2022

**NAME\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_INDEX NO.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**DATE\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_SIGNATURE\_\_\_\_\_\_\_\_**

**ADM NO.\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**232/2**

**PHYSICS PAPER 2**

**THEORY**

**YEAR 2022 SEPTEMBER**

**TIME: 2 HOURS**

***A.C.K DIOCESE OF MUMIAS JOINT EVALUATIONASSESMENT TEST***

***KENYA CERTIFICATE OF SECONDARY EDUCATION (K.C.S.E.)***

**INSTRUCTIONS TO THE CANDIDATES:**

* Write your **name** and **index number** in the spaces provided above
* Sign and write the date of the examination in the spaces provided.
* This paper consists of ***two*** sections: **A** and **B.**
* Answer ***all*** questions in section **A** and **B** in the spaces provided.
* All working ***must*** be clearly shown in the spaces provided in this booklet.
* Scientific calculators and KNEC mathematical tables may be used except where stated otherwise.

**For Examiner’s Use Only**

|  |  |  |  |
| --- | --- | --- | --- |
| **SECTION** | **QUESTION** | **MAXIMUM SCORE** | **CANDIDATE’S SCORE** |
| A | 1-12 | 25 |  |
| B | 13 | 09 |  |
| 14 | 08 |  |
| 15 | 10 |  |
| 16 | 11 |  |
| 17 | 09 |  |
| 18 | 08 |  |
|  | **TOTAL** | **80** |  |

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

**Section A ( 25 marks)**

**Answer ALL the questions in this section.**

1. State one use of magnets. (1mk)

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

2. Two mirrors are incline at 600 to each other. Determine the number of images observed and state one application of this arrangement. (3mks)

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

3. Explain the purpose of manganese (IV) oxide in a dry cell. (1mk)

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

4. The period of a wave is T seconds. Its wavelength is λ metres. Show that V= fλ where v is the speed of the wave and f is the frequency. (2mks)

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

5. a) State one application of force on a current carrying conductor placed in magnetic field. ……………………………………………………………………………………………………………………………………………………………………………………………… (1mk)

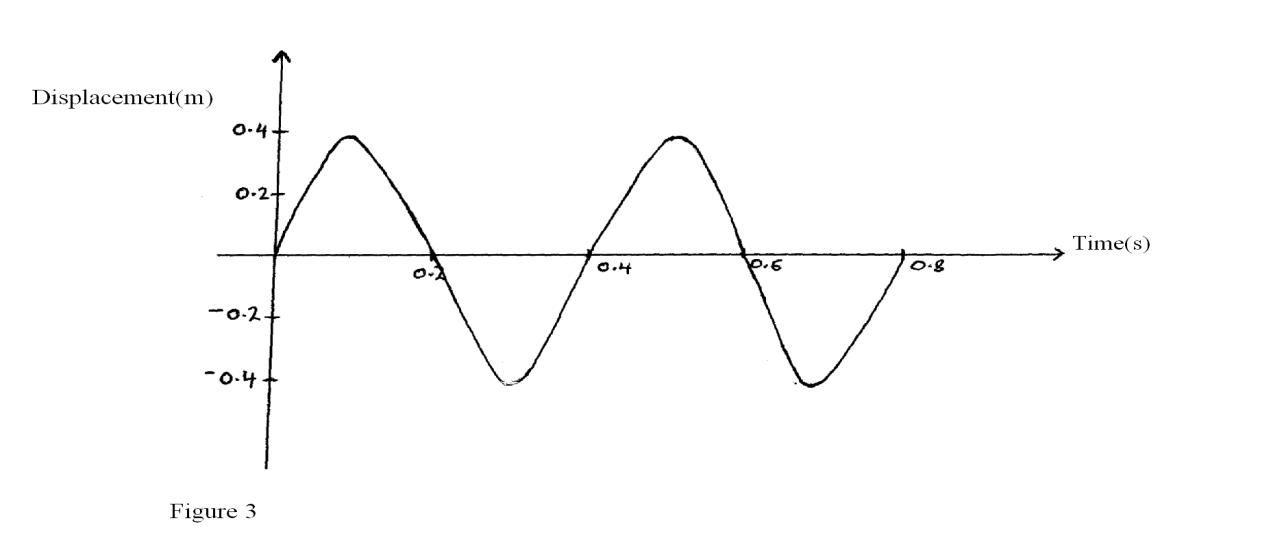
b) Your house is supplied with 240 v from a power source which is fitted with a 13 A safe fuse. What is the maximum number of 60w bulbs that can be fitted in the house?

........................................................................................................................................................................................................................................................................................................................................................................................................................................................................................................................................................................................................ (2mks)

6. What causes electrical resistance in conductors? (1mk)

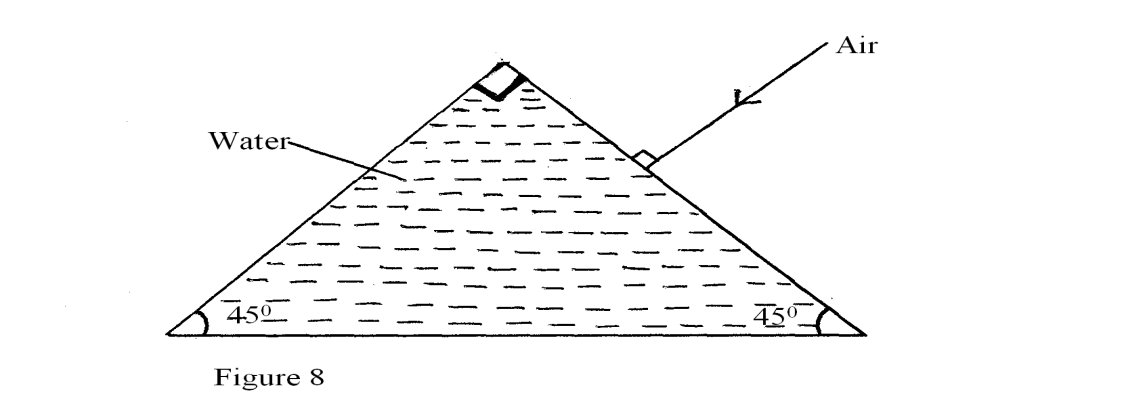
………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………..

7. Figure 3 shows how the displacement of a point varies with time as waves passes it.



On the same diagram, draw a wave which passes the point with twice the frequency and half the amplitude of the one shown. (2 marks)

8. Figure 8 shows a ray of light incident on the face of a water prism.



Sketch the path of the ray as it passes through the prism. Critical angle for the water is 490. (2mks)

1. A boy observes his face in a concave mirror of focal length 100cm. If the mirror is 80cm away, state one characteristics of the image observed (1mks) ...........................................................................................................................................................
2. Describe how microwaves are used in determining distances of objects as in the radar.(3mks)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………11. An alternating voltage of peak value 15v and frequency 25Hz is applied to the terminals of a Cathode ray oscilloscope. The Y-gain is set at 5 v/cm and the time base at 10 ms/cm. Draw the trace observed on the screen. (2mks)

1cm

1cm

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

1. (a) Name all the radiations of the electromagnetic spectrum which have higher wavelengths

than the visible light.

................................................................................................................................................................................................................................................................................................................................................................................................................................................

(1 mark)

(b) State the radiation that is detected using a blackened bulb of a thermometer.

................................................................................................................................(1 mark)

13. The figure below shows two rays drawn from an object on to the mirror.

Mirror

Object

Complete the ray diagram to show the position of the image. (2 marks)

**SECTION B (55 MKS)**

14. (a) **Figure 4** below shows an X – ray tube

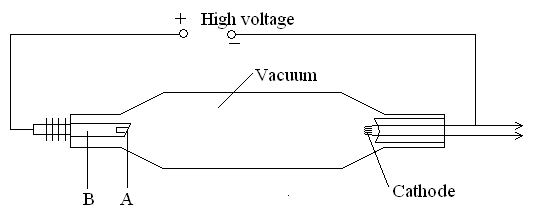


Figure 4

* + 1. Label the parts A and B. (2mks)

A…………………………………………………………………………

B…………………………………………………………………………

* + 1. Suggest with a reason the material used for A. (2mks)

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

* + 1. **State** the reason why the X –ray tube is evacuated. (1mk)

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

* + 1. For the X – ray tube how would the following be controlled;

1. The intensity (1mk)

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

1. Quality of X- rays (1mk)

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

1. The exposure to patients (1mk)

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

(b) (i) A potential difference of 50KV is applied across an X-ray tube. Given that the charge of

an electron e = 1.6 x 10-19coulombs and the mass of an electron **Calculate** the kinetic energy of the electrons. (3mks)

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

1. If 12% of the electron energy is converted into X-ray, **determine** the minimum wavelength of the emitted X –ray given planks constant h = 6.63 x 10-34 (3mks)

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

1. (a) **Figure 7** below shows the deflection from a radioactive isotope by an electric field.

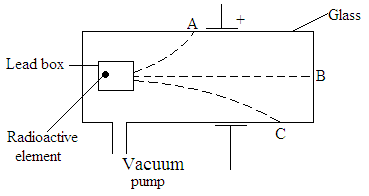


Figure 7

* + - 1. **Define** the term isotope. (1mk)

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

* + - 1. **Identify** the radiations A,B, and C (3mks)

A ………………………………………………………………………………..

B ………………………………………………………………………………..

C ………………………………………………………………………………..

(b) **Give one** use of a radioactive isotope in medicine. (1mks)

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

(c) Radium  disintegrates into a new stable element lead **how many** alpha and Beta particles are emitted (3mks)

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

(d) A 32g sample of radioactive substance was reduced to 2g in 96 days. What is the half life

of the substance. (2mks)

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

1. (a) **Distinguish** between self-induction and mutual induction. (2mks)

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

(b) In what form is energy lost in acable during transmission. (1mk)

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

(c) **State** the difference between a step-up transformer and an induction coil. (1mk)

……………………………………………………………………………………………

(d) **Figure 5** below shows a diagram of a bicycle dynamo. The wheel A is connected by an

axle to a permanent cylindrical magnet and is rotated by the bicycle tyre.

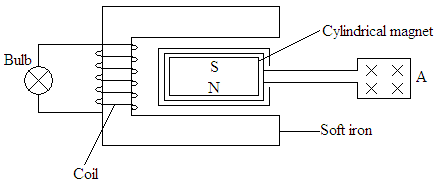


Figure 5

* + - 1. **Explain** why the bulb lights. (2mks)

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

* + - 1. If you were riding the bicycle, what would you do to make the bulb light more brightly? (2mks)

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

* + - 1. On the axes provided, sketch the graph of induced e.m.f with time(1mk)

Induced

e.m.f

Time t

17. I a) A 10 μf capacitor is charged to a potential difference of 300V and isolated. It is then connected in parallel to a 5 μF capacitor. Find the resultant potential difference. (3mks)

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

b) The energy stored before connection. (3mks)

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

c) The energy in the two capacitors after connection. (3mks)

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

1. a) State how distance of separation between the plates affect the capacitance of a parallel plate capacitor. (1mks)

................................................................................................................................................

................................................................................................................................................

................................................................................................................................................

................................................................................................................................................

b) Three capacitors of capacitance 100µƒ, 500aF and 400µƒ are connected together in a circuit.

Draw a circuit diagram to show the arrangement of the capacitors which gives an effective capacitance of 250µƒ (1mks)

................................................................................................................................................

................................................................................................................................................

................................................................................................................................................

................................................................................................................................................

................................................................................................................................................

18. (a) Differentiate between an Ohmic and non-ohmic conductor giving **one** example in each case.(2marks)

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

(b) **Figure 7** shows a circuit with resistors and voltmeter connected to a battery.

6.0V

V

3Ω

2Ω

5Ω

S

**Figure 7**

1. If each cell has an internal resistance of 0.7Ω, determine the total resistance in the circuit.(3mks)

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

1. What amount of current flows through the 3Ω resistor when the switch is closed? (3mks)

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

1. What is the reading of the voltmeter when the switch S is

(I) Open (1mk)

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

(II) Closed (1mk)

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

1. Account for the difference between the answers in (I) and (II) above. (1mk)

......................................................................................................................................................

............................................................................................................................................................................................................................................................................................................