NAME ……INDEX NO……

SCHOOL…… CANDIDATE'S SIGN…….

DATE…….

232/2
PHYSICS
PAPER 2 (THEORY)
TERM 1 2022
TIME: 2 HOURS

MARANDA HIGH SCHOOL PREMOCK

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

232/2
PHYSICS
PAPER 2
(THEORY)

INSTRUCTIONS TO CANDIDATES

a) Write your name and index Number in the spaces provided above

b) This paper consists of two sections A and B.

c) Answer ALL questions in both section in the spaces provided

d) All working MUST be clearly shown.

e) Silent non-programmable electronic calculators may be used

f) This paper consists of 12 printed pages. Candidates should check the question paper to ascertain all the pages are printed as indicated and no questions are missing.

FOR EXAMINERS USE ONLY

Section	Question	Maximum score	Candidate's score
A	**1-16**	**25**	
B	**17**	**11**	
	18	**9**	
	19	**6**	
	20	**16**	
	21	**13**	
Total score		**80**	

SECTION A (25 MARKS)

Answer ALL the question in this section in the spaces provided

1. State the condition under which the P.d across the terminals of a cell is equal to its e.m.f. (1 mark)

   - When there is no current flowing out of the cell. ✓1

2. Figure 1 shows the pattern of water ripples in a dam.

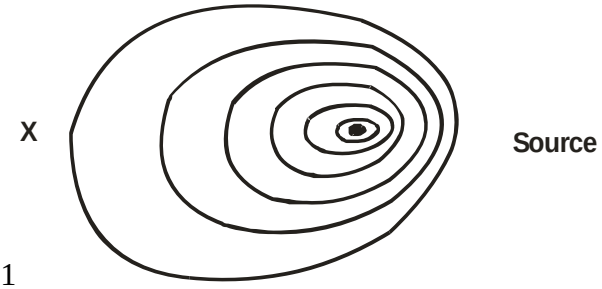


Fig 1

What information about the depth of the dam at point X can you deduce from the pattern? Explain your answer. (2 marks)

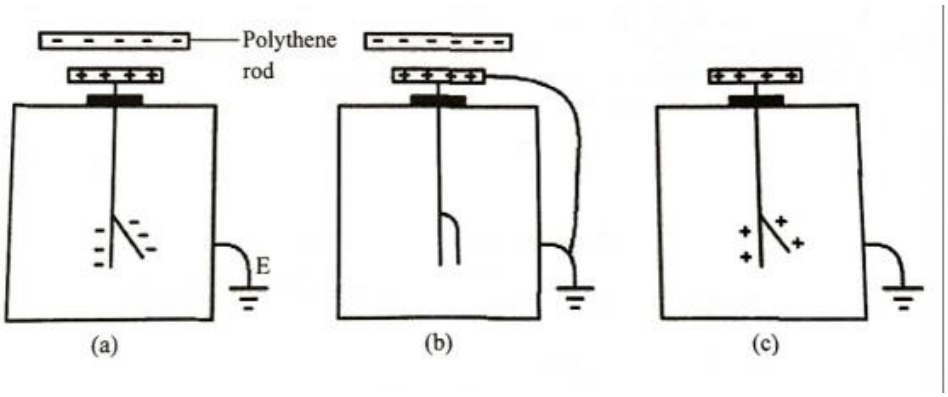
-The dam is deeper at X✓1. This is because the ripples / waves are far apart at that point ✓1

3. Kiss Fm is broadcasting at a frequency of 70MHz. What is the wavelength of the waves, if the speed of the waves is 3.0 x 10^8 m/s? (2 marks)

$$\mathbf{V = f\lambda \rightarrow \lambda = \frac{v}{f} = \frac{3 \times 10^8}{70 \times 10^6}} \checkmark^1$$

$$\mathbf{= 4.286m} \checkmark^1$$

4. Figure 2a,2b and 2c show the process of charging an electroscope by induction.



It is observed that the leaf rises in (a),collapses in (b) and then rises in (c).explain why the leaf collapses in (b) (3mks)

The electroscope is <u>earthed</u>✓1 thus the electrons <u>flow from the leaf to the earth</u>. ✓1this <u>reduces the force of repulsion</u>✓1 between the leaf and the plate to zero / <u>electroscope is discharged</u> hence the leaf falls.

5. Give **one** reasons why soft iron is used as a core of the coil in an electric bell. (1 marks)

   It is easily magnetized and demagnetised✓1

6. What property of light is suggested by the formation of shadows? (1mk)

   Light travels in a straight line / Rectilinear propagation of light. ✓1

7. A student holds a large concave mirror of focal length 1M, 80cm from her face. State **two** characteristics of her image in the mirror. (2mks)

   -Magnified.

   -Upright/erect

   -Virtual Any 2 x 1 = 2mks

8. Convex mirrors are used in cars as driving mirrors because they have a wide field of view. Sketch a labeled diagram to show the wide field of view. (2mks)

9. Arrange the following in order of increasing frequency. Visible light, infrared radiation, X-rays, U.V radiation, Radio waves. (1 mark)

   -Radio waves, Infrared radiation, Visible light, U.V radiations, X-rays. ✓1

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

    -radio waves have <u>longer wavelength</u>✓1 so are easily diffracted around the hills

11. Figure 4 shows three capacitors connected between two points A and B.

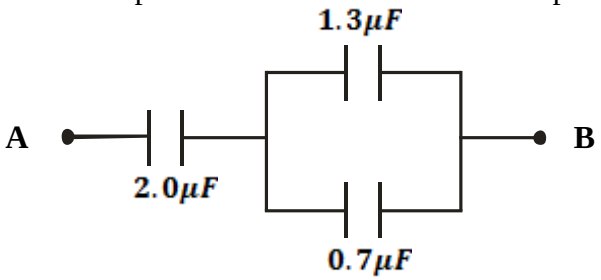


Fig 4

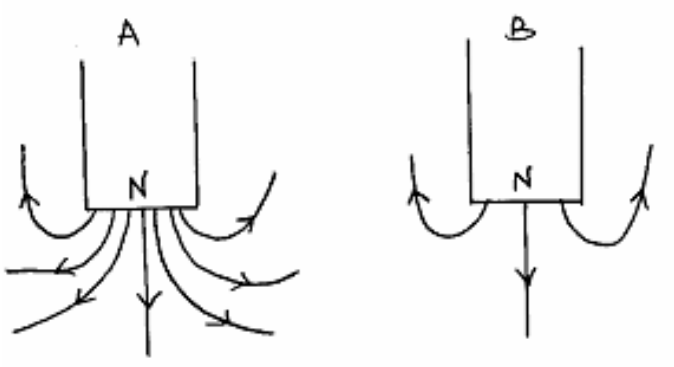
Determine the capacitance across AB. (3 marks)

$1.3\mu F + 0.7\mu F = 2\mu F$ ✓1

$\frac{1}{2.0} + \frac{1}{2.0} = \frac{2}{2} = 1\mu F$ ✓1

$= 1 \times 10^{-6} F$ ✓1

12. Two magnets **A** and **B** in figure 2 were brought from a point high above a table towards a steel pin.



State with a reason which magnet will attract the pin at a bigger height above the table. (2mks)

A✓1 – It has a stronger magnetic field than B. ✓1

13. Sound is classified as a longitudinal mechanical wave. Explain why sound is classified as;

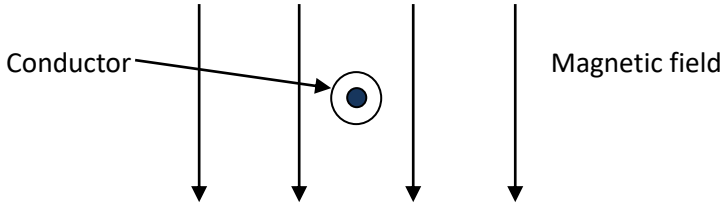
i. A longitudinal wave. (1 mark)

- It is transmitted in series of alternating compressions and rare factions ✓1
- its direction of propagation is parallel to the disturbance producing it ✓1
Any one

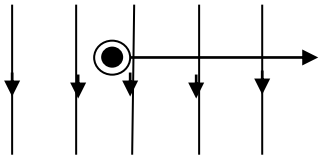
ii. A mechanical wave. (1 mark)

– It require a material medium for its transmission

14. Figure 4 below shows a conductor in a uniform magnetic field carrying current in the direction shown.



15. Indicate on the diagram the direction of motion of the conductor. (1mk)



16. Name the property of light applied in transmitting light signal in optical fibres. (1mk)

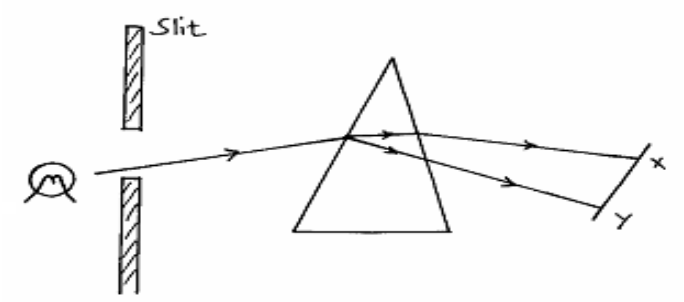
Total internal reflection

SECTION B (55 MARKS)

Answer ALL the questions in this section in the spaces provided

17.

a. Figure 7 below shows a narrow beam of white light onto a glass prism.



i) What is the name of the phenomenon represented in the diagram? (1mark)

-Dispersion of light.

ii) Name the colour at **X** and **Y**. Give a reason. (3mks)

X – Red ✓1

Y – Violet ✓1

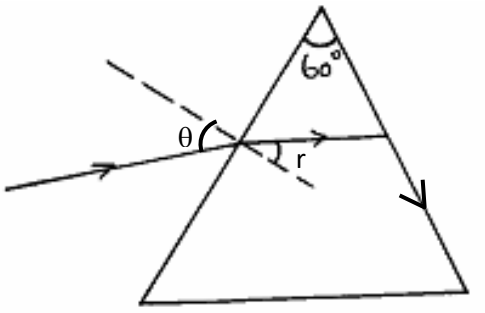
- Red has the lowest frequency/longest wavelength hence least deviated while violet has the highest frequency/shortest wavelength hence most deviated. ✓1

iii) What is the purpose of the slit? (1mk)

- Act as point source of light.

b. Figure 8 below shows the path of ray of yellow light through a glass prism.The speed of yellow light in the prism is 1.8 x 10^8m/s.

Figure 8



i.) Determine the refractive index of the prism material (speed of light in vacuum C =3.0 x 10^8m/s). (3mks)

$${}_a\eta_g = \frac{C}{V}$$ ✓1 $$= \frac{3.0\times10^8}{1.8\times10^8}$$ ✓1 **= 1.6667** ✓1

ii.) Show on the same diagram, the critical angle, c, and hence determine its value. (3mks)

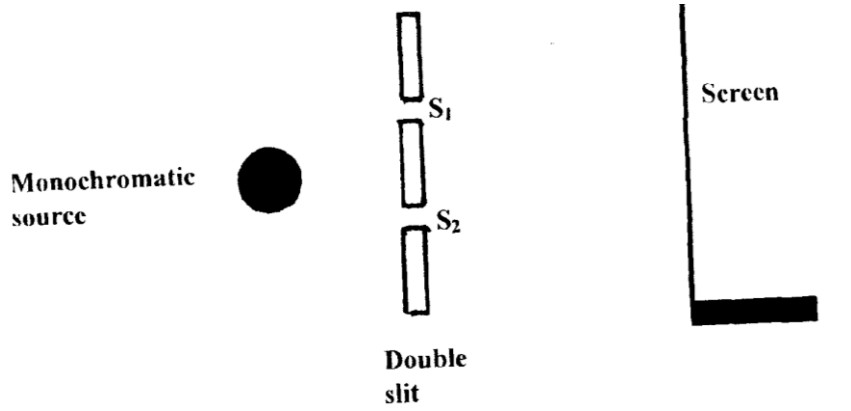
C on the diagram. ✓1

$$\eta = \frac{1}{Sin\ C} \Rightarrow Sin\ C = \frac{1}{\eta} = \frac{1}{1.6667}$$ ✓1

Sin C = 0.5999

C = 36.86° ✓1

18. In an experiment to observe interference patterns of light waves, a double slit is placed close to the source as shown below.



i.) State the function of the double slit. (1mk)

-The double slit allows for coherent source of light to occur (light of same frequency and wavelength)

ii.) Briefly describe what is observed on the screen. (3mks)

A series of dark and bright frings √1are observed decreasing in intensity from the centre outwards

The bright fringes are due to constructive interference √1while dark fringes are a result of destructive interfered √1

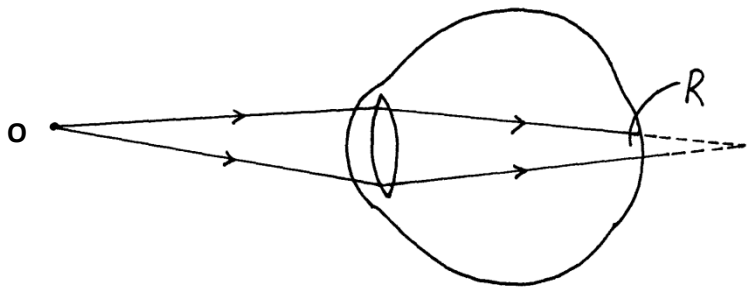
iii.) State and explain what is observed on the screen when the slit separation S_1- S_2 is reduced. (2mks)

When the slit separation is reduced the distance between peaks on the interference pattern increases; this is because of increase in resolution power.

iv.) State and explain what is observed on the screen when white light is used in place of the monochromatic light. (3mks)

A central white fringe will be formed followed by the other fringes taking the seven colours of the rainbow.√ This is because each colour of the rainbow will be refracted √1 differently because of the varying wavelength√1

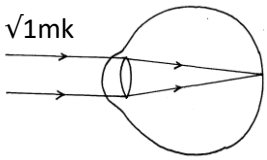
19. The figure below shows how a near object O is focused in a defective eye,



a) What problem does the observer face when viewing an object at the near point? (1mk)

Blurred image √

b) (i) Sketch on the same figure how a distant object is focused by the eye. (2mks)



Incoming rays should be parallel. ✓1

Refracted rays to R √

(ii) State the nature of the defect. (1mk)

Long-sightedness or hypermetropia √

c)

(i) A pastor is known to have the defect stated in **(b) (ii)** above how will the pastor handle a bible as he reads it. (1mk)

-At arm length √

(ii) How would you advise the pastor as he goes about correcting the defect? (1mk)

-Use spectacles with convex lens √

20.

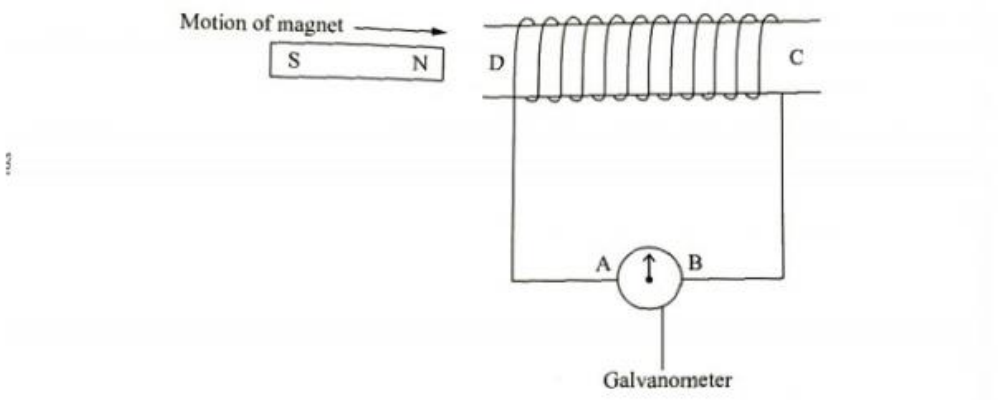
a. State faradays law of electromagnetic induction (1mark)

the magnitude of the induced emf is directly proportional to the rate of change of the magnetic flux linkage. (N/B the word linkage must be seen**)**

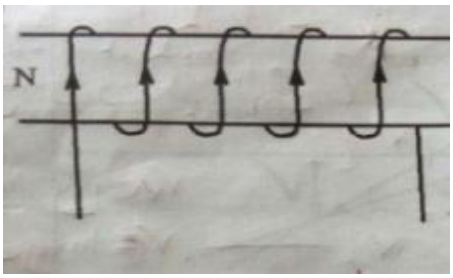
Or

Whenever there is change of magnetic flux associated with a conductoer am emf is induced in the conductor whose magnitude is directly proportional to the rate of change of magnetic flux linkage

b. Figure shows a bar magnet being moved towards a solenoid.the solenoid is connected to a galvanometer.



(i) Indicate on the diagram the direction of the induced current in the solenoid. (1mark)



(ii) Identify the pole induced at D (1mark)

N

(iii)Explain the answer in 16b.(ii) (2marks)

From the lenzs law the induced current flows in the direction <u>such that it opposes the change causing it</u>.therefore as the north pole of the magnet approches end D becomes <u>North Pole to repel</u> the incoming North Pole.

c. Explain how laminating the core of a transformer increases its efficiency (2mks)

Lamination <u>increases the resistance</u> of the core/reduces eddy currents,<u>this reduces heating effect</u> thus efficiency increases.

d. A transformer has 1000 turns in its secondary coil and 10 turns on its primary coil. An alternating current of 2.5A flows in the primary circuit when it is connected to a 12V a.c. supply.

(i) State the type of transformer. (1mk)

Step – Up transformer.

(ii) Calculate the power input to the transformer. (3mks)

$$\mathbf{P_P = I_P V_P} \checkmark_1$$

$$\mathbf{= 2.5 \times 12} \checkmark_1$$

$$\mathbf{= 30W} \checkmark_1$$

(iii) Calculate the e.m.f. across the secondary coil. (3mks)

$$V_S = \frac{N_S}{N_P} \times V_P \checkmark_1$$

$$= \frac{1000}{10} \times 12 \checkmark_1$$

$$\mathbf{= 1200V} \checkmark_1$$

(iv) In transmitting power why is it necessary to step up before transmission.

Explain. (2mks)

-Minimizing energy losses./power losses:
High voltages leads to <u>small output current</u> thus less resistance and low heating effect on the cables since

21. a) Distinguish between electromotive force (e.m.f) and potential difference, p.d of a cell. (2 marks)

- E.m.f is the voltage across the cell when no current is flowing out of the cell (in open circuit) ✓1

- P.d is the voltage across the cell when current is flowing out of the cell (in a closed circuit) ✓1

b)Lead acid accumulators and alkaline accumulators are all sources of electromotive force. State **one** advantage of

i) Lead acid accumulator over alkaline accumulator. (1 mark)

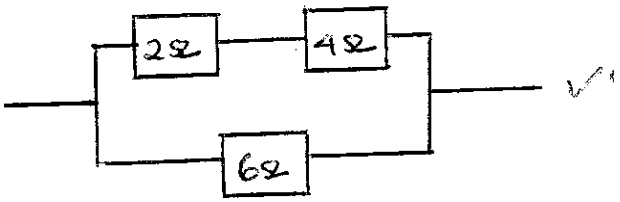
– most reliable✓1
- Long lasting✓1
- Cost - effective✓1 (any one)

ii) Alkaline accumulator over lead acid accumulator. (1 mark)

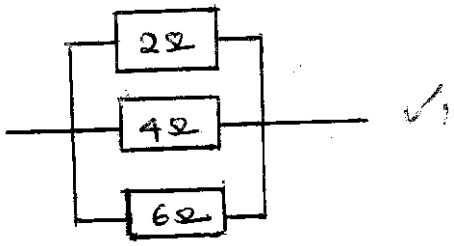
- large currents can be drawn from them. ✓1
- **Can be kept in a discharged condition for a very long time before the cells are ruined. ✓1**
- **They require very little attention to maintain✓1**
- **They are lighter hence more portable. ✓1** **(*any one)***

c) Three resistors of resistances 2.0Ω, 4.0Ω and 6.0Ω are connected together in a circuit.
Draw a circuit diagram to show the arrangement of the resistors which gives.

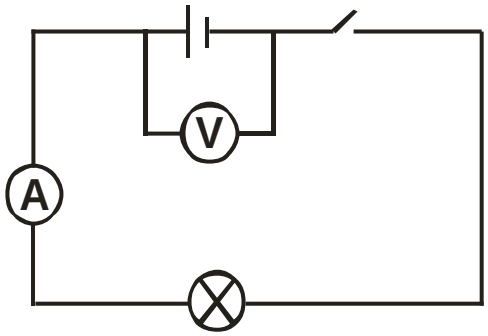
i) Effective resistance of 3.0Ω. (2 mark)



ii) Minimum resistance. (1 mark)



d) In the figure below the voltmeter reads 2.1V when the switch is open. When the switch is closed, the voltmeter reads 1.8V and the ammeter reads 0.1A.



Determine;

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

2.1V✓1

ii) The internal resistance of the cell. (3 marks)

iii) lost volts = Ir = 2.1 – 1.8 = 0.3 ✓1

r = internal resistance

$\frac{0.3V}{0.1} = \frac{0.1}{0.1}r$ ✓1

$r = 3\Omega$ ✓1

iv) The resistance of the lamp. (2 marks)

Terminal voltage = P.d = 1.8 = IR

R = Resistance of the lamp

$\frac{1.8}{0.1} = \frac{0.1}{0.1}R$ ✓1

$= 18\Omega$ ✓1

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