
(c) The figure shows an experimental set up consisting of a mounted convex lens **L**, cardboard screen with cross-wires at the centre, a plane mirror, a metre rule and a candle.



Describe how the set-up may be used to determine the focal length, f, of the lens. (4 marks)

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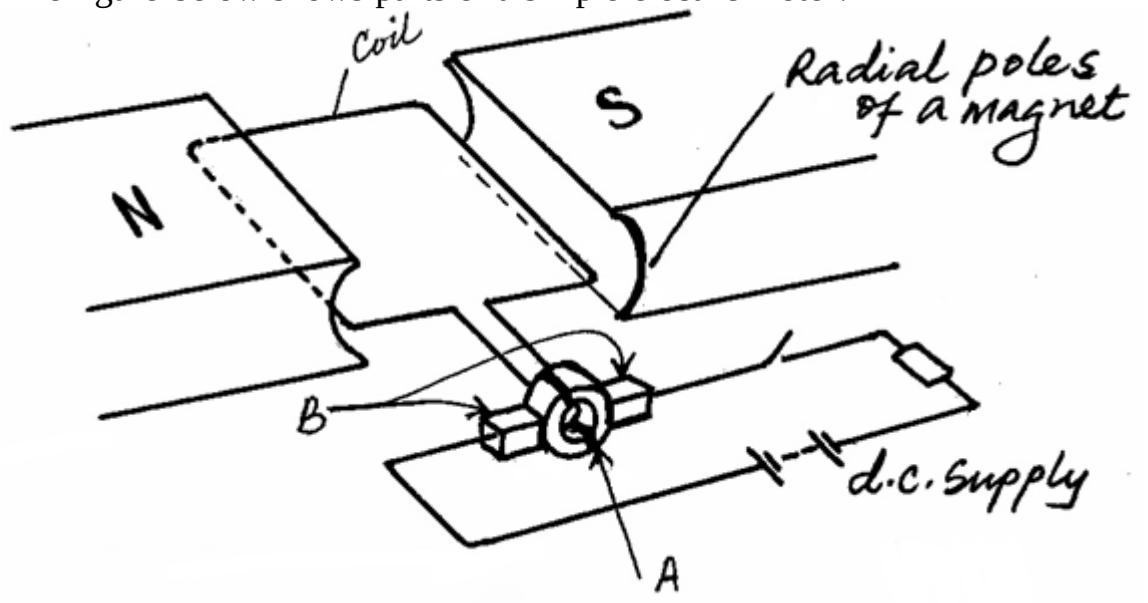
14. (a) The figure below shows parts of a simple electric motor.



(i) Name the parts labelled **A** and **B**. (2 marks)

A ……

B ……

(ii) State the function of each of the parts named in part (i) above. (2 marks)

A ……

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B ……

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(iii) State the advantage of using radial (curved) poles of a magnet over plane (flat) poles. (1 mark)

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(iv) Explain the significance of copper coil as part of an electric motor. (2 marks)

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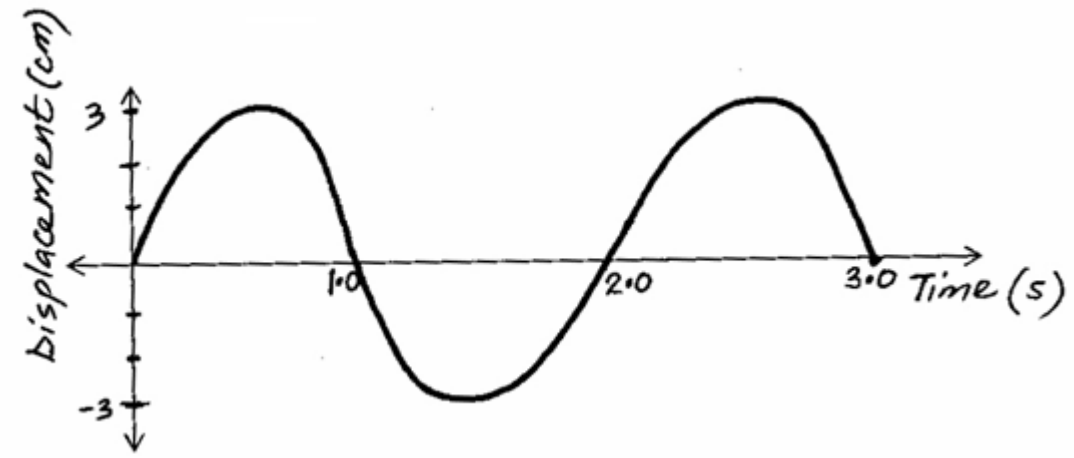
(b) The graph in the figure below shows the displacement of a pendulum bob from its rest position as it varies with time.



(i) Determine the amplitude of the oscillation. (1 mark)

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(ii) What is the time for one complete oscillation? (1 mark)

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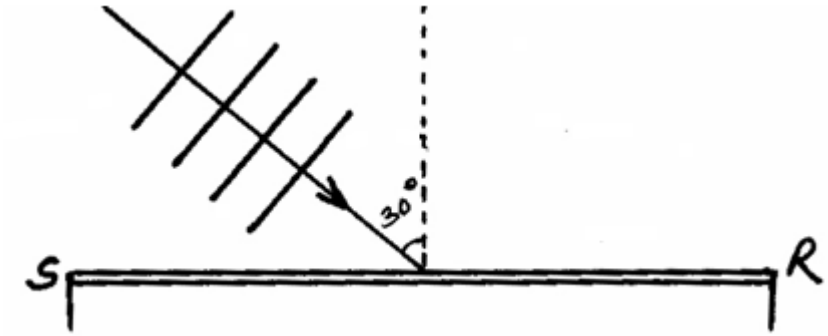
(iii) On the same graph, draw a sketch graph which represents a pendulum swinging with half the amplitude and twice the frequency. (2 marks)

(c) Plane water wave fronts are incident onto reflector **SR** as shown in the figure below. Show on the diagram the nature and direction of the reflected wave fronts. (1 mark)



15. (a) State the property of lead that makes it a suitable material for shielding an x-ray tube. (1 mark)

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(b) State how an increase in temperature of the filament in an x-ray tube affects the nature of x-rays produced. (1 mark)

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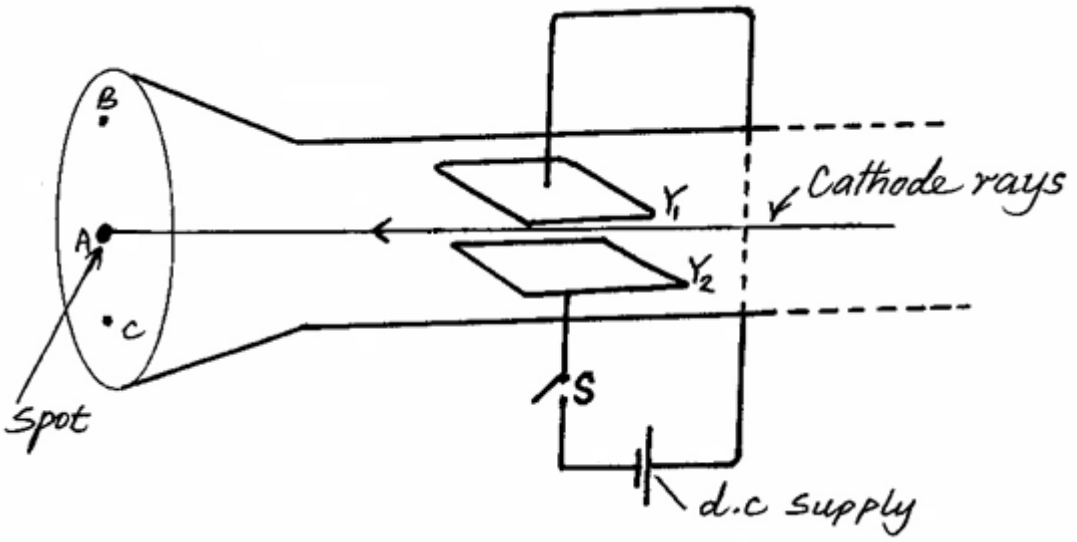
(c) The figure below shows the vertical deflection system of a Cathode Ray Oscilloscope (C.R.O).



(i) State how cathode rays are produced in Cathode Ray Oscilloscope. (1 mark)

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(ii) Show on the diagram the path of the cathode rays when the switch **S** is closed. (1 mark)

(iii) State what is observed on the screen if the d.c. supply is replaced with a high frequency a.c. supply. (1 mark)

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(d) An electric filament bulb is rated 24V, 0.5A.
Calculate:

(i) the power of the bulb. (2 marks)

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(ii) the energy dissipated by the bulb in 80 minutes. (2 marks)

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16. (a) State Faraday's law of electromagnetic induction. (1 mark)

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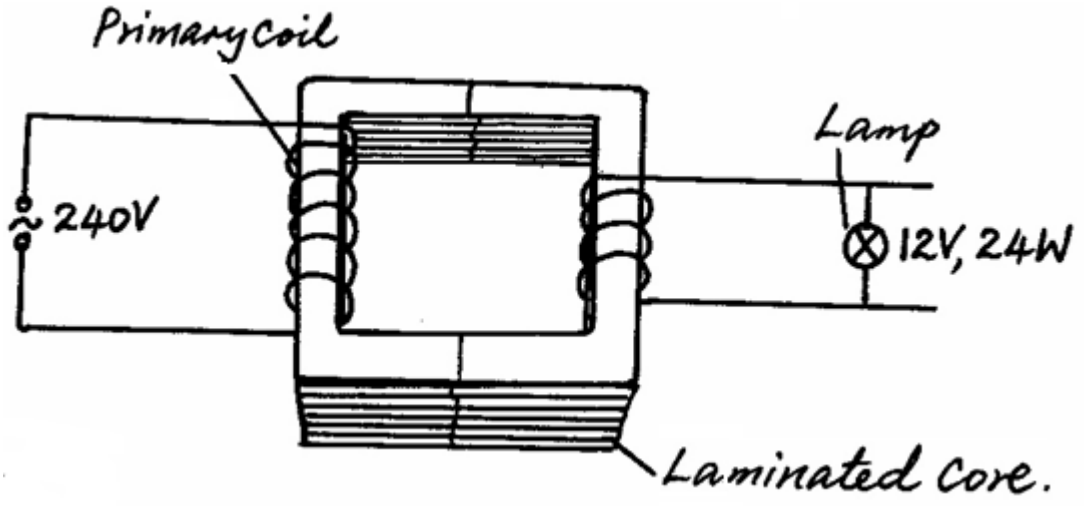
(b) The figure below shows a 12V, 24W lamp operated by a step-down transformer that is connected to a 240V mains supply.



(i) Explain what is meant by the term '**laminated core'** and state its significance in a transformer. (2 marks)

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(ii) Calculate the efficiency of the transformer if the current through the primary coil is 0.12A. (3 marks)

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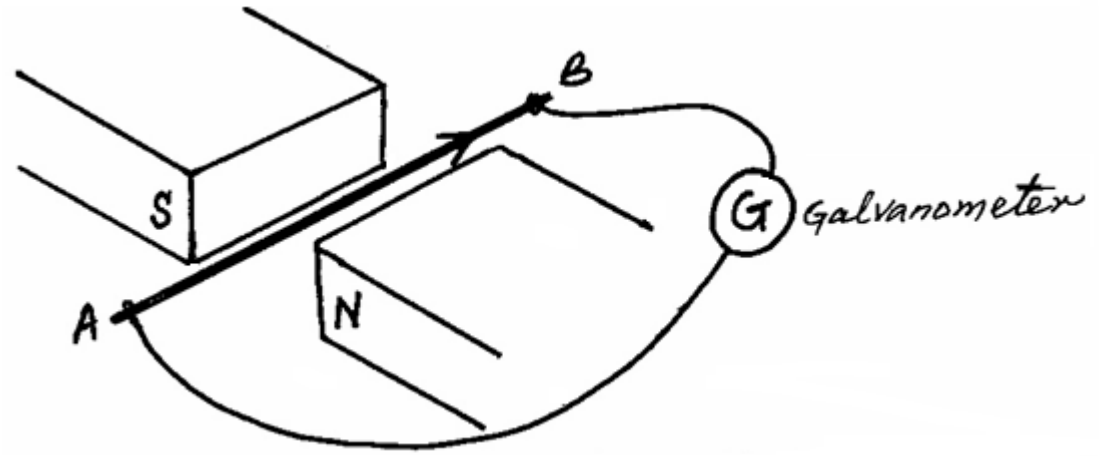
(c) The figure below shows a conductor AB placed in a magnetic field.



State the direction in which the wire must be moved for the induced current to flow in the direction shown. (1 mark)

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(d) Explain the meaning of the term **'Hysteresis loss'** as applied in transformers and state how it can be reduced. (2 marks)

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17. (a) State **two** properties of electric field lines. (2 marks)

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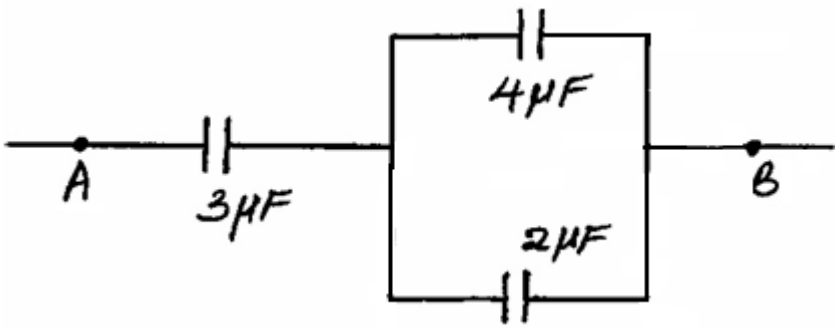
(b) The figure below shows part of a circuit containing three capacitors.



(i) Calculate the effective capacitance between **A** and **B**. (3 marks)

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(ii) Given that the potential difference (p.d.) across AB is 10V, what is the total charge flowing through the circuit? (1 mark)

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(c) State how an increase in thickness affects electrical resistance of a conductor. (1 mark)

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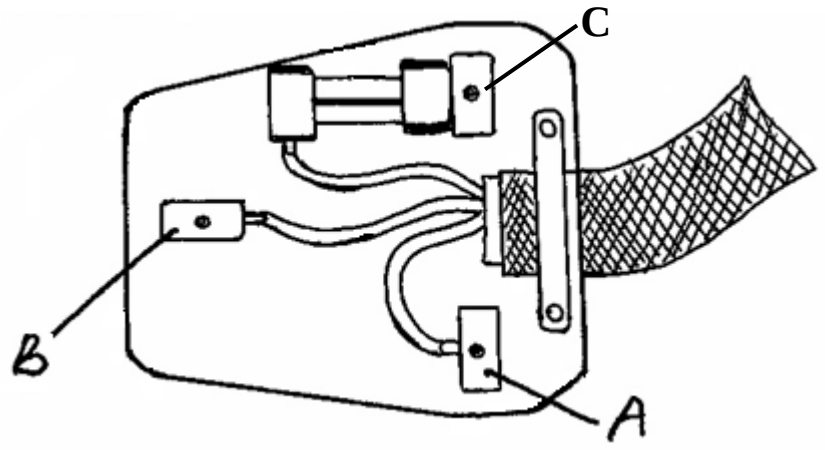
18. (a) The figure below shows the inner parts of a three-pin plug.



(i) Identify the pins **A** and **B**. (2 marks)

A ……

B ……

(ii) State the reason why the pin **B** is normally longer than the other two pins **A** and **C**. (1 mark)

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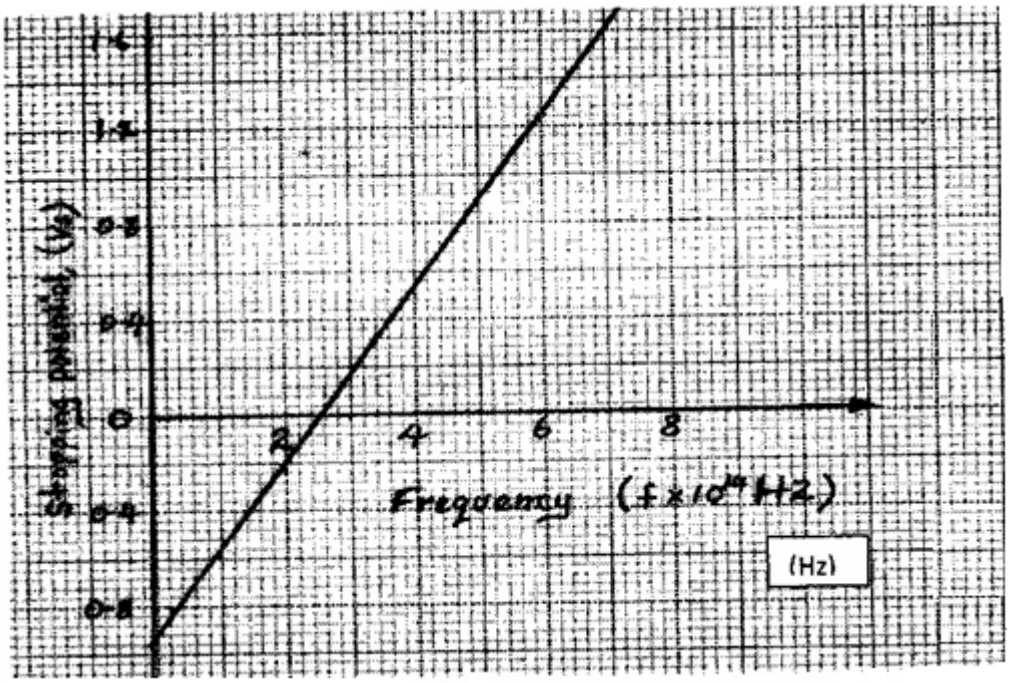
(b) In an experiment to find the relationship between frequency of radiation and kinetic energy of photoelectrons in a photoelectric device, the following graph was obtained.



Use the graph to answer the following questions.

(i) Determine the threshold frequency. (1 mark)

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(ii) Find the plank's constant h. (Take the charge of an electron to be 1.6×10^{-19}C). (3 marks)

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(iii) Calculate the work function of the metal in joules. (2 marks)

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