**SUNRISE 2 EVALUATION EXAM FORM 4 - 2022**

NAME: ………………………………………………ADM NO: …………CLASS…………

 SCHOOL…………………………………………………………………….DATE: …..…….

PHYSICS

Paper 2

Time 2 HOURS

June/July *-*2022

 **Student Target**

**Instructions to candidates**

* Write your name, admission number, class and date in the spaces provided at the top of the page.
* 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. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

|  |  |  |  |
| --- | --- | --- | --- |
| **SECTION** | **QUESTION** | **MAX MARKS** | **CANDIDATE’S SCORE** |
| **A** | **1 – 12** | **25** |  |
| **B** | **13** | **11** |  |
|  | **14** | **11** |  |
|  | **15** | **13** |  |
|  | **16** | **06** |  |
|  | **17** | **14** |  |
| **TOTAL** |  | **80** |  |

**ACHIEVED**

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**SECTION A: (25 MARKS)**

1. Differentiate between primary and secondary cells (1mk)

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 ……………………………………………………………………………………..……………

2. The diagram in figure 1 below shows the displacement against time for a wave whose wavelength is 4.0mm.



 Determine the velocity of the wave. (3mks)

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1. The figure 2 below shows a thin wire connected to a charge generator and placed close to a candle flame.

 

 Explain why the candle flame is deflected as shown. (2mks)

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1. What is thermionic emission? (1 mk)

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1. Ultraviolet radiation incident on a zinc plate releases electrons from the zinc surface. The energy of each incident proton is 5.4eV. Zinc has a work function of 4.3eV.

 (i) State the name given to this effect. (1 mk)

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

 (ii) What is meant by work function of the metal? (1 mk)

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

 (iii) An electron is emitted from the surface of zinc. Calculate the maximum kinetic energy of the electron in Joules. (2 mks)

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1. A vibrating tuning fork of frequency 512Hz was brought close to two test tubes X and Y

 With water levels as shown in fig. 3

 Fig. 3



 It was observed that loud sound is produced in test tube X but not in Y. Explain this observation. (2mks)

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Radio | A | Visible | Ultra-violet | X-rays | Gamma-Rays |

 Name the radiation represented by A (1mk)

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

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1. The figure 4 below shows a container loader which uses electromagnet to offload containers from a ship.



 (i) Why should the container be made of iron. (1 mrk)

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

 (ii) State **two** ways in which the loader can be made to lift a heavier container. (2 mrks)

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

1. The figure below shows an object O and it’s image I formed by a concave mirror. The diagram is drawn to scale.

0

I

Using a suitable ray, determine the focal length (f) and the radius of curvature (r) of the

mirror. (3 marks)

f ……………… cm

r………………. cm

1. State two differences between pinhole camera and the human eye. (2 marks)

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1. Give a reason why soft iron is used as a core of the coil of an electric bell. (1 mark)

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1. State two uses of gold leaf electroscope. (2 marks)

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 **SECTION B: (55 MARKS)**

1. a) Define a resistor. (1 mark)

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 b) The figure below shows three resistors connected to 12v supply of internal resistance of 0.2Ω.



 Calculate

 i) The effective resistance. (3 marks)

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 ii) The total current in the circuit. (2 marks)

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 iii) the current through the 4Ω resistance. (3 marks)

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 c) If the current flows for 2 minutes calculate the total energy dissipated. (2 marks)

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 d) State two applications of resistors in real life situation. (2 marks)

 (i) ..............................................................................................................................................................

 (ii)...............................................................................................................................................................

1. Define the following terms.

 i) Capacitor (1 mark)

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 ii) Capacitance (1 mark)

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

 b) Three capacitors are connected to a 10v battery.



 Calculate

 i) The effective capacitance (3 marks)

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

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

 ii) The total charge (3 marks)

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

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 c) State three factors that determine the capacitance of a capacitor. (3 marks)

 i)

 ii)

 iii)

1. (a ) X- rays are used for detecting cracks inside metal beams; (i) State the type of the X- rays used. (1mark)

 ……………………………………………………………………………………………………….

 ……………………………………………………………………………………………………….

 (ii) Give a reason for your answer in (i) above. (1mark)

 …………………………………………………………………………………………………….... ………………………………………………………………………………………………………

 (b) Figure shows the features of an X- ray tube



 i) Name the parts labelled A and B. (2marks)

 A……………………………………………………………………………………….

 ……………………………………………………………………………………….

 B………………………………………………………………………………………..

 (ii) Explain how a change in the potential across P changes the intensity of the X- rays produced in the tube. (2 marks)

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 (iii) During the operation of the tube, the target becomes very hot. Explain how this heat is caused. (2 marks)

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 (iv) What property of lead makes it suitable for use as shielding material?(1mark)

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 ……………………………………………………………………………………….

 ………………………………………………………………………………………..

(c) ln a certain X- ray tube, the electrons are accelerated by a Pd of 12000V. Assuming all the energy goes to produce X- rays, determine the frequency of the X- rays produced. *(Planck’s constant h= 6.62 x 10-34 JS and charge on an electron, e = 1.6 x 10 -19C).*  (4marks)

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1. A student connected a circuit as shown in figure 16 below hoping to produce a rectified out put



**T**

**a.c**

**TO**

**CRO**

**B**

**D2**

**R**

**Fig 16.**

(a) Sketch the graph of the output on the **CRO** screen (2mark)

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 (b) Explain how the output above is produced (2marks)

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 (c) Name other **two** uses of a junction diode (2marks)

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1. (a) Thorium decays to protactinium by emission of a beta particle (β) as shown.

 

 Determine the atomic and mass number of thorium

Atomic number …………………mass number ……………………(2marks)

* 1. The figure 15 below shows the path taken by three radiations A,B and C from

 a radioactive source through an electric field.



 Fig.15

(i) Identify the radiation B (1 mark)

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

(ii) Give a reason for the difference in deviation shown by A and C

(2 marks)

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

* 1. The table 1.Below shows results obtained from a G-M tube when a radioactive sample was placed near it.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Time (min) | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Counts per (min) | 1048 | 994 | 926 | 838 | 719 | 557 | 330 |
| Correct count |  |  |  |  |  |  |  |

 (i) Given that the background radiation was 30 counts per minute, fill in the blank

 spaces in the table. (3mark)

 (ii) Draw a suitable graph on the grid provided. (5marks)

 (ii) From the graph determine the half-life of the sample. (1mark)

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