**PHYSICS** **Paper 2**

 **(THEORY)**

**MAY 2022**

2 hours

**Name …………………………………………………………. Index No. ……………………….**

 **Adm. No. ……………… Candidate’s Signature…………………**

**2022 TRIAL 1 MAY INTERNAL EXAMINATION**

*Kenya Certificate of Secondary Education (KCSE)*

**Instructions to candidates**

* This paper consists of two sections A and B.
* Answer **all** the questions in the two sections in the spaces provided after each question
* All working must be clearly shown.
* Electronic calculators, mathematical tables may be used.
* All numerical answers should be expressed in the decimal notations.
* This paper consists of 14 printed pages and check to ensure all the pages are there.

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| **SECTION** | **QUESTION** | **MAX MARKS** | **CANDIDATE’S SCORE** |
| **A** | **1 – 11** | **25** |  |
| **B** | **12** | **10** |  |
| **13** | **13** |  |
| **14** | **11** |  |
| **15** | **11** |  |
| **16** | **10** |  |
| **TOTAL** | **80** |  |

 **SECTION A (25 MARKS)**

**Answer all the questions in the space provided**

1. **Figure 1** below shows a ray of light reflected from a mirror.

300

Figure 1

Complete the ray diagram and find the new angle of reflection after it is rotated 100 anticlockwise with the incident ray fixed. (2marks)

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1. Three electric bulbs are connected in series with a battery of two dry cells and a switch. At first the bulbs light brightly.
2. State a reason why they gradually light dim. (2marks)

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1. The switch is put off for sometimes. Explain why the bulbs again shine brightly. (1mark)

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1. A positively charged rod is brought near the cap of a lightly charged electroscope. The leaf first collapses and as the rod comes nearer, the leaf diverges.
2. What is the charge on the electroscope? (1mark)

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1. Explain the behavior of the leaf. (2marks)

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1. Figure 2 below shows a bar magnet attracting steel pin as shown

N

S

X

Y

Steel pin

Figure 2

 State and explain what would happen when a North pole of a bar magnet is brought near the tips of steel pin X and Y. (2marks)

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1. Determine the equivalent resistance between P and Q for the following resistors shown in Figure 3. (2marks)

30Ω

70Ω

19Ω

Figure 3

Q

P

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1. Figure 4 below shows a wave profile for a wave whose frequency is 5Hz.

t3

t5

t7

t9

t1

Time (s)

Displacement (cm)

1

-1

-2

Figure 4

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Determine the value of t8. (2marks)

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1. An electromagnetic radiation whose wavelength is greater than that of microwaves has a wavelength of 306.1224 m. Take speed of light in air, c = 3 x108 m/s.
2. Identify the radiation. (1mark)

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1. Calculate its frequency. (2marks)

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1. Two heating coils A and B connected in parallel in a circuit produces power of 36W and 54W respectively. What is the ratio of their resistance?(2marks)

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1. State **two** conditions necessary for total internal reflection to occur. (2marks)

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1. Define coherent source of a wave. (1mark)

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1. Figure 5 below show a conductor carrying electric current place between two magnetic poles.

N

S

Figure 5

Complete the diagram by sketching the magnetic field and also show the direction of the force on the conductor. (3 marks)

**Section B (55 marks)**

**Answer ALL the questions in the spaces provided**

1. (a) State **one** factor that affects the force between two charged bodies. (1mark)

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(b) To investigate charge distribution on metallic surfaces, electric charges were collected from different parts of the surfaces using a proof plane as shown in figure 6 below:

Proof Plane

Metallic conductor

Insulator

A

B

C

D

Fig. (i)

Fig. (ii)

Figure 6

The proof plane was then placed on the cap of a neutral electroscope.

1. State and explain the leave divergence of the electroscope as the proof plane is placed at various points round the spherical surface in figure (i) above. (2marks)

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1. State with reason which part of the conductor in figure (ii) gave the greatest deflection of the electroscope. (2marks)

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(c) Figure 7 shows a 10µF capacitor being charged from a 12V battery by connecting the switch terminal on R. The switch is then connected to S to discharge the 4µF capacitor.

**4 μF**

**R**

**S**

**E = 12V**

**10 μF**

Figure 7

 Determine the resultant potential difference between the two capacitors. (3marks)

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1. State two uses of capacitors. (2marks)

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

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(b) Figure 8 below shows a simplified circuit of a generator.

X

Y

N

S

Bulb

Figure 8

1. Identify parts X and Y. (2marks)

X: ..…………………………………….

Y: ………………………………………

1. State **two** ways of making the bulb light brighter. (2marks)

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(c) An a.c generator produces an e.m.f of 50.0V which is used to operate a circuit that requires a minimum of 250.0V. If the power of the generator is 200W, determine the:

(i) Current generated by the a.c source. (2marks)

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(ii) Current supplied to the circuit by the transformer assuming 100% efficiency. (2marks)

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(iii) Ratio of turns in the coils of the transformer, primary: secondary. (2marks)

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(d) Explain how power loses in a transformer are minimized. (2marks)

 (i) Eddy currents

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 (ii) Hysteresis losses

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1. (a) A disc of a siren with 100 holes is rotated at constant speed making 0.5 revolutions per second. If air is blown towards the holes, calculate:
2. The frequency of the sound produced. (2marks)

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1. The wavelength of the sound produced, if the velocity of sound is 340 m/s. (2marks)

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(b) A ship sends out an ultrasound whose echo is received after 5 seconds. If the wavelength of the ultrasound in water is 0.05 m and the frequency of the transmitter is 50 KHz, calculate the depth of the ocean. (3marks)

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(c) A ray of light is incident at right angles to the face AB, of a right angled isosceles prism of refractive index 1.6 as shown in Figure 8 below.

A

B

B

Liquid

Liquid

Liquid

Figure 8

 If the prism is surrounded by a liquid of refractive index 1.40, determine:

1. The angle of incidence on the face BC. (1mark)

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(ii) The angle of refraction on the face BC. (3marks)

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1. (a) Distinguish between principal focus and focal length of a concave lens. (1mark)

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1. Figure 9 below shows sketches of a window frame and its image formed on a screen by a convex lens.

600mm

480mm

160mm

200mm

Figure 9

1. State the nature of the image formed. (2marks)

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1. Calculate the linear magnification of the imaged formed. (2marks)

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1. The imaged of the frame was produced 500mm from the lens. Calculate the focal length of the lens. (3 marks)

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1. A student finds that at a distance of 25 cm, the words in a book looked blurred.
2. What eye defect does the student suffering from? (1mark)

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1. In which direction does he/she move the book to be able to see the words clearly from the distance? (1mark)

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1. Which lens can be used to correct the eye defect? (1mark)

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1. (a) (i) Figure 10 shows a graph of 1/v against 1/u for a concave mirror. Use your graph to determine the focal length of the mirror. (2marks)

Figure 10

0.08

0.04

0

0.12

0

1/u cm-1

1/v cm-1

0.12

0.08

0.04

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(ii) Determine the image distance when the magnification is m = 2 for the concave mirror above. (3 marks)

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(b) State **one** application of each of the following

 (i) Convex mirror. (1mark)

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 (ii) Parabolic mirror. (1mark)

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 (c) A small object is placed 15 cm in front of a convex mirror of focal length 10 cm. Determine the position of the image. (3marks)

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