

NAME \_\_\_\_\_ INDEX NO. \_\_\_\_\_

SCHOOL \_\_\_\_\_ SIGNATURE \_\_\_\_\_

DATE \_\_\_\_\_

**232/2**

**PHYSICS**

**PAPER 2**

**(THEORY)**

**JULY / AUGUST, 2019**

**TIME: 2 HOURS**

**LARI SUB COUNTY JOINT EXAMINATION**

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

232/2

PHYSICS

PAPER 2

(THEORY)

TIME: 2 HOURS

**INSTRUCTION TO CANDIDATES**

- Write your name, index number and school in the spaces provided.
- This paper consists of TWO sections: I and II.
- Answer ALL questions in section I and II in the spaces provided.
- ALL workings MUST be clearly shown.
- Mathematical tables and electronic calculators may be used.

**FOR EXAMINERS USE ONLY**

| Question     | Question | Maximum Score | Candidates Score |
|--------------|----------|---------------|------------------|
| A            | 1 – 12   | 25            |                  |
| B            | 13       | 12            |                  |
|              | 14       | 11            |                  |
|              | 15       | 13            |                  |
|              | 16       | 10            |                  |
|              | 17       | 09            |                  |
| <b>TOTAL</b> |          | 80            |                  |

*This paper consists of 12 printed pages.  
Candidates should check the question paper to ensure that all the  
Pages are printed as indicated and no questions are missing.*

**SECTION A**

1. State **ONE** factor which does not change as water waves move from shallow to deep end. (1 mark)

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2. Figure 1 below shows a ray of light incident on a glass prism

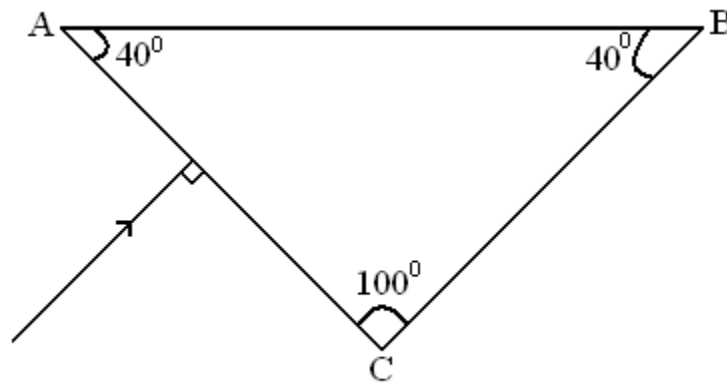


Figure 1

Given that the critical angle for the glass is  $39^\circ$ , **sketch** on the diagram the path of the ray through the prism (2 marks)

3. An X-ray tube has an accelerating potential of 60kv. What is the shortest wavelength of the X-ray beam? ( Planck constant,  $h= 6.63 \times 10^{-34}\text{Js}$  , electronic charge to be  $1.6 \times 10^{-19}\text{C}$  and speed of light= $3.0 \times 10^8\text{m/s}$ ) (3marks)

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4. Why is topping of an accumulator done with distilled water and not sulphuric acid? (1mark)

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5. The table below shows an incomplete electromagnetic spectrum.

|             |   |           |               |   |        |            |
|-------------|---|-----------|---------------|---|--------|------------|
| Radio waves | A | Infra-red | Visible light | B | x-rays | Gamma rays |
|-------------|---|-----------|---------------|---|--------|------------|

Name and State one use of radiation A. (2marks)

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6. State **ONE** similarity and **ONE** difference between a camera and a human eye. (2 marks)

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7. The sharp point of a pin is held with bare hands and brought near the cap of a positively charged electroscope. State and explain the observation made on the electroscope (2marks)

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8. A concave mirror of radius of curvature 80cm forms a real image half its height. Determine the position of the object. (3marks)

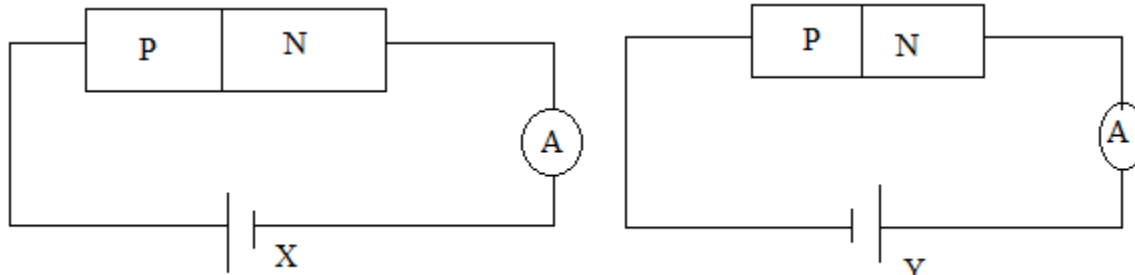
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9. **Differentiate** between soft x-rays and hard x-rays. (2 marks)

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10. Figure 2 shows two ways of biasing a p-n junction



**Figure 2**

Current may flow in X and not in circuit Y. Explain.

(2 marks)

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11. A transformer of 480 turns in the primary coil is used to connect a 9.0V a.c. electric device to a 240V a.c mains supply. Calculate the number of turns in the secondary coil. (3marks)

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12. State any two conditions necessary for the formation of stationary waves by two progressive waves traveling in opposite direction. (2marks)

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**SECTION B (55 MARKS)**

13. a) Define the term mutual induction. (1mark)

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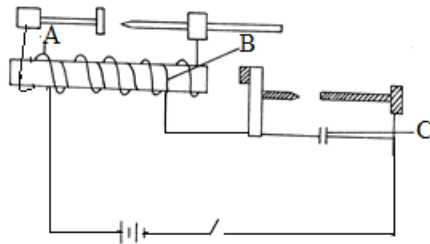
b) State two factors that determine magnitude of induced e.m.f in a coil. (2marks)

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c) The diagram below shows an induction coil used to produce sparks.



(i) Name parts labeled A, B and C. (3marks)

A.....

B.....

C .....

(ii) Explain the purpose of device C (1mark)

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d) A transformer is used on a 240V a.c supply to deliver 12A at 120v to a heating coil. If 20% of energy taken from the supply is dissipated in the transformer

(i) What is the current in the primary coil (3marks)

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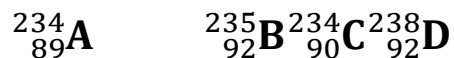
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(ii) Give any two causes of 20% energy dissipation in the transformation above. (2marks)

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14. a) Define radioactivity. (1mark)

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b) Four nuclides are represented by the following symbols.



(i) Which nuclides are isotopes and which ones are isobars of the same element? (2marks)

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(ii) Name the nuclides one of which could be produced from the other by emission of a beta particle. Write the equation of the reaction (2marks)

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(iii) A manufacturer wishes to check on the thickness of steel sheets he produces. Describe how this could be done using radioactive source and a counter. (3marks)

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c) A certain nuclide P decays by emission of a beta-particle to form a daughter nuclide Q. The daughter nuclide Q subsequently decays by alpha emission to form a nuclide R. The half-life of P is 20 seconds

(i) How long would it take for three quarters of a sample of P to decay? (1mark)

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(ii) How does the atomic number of nuclide R compare with that of nuclide P? (1mark)

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(iii) What effect would an increase of temperature have on the rate of decay? (1mark)

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15. a) i) What is meant by photoelectric effect? (1mark)

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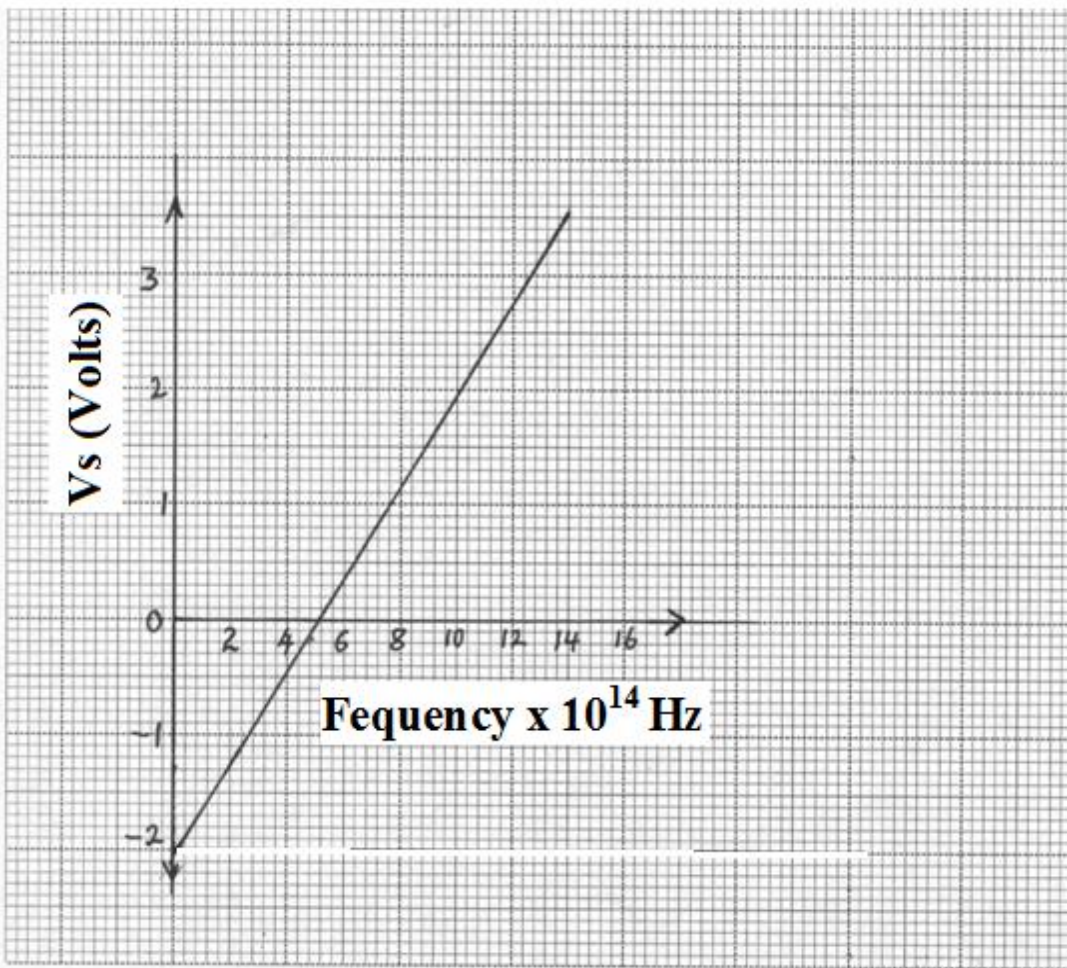
ii) (I) You are provided with highly polished Zinc Plate, electroscope, source of ultra – Violet rays, and materials for charging the electroscope. Draw a set-up of the apparatus showing how electric effect may be demonstrated in a laboratory. (2marks)

(II) Explain how the set up can be used to describe the nature of photoemission. (3marks)

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(b)(i) State two factors that affect photo- electric emission. (2marks)

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 (ii) When a certain photoelectric surface is illuminated with light of different frequencies, the corresponding stopping potential was measured. The graph below shows how frequency ( $f$ ) varies with stopping potential,  $V_s$ .



Given that  $eV_s = hf - \phi$ ; from the graph determine ;

(I) the value of Planck's constant,  $h$  (electronic charge =  $1.6 \times 10^{-19}$ C) (3marks)

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(II) The value of work function  $\phi$  (2 marks)

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18. a) Differentiate between longitudinal and transverse waves.

(1mark)

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b) A mine worker stands between two vertical cliffs 400m from the nearest cliff. The cliffs are X m apart. Every time he strikes the rock once, he hears two echoes, the first one in 2.5 s while the second follows 2 s later. From this information calculate.

i) The speed of sound in air.

(2marks)

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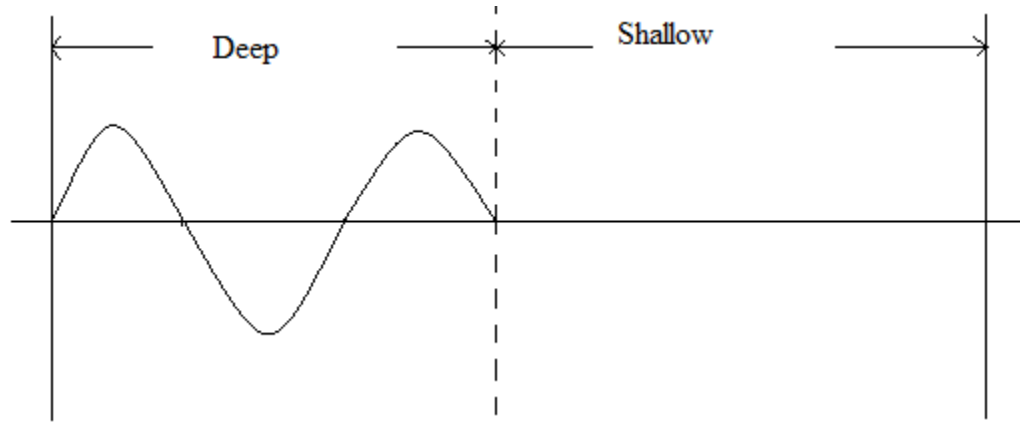
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ii) The value of X.

(3marks)

d) Figure 12 below shows the displacement of a particle in progressive wave incident on a boundary between deep and shallow regions.



i) Complete the diagram to show what is observed beyond the boundary. ( Assume no loss of energy )  
(2marks)

ii) Explain the observation in C (i) above. (2marks)

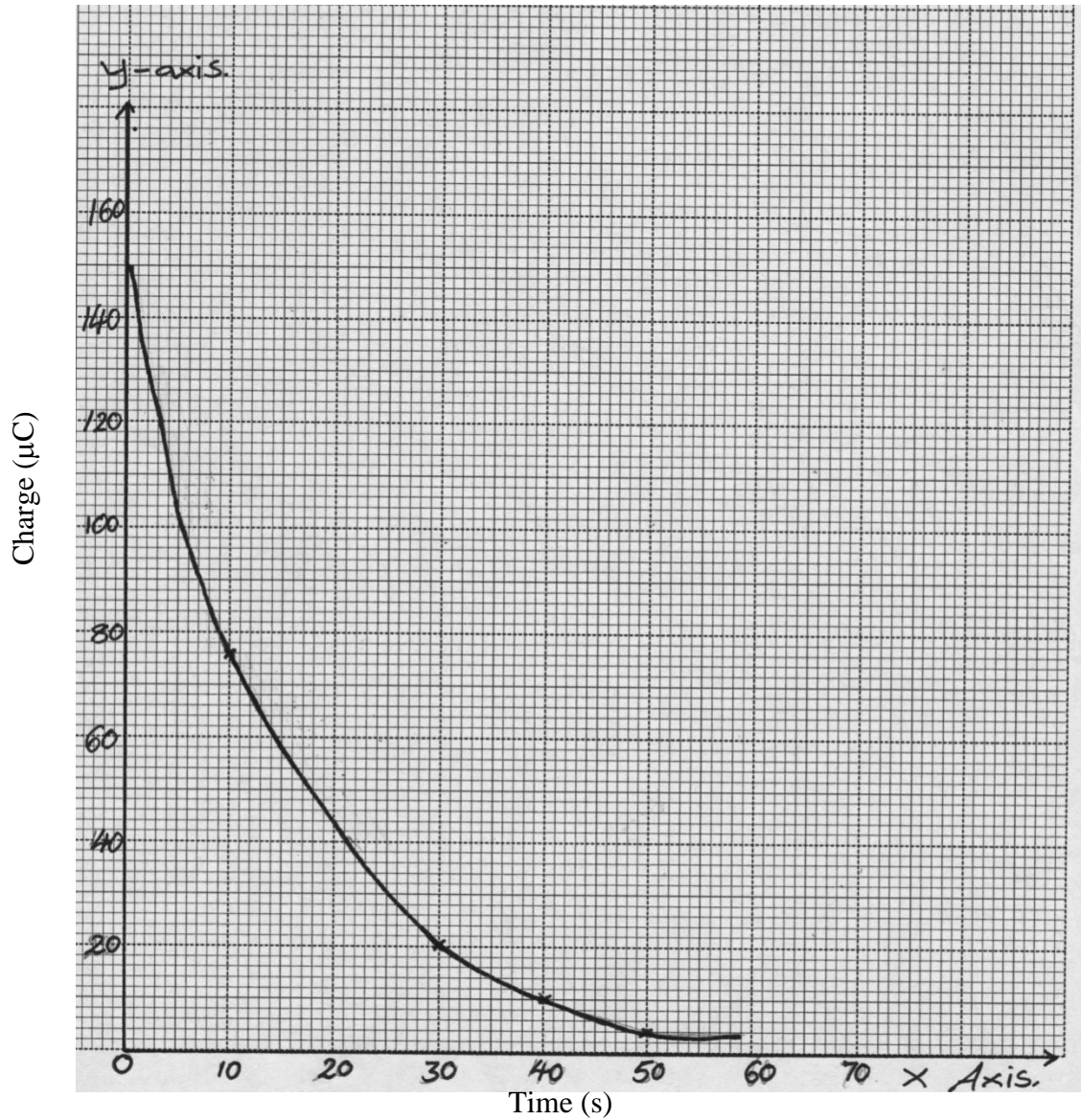
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19. a) The graph below shows the variation of charge and time when the capacitor is being discharged through a resistor.



From the graph, determine:

(i) the quantity of charge at  $t = 34$  seconds.

(1mark)

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(ii) the amount of current flowing when the time is 20 seconds.

(2marks)

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(iii) the initial charge.

(1mark)

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b) State two factors affecting capacitance.

(2marks)

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c) Two resistors  $6\Omega$  and  $3\Omega$  in parallel are connected in series to a  $4\Omega$  resistor and a cell of e.m.f  $1.5V$ , and negligible internal resistance. Calculate the equivalent resistance of the circuit. (3marks)

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**END**