**NANDI NORTH AND NANDI CENTRAL SUB-COUNTIES JOINT EXAMINATIONS 2016**

***Kenya Certificate of Secondary Education (KCSE)***

**232 / 1**

**PHYSICS**

**PAPER 1**

**TIME: 2 HOURS**

**SECTION A (25 MARKS)**

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

1. The micrometer screw gauge represented by figure 1 has a thimble scale of 50 divisions.

What is the reading shown? (1mk)

1. The bar AB represented in figure 2 has negligible weight and is pivoted at A.

Find the weight W when the bar is equilibrium. (3mks)

1. Explain why a glass container with thick walls is more likely to crack, than one with a thin wall when a very hot liquid is poured into them. (1mk)
2. Two identical alluminium rods are placed as shown in figure 3. One rests on a metal block and the other on a wooden block. The protruding ends are heated on a Bunsen burner as shown.

State with a reason on which bar of the wax is likely to melt sooner. (2mks)

1. A spring stretches by 5cm when 40N force is applied to it. If the 40N force is replaced by 125N, how much further would the spring stretch? (3mks)
2. (a ) A body in circular motion moving at constant speed is said to be accelerating. Explain this. (1mk)

(b) A stone of mass 450g is rotated in a vertical circle at 3 revolutions per second. If the string has a length of 1.5m, determine its linear velocity. (2mks)

1. State the variable force acting on a ball bearing released to fall freely on a surface of glycerin. (1mk)
2. Figure 4 shows a manometer used to measure the pressure of gas.

The force exerted by gas on A is 20,000N. Calculate the density of the liquid given that the cross-sectional area of A is 0.1m2 and the atmospheric pressure is 100,000 Pascals. (3mks)

1. State the Newton’s second law of motion. (1mk)
2. A trolley of mass 4kg is moving with a velocity of 3m/s and collides head on with another trolley of mass 2kg travelling in the opposite direction a velocity of 4m/s. After collision both trolleys fuse and move with a common velocity V. Determine V. (2mks)
3. Water flows through a horizontal pipe of varying cross-sectional area as shown in figure 5.

The volume flux is 30m3/s. calculate the change in speeds of the fluid. (3mks)

1. In an experiment to determine the density of ground stones a form one student obtained the following results

* Mass of empty density bottle – Xg
* Mass of density bottle filled with water – Yg
* Mass of density bottle + ground stones – Vg
* Mass of density bottle + ground stones + top up water – Zg

Use the information to calculate the density p of the ground stones. (3mks)

**SECTION B: 55 MARKS**

**ANSWER ALL QUESTIONS IN THIS SECTION.**

1. (a)Using the kinetic theory of gases, explain how rise in the temperature of a gas causes a rise in the pressure of the gas if the

volume is kept constant. (2mks)

(b) Figure 6 below shows a set up that may be used to verify Charles’ law.

1. State the measurements that should be taken in the experiment. 2mks
2. Explain how the measurement taken in (i) above, may be used to verify Charles Law. (4mks
3. A certain mass of hydrogen gas occupies a volume of 1.6m3 at a pressure of 1.5x105 pa and temperature 12°C. Determine its volume when the temperature is O° at a pressure of 1.0x105pa. (3mks)
4. (a)State the law of floatation. (1mk)

(b)The figure 7 below shows a simple hydrometer.

1. State the purpose of the lead shots in the glass bulb. 1mk
2. How would the hydrometer be made more sensitive? 1mk
3. Describe how the hydrometer is calibrated to measure relative density. 2mks

(c) Figure below shows a cork floating on water and held to the bottom of the beaker by a thin thread.

1. Name the forces acting on the cork. (3mks)
2. Describe how each of the forces mentioned in (i)above changes when water is added into the beaker until it fills p. (3mks)
3. An engineer uses a pulley with a velocity ratio of 6 to raise an engine out of a vehicle. The engine which has a weight of 3200N is raised through a vertical distance of 1.5m by the machine. If the machine pulls within an effort of 600N, calculate:-
4. The work done by the machine. (3mks)
5. The work done by effort. (2mks)
6. The efficiency of the machine. (3mks)
7. State **two** reasons why the efficiency in (a) (iii) above is not 100%. (2mks)

(c) (i) State the law of conservation of energy. (1mk)

(ii) The graph shown below shows how potential energy of a stone thrown vertically upwards varies with height.

Sketch on the same axes the graph of kinetic energy against height. (1mk)

1. (a) Differentiate between specific heat capacity of ice and specific latent heat of ice. (1mk)
2. Figure 9 shows an incomplete circuit set-up by a student to determine the specific capacity of an Alluminium block of mass 1.4kg.
3. Complete the diagram showing missing components in their correct symbols. (2mks)
4. During the experiment, the heater was switched on for 15 minutes. The ammeter and voltmeter were found to be

steady at 3A and 48V respectively. The temperature rose by 250C. Calculate the specific heat capacity of the Aluminum block. (4mks)

1. Give **two** precautions which should be taken in when carrying out the experiment so as to obtain accurate results. (2mks)
2. (a) A body in motion is uniformly retarded from a certain velocity to a final velocity V in a time of t seconds.
3. Sketch a velocity time graph to show the motion. (1mk)
4. Using the drawn graph show how to get the final velocity V. (2mks)
5. By finding the area under the graph, show that the total displacement for the motion is given by s = ut + ½ at2. (3mks)
6. A stone of mass 0.5kg is whirled in a vertical circle by a cord of length 1.5m at a velocity of 30m/s. Find the maximum tension on the cord. (3mks)

(c) Speed governor is one of the applications of circular motion. Explain how it works. (3mks)

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***Kenya Certificate of Secondary Education (KCSE)***

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**PHYSICS**

**PAPER 2**

**TIME: 2 HOURS**

**SECTION A (25 MARKS)**

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

1. Name **two** measurements you would need to determine whether a lead accumulator is fully charged. (2mks)
2. Fig. 1 shows a ray of light striking a mirror at an angle of incidence of 450. Complete the diagram to show the path of the ray and the angle of reflection at which it leaves the second mirror. (2mks)
3. Figure 2 shows a straight electrode placed near a point charge. Draw the electric field map between them.
4. Figure 3 shows an electric circuit operated by four dry cells each of e.m.f 1.5V and internal resistance of 0.2Ω. When the switch is closed, the ammeter reads 0.2A. (3mks)
5. The graphs in figure 4 represents the same wave.

Determine the velocity of the wave. (3mks)

1. Arrange the following waves in order of increasing frequency; X-rays, visible light, infrared, T.V waves, microwaves, ultraviolet, y-rays. (1mk)
2. Two heaters A and B are connected in parallel across a 240V mains supply. Heater A is rated 1000W and B 2500W. Calculate the ratio of their resistances. (3mks)
3. Draw a circuit showing a junction diode in a reverse bias connection to a cell. (2mks)
4. Find the cost of using a 3000W electric heater for 24 hours. The cost of a unit is sh. 2.00. (2mks)
5. Figure 5 below represents a soft iron bar being magnetized.

Strength of the magnet

**Magnetic force Fig. 5**

Explain the shape of the graph. (1mk)

1. A gun is fired in front of a high building. It takes 2 seconds for the soldier to hear the echo. If the speed of sound in air is 330m/s. Calculate the distance from the building which the soldier stands. (2mks)
2. Two monochromatic rays from a ray box are incident on a glass prism of refractive index 1.56 as shown in the figure below.

450C

Draw on the diagram how the rays are refracted until they leave the prism. (2mks)

1. What is the purpose of a commutator in an electric current? (1mk)

**SECTION B (55 MARKS)**

1. (a) A Television tube uses a voltage of 4.55k.V to accelerate electrons released from its cathode by thermionic emission.
2. What is meant by thermionic emission? (1mk)
3. If the electron has a charge of -1.6 x 10-19C and the mass of an electron is 9.1 x 10-31kg, find:-

I.The energy of an electron striking the television screen. (3mks)

II The speed of the electron as it strikes the screen. (3mks)

(b) Figure 7 shows a cathode ray oscilloscope.

1. State the function of the components labeled A, B, C and D. (4mks)
2. Sketch what will be observed on the screen when an A.C voltage is connected to the Y-plates. (1mk)
3. (a) Figure 8 below represents an eye defect.
4. State **two** possible causes of the defect. (2mks)
5. Draw a ray diagram to show how the defect can be corrected. (1mk)
6. An object O placed in front of a converging lens Lo forms an image I on the other side of the lens. Another

Converging lens Le is placed such that the two form a compound microscope.

* 1. Draw a ray diagram of the set up to show how the final image is formed. (3mks)
  2. State the reason why the focal length of Lo must be greater than that of Le. (1mk)

1. An object is placed 20cm from a converging lens. A focused image is formed on a screen placed 30cm from the lens on

the other side. If the screen is moved 6cm towards the lens, work out the distance the object must be moved for the image to be formed on the screen. (3mks)

1. (a) What is radioactivity? (1mk)
   1. The graph below shows radioactive decay of iodine.

Graph

Use the graph to determine the half-life of iodine. (2mks)

* 1. Figure 9 below shows a G.M tube.

Diagram

* + 1. Give the reason why the mica window is made thin. (1mk)
    2. Explain how the radiation entering the tube is detected by the tube. (3mks)
    3. What is the purpose of the halogen vapour? (1mk)
  1. A sample of a radioactive substance of half life 1500 years has an activity of 32000 counts per hour. Find the time it will

take for the activity to decrease to 2000 counts per hour. (3mks)

1. Figure 10 shows UV light shone on a zinc plate placed on a negatively charged leaf electroscope. It was observed that the leaf collapses.

Diagram

* + 1. State and explain the above observation. (2mks)
    2. Figure 11 below shows a photocell.
    3. State the reason of using an evacuated photocell. (1mk)
    4. Explain the role of resistor P in the circuit. (1mk)
    5. What is the effect on the reading of the millimeter if the frequency of the radiation falling on the cathode is

increased? (2mks)

* + 1. Briefly explain how the set up can be used as an automatic switching device alarm.(2mks)
    2. A surface whose work function is 1.82 x 10-19J is illuminated with light of frequency 4.0 x 1014HZ. Work out

the minimum kinetic energy of the emitted photoelectrons. (h = 6.6 x 10-34Js) (3mks)

1. (a) State **one** cause of energy losses in a transformer and explain how it can be minimized. (2mks)
   1. A transformer is designed to supply a current of 7.5A at a potential difference of 100V to a motor from an A.C supply

of 240V. If the efficiency of the transformer is 85%, calculate;-

* + 1. The power supplied to the transformer. (3mks)
    2. The current in the primary coil. (3mks)
  1. Fig. 12 below shows a cross-section of a bicycle dynamo. The wheel is connected by an axle to a permanent cylindrical

magnet and is rotated by the bicycle tyre.

* + 1. Explain why the bulb lights. (2mks)
    2. How can the bulb be made brighter? (1mk)

**NANDI NORTH DISTRICT JOINT MOCK 2016**

**232/3 – PHYSICS PAPER 3**

**CONFIDENTIAL**

**QUESTION 1**

1. Two dry cells (Size D, each 1.5V)
2. Nichrome Wire (SWG 28 – 100cm long mounted on a mm scale).
3. An ammeter.
4. Cell holder.
5. 6 connecting wires with crocodile clips.
6. Switch.
7. A Voltmeter
8. A Jockey (Crocodile clip)

**QUESTION 2**

1. A metre rule.
2. One Stop watch.
3. One complete stand.
4. One spring, (spring constant 0.1N/cm) Range 0.07 – 0.12Ncm-1
5. 2 pieces of wood.
6. Beam balance or electronic balance (to be shared).
7. One 100g mass labeled M.

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***Kenya Certificate of Secondary Education (KCSE)***

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**PHYSICS**

**PAPER 3**

**(PRACTICAL)**

**JULY / AUGUST 2016**

**TIME: 2 ½ hours**

1. You are provided with the following:-

* Nichrome wire (SWG 28) mounted on a mm scale.
* Micrometer screw gauge (to be shared).
* Voltmeter (0 – 3V or 0-5V)
* Ammeter (0-1A)
* Switch
* Jockey / long wire with crocodile clip attached.
* One new dry cell and a cell holder.
* 6 connecting wires with crocodile clips attached to one end.

**Proceed as follows:**

* + 1. Set up the circuit below and ensure that when the switch is open, both meters read zero, keep the switch open when readings are not being taken.

Diagram

1. Measure and record the diameter d of the nichrome wire AB mounted on a mm scale using the micrometer screw gauge. (1mk)

d = ……………………………………..mm = ………………………………….m

1. Disconnect the jockey from wire AB and close the switch. Record the value E of the voltmeter reading.

E = ……………………………………………. V (1mk)

* + 1. Now, connect the jockey on AB at a distance L = 2.5cm. Close the switch and record the voltmeter and ammeter readings, V and I respectively in table 1 below.

**Table 1**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| L(cm) | 2.5 | 7.5 | 10.0 | 20.0 | 30.0 | 40.0 |
| P.d(V) |  |  |  |  |  |  |
| Current I (A) |  |  |  |  |  |  |
| IV (watts) 4d.p |  |  |  |  |  |  |

1. Complete the table (6mks)
2. Plot a graph of IV (Vertical axis) against L. (5mks)
3. Using your graph, find the value Lo where the line intersects the horizontal axis. (1mk)

Lo = ………………………………….cm

* + 1. Now, place the jockey on AB such that the length  is 63cm. Close the switch and record both the voltmeter reading, V

and the ammeter reading, I. (2mks)

V = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ V

I = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ A

* + 1. Determine the value r from the relation. (2mks)



* + 1. Determine the value of X from the relation: (2mks)

 where π= 3.142

**Question 2**

1. **PART A**

You are provided with the following:-

* Vernier calipers
* Micrometer screw gauge
* Masses: one 10g, two 20g and one 100g.
* A helical spring.
* Metre rule or half metre rule.

**Proceed as follows:**

* + - * 1. Determine the number of complete turns of the helical spring.

N = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (1mk)

* + - * 1. Measure the external diameter of the spring using the vernier calipers.

D = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_m. (1mk)

* + - * 1. Use the micrometer screw gauge to determine the diameter of the wire of the spring.

d = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ m (1mk)

* + - * 1. Determine the value of m.



* + - * 1. Suspend the helical spring vertically alongside the clamped half metre rule as shown in figure 3 below. Determine the length Lo of the spring before loading it.

Lo = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cm

* + - * 1. Load the spring with a mass of 20g and determine the new reading on metre rule, (L). Record this in the table below.

Determine the extension e = L – Lo due to the mass of 20g and record the value in the table given below. Repeat step (f) for other masses and complete the table. (6mks)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Mass(g) | 0 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| Weight (N) |  |  |  |  |  |  |  |  |  |  |
| Reading (L) (cm) |  |  |  |  |  |  |  |  |  |  |
| Extension e (cm) |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |

* + - * 1. Plot a graph of weight (N) against  (5mks)
        2. Determine the slope S of the graph at a mass of 55g. (2mks)
        3. Given that , determine the value of T. (2mks)