535/2
PHYSICS
Paper 2
July - August 2023
2 ¼ Hours

UGANDA MUSLIM TEACHERS' ASSOCIATION

UMTA JOINT MOCK EXAMINATIONS – 2023

UGANDA CERTIFICATE OF EDUCATION

PHYSICS

Paper 2

2 hours 15 minutes

INSTRUCTIONS TO CANDIDATES

- *Attempt 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 qualities may be useful to you.*
- *Acceleration due to gravity* $= 10ms^{-2}$
- *Speed of sound in air* $= 320ms^{-1}$
- *Specific heat capacity of water* $= 4200\ Jkg^{-1}K^{-1}$.
- *Density of water* $= 1000kgm^{-3}$.
- *Specific latent heat of vaporization* $= 2.26 \times 10^{6}\ JKg^{-1}$
- *Specific heat capacity of brass* $= 380JKg^{-1}K^{-1}$
- *Specific heat capacity of copper* $=400JKg^{-1}K^{-1}$
- *Specific heat capacity of aluminium* $= 900Jkg^{-1}K^{-1}$

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1. (a)(i) Distinguish between force and vector quantity. (02 marks)

(ii) Give **two** examples of each type in 1(a)(i) above. (02 marks)

(b) Explain why when a detergent is added to clean water surface a floating needle sinks. (02 marks)

(c) A body of mass 800kg moving at $30ms^{-1}$ collides with another body of mass 1400kg moving in opposite direction at $25ms^{-1}$. After collision the two bodies stick together. Calculate the momentum of the bodies after collision. (04 marks)

(d)(i) State **two** factors affecting pressure in liquids. (02 marks)

(ii) Describe briefly an experiment to show that air pressure crushes a can. (03 marks)

(e) State **two** applications of the applications of the principle of transmission of pressure. (01 mark)

2. (a) (i) Define a spectrum. (01 mark)

(ii) Describe how a pure spectrum is formed. (04 marks)

(b) (i) Define principal focus as applied to curved mirrors. (01 marks)

(ii) An object 5cm tall, standing on the principal axis of a concave mirror of focal length 20 cm and 30cm from the mirror forms an image. By means of an accurate graphical construction, determine the position of the image. (04 marks)

(c). Explain how a periscope may be applied to view a thief behind the perimeter wall of a house. (03 marks)

(d)(i) A converging lens has focal length of 5cm. Find the power of the lens. (02 marks)

(ii) State **two** applications of lenses. (01 mark)

3. (a) (i) State Ohm's law as applied to Ohmic conductors. (01 mark)

(ii) Describe an experiment to show the relationship between the potential differences of a metallic conductor and current passing through it at constant temperature. (05 marks)

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(b) The circuit in **figure .1** consists of a battery wit negligible internal resistance.

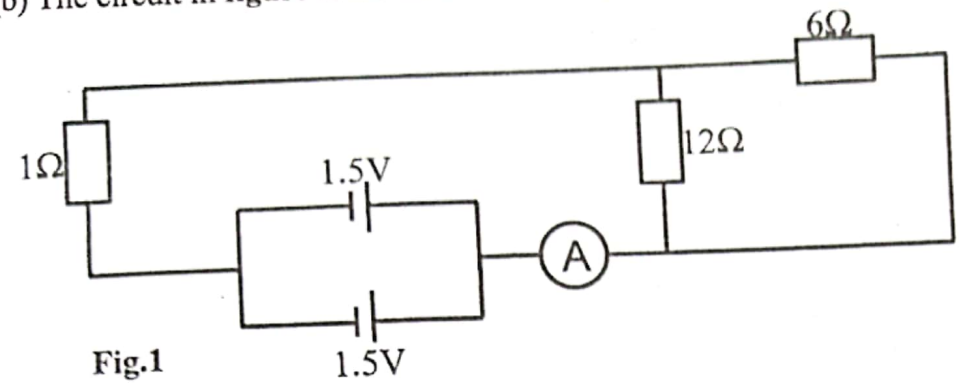

Fig.1

Find the reading of the ammeter. (04 marks)

(c) (i) Draw a labelled diagram of a simple cell. (02 marks)

(ii) Explain how polarization affects a simple cell. (03 marks)

(d) State **two** ways to maintain a battery. (Lead acid accumulator) (01 mark)

4. (a) (i) Define moment of force? (01 mark)

(ii) Describe an experiment how to locate the centre of gravity of an irregular sheet of cardboard. (04 marks)

(b) With aid of a pulley system with velocity ratio 4, describe how the mechanical advantage varies with the load. (05 marks)

(c) Sketch a velocity time graph for a car traveling at uniform speed of $90kmhr^{-1}$ for one minute. The brakes are applied and it comes to rest with Uniform retardation in a further 15 seconds. (03 marks)

(d) (i) State the Archimedes' principle. (01 mark)

(ii) A piece of sealing-wax weighs 0.27N when immersed in water. Calculate the relative density of wax. (02 marks)

5. (a) (i) Define temperature of material. (01 mark)

(ii) The fundamental interval of mercury in glass thermometer is 192mm. Calculate the temperature in degree Celsius when the mercury thread is 67.2 mm long (03 marks)

(b) Describe an experiment to show the relationship between the volume of a fixed mass of gas and temperature at a constant pressure. (05 marks)

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(c). A copper block of mass 150g is heated to a temperature of 95^0C and then dropped into a well lagged copper calorimeter of mass 200g containing 250g of water at 15°C. Calculate the maximum temperature attained by the water. (04 marks)

(d) Explain how a thermos flask can keep hot liquid without cooling for a long time. (03 marks)

6. (a)(i) Distinguish between a crest and wave length as applied to transverse waves. (02 marks)

(ii) **Figure.2** shows the motion of a wave.

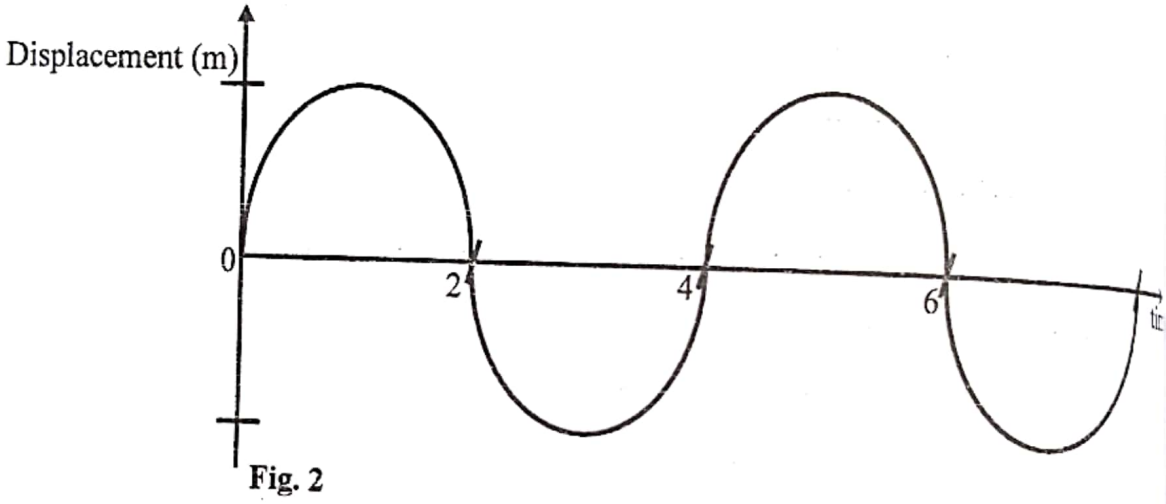

Fig. 2

determine the frequency of the wave. (02 marks)

(b)(i) Define diffraction of waves.

(ii) Draw a diagram to show diffraction of waves through narrow opening. (02 marks)

(iii) State one difference between constructive and destructive interference. (01 marks)

(c). Explain how an echo sounder can be applied to measure the depth of the sea. (03 marks)

(d). The frequency of the fourth harmonic of a closed pipe is 280 HZ. Calculate the length of air column. (02 marks)

(e). Describe an experiment to show that sound does not travel through vacuum. (04 marks)

7. (a) Define

(i) Atomic number (01 mark)

(ii)Thermionic emission (01 mark)

(b) With the aid of a labelled diagram, describe the mode of operation of the cathode ray oscilloscope. (06 marks)

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(c)(i) State two properties of cathode rays (01 mark)

(ii) Explain why the anode of an X-ray tube is made from copper. (02 marks)

(d) A radioactive element decays to $(\frac{1}{16})^{th}$ its original mass in 60 hours. Find the half-life of the element. (03 marks)

(e) State two health hazards of the X-rays. (02 marks)

8. (i) Define the term magnetic field as applied to magnetism. (01 mark)

(ii) Briefly explain how a steel bar can be magnetized by single touch stroking method. (03 marks)

(b) With the aid of labeled diagram, describe the working of a moving coil loud speaker. (05 marks)

(c) A galvanometer has resistance 5Ω and gives a full-scale deflection of 15 mA.

Calculate the value of the resistor that must be connected to the galvanometer so that a maximum current of 5A can be measured. (03 marks)

(d)(i) Distinguish between a fuse and circuit breaker. (02 marks)

(ii) State one practical way to increase the magnitude of the electromotive force of a generator. (01 mark)

(e) Draw a diagram to show distribution of charge on a spherical body. (01 mark)

END

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