535/2
PHYSICS THEORY
Paper 2
JUNE 2023
2 $^{1}/_{2}$ HOURS

MATIGO EXAMINATIONS BOARD

PRE MOCK 2023

Uganda Certificate of Education

PHYSICS

(**Paper 2**)

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

Answer any **five** *questions.*

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

Mathematical tables and silent non-programmable calculators maybe used.

These values of physical quantities may be useful to you.

Assume the following where necessary;

- *Acceleration due gravity,* $g = 10\ ms^{-2}$
- *Specific heat capacity of water* $= 4200\ J\ kg^{-1}\ K^{-1}$
- *Specific heat capacity of ice* $= 2100\ J\ kg^{-1}\ K^{-1}$
- *Specific latent heat of vaporization of water* $= 2{,}260{,}000\ J\ kg^{-1}$
- *Specific latent heat of fusion of water* $= 340{,}000\ J\ kg^{-1}$
- *Speed of sound in air* $= 330\ m\ s^{-1}$
- *Density of water* $= 1000 kgm^{-3}$

Turn Over

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1. (a) (i) Name the states of matter that do not have a definite shape. (01 mark)
   (ii) Give any two differences between the states mentioned in (i) above. (02 marks)
   (b) (i) Distinguish between diffusion and capillarity. (02 marks)
   (ii) Describe an experiment to demonstrate diffusion in gases. (04 marks)
   (iii) State any **three** advantages of capillarity in our daily lives. (02 marks)
   (c) (i) A body weighs $12kg$ on earth. Determine its weight when on a planet whose acceleration due to gravity is $8ms^{-2}$. (03 marks)
   (ii) Explain why weight varies with altitude. (02 marks)

2. (a) State Newton's laws of motion. (03 marks)
   (b) A body accelerates from rest to $5ms^{-1}$ in 2 seconds. It then maintains this speed for 4 seconds after which it decelerates to rest in 3 seconds. The body stays at rest for 1second and then accelerates in reverse to $3ms^{-1}$in 4 seconds.
   (i) Sketch a velocity – time graph of the motion of the car. (04 marks)
   (ii) Use the graph to determine the total distance covered. (03 marks)
   (iii) Use the same graph to find the body's displacement from its original position. (02 marks)
   (c) Describe the working of a rocket engine. (04 marks)

3. (a)(i) State the materials used to produce concrete. (02 marks)
   (ii) State any four advantages of concrete as a construction material (02 marks)
   (iii) Glass is one of the roofing materials in Uganda. Give any four advantages of using glass to roof a house. (02 marks)
   (b) (i) State Hooke's law of elasticity. (01 mark)
   (ii) Describe an experiment to determine the force constant of an elastic material. (05 marks)
   (c) A mass 0f $5kg$ extends rubber by $2cm$. Determine;
   (i) the force constant of the rubber. (02 marks)
   (ii) extension caused by $3kg$ mass on the same rubber. (02 marks)

4. (a)(i) Define the term fundamental interval as applied to thermometers. (01 mark)
   (ii) Briefly describe the steps taken to calibrate a thermometer. (04 marks)
   (b) When making a thermometer, water is not used as a thermometric liquid. Give any four reasons for this. (02 marks)
   (c) (i) State the pressure law. (01 mark)
   (ii) Describe an experiment to verify the pressure law. (05 marks)

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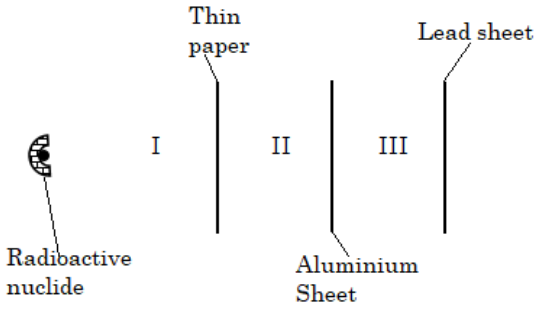
(d) A gas at 0℃ occupies $250cm^3$ when its pressure is $800mmHg$. What volume will the same gas occupy at s.t.p (03 marks)

5. (a)(i) Distinguish between conductors and insulators as applied to electrostatics. (02 marks)
   (ii) State the laws of electrostatics. (01 mark)
   (b) Describe how a body can be charged positively by induction. (05 marks)
   (c) Explain how lightening conductor safeguards a house against lightening. (05 marks)
   (d) Sketch the electric field patterns for the following;
   (i) two negative point charges close each other. (02 marks)
   (ii) two opposite point charges close to each other. (01 mark)

6. Define the following terms as applied to wave motion.
   (i) *Wave length* (01 mark)
   (ii) *Wave velocity* (01 mark)
   (b) A wave of frequency $\boldsymbol{f}$ and wave length $\boldsymbol{\lambda}$ travels from one point to another. Show that its velocity **V** is given by $\boldsymbol{V = f\lambda}$ (03 marks)
   (c) Distinguish between mechanical and electromagnetic waves. (02 marks)
   (d) State the effect and observation of the following;
   (i) when sound waves undergo constructive interference. (01 mark)
   (ii) When light waves undergoes constructive interference. (01 mark)
   (e) (i) What is sound? (01 mark)
   (ii) State any **two** properties of sound waves. (01 mark)
   (iii) Describe an experiment to verify the laws of reflection of sound. (05 marks)

7. (a) Define the following terms as used in physics;
   (i) *Atomic mass.* (01 mark)
   (ii) *Isotopes* (01 mark)
   (b) The figure below shows a radioactive nuclide placed in the lead box.



   (i) Identify the radiation/emission(s) in region I. (01 mark)
   (ii) Identify the radiation/ emission(s) in region II. (01 mark)
   (iii) Outline any three differences between emissions in region II. (03 marks)
   (c) Describe an experiment to distinguish between radioactive emissions using a gold leaf electroscope. (05 marks)

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(d) Explain why;

(i) Alpha particles are least deflected in an electric field? (02 marks)

(ii) Isotopes cannot be separated by chemical means? (02 marks)

8. (a) State the **laws of refraction**. (02 marks)

(b) Describe the power of a lens of focal length $20cm$. (02 marks)

(c) (i) What is meant by the term dispersion. (01 mark)

(ii) Describe, using a diagram, how dispersion in a glass prism forms a spectrum. (05 marks)

(d)(i) State any **two** differences between the eye and a lens camera. (02 marks)

(ii) Using a ray diagram, describe how long sightedness can be corrected. (04 marks)

END

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