**Name**:………………………………………...……,,,,,,… **Class** ……………………………….

**232/2**; **PHYSICS**   **Candidate’s Signature**:………,,,,………

**PAPER 2**

**SEPTEMBER 2022 Date**…………………,,,……………..

**TIME:** $2$ **HRS**

**MOKASA II JOINT EXAMINATION.**

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

**INSTRUCTIONS TO CANDIDATES**

* Write your name and index number in the spaces provided.
* Mathematical tables and non-programmable calculators may be used.
* This paper consists of TWO sections **A** and **B**.
* Attempt all the questions in the spaces provided.
* ALL working MUST be clearly shown.

 **For Examiners Use**

|  |  |  |  |
| --- | --- | --- | --- |
| **SECTION** | **QUESTIONS** | **MAXIMUM SCORE** | **CANDIDATE’S SCORE** |
| **A** | 1 – 11 |  25 |  |
| **B** | 12 |  10 |  |
| 13 |  14 |  |
| 14 |  08 |  |
| 15 |  13 |  |
| 16 |  10 |  |
|  | **TOTAL** |  **80** |  |

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

**SECTION A (25 MARKS)**

1. Figure 1 below shows an object O in front of a concave mirror and its image I formed after reflection. On the same diagram draw appropriate ray(s) to locate the center of curvature C, of the mirror. (2 marks)



1. The diagram below shows an iron ring between two opposite magnetic poles.

Iron fillings

Soft iron ring

S

N

N

Explain what happens to the iron fillings. (2 marks)

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1. a) State one main reason why the bulb’s filament is made of a tungsten. (1 mark)

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 b). How many 75W electric bulbs could be safely connected to a 240V mains circuit fitted with a 13A fuse. (2marks) ……………………………………………………………………………………………………………………………………………………

1. a) State one advantage of circuit breaker over a fuse. (1 mark)

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b) An electric heater of power 1.5Kw is used every day for 30 minutes. Calculate the cost of electricity energy consumed in a month of 30 days if the cost per unit is 12.50/=.

 (2 marks)

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1. a) State how electrical conductivity of an intrinsic semi-conductor can be improved. (1 mark)

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b) The diagram below shows a junction diode.

|  |  |
| --- | --- |
| P | N |

Complete the diagram to show how the junction can be connected in forward bias condition. (1 mark)

1. The diagram below represents an electric bell inside a bell jar. The air inside the bell jar is pumped out by a pump connected to it.

1. What would be observed after the power is switched on? (1 mark)

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1. What would be observed as air is pumped out of the bell jar? (2 marks)

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1. The table below shows the electromagnetic spectrum.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Gamma rays | A | Ultra violet  | B | Infrared waves | Radio waves |

1. Identify A and B. (2marks)

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1. State one use for B. (1 mark)

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1. An X-ray tube produces soft X-rays. State the adjustment that can be made so that the tube produces hard X-rays. (1 mark)

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1. Fig (a) and (b) show two possible arrangements of a bulb to a source of power.

**Fig (a)**

**Fig (b)**

In which of the arrangement above would the cells drain faster. Explain your answer. (2 marks)

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1. The sketch is a displacement – time graph of a wave traveling at 320ms-1 .The wave takes 1.2 seconds to move from point **A** to **B**.



 Find the frequency (2 marks)

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1. The figure **below** shows the trace on the screen of C.R.O when an a.c. signal connected to the y –plates with time base on. Given that the time base control is 100ms/div and the y-gain is at 120V/div, determine the frequency of the a.c. signal. (2 marks)

1div

1div

**SECTION B (55 MARKS)**

1. a) State the meaning of the term photoelectric effect. (1 mark)

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 b). State the property of radiation that determines the number of electrons emitted when a radiation falls on a metal surface. (1 mark)

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 c). Figure shows a graph of maximum kinetic energy (K.E max) of photoelectrons against the frequency (f) of the incident radiation.



From the graph, determine;

1. Plank’s constant h. (2marks) ………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………
2. The threshold wavelength ($λ\_{0}$) given that the speed of light c is 3.0 x 108 m/s.

 (3 marks)

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1. Work function of the metal surface. (2 marks)

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d). On the same graph draw a line for a second metal which has a lower work function than that used in (c). (1 mark)

1. a. The diagram below shows a pear-shaped charged conductor on an insulating stand (charges not shown on the diagram)

A

B

Part A is touched using a proof-plane and then the proof-plane is brought next but not touching the cap of a leaf electroscope, the same experiment is repeated for part B of the conductor.

1. State the expected observation in the above experiments. (2 marks)

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1. Explain the observation made above. (2 marks)

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1. The diagram represents two parallel plates capacitor separated by a distance d and each plate has an area A square unit.

**d**

1. Mention one change that can be made to reduce the effective capacitance. (1 mark)

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1. The area of each plate A = 2.0 cm2 and C= 4 x 10-12 F, determine the separation distance d of the capacitor shown ( Given that Ɛo = 8.85 x 10-12 Fm-1) (2 marks)

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1. In the circuit shown below, 3µF capacitor is fully charged from 12 V battery by connecting the switch to terminal P.



The switch is then disconnected at P and connected to terminal Q to charge 1 µF capacitor and 3 µF capacitor.

1. Determine energy initially stored in the 3 µF capacitor. (2 mark)

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1. Calculate the final potential difference across the parallel arrangement. (2 marks)

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1. The total energy stored in the parallel arrangement. (2 marks)

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1. Explain why a copper rod cannot be charged by friction (rubbing) while held by bare hand. (1 mark)

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1. a. Given that 5g of Cobalt-60 is kept in a laboratory and its half- life is 5 years. Calculate its mass after 45 years. (2 marks)

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b. State one source of background radiation. (1 mark)

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1. When a radioactive source is held near the cap of a charged gold leaf electroscope it becomes discharged, Explain. (2marks)

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1. The graph in Fig shows the activity of a radioactive sample against time.



Use the graph to obtain half-life. (2 marks)

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1. State one application of radioactivity in industry. (1 mark)

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1. a. The figure shows a resistance wire **R** of diameter 0.5mm and length 1.5m connected in series with ammeter as shown. 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;

1. The internal resistance of the cell. (2 marks)

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1. The resistivity of the wire. (2 marks)

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b. State the Snell’s law of refraction. (1 mark)

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c. A ray of light travelling from water to glass makes an angle of incidence of 300. Find the angle of refraction in the glass. (Refractive index of water$=^{4}/\_{3}$, Refractive index of glass$=^{3}/\_{2}$) (2 marks)

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1. The figure given shows below shows a glass prism and an incident ray striking the surface marked AB at right angle.

$$65^{°}$$

$$25^{°}$$

1. Calculate the critical angle C given that the refractive index of class is 1.52.

 (2 marks)

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1. Trace the path of the ray through the glass prism indicating all the angles.

 (1 mark)

1. A ray of light incident on the surface of a glass prism is observed as represented in the diagram below.

**Y**

**X**

**Yellow light**

A text here

1. State what happens at point A. (1 mark)

…………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

1. Name the colours represented by X and Y. (2 marks)

X…………………………………………………………………………………………………………………………..

Y…………………………………………………………………………………………………………………………….

1. a) Energy losses in a transformer are reduced by having a laminated soft iron core, using a core of soft magnetic material,winding the secondary coil over the primary coil. State and explain any other way of reducing energy loses in a transformer.

(2 marks)

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1. State two factors affecting the strength of an electromanet. (2 marks)

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1. The e.m.f generated as the coil of an alternating generator rotates is represented in the graph **below**.

EMF

 (V)

0

90 180 270 360 Angle (θ°)

1. Give a reason for the change in e.m.f as the coil rotates from 0° to 90°. (1 mark)

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1. Sketch on the same diagram a similar graph if the generator was a direct current one. (1 mark)
2. A 240V mains transformer has 800 turns in the primary and N turns in the secondary. It is used to supply energy to a 12v, 21W lamp.
3. Calculate the number of turns N in the secondary. (2 marks)

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1. What is the efficiency of the transformer if the current drawn from the 240V mains is 100mA? (2 marks)

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