

535/2
PHYSICS
PAPER 2
July/August 2018
2¼ hours



WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Certificate of Education

PHYSICS

Paper 2

2hours 15 minutes

INSTRUCTIONS TO CANDIDATES:

- Answer any **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, g = 10ms^{-2}

Specific heat capacity of water = $4200\text{Jkg}^{-1}\text{K}^{-1}$

Specific heat capacity of copper = $400\text{Jkg}^{-1}\text{K}^{-1}$

Specific latent heat of fusion of ice = $3.36 \times 10^5\text{Jkg}^{-1}$

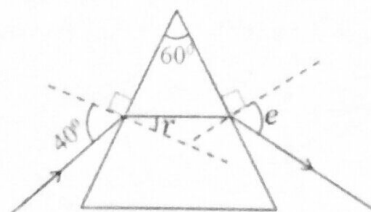
Density of water = 1000Kgm^{-3}

Density of Mercury = $13,600\text{Kgm}^{-3}$

Speed of sound in air = 340ms^{-1}

1. (a) (i) Define the term **density** and state its SI units. (02 marks)
 (ii) Describe a simple experiment to measure the density of a piece of metal. (03 marks)
 - (b) State **Archimedes principle**. (01 mark)
 - (c) A piece of metal weighed 3.50N in air and when fully submerged in oil of density 800kgm^{-3} it weighed 3.10N. Calculate the density of the metal. (04 marks)
 - (d) (i) Distinguish between **kinetic energy** and **potential energy**. (02 marks)
 (ii) State the law of **conservation of energy**. (01 mark)
 (iii) Describe the energy changes in a swinging simple pendulum. (03 marks)
2. (a) (i) Define the term **acceleration**. (01 mark)
 (ii) Write down the equations of motion. (03 marks)
 - (b) A bullet is fired into a fixed block of wood resting on a smooth surface at a speed of 150ms^{-1} . If it penetrated 0.08m before coming to rest; Calculate its speed when it was 0.04m into the block. (04 marks)
 - (c) (i) Distinguish between **strong** and **brittle materials** and give **one** example of each. (03 marks)
 (ii) State the factors that determine the strength of a material. (01 mark)
 - (d) Describe a simple experiment to determine the thickness of an oil molecule. (04 marks)
3. (a) State the **laws of refraction**. (02 marks)
 - (b) White light is incident on the first refracting surface of an equilateral glass prism at an angle of 40° as shown in **figure 1** below.

Fig. 1

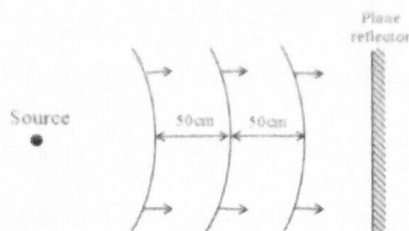


Given that the refractive index of the prism is 1.54, calculate,

- (i) the angle of refraction **r** (03 marks)
 - (ii) the angle of emergence, **e**. (02 marks)
- (c) (i) Define the term **dispersion of light**. (01 mark)
 (ii) Draw a clear diagram to show the formation of a white spectrum. (02 marks)
 (iii) Explain why most hind car registration number plates are printed in black on a yellow back ground. (03 marks)

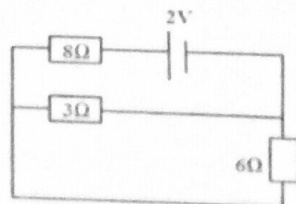
- (d) (i) What is **power of a lens**? (01 mark)
- (ii) Calculate the power of a concave lens of focal length 20cm. (02 marks)
4. (a) (i) Define **upper fixed point**. (01 mark)
- (ii) Draw a labeled diagram showing how the upper fixed point can be determined. (02 marks)
- (b) Explain why water is used in a car radiator? (02 marks)
- (c) A piece of copper of mass 40g at 200°C is placed in a copper calorimeter of mass 60g and containing 50g of water at 10°C. Determine the final temperature after stirring (Ignore any heat losses to the surrounding) (04 marks)
- (d) Describe the electrical method for determining the specific heat capacity of a metal block. (06 marks)
- (e) State the function of the silvered walls of a thermos flask. (01 mark)
5. (a) (i) What are **x-rays**? (01 mark)
- (ii) Draw a labeled diagram of a machine used for production of x-rays. (03 marks)
- (b) (i) Define the term "**half-life**" of a radioactive nuclide. (01 mark)
- (ii) The half-life of a nuclide is 24 days and has a mass of 0.64g. Calculate the mass of the nuclide that will have decayed after 120days. (04 marks)
- (c) Explain the changes that take place in the structure of element ${}^{226}_{88}\text{X}$ when two alpha particles are emitted. (03 marks)
- (d) Briefly describe the mode of operation of a cathode ray oscilloscope (CRO). (04 marks)
6. (a) (i) What is an **echo**? (01 mark)
- (ii) Explain why echoes are not heard in small rooms. (02 marks)
- (b) Explain why reverberation in a concert hall can be desirable. (02 marks)
- (c) Describe an experiment to show that sound waves require a material medium for their transmission. (04 marks)
- (d) Define the following terms as applied to waves:
- (i) **Wavelength**. (01 mark)
- (ii) **Frequency**. (01 mark)
- (e) The diagram in figure 2 shows circular waves propagating towards a plane reflector.

Fig. 2



- (i) Copy the diagram and show how the waves are reflected. (02 marks)
 - (ii) If the wave is travelling with a velocity of 20ms^{-1} , calculate its frequency. (03 marks)
7.
 - (a)
 - (i) What is a **magnetic line of force**? (01 mark)
 - (ii) List **two** properties of a magnet. (02 marks)
 - (b)
 - (i) What is a **neutral point**? (01 mark)
 - (ii) Sketch a magnetic field pattern between the south poles of two bar magnets placed near each other. (02 marks)
 - (iii) State **two** ways of demagnetising a magnet. (02 marks)
 - (c) With the aid of a labeled diagram explain how a moving coil loudspeaker works. (05 marks)
 - (d) A milliammeter has a resistance of 5Ω and gives a full scale deflection when a current of 0.015A flows through it. Calculate the value of the resistor to convert it into a voltmeter reading up to 15V . (03 marks)
8.
 - (a)
 - (i) State the **law of electrostatics**. (01 marks)
 - (ii) State **two** uses of a gold leaf electroscope. (01 marks)
 - (iii) Describe how a gold leaf electroscope can be charged negatively by induction. (03 marks)
 - (b) Define the following terms:
 - (i) **electric cell**.
 - (ii) **internal resistance**. (02 marks)
 - (c) Explain why internal resistance of a primary cell is higher than that of a secondary cell. (03 marks)
 - (d)
 - (i) Resistors of 8Ω , 6Ω and 3Ω are connected across a battery of e.m.f 2.0V and negligible internal resistance as shown in **figure 3** below;

Fig. 3



- (ii) Calculate the current flowing through the 8Ω resistor. (04 marks)
 - Why is alternating current preferred to direct current in power transmission? (02 marks)

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