**Name: ……** **Index No. ……**

Candidate's Sign. ……..……..……....

Date: **……**

232/2

**PHYSICS**

Paper 2

August/September 2022

**TIME: 2 HOURS**

# SUKELLEMO JOINT EXAMINATION

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



**INSTRUCTIONS TO THE CANDIDATES:**

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

**For Examiners' Use Only**

| SECTION | QUESTION | MAXIMUM SCORE | CANDIDATE'S SCORE |
|---|---|---|---|
| A | 1-13 | 25 | |
| B | 14 | 10 | |
| | 15 | 11 | |
| | 16 | 11 | |
| | 17 | 12 | |
| | 18 | 11 | |
| | **TOTAL** | **80** | |

*This paper consists of 14 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.*

## SECTION A(25MARKS)

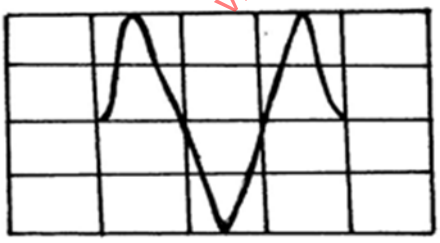
**1.** State any one condition under which a pinhole camera may form an image on its screen which has the same size as the object. (1 mark)

**2.** State one detector of infrared radiation. (1 mark)

**3.** 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 the observation. (2 marks)

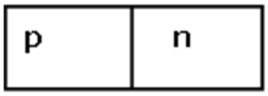


**4.** The diagram below shows the trace signed on the CRO. Given that the time based is set at 100ms/div. Determine the frequency of the signal. (2 marks)



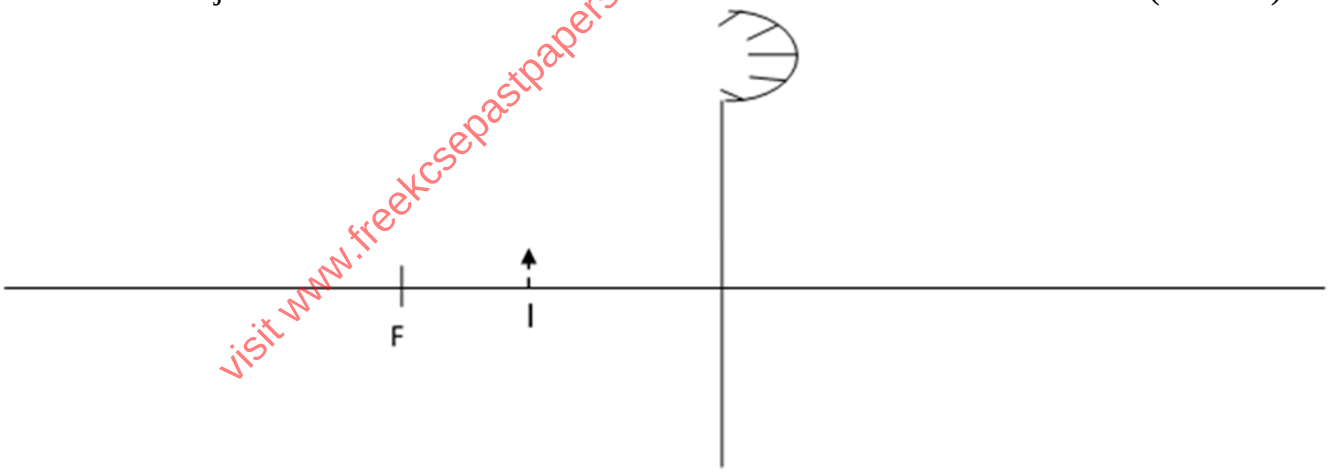
**5.** (a) Define the term biasing as used in electronics. (1 mark)

(b) The figure below shows a p-n junction diode. Complete the diagram to show the reverse bias state (1 mark)






**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.** A ship in an ocean sends an ultra sound whose echo is received after 3 seconds. If the wavelength of the ultra sound in water 7.5 cm, and the frequency of the transmitter is 30 kHz, determine the depth of the ocean. (3 marks)

**8.** State **one** quantity that is used to determine whether lead acid accumulator require charging or not. (1 mark)

**9.** The following equation represents a decay series.

$$^{210}_{83} \xrightarrow{X} {}^{210}_{84} \xrightarrow{\alpha} {}^{a}_{b}Q$$

Identify the radiation X and determine the value of b

X …… (1 mark)

b …… (1 mark)



**10.** An object is placed 20 cm from a converging lens of focal length 10 cm. Determine how far the image is from the object. (3 marks)

**11.** Using domain theory explain how magnetic material is magnetized by hammering method. (2marks)

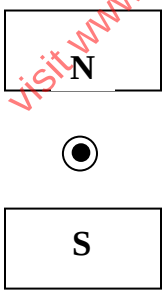
**12.** A circuit consists of a battery, metal wire, ammeter and a switch connected in series. The switch is closed and the ammeter reading noted. The metal wire is now heated.

a) State the observation made on the ammeter reading. (1 mark)

b) Give one reason for the above observation made. (1 mark)



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



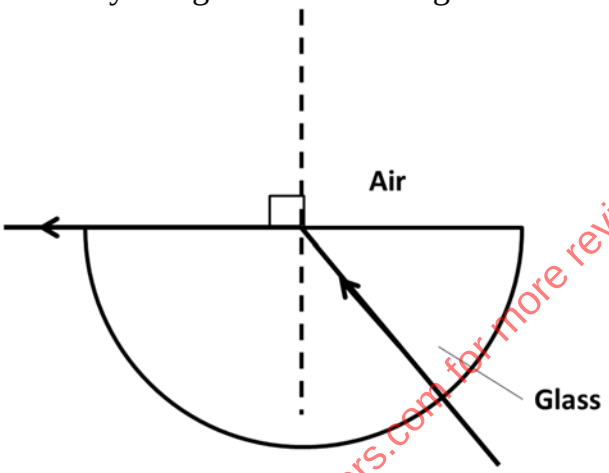

a) Indicate on the figure the direction of the force F, acting on the wire. (1 mark)

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

## SECTION B (55 MARKS)

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

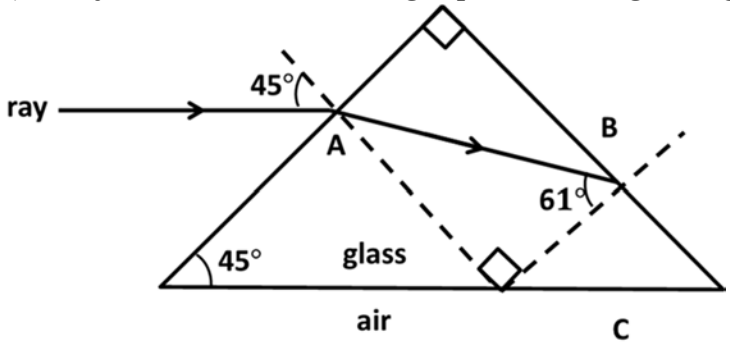
(b) The figure shows a ray of light incident on a glass - air interface.




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

(ii) Given that the refractive index of the glass is $_{a}n_{g,}$ and that the critical angle c = 42°, determine the value of $_{a}n_{g}$ (3 marks)

(c) A ray of monochromatic light passes through the glass prism shown.



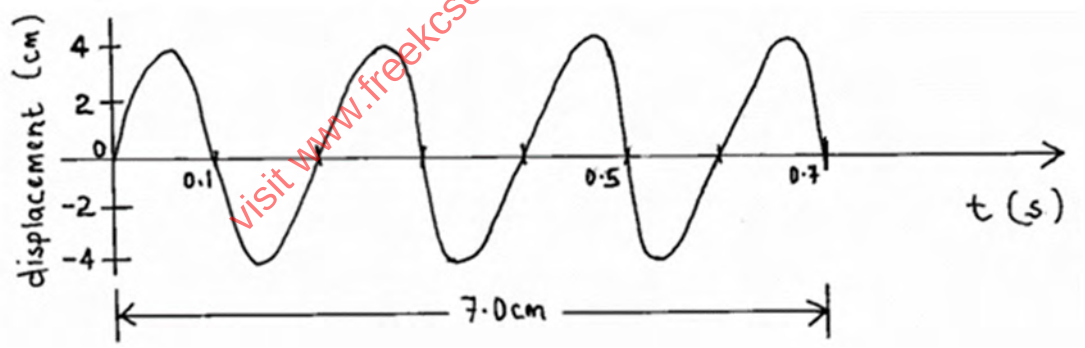

(i) State what is meant by the term monochromatic light. (1 mark)

(ii) Calculate the refractive index of the glass prism. (3 marks)



(iii) Complete the ray diagram until it emerges out of the glass prism. (1 mark)

**15.** The diagram below represents a wave motion.




a) (i)What is the amplitude of the wave in metres. (1 mark)

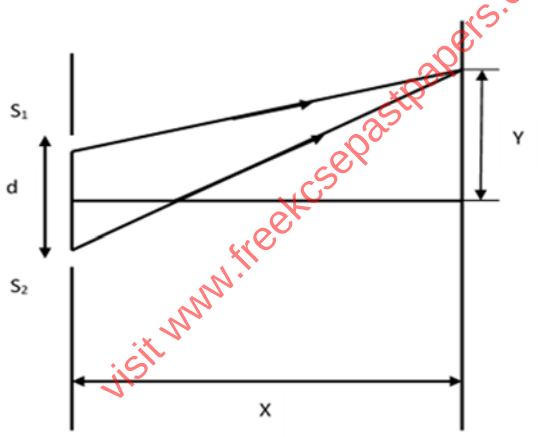
(ii) How many cycles are made. (1 mark)

(iii) Calculate the wavelength, $\lambda$ of the wave. (2 marks)

(iv) Calculate the frequency of the wave. (2 marks)

(v) Calculate the velocity of the wave. (2 marks)

b) Figure below shows two rays of monochromatic light incident on two adjacent slits S1 and S2






State what is observed on the screen when the:

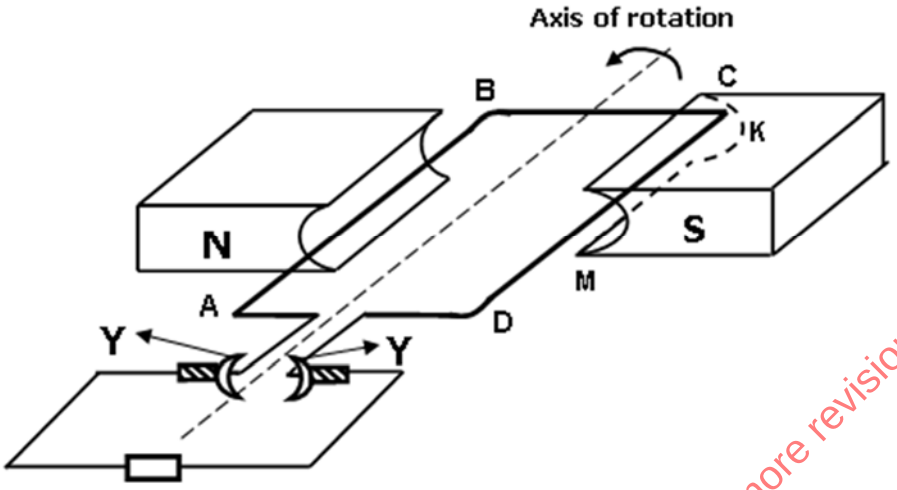
i. Distance X is increased. (1 mark)

ii. Slit separation d is reduced. (1 mark)

iii. White light is used. (1 mark)

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

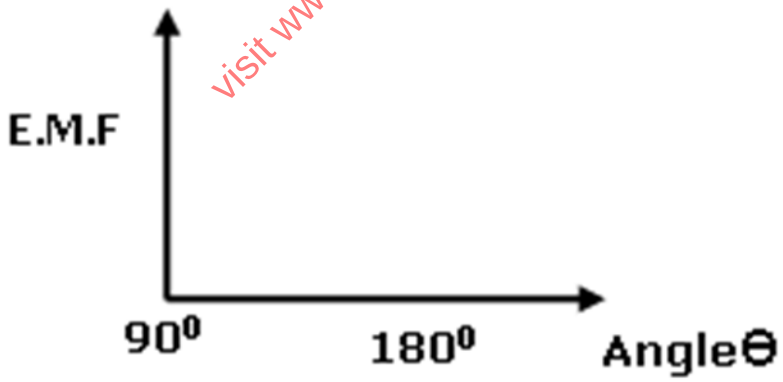
(b) The diagram below shows a simple d.c generator.



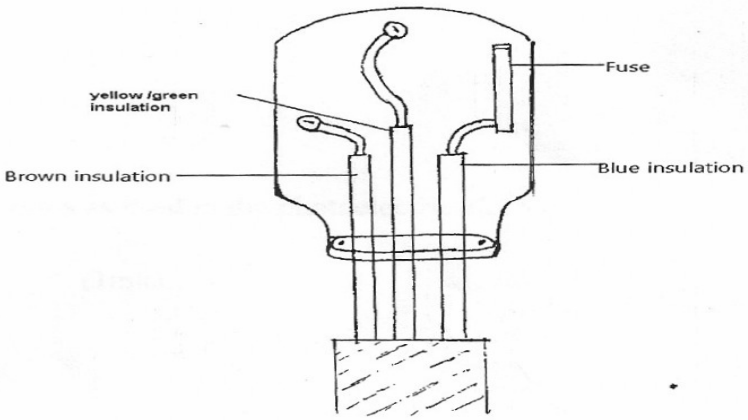

(i) Name the part labeled Y (1 mark)

(ii) The coil is rotated in anticlockwise direction, indicate using an arrow on the figure the direction of the induced current as the arm CD passes the position MK as shown. (1 mark)

(iii) Sketch on the axis below, a graph of the e.m.f generated against the angle as arm CD rotates from 90° to 180°. (1 mark)



(c) The figure below shows the inner parts of a 3 pin plug.




(i) The plug has been incorrectly fitted. List two mistakes and suggest corresponding remedies. ( 2 marks)

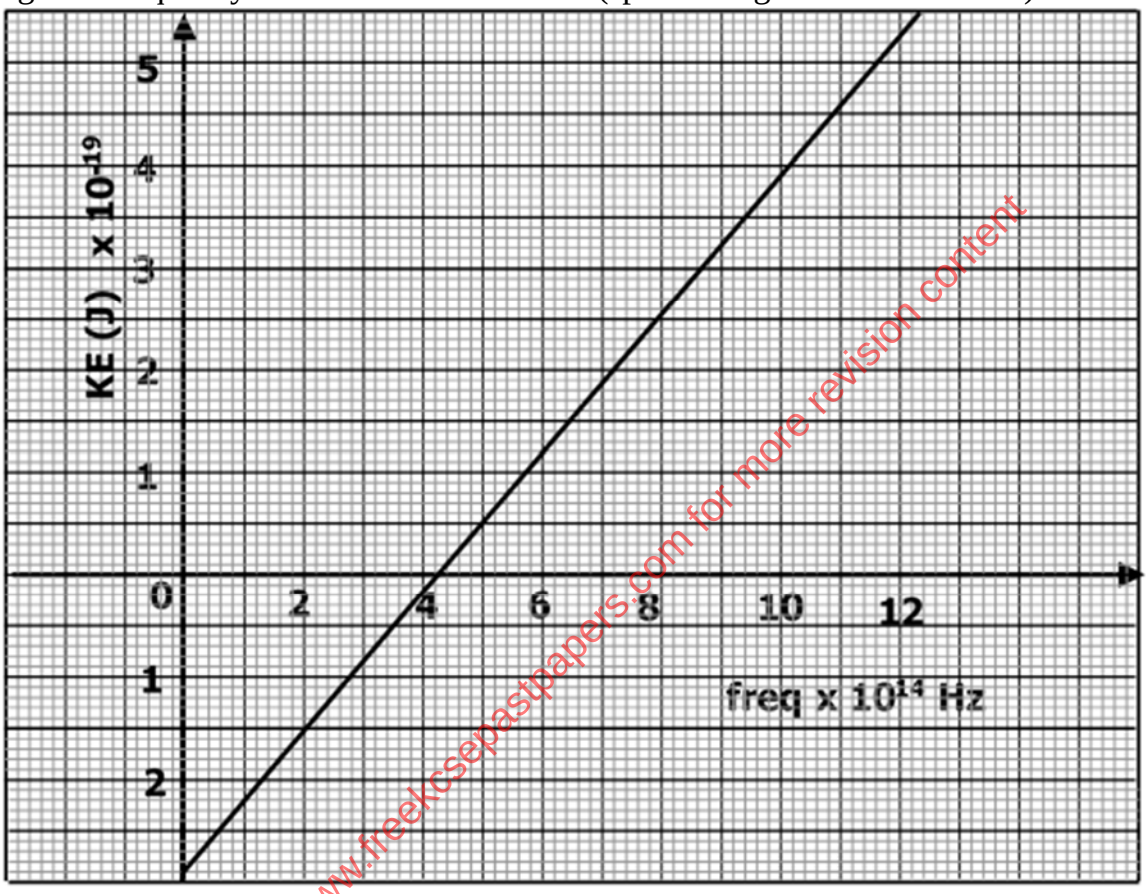
(ii) Why would it be wrong to fit an electric heater in a bathroom on the wall directly. (1 mark)

(iii) Where would such a heater be fitted and what type of switch should be used to operate it? (2 marks)

(iv) A power line from a power sub- station to a town some distance away, has a resistance of 0.10 Ohms per kilometer. Determine the rate of energy loss in the transmission of power over 50km at a current of 60 Amperes (3 marks)

**17.** (a)Define photo electric emission. (1 mark)

(b) The graph below shows the variation of kinetic energy (K.E) of a photo electron emitted against frequency of the incident radiation.(speed of light = $3.0 \times 10^8$ m/s)






From the graph, determine

i. The threshold wavelength λo (2 marks)

ii. Planck's constant h (3 marks)

iii. Work function, $W_o$ (2 marks)

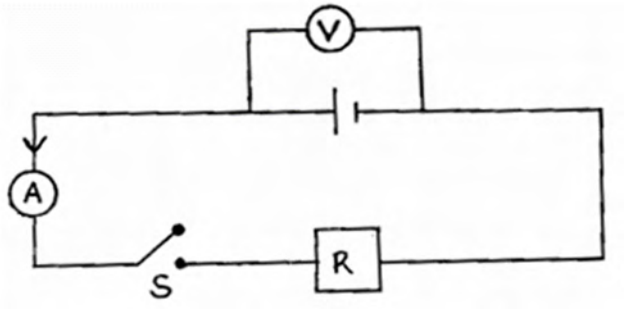
(c) The figure below shows one of the practical application of X – rays.


(i) Name the application. (1 mark)

(ii) State two properties of X –rays that makes it possible for the application shown in the figure above. (2 marks)

**18.** (a) State ohm's law. (1 mark)

(b) In an experiment to determine the internal resistance of a cell, the following circuit was used.




It was noted that when S is open, the voltmeter reads 1.5V and when S is closed the voltmeter reads 1.3V and ammeter reads 0.2A.

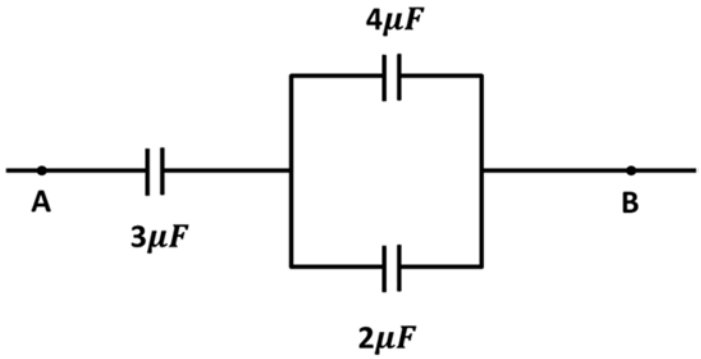
(i) What is the e.m.f of the cell. (1mark)

(ii) Determine the lost voltage. (1mark)

(iii)Find the value of R. (2marks)

(iv) Find the internal resistance of the cell. (2marks)

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




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



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