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

PROVINCIAL - NAMIREMBE DIOCESE
COUHEIA SECONDARY
MOCK EXAMINATIONS 2023

Uganda Certificate of Education

PHYSICS

Paper 2

2 hours 15 minutes

INSTRUCTIONS TO CANDIDATES:

*Attempt any five **(5)** questions. All questions carry equal marks*

Where necessary, the following values of physical quantities may be assumed.

Density of water	=	$1000kgm^{-3}$
Acceleration due to gravity	=	$10ms^{-2}$
Speed of sound in air	=	$3.0 \times 10^{8} ms^{-1}$
Specific heat capacity of water	=	$4200Jkg^{-1}k^{-1}$

TEXT BOX

1. (a) (i) Define the term linear momentum and state its SI unit. (02 marks)

(ii) State the law of conservation of linear momentum. (01 mark)

(b) A ball of mass 0.5kg is rolled at a speed of $40ms^{-1}$ and it collides with another ball of mass 0.3kg moving at a speed of $20ms^{-1}$ in the opposite direction

If after collision, the 0.5kg ball moves with a speed of $13ms^{-1}$;

(i) Calculate the velocity of the 0.3kg ball after collision. (03 marks)

(ii) Find the loss in kinetic energy (03 marks)

(iii) Account for the loss in kinetic energy. (01 marks)

(c) Explain the following observations;

(i) When a man jumps from a boat to the lake shore, the boat moves away from him. (03 marks)

(ii) Beating a carpet with a stick removes dust particles from it. (03 marks)

2. (a) (i) Define the term viscosity (01 mark)

(ii) What is terminal velocity? (01 mark)

(iii) Sketch a graph of velocity against time for steel ball dropped centrally in a viscous fluid. (02 marks)

(b) Differentiate between streamline and turbulent flow of fluid. (02 marks)

(c) A steel ball of density $7000kgm^{-3}$ and volume $1.5 \times 10^{-3} m^3$ is dropped in oil of density $2000kgm^{-3}$. It accelerates for a short time and then attains a terminal velocity. Calculate the value of viscous drag acting on the steel ball. (03 marks)

(d) (i) Describe a simple experiment to demonstrate the existence of surface tension. (04 marks)

(ii) Explain the effect of temperature on the surface tension of water. (03 marks)

3. (a) Define the following terms as used in waves.

(i) Wavelength (01 mark)

(ii) Frequency (01 mark)

(b) With the aid of a well- labelled diagram, describe an experiment to show that sound does not travel through a vacuum. (05 marks)

(c) (i) What are ultrasonic waves? (01 mark)

(ii) State two applications of ultrasonic waves. (01 mark)

(d) A student dips her finger into a basin of water twice every second producing waves with crests that are separated by 25cm. Determine the;

(i) Wave frequency (02 marks)

(ii) Period of the waves (02 marks)

(iii) Wave speed (03 marks)

4. (a) What is meant by dispersion of white light? (01 mark)

(b) With the aid of a diagram, describe how a pure spectrum can be produced. (05 marks)

(c) (i)Explain with the aid of a labelled diagram why a writing on a piece of paper placed under a glass block appears raised when observed from above. (04 marks)

(ii) Calculate the critical angle for an air-glass interface if the refractive index of glass is 1.5. (03 marks)

(d)With the aid of a labelled diagram, show how a converging lens can be used as a magnifying glass. (03 marks)

5. (a) The table below shows some components of an electrical circuit together with their functions.

Component	Function
• Earthing • Fuse • Switch	• Completes and breaks the circuit • Protects users from electric shock • Melts and breaks the circuit when too much current flows in the circuit

Match each component to its function. (03 marks)

(b) Describe the mode of operation of a d.c motor. (05 marks)

(c) An electric water pump raises 4.5kg of water through 20m every second. If the efficiency of the pump is 80%, calculate the power input. (04 marks)

(d) Explain why electricity is transmitted at high voltage. (02 marks)

(e) What is the cost of running an electrical heater rated 1000W for 2hours every day for one month if 1KWh of electricity costs 850? (02 marks)

6. (a) (i) Distinguish between ***dip*** and ***declination*.** (02 marks)

(ii) Draw a magnetic field for a bar magnet placed with its north pole facing northwards in the earth's magnetic field. (03 marks)

(b) (i)What is an electromagnet? (01 mark)

(ii) With the aid of a well-labelled diagram, describe how an electric bell works. (05 marks)

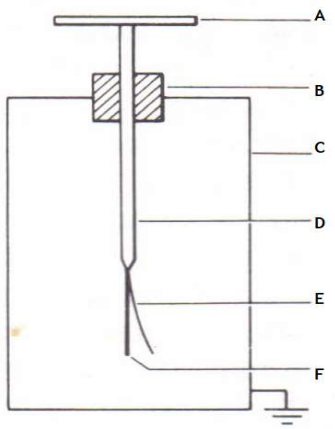
(c) (i)Write down the transformer equation. (01 mark)

(ii) A transformer has 50 turns on the primary coil and 25 turns on the secondary coil. What type of transformer is it? (01 mark)

(iii) A voltage of 480V is connected to the primary coil of the transformer in b(ii) above. What out put does the transformer give? (03 marks)

7. (a) State the law of electrostatics. (02 marks)

(b) Below is a diagram showing the structure of a gold leaf electroscope.



(i) Name the parts marked A, B, C, D, E and F. (03 marks)

(ii) State two methods of charging a gold leaf electroscope. (02 marks)

(iii) Describe how the gold leaf electroscope can be used to determine the charge on a body. (05 marks)

(c)(i) What is meant by ***action at points?*** (01 mark)

(ii) How does a lightning conductor safeguard a building from the dangers of lightning? (03 marks)

8. (a)(i) What are X-rays? (01 mark)

(ii) State four properties of X-rays. (02 marks)

(b) (i) Draw a well-labelled diagram of an x-ray tube and use it to describe how X-rays are produced. (05 marks)

(ii) Write down the energy changes that take place in an X-ray tube. (02 marks)

(iii) State two medical uses of X-rays. (02 marks)

(c) (i) What is half life? (01 mark)

(ii) A radioactive sample undergoes decay and its mass reduces by 64g in 32 minutes. If the half-life of the sample was 8 minutes, Calculate the;

(i) Original mass of the sample (03 marks)

(ii) Mass of the sample that remained after 32 minutes. (02 marks)

END