**GATUNDU EVALUATION 2019 EXAMINATION PHYSICS PAPER 232/2**

232/2

PHYSICS

PAPER 2

JULY / AUGUST, 2019

2 HOURS

**INSTRUCTIONS TO CANDIDATES**

* *Write your name and index number in the spaces provided above*
* *Sign and write the date of the examination in the spaces provided*
* *Mathematical tables and electronic calculators may be used.*

**For Examiner’s Use Only**

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| --- | --- | --- | --- |
| **Section**  | **Question** | **Maximum Score** | **Candidates’ Score** |
| A | Q1 – Q12 | 25 |  |
| B | Q13Q14Q15Q16Q17 | 1112111011 |  |
|  | 80 |  |

*This paper consists of 14 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 (25 MARKS)**

1. a) A plane mirror suspended on a vertical wall makes an angle of 600 with the wall. Determine the angle of reflection for a ray incident on the mirror and parallel to the horizontal.



 Fig. 1

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b) During total eclipse of the sun, both light and heat are observed to disappear simultaneously. Explain (1 mark)

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1. Two identical sphere A and B each standing on an insulated base are in contact .A negatively charged rod is brought near sphere A as shown below.



 In what way will **A** differ from **B** if separated while the rod is held close to A ? (2mks)

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1. A student was investigating the brightness of bulbs when set up in circuits. He used identical bulbs and cells. He set up circuit A and B consisting of two bulbs and two cells as shown below.



 State and explain which set – up had the bulbs brighter (2mks)

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1. (i) The diagram below show a ferromagnetic material being magnetized by the method shown.



 Identify the polarity of P (1mk)

(ii) On the axes given below , sketch a graph to show how the strength of the magnet being created varies with the number of strokes. (1mk)

 

Strength of

magnet

 Number of strokes

1. Figure below shows a current carrying vertically right wire at right angle to a cardboard. Iron fillings are sprinkled on the card and card slightly tapped.



Draw and indicate the direction of the magnetic field pattern displayed on the card. (2 mks)

1. When a germanium crystal is doped with arsenic, it becomes an N-type semiconductor. Explain how this change occurs. (2 mks)

*(Number of electrons in the outermost shell for germanium = 4, Arsenic = 5)*

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1. The following is a part of a radio – active series.

  r   

 Identify the radiation r , find the values of C and d r………………………………………………………………………………………………(1mk) c…………………………………………………………………………………………..(1/2mk) d…………………………………………………………………………………………..(1/2mk)

1. The figure below shows a set up to demonstrate photoelectric effect. Use it to answer

 Questions 8(a) and (b).



1. What observation will be made when UV light shines on plate A. Explain. (2mks)

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1. What is the effect of introducing a barrier between plates A and B. (1mk)

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1. A house has a lighting circuit operated from a **240V** mains supply. Four bulbs rated **40W 240V** and six bulbs rated **100W 240V** are switched on for **5** hours a day. Determine the monthly bill for the consumer given that the cost of electricity is at shs. 5.50 per unit.

*(Take 1 month = 30 days and the standing charge is sh. 150)*  (3 mks)

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1. The chart below shows an arrangement of different parts of the electromagnetic spectrum.

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| P | Q | R | Ultra violet | S | Gamma rays |

Name the radiation represented by letter Q and state one use of the radiation. (2 mks)

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1. Plane water waves produced in a ripple tank are passed from a region of deep water into a region of shallow water. The figure below shows the top view of the tank.

 

1. State what happens at the boundary to the frequency of the waves. (1 mk)

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1. The waves have a speed of 24cm/s in the deep water. Consecutive waves crests are 0.08m apart in the deep water. Calculate the frequency of the source producing the wave.

 (2 mks)

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1. State one advantage and one disadvantage of a convex mirror when used as a driving mirror (1mk)

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 **SECTION B (55 MARKS)**

1. The image formed by a convex lens is erect. On Figure 10 below, draw the object and

using ray diagram, locate and draw the erect image. (3mks)

 **Figure 10**

(a) Apart from being erect, state two other characteristics of the image. (2mks)

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(b) In an experiment to determine the focal length of a converging lens using the lens

formula, several values of image distance corresponding to value of object

distance U were determined and a graph of magnification m against image distance

v,plotted as shown in **Figure 11** below



The equation of the graph can be represented by the equation

 m=

 (i) What does the gradient of the graph represent? (1mk)

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(ii) Determine the focal length of the lens. (2mks)

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(iii) Find the value of object distance for which the image is not magnified. (1mk)

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1. An object of height 10.5cm stands before a diverging lens of focal length 20cm and a distance of 10cm from the lens. Determine the image distance. (2 mks)

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1. (a) The refractive index of glass is and that of water is . Calculate the refractive index of glass with respect to water. (2 mks)

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1. The figure below shows a ray of light incident at an angle of 35.6° at point D

on the first face of a glass prism ABC. The refractive index of the prism

is 1.6.

1. Determine the angle of refraction at point D. (2 mks)

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1. Find the angle of incidence of the refracted ray on the face AC to 1 decimal point. (2 mks)

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1. Complete the ray diagram to show the emergent ray from the face AC. (2 mks)

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

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1. 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. (2 mks)

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1. a) State one application of a capacitor. (1 mk)

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b) Figure 7 shows four capacitors connected to a battery of 12 volts.

 

Calculate:

 i) Effective capacitance. (2 mks)

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ii) Charge on 3.2 µF (2 mks)

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iii) Potential Difference across 5 µF (2 mks)

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iv) The energy stored by 2 µF (2 mks)

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(c) What are effects on capacitance of a parallel plate capacitor when :

 (i) Increasing the area overlap of the plates ? (1mk)

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(ii) Increasing the distance of separation between plates ? (1mk)

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1. a) State Lenz’s law of electromagnetic induction. (1mk)

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 b) The figure shows two coils of insulated copper wires wound on a single soft iron core. One coil is connected to a battery through a switch and the other is connected to a resister through a galvanometer.



It is observed that as the switch is closed, the pointer of the galvanometer deflects momentarily. The same as when the switch is opened.

 i) Explain why the pointer deflects momentarily. (2mks)

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 ii) State one way in which the current through R can be increased. (1mk)

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c) i) State one way in which power is lost in a transformer. (1mk)

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 ii) A transformer uses 240V ac supply to deliver 9A at 80V to a heating coil.

 If 10% of the energy taken from the supply is lost in the transformer itself,

 What is the current in the primary winding? (2mks)

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1. **Figure 8** , shows the voltage – current relating for a certain battery used in the electrical circuit in a above



Given that the equation of the graph is V = E – Ir , from the graph , determine

 (i) The e.m. fof the battery. (1mk)

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 (ii) The internal resistance of the battery used. (2mks)

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1. a) During the operation of an X-Ray tube, the target becomes very hot. Explain how this heat is caused. (1 mk)

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(b) What property of lead makes it suitable for use as a shielding material in an X-Ray tube?

 (1 mk)

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1. In a certain X- ray tube electrons are accelerated by p.d of 12 kV. Assuming all energy goes to produce X-rays, determine the frequency of the X-rays produced

(Planck’s constant =6.63x10-34 Js. Charge of an electron=1.6x10-19C) (2 mks)

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1. X-Rays are used in detecting cracks inside metal beams. State the type of X-rays used for this purpose and state the reason. \ (2 mks)

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1. The figure below shows the waveform of a voltage displayed on the screen of a C.R.O.

The Y-gain was 5V/cm and time base control was 10ms/cm.

 

Determine the:

i) Peak to peak voltage of the Y- input (1 mk)

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ii) Period of the signal (2 mks)

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iii) Frequency of the signal. (2mks)

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