535/2
PHYSICS
Paper 2
Jul./Aug. 2023
2¼ hours

WAKISO-KAMPALA TEACHERS' ASSOCIATION (WAKATA)

WAKATA MOCK EXAMINATIONS 2023

Uganda Certificate of Education

PHYSICS

Paper 2

2 hours 15 minutes

INSTRUCTIONS TO CANDIDATES:

Answer **five** *questions*

Any additional question(s) answered will **not** *be marked.*

Mathematical tables and silent non programmable calculators may be used.

These values of physical quantities may be useful to you:

Acceleration due to gravity	$= 10\ ms^{-2}$
Specific heat capacity of water	$= 4200\ JKg^{-1}K^{-1}$
Specific heat capacity of copper	$= 400\ JKg^{-1}K^{-1}$
Specific latent heat of fusion of water	$= 340000\ JKg^{-1}$
Speed of sound in air	$= 330\ ms^{-1}$
Velocity of electromagnetic waves	$= 3.0 \times 10^{8}\ ms^{-1}$

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1. (a) (i) State **three** effects a force can have on a body. *(03 marks)*

(ii) Mention **two** forces that act on an object without coming physically in contact with it. *(02 marks)*

(b) Using a velocity time– graph, describe the motion of a metal sphere released from the top surface of a tall glass vessel filled with oil. *(04 marks)*

(c) A body of mass 8kg slides from the top of an incline and reaches the bottom when moving at 4 m/s. The body then continues along a rough horizontal surface.

(i) If the dynamic friction is 16N, find the horizontal distance it covers before it stops. *(03 marks)*

(ii) If it is desired that the body stops after 5m, find the frictional force between the surfaces. *(03 marks)*

(d) State **one** use of friction to a mechanic. *(01 mark)*

2. (a) (i) Define **centre of gravity of a body**. *(01 mark)*

(ii) Describe an experiment to determine centre of gravity of a uniform lamina. *(05 marks)*

(b) (i) State the conditions obeyed by a body in equilibrium under a set of parallel forces. *(02 marks)*

(ii) Two masses of 50kg and 80kg are put at the ends of a uniform rod 100cm long of negligible weight. Determine where a pivot must be placed to keep the load in equilibrium. *(04 marks)*

(c) Explain why would a forklift truck be better carrying load close to the ground rather than higher up in the air. *(02 marks)*

(d) Name **two** devices based on principle of moments. *(02 marks)*

3. (a) (i) What is **sound**? *(01 mark)*

(ii) State the laws of reflection of sound. *(02 marks)*

(b) Aboy stood 100m from a high cliff and clapped. His echo took 0.6s to be heard. Calculate the;

(i) velocity of sound. *(03 marks)*

(ii) frequency of sound if there are ten wave lengths of sound occupying the space between the boy and the cliff. *(04 marks)*

(c) Explain the effect of temperature and pressure on the results you have obtained in b(i) and b(ii) above. *(03 marks)*

(d) State **three** differences between **sound** and **electromagnetic waves.** *(03 marks)*

4. (a) (i) State the laws of reflection of light. *(02 marks)*

(ii) Describe an experiment to verify the laws of reflection in a laboratory. *(04 marks)*

(iii) With the help of diagrams explain the difference between **regular** and **diffuse** reflection. *(04 marks)*

(b) Figure 1 shows an object O placed 3cm from mirror M_1 and 4cm from mirror M_2. M_1 and M_2 are inclined to each other at 90°.

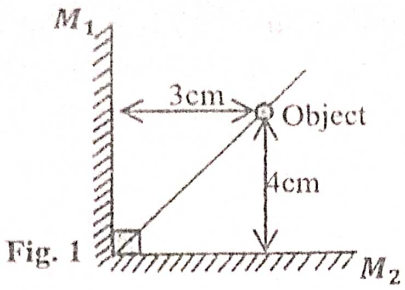

Fig. 1

Calculate the distance between the images formed. *(04 marks)*

(c) State **two** properties of images formed by a plane mirror. *(02 marks)*

5. (a) Define the following:
   (i) **Saturation vapour pressure.** *(01 mark)*
   (ii) **Boiling point of a liquid.** *(01 mark)*

(b) State the effect of impurities on the boiling point of a liquid. *(01 mark)*

(c) (i) With the aid of a diagram describe how a refrigerator works. *(06 marks)*
   (ii) 1.8kg of water is put in an ice making machine. If the water is at $40°C$ and the machine removes heat at a rate of $200J/s$, how long would it take to convert it into ice at $O°C$? *(05 marks)*

(d) Explain what may happen if one cooks at a very high altitude. *(02 marks)*

6. (a) (i) What is meant by **back emf** of a motor? *(01 mark)*
   (ii) A d .c motor connected across a 240V power supply has an armature resistance of 5Ω. When operating, the armature draws a current of 10A from the power supply. Calculate the efficiency of the motor. *(04marks)*

(b) (i) Explain why a magnet, placed in a coil of wire, carrying alternating current loses its magnetism. *(03 marks)*
   (ii) State **two** other methods by which a magnet can be made to lose its magnetism. *(02marks)*

(c) Figure 2 shows the poles **A** and **B** of a horse shoe magnet.

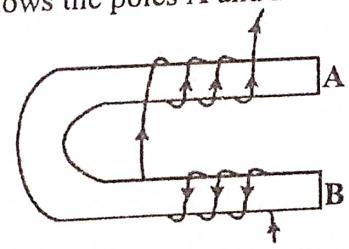

Fig. 2

If the arrow shows the direction of flow of current through the horse shoe magnet;
   (i) determine the polarities at **A** and **B**. *(02 marks)*
   (ii) sketch the lines of force between the poles, **A** and **B** of the horse shoe magnet *(01mark)*

(d) (i) Describe the major energy changes that take place in a moving coil loud speaker *(02 marks)*

Turn Over

(ii) State **two** factors which can increase the pitch and loudness of sound produced by a moving coil loud speaker. *(01mark)*

7. (a) (i) Differentiate between **electromotive force (emf)** of a cell and potential difference. *(01 mark)*

(ii) State **two** sources of emf. *(02 marks)*

(b) Sketch a graph of current against voltage for the following.

(i) Semi–conductor diode. *(02 marks)*

(ii) Metal wire. *(01 mark)*

(c) (i) What is the advantage of **ac** over **dc** in mains supply? *(01mark)*

(ii) State **three** safety precautions which must be taken when wiring a house. *(03 marks)*

(iii) Give **two** reasons why all house connections are in parallel. *(02 marks)*

(d) Figure 3 shows a battery of emf, 12V and internal resistance 1Ω connected to 3 resistors of 4Ω, R and R.

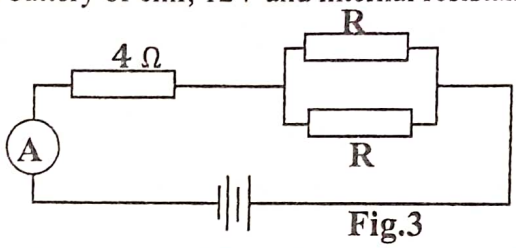

Fig.3

If the ammeter records a current of 2A, what is the value of **R**? *(03 marks)*

(e) What is the function of an earth wire in electrical connections? *(01 mark)*

8. (a) What are **X–rays** ? *(01 mark)*

(b) State **two**;

(i) properties of X–rays. *(02 marks)*

(ii) differences between **cathode rays** and **X – rays.** *(02 marks)*

(iii) similarities between **cathode rays** and **X–rays.** *(02 marks)*

(c) Figure 4 shows an X–ray tube.

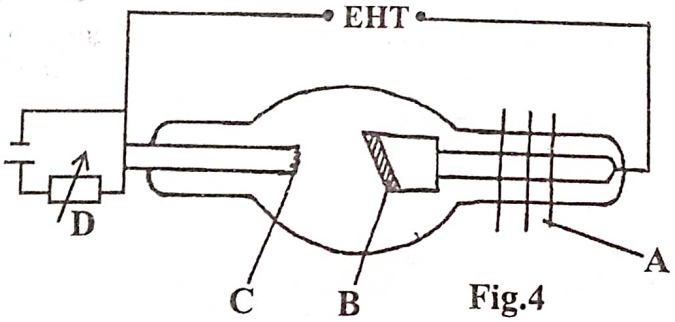

Fig.4

(i) Name the parts labeled **A** and **B**. *(02 marks)*

(ii) State the function of each of the parts labelled **C** and **D.** *(02 marks)*

(iii) What is the purpose of a high voltage? *(01 marks)*

(d) State **two** harmful effects of X–rays. *(02 marks)*

(e) Suggest **two** safety precautions that should be taken when dealing with X–rays. *(02 marks)*

END