

535/2
PHYSICS
PAPER 2
July/August 2023
2¹/₄ hours



WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Certificate of Education

PHYSICS

Paper 2

2 hours 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 Iron = $450\text{Jkg}^{-1}\text{K}^{-1}$

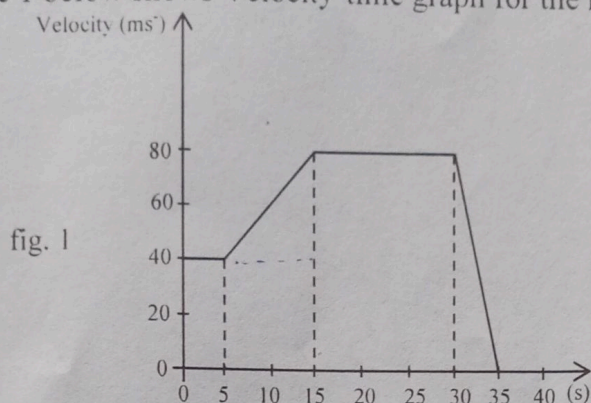
Density of water = 1000kgm^{-3}

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

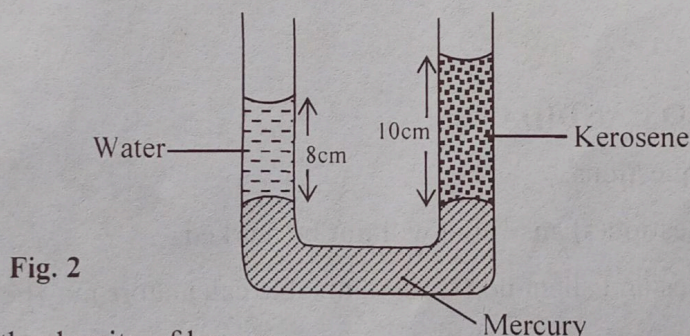
Speed of sound in air = 340ms^{-1}

Velocity of electromagnetic waves = $3 \times 10^8\text{ms}^{-1}$

1. (a) Distinguish between **uniform velocity** and **uniform acceleration**. (02 marks)
- (b) Figure 1 below shows Velocity-time graph for the motorist.



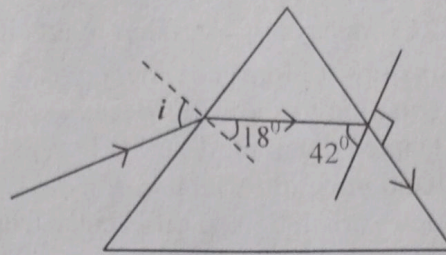
- (i) Describe the motion of the motorist. (05 marks)
- (ii) Find the total distance covered by the motorist. (04 marks)
- (c) Explain what happens to a passenger in a car when a driver brakes suddenly. (03 marks)
- (d) State **two** instances where the law of conservation of momentum is applied. (02 marks)
2. (a) (i) Define **pressure** and state its SI unit. (02 marks)
- (ii) Explain why water in a river flows faster at a narrow section than at a wide section. (03 marks)
- (b) Figure 2 below shows a U-tube containing two liquids balanced over mercury.



- Calculate the density of kerosene. (03 marks)
- (c) State the **law of floatation**. (01 mark)
- (d) A block of wood of volume 0.01 m^3 is placed and floats in water with three quarters of its volume submerged. Calculate the density of wood. (03 marks)
- (e) Briefly describe a simple experiment to measure density of a solid using Archimedes' principle. (04 marks)

3. (a) Define the following terms as applied to converging lens.
- (i) **Power of a lens**. (01 mark)
- (ii) **Focal length**. (01 mark)
- (b) (i) A finite object is placed between the optical centre and principal focus of a converging lens. Using a ray diagram, state any **three** properties of the image formed. (03 marks)
- (ii) Determine the power of the diverging lens of focal length 20 cm. (02 marks)
- (c) Light of the same wave length is incident at angle i on a glass prism, the light is refracted and follows the path shown in figure 3.

Fig. 3



Find the angle of incidence, i .

(05 marks)

- (d) (i) Explain why it's easier to read writings in white chalk on a black board. (02 marks)
(ii) Why are concave mirrors not used as driving mirrors. (02 marks)

4. (a) Define the following terms as applied to waves

- (i) **Period.** (01 mark)
(ii) **Wave length.** (01 mark)

(b)

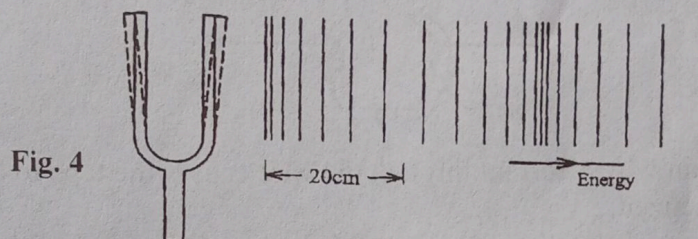


Fig. 4

Figure 4 shows a sound wave produced from a tuning fork vibrating at 800 Hz.

- (i) Calculate the velocity of the wave in the medium. (02 marks)
(ii) State **two** factors which determine the velocity of sound in air. (02 marks)
(c) Describe an experiment to show that sound is a mechanical wave. (05 marks)
(d) (i) What is meant by **diffraction of waves**? (01 mark)
(ii) Sketch the diffraction pattern of straight wave fronts incident on a barrier into a narrow slit and wide slit. (04 marks)

5. (a) (i) Define **emf of a cell**. (01 mark)
(ii) Draw a diagram to show the structure of a simple cell. (02 marks)
(iii) Polarisation is one of the defects of a simple cell. Explain how it is minimized. (02 marks)

(b) Four similar bulbs P, Q, R and S are connected in a circuit as shown.

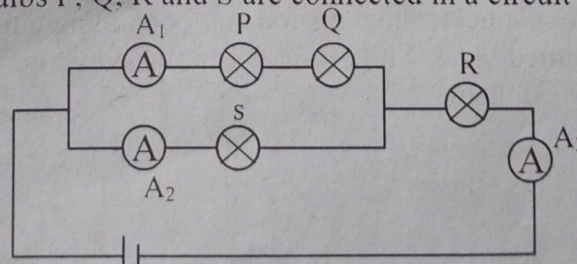


Fig. 5

- (i) Which bulb(s) will light brightest? (01 mark)
(ii) If ammeter A_1 reads 1.5 A and ammeter A_2 reads 2.0 A, what is the reading on ammeter A_3 ? Explain your answer. (02 marks)
(c) Given that the resistors P, Q, R and S are of resistances $2\ \Omega$, $3\ \Omega$, $10\ \Omega$ and $5\ \Omega$ respectively arranged as shown in figure 5.
Calculate ; (i) the total resistance. (03 marks)
(ii) power dissipated in the circuit network. (03 marks)
(d) Explain why domestic appliances are arranged in parallel. (02 marks)

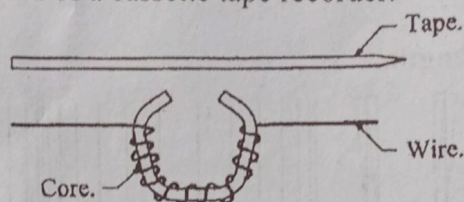
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6. (a) (i) State **two** differences between cathode rays and gamma rays. (02 marks)
 (ii) A radio isotope $^{60}_{70}\text{Co}$ decays by emission of an alpha particle, two beta particles and gamma rays to form nuclide Y. Write a balanced equation to show this decay. (02 marks)
 (b) (i) With the aid of a labeled diagram, describe how X-rays are produced. (05 marks)
 (ii) State **one** medical and **one** industrial use of x-rays. (02 marks)
 (c) Explain why alpha particles are deflected differently from beta particles by magnetic field. (02 marks)
 (d) State the function of the main components of C R O. (03 marks)

7. (a) (i) What is a **magnetic field**? (01 mark)
 (ii) Describe an experiment to determine field pattern of a bar magnet using iron fillings. (04 marks)

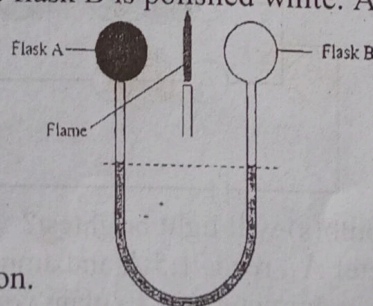
- (b) Figure 6 shows the head of a cassette tape recorder.

Fig. 6



- (i) Explain why a current through the wire causes the tape to become magnetized. (02 marks)
 (ii) The tape is usually made of plastic and coated with thin layer of iron oxide. Why is iron oxide used? (02 marks)
 (c) (i) A 240 V step down mains transformer is designed to light ten X-ray box lamps rated 12 V, 20 W and it draws a current of 1.0 A in the primary coil. Calculate the efficiency of the transformer. (05 marks)
 (ii) State **two** causes of power loss in a transformer. (02 marks)
 8. (a) (i) What is a **notch**? (01 mark)
 (ii) State **one** advantage of a notch in daily use. (01 mark)
 (iii) State **two** factors on which the strength of material depends. (02 marks)
 (b) Define the terms below as applied to heat.
 (i) **Temperature**. (01 mark)
 (ii) **Specific heat capacity**. (01 mark)
 (c) Two flasks are connected to a manometer containing ether as shown in figure 7. Flask A is painted black while flask B is polished white. A flame is then placed midway between them.

Fig. 7



- (i) State what is observed. (01 mark)
 (ii) Explain your observation. (03 marks)
 (d) (i) Use the kinetic theory of matter to explain the concept of absolute temperature. (03 marks)
 (ii) A 10 kg mass of iron at 70°C is dropped into water in a calorimeter. If the mass of water is 20 kg and its temperature is 10°C , before the iron is added. Calculate the final temperature of mixture. (03 marks)

END