535/2

PHYSICS

Paper 2

July, 2023

2¼ hours

INTERNAL MOCK EXAMINATIONS 2023

Uganda Certificate of Education

PHYSICS

Paper 2

2 hours 15 minutes

INSTRUCTIONS TO CANDIDATES.

- *Answer only* **five** *questions from this paper. All the questions carry equal marks.*

- *Where necessary, assume;*
  - *Acceleration due to gravity* $= 10ms^{-2}$.
  - *Specific heat capacity of copper* $= 400Jkg^{-1}K^{-1}$.
  - *Specific heat capacity of water* $= 4200Jkg^{-1}K^{-1}$.
  - *Specific latent heat of fusion of water* $= 340000Jkg^{-1}$.
  - *Velocity of electromagnetic waves* $= 3.0 \times 10^{8}ms^{-1}$.
  - *Speed of sound in air* $= 320ms^{-1}$.

1. (a) Differentiate between conduction and convection. **(02marks)**

(b) Describe an experiment which can be performed to show convection currents in a liquid. **(04marks)**

(c) (i) Draw a well labeled diagram of a vacuum flask. **(03marks)**

(ii) Explain how a vacuum flask minimizes heat losses. **(04marks)**

(d) Explain why it is not advisable to wear black clothes during extremely very cold weather. **(03marks)**

2. (a) State the three Newton's Laws of motion. **(03marks)**

(b) Explain why a passenger seated in a moving taxi jerks forward and then backwards when the driver breaks suddenly. **(04marks)**

(c) Briefly describe an experiment to locate the centre of gravity of a regularly shaped card board. **(04marks)**

(d) A 5tonne truck initially moving with a velocity $40ms^{-1}$ accelerates to $80ms^{-1}$ in 5 seconds. Calculate the force on the truck that caused the velocity change. **(05mrks)**

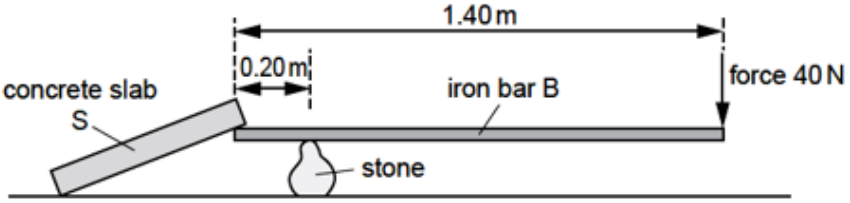
3. (a) (i) State the principle of moments. **(01 mark)**

(ii) Describe a simple experiment you would carry out to verify the principle of moments. **(05 marks)**

(iii) State any one application of the principle of moments. **(01 mark)**

(b) State the conditions for a body to be in a state of mechanical equilibrium. **(02 marks)**

(c) A uniform iron bar of weight $30N$ and length $1.40m$ that is being used to lift one edge of a concrete slab ***S***. A stone placed $0.20m$ from one end ***B*** acts a pivot. A force of $40N$ pushing down at the other end is just enough to lift the slab and hold it as shown below.



(i) On the figure, draw an arrow to show the weight of the bar. Label it ***W***. **(01 mark)**

(ii) Calculate the downward force which the slab exerts on the bar. **(05 marks)**

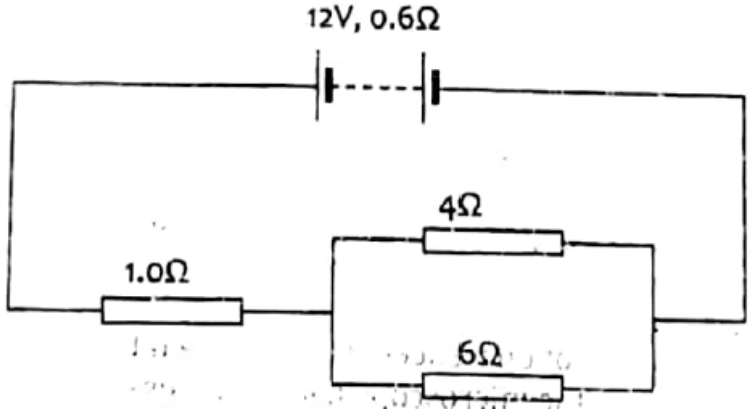
(iii) Suggest a change to the arrangement in the figure above that would reduce the force required to lift the slab. **(01 mark)**

4. (a) (i) What is meant by electromotive force of a cell? **(01 mark)**

(ii) Mention two defects in a simple cell and explain how they are minimised. **(04 marks)**

(b) Identify two factors that affect the resistance of a conductor and state how these factors affect the resistance. **(04 marks)**

(c) The figure below a battery of electromotive force $12.0V$ and internal resistance 0.6Ω connected to three resistors.



Calculate the power dissipated in the 4Ω resistor. **(07 marks)**

5. (a) (i) Define the term surface tension. **(01 mark)**

(ii) Describe an experiment to show the existence of surface tension in liquids. **(04 marks)**

(iii) Use kinetic theory to explain the existence of surface tension in liquids. **(03 marks)**

(b) (i) A steel ball is placed centrally on the surface of a viscous oil in a tall jar. Describe the motion of the ball. **(03 marks)**

(ii) Sketch a velocity-time graph to show the motion of the ball. **(01 marks)**

(iii) If the density of oil is $1500kgm^{-3}$ while the steel ball has a volume of $1cm^3$ and density $7500kgm^{-3}$, calculate the maximum viscous force on the ball. **(04 marks)**

6. (a) (i) Distinguish between reflection and refraction of light. **(02 marks)**

(ii) State the laws of refraction of light. **(02 marks)**

(b) (i) What is meant by the term dispersion of light ? **(01 mark)**

(ii) Describe, with the aid of a diagram, how a spectrum is formed by a glass prism. **(04 marks)**

(c) (i) What do you understand by the term power of a lens. **(01 mark)**

(ii) Determine the power of a converging lens of focal length 25*cm.* **(02 marks)**

(d) How is the action of a lens camera similar to that of a mammalian eye? **(02 marks)**

(e) Draw a ray diagram to show how a concave lens can be used to correct an eye defect. **(02 marks)**

7. (a) Define the following terms as applied to wave motion.

(i) Wave length. **(01 mark)**

(ii) Amplitude **(01 mark)**

(b) (i) Describe a simple experiment to demonstrate resonance in sound. **(04 marks)**

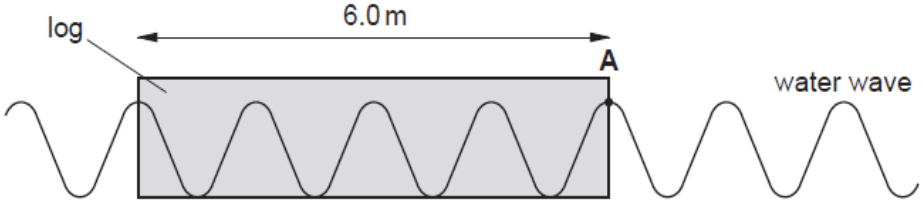
(ii) State one application of resonance. **(01 marks)**

(iii) State one disadvantage of resonance. **(01 mark)**

(c) Draw a diagram to show how plain waves pass through a narrow gap in an obstacle. **(02 marks)**

(d) Explain why sound can be heard beyond an obstacle. **(02 marks)**

(e) The figure below shows a water wave passing a stationary floating log of length $6.0m$.



If 5 complete waves take 10 seconds to pass point **A**, calculate the speed of the water waves. **(04 marks)**

8. (a) (i) Define the term cathode rays. **(01 mark)**

(ii) Give three uses of radioactivity. **(03 marks)**

(b) With the aid of a well labeled diagram of a cathode ray tube, describe the production of cathode rays. **(04 marks)**

(c) Give two uses of a C.R.O. **(02 marks)**

(d) (i) How many neutrons are released by the following nuclear reaction?

$$^{235}_{92}U + {}^{1}_{0}n \longrightarrow {}^{148}_{57}La + {}^{85}_{z}X + neutrons$$ **(02 marks)**

(ii) What is the value of z? **(01 mark)**

(e) Give three differences between alpha particles and gamma rays. **(03 marks)**

***** END *****