NAME……..…… **INDEX NO**…….....……..…..

SCHOOL…… **CANDIDATE'S SIGNATURE**……..…..

DATE……..……..

232/2
PHYSICS
(THEORY)
PAPER 2
NOVEMBER 2020
TIME: 2 HOURS

SUKELEMO JOINT EXAMINATION-2020

Kenya Certificate of Secondary Education

INSTRUCTIONS TO CANDIDATES:

*(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 workings must be clearly shown.
*(f) Non-programmable silent electronic calculators and KNEC Mathematical tables **may be** used.*

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FOR EXAMINER'S USE ONLY:

Section	Question	Maximum Score	Candidate's Score
A	1 – 13	25	
B	14	10	
	15	13	
	16	12	
	17	08	
	18	12	

Total Score	**80**	

Turnover

SECTION A: (25 MARKS)

*Answer **ALL** questions in this section in the spaces provided:*

1. State t**wo** conditions under which a pinhole camera may form an image on its screen which has the same size as the object. (2mks)

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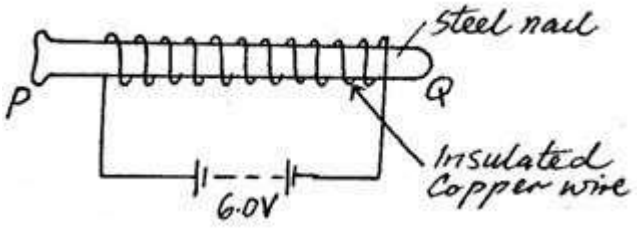
2. The figure below shows a ray of light incident on the surface of one plane mirror.

Sketch the path of the ray on the diagram after striking mirror 2 indicating all the angles. (2 marks)

3. A steel is to be magnetized by electrical method as shown below. Identify the pole **P** and **Q** of the resulting magnet. (1mk)



P: _____

Q: _____

4. A small chain is often seen hanging at the back of a petrol carrying lorry. State and explain its significance. (2mks)

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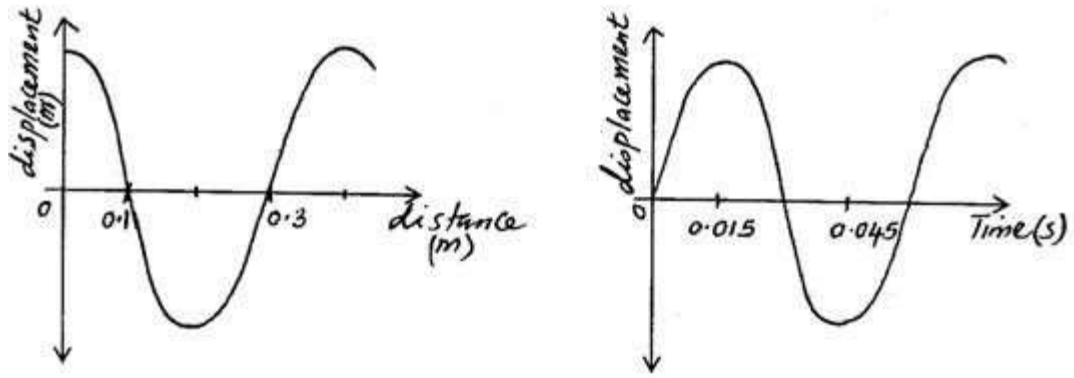
5. The figure **below** shows two waveforms representing the same wave motion.



Determine the velocity of the wave. (3mks)

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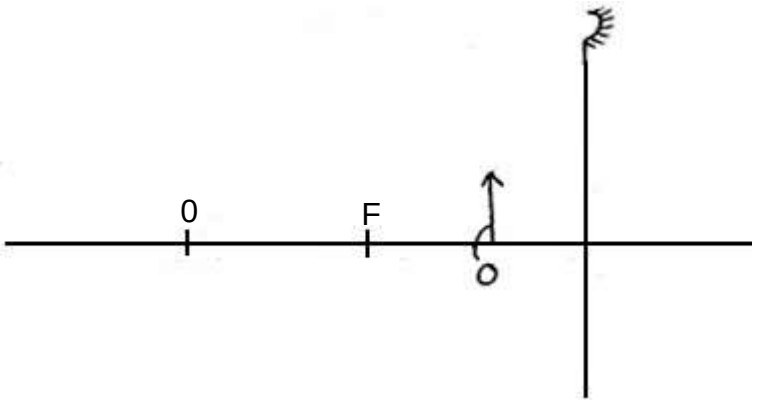
6. An object O is placed in front of a concave mirror and on the principal axis, as shown in the figure **below**. Complete the light ray diagram to locate the position of the image. (3mks)



7. Arrange the following radiations in order of increasing wavelengths. (1mk)
Infrared, blue light, ultraviolet, radiowaves, χ-rays.

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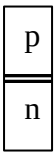
8. The figure **below** shows a block diagram of a p-n junction diode.



On the same diagram, show how a cell may be connected so that it is reverse biased. (1mk)

9. A girl standing at a distance claps her hands and hears an echo from a tall building 2 seconds later. If the speed of sound in air is 340m/s, determine how far the building is. (3mks)

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10. What do you understand by polarization as used in a simple cell? (1mk)

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11. State how the defect mentioned in question 10 above is minimized in a simple cell. (1mk)

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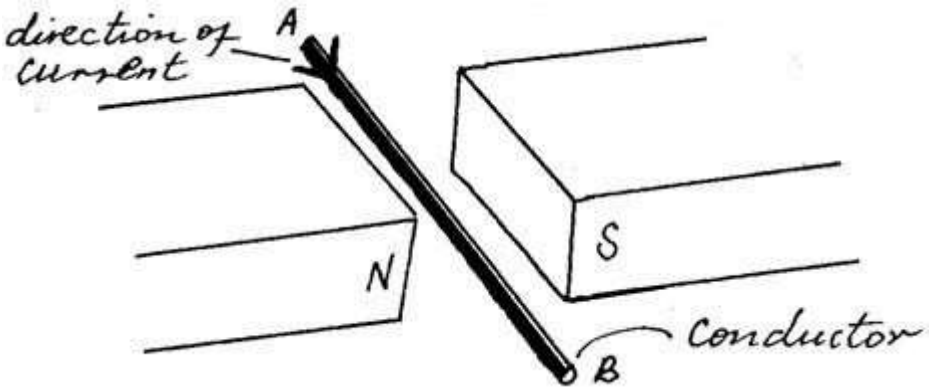
12. A current-carrying conductor **AB** is in a magnetic field as shown in the figure **below**.



(a) Indicate the direction of force F acting on the conductor. (1mk)

(b) State **two** factors that determine the direction of the force F. (2mks)

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13. You are given three resistors of values 5Ω, 8Ω and 12Ω. Show in a circuit diagram how you would connect them so as to give:

(a) an effective resistance of 9.8Ω. (2mks)

(b) the least effective resistance. (2mks)

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SECTION B: (55 MARKS)

*Answer **ALL** questions in this section in the spaces provided.*

14. (a) Define refractive index. (1mk)

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(b) The critical angle of a certain material medium is 43.2º. Determine the refractive index of the material. (2mks)

(c) (i) What do you understand by the term accommodation? (1mk

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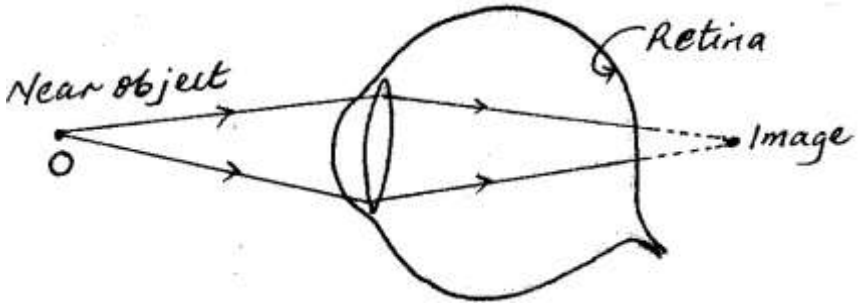
(ii) The diagram **below** shows a certain defect of vision. Name the defect. (1mk)



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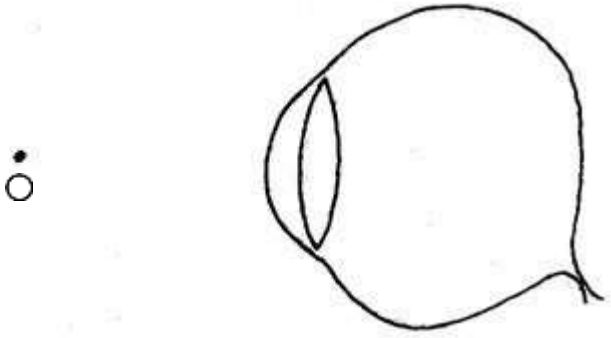
(iii) On the figure **below** show how the defect can be corrected. (2mks)



(d) An object is placed 40cm in front of a concave lens of focal length 20cm; determine the position of the image. (3mks)

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15. (a) (i) State Lenz's a law of electromagnetic induction. (1mk)

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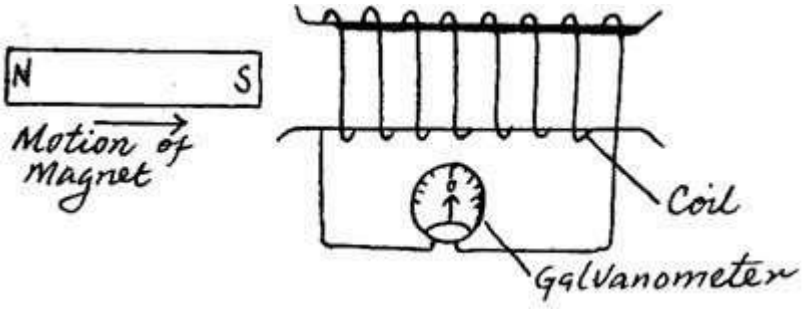
(ii) A bar magnet is moved into a coil of insulated copper wire connected to a centre-zero galvanometer, as shown in the figure **below**.



(i) Show on the diagram the direction of induced current in the coil. (1mk)

(ii) State and explain clearly what is observed on the galvanometer when the S-pole of the magnet is moved into and then withdrawn from the coil. (4mks)

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(b) A transformer has 800 turns in the primary and 40 turns in the secondary winding. The alternating e.m.f connected to the primary is 240V and the current is 0.5A.

(i) Determine

I the secondary e.m.f (2mks)

II the power in the secondary if the transformer is 95% efficient. (2mks)

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(ii) Explain how energy losses in a transformer are reduced by having:

I a soft-iron core. (2mks)

II a laminated core. (1mk)

16. (a) (i) Distinguish between thermionic emission and photoelectric emission. (2mks)

(ii) State **one** factor which affects the rate of each of the above types of emission.

Thermionic emission. (1mk)

Photoelectric emission. (1mk)

(b) Sodium has a work function of 2.3eV. Given that: Planck's constant h = 6.63×10^{-34}JS, velocity of light in vacuum, C = 3.0×10^{8}m/s, 1 electron-volt (1eV) = 1.6×10^{-19} C and mass of an electron, $m_e = 9.1 \times 10^{-31}$kg, calculate:

(i) its threshold frequency. (2mks)

(ii) the maximum velocity of the photoelectrons produced when the sodium is illuminated by light of wavelength 5.0×10^{-7}m. (4mks)

(iii) the stopping potential V, with the light of this wavelength. (2mks)

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17. (a) State **two** advantages of using a Cathode Ray Oscilloscope (C.R.O) as a voltmeter over the ordinary voltmeter. (2mks)

(b) An X-ray operates at 30000V and the current through it is 2mA. Given that the charge of an electron is 1.6×10^{-19}C, h = 6.63×10^{-34}JS, speed of light, C = 3.0×10^{8}m/s, calculate:-

(i) the maximum kinetic energy of the electrons when hitting the target. (2mks)

(ii) the number of electrons hitting the target per second. (2mks)

(iii) the minimum wavelength of the X-rays emitted.

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18. (a) A radioactive carbon-14 decays to nitrogen by beta particles as shown **below**.

$$^{14}_{6}C = ^{\chi}_{7}N + ^{0}_{y}e$$

Determine the values of χ and y. (2mks)

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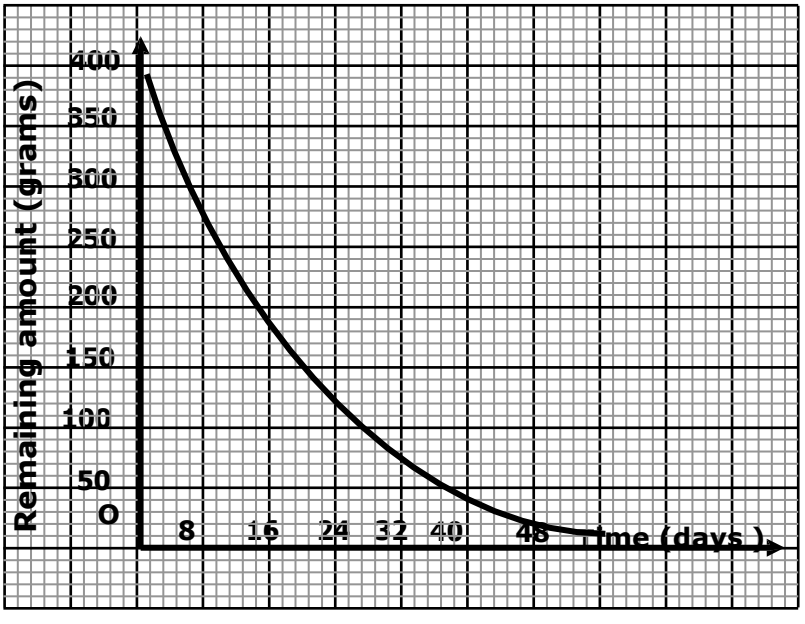
b) The graph below shows radioactive decay of iodine.



Use the graph to determine the:-

(i) Fraction of the amount remaining after 16.2 days. (2mks)

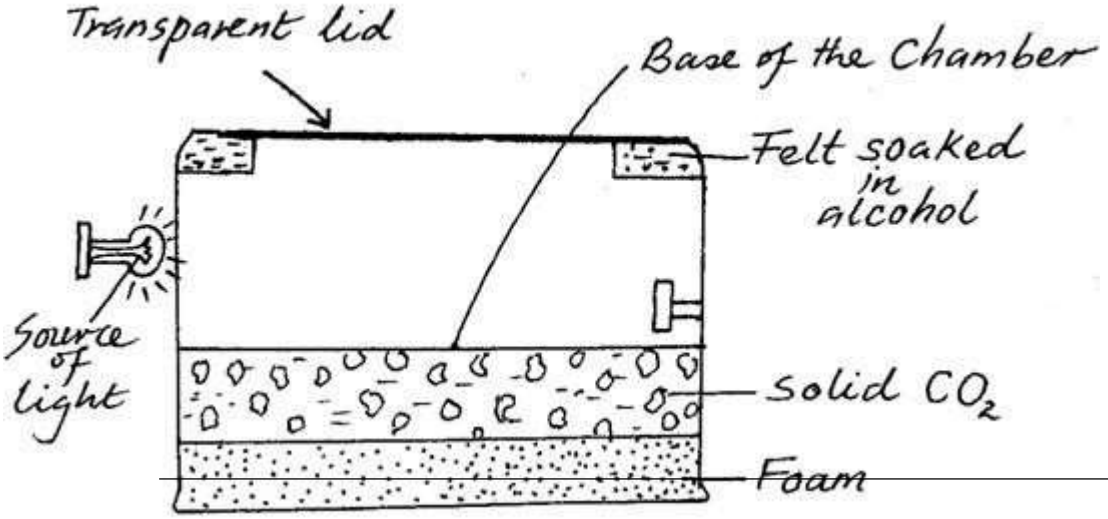
(iii) Determine the half – life of iodine.

(2mks)

(iv) Mass remaining after 17 days.

(1mk)

c) The figure **below** shows the cross-section of a diffusion cloud chamber used to detect radiation from radioactive sources.



(i) State the function of the following:

I Alcohol. (1mk)

II Solid CO_2. (1mk)

(ii) Explain briefly how the diffusion cloud chamber can be used to detect and identify alpha particles. (3mks)

THE END