535/2

PHYSICS

PAPER 2

JULY/AUGUST, 2023

2 ½ HOURS

ERETA EDUCATION CONSULTS

JOINT MOCK EXAMINATIONS 2023

Uganda Certificate of Education

PHYSICS

PAPER 2

2 HOURS 15 MINUTES

INSTRUCTIONS TO CANDIDATES

Attempt only five questions in this paper where necessary, take

- *Acceleration due to gravity, g* = *10ms $^{-2}$*
- *Density of mercury* = *13600 Kgm $^{-3}$*
- *Density of water* = *1000 Kgm^{-3}*

TURN OVER

1. (a). Define pressure and state its S.I unit *(02 marks)*

(b). In figure 1 below calculate the density of liquid B if the density of liquid A is $1200kgm^{-3}$ *(02 marks)*

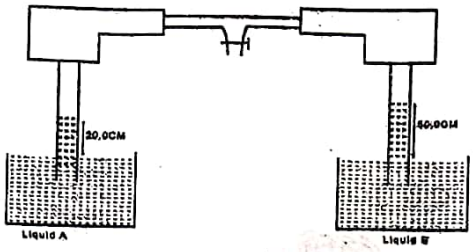

Figure 1

(c). Describe with the aid of a diagram how a simple mercury barometer is set up to measure atmospheric pressure *(05 marks)*

(ii). A mercury barometer reads 760 mmHg at the bottom of a mountain 430m high. What is the barometric reading at the top of the mountain if the density of air is $1.25\ kgm^{-3}$ *(03 marks)*

(d) (i). State four applications of atmospheric pressure *(02 marks)*

(ii) Describe briefly one of the above application mentioned in 1 d(i) above (02 marks).

2. (a). What is meant by uniform declaration? *(01 mark)*

(b) Figure 2 show a velocity-time graph for a body

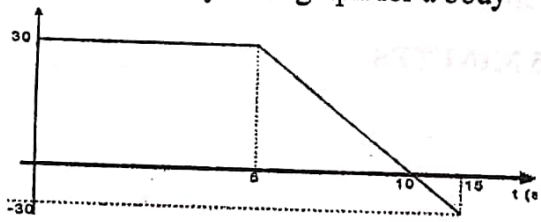

Figure 2

(i). Describe the motion of the body. *(03 marks)*

(ii) Calculate the total distance covered by the body in 15s *(03 marks)*

(c) (i). What is meant by the term acceleration due to gravity *(01 mark)*

(ii). Describe an experiment to determine acceleration due to gravity, g *(05mrks)* (d). Sketch the following graphs for an object thrown vertically upwards from the top of a cliff.

(i) A displacement time graph

(ii) A velocity –time graph *(1½ mark)*

3. (a)(i) State Archimedes principle *(1½ marks)*

(ii) Describe an experiment to verify Archimedes principle *(01 mark)*

(iii) A balloon of negligible mass and volume 100 m3 is filled with hydrogen gas of density $0.18kgm^{-3}$. The balloon is held stationary by a rope holding it to the ground as shown in figure 3 *(04 marks)*

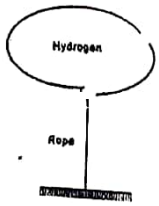

Figure 3

If the density of air is 1.2 kgm-3, find the tension in the rope (03 marks)
(b) (i) State the principle of moments (01 mark)
(ii) Describe how you can determine the mass of a uniform metre rule given a known mass, m, a rectangular wooden block, a knife edge and a piece of thread. (04 marks) (c). Briefly explain two applications of the principle of moments. *(03 marks)*

4. (a). State four reasons for not using water as a thermometric liquid *(02 marks)*
(b). Define radiations applied to heat *(01 mark)*
(c). Two flasks are connected to a manometer containing ether as shown below. Flask A is painted black while flask B is polished white. A flame is then placed midway between them as shown in figure 4.

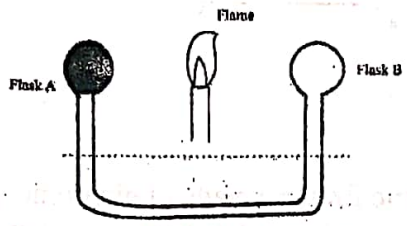

Figure 4

(i). State what is observed. *(01 mark)*
(ii). Explain your observation. *(03 marks)*
(d) (i). What is a bimetallic strip. *(1 mark).*
(ii). State two applications of a bimetallic strip. *(01mark).*
(iii). A bimetallic strip of brass and iron, 10cm long and at 20^0C is held horizontally with a Bunsen flame, the temperature of brass is 820^0C and that of iron is 770^0C. Calculate the difference in the new lengths of iron and brass.
(linear expansivity of brass is 1.9×10^{-5} k^{-1} and linear expansivity of iron is $(1.2 \times 10^{-5}$ $k^{-1})$ (03 marks)
(e)(I). Explain why car radiator cooling fins are painted black. *(02 marks)*
(ii). Explain why water is preferred as coolant in a car engine. *(02 marks)*

5. (a) (i). Define a virtual image. *(01 mark)*
(ii) Use a ray diagram to show the formation of a virtual image of a finite object using a plane mirror. *(02 marks)*
(iii). Explain why parabolic mirrors are used in search lights. *(02 marks)* (b). With the aid of a labeled diagram, describe a simple experiment to determine the focal length of a converging lens using an illuminated object and a plane mirror. (04 marks)
(c)(i). What is meant by accommodation? *(01 mark)*
(ii) State one eye defect and it's correction. *(01 mark)*
(d). (i). Describe briefly the formation of a mirage *(02 marks)*
(ii) Figure 5 below shows a ray of light incident on a water –glass boundary at an angle of incidence i

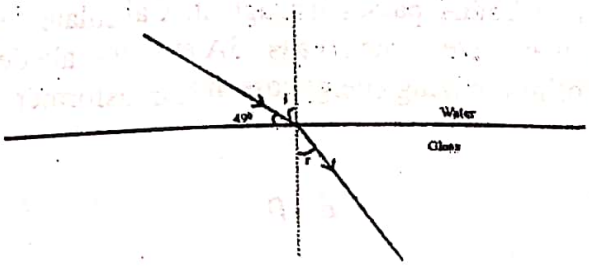

Figure 3

Calculate the angle of reflection, r if the refractive indices of water and glass are 1.33 and 1.50 respectively. *(03 marks)*

6. (a) (i) Define the terms: terminal p.d, lost volts and internal resistance of a cell. *(03 mks)*
   (ii) Describe an experiment to measure internal resistance of a cell *(04 marks)*
   (b)(i). State ohm's law *(01 mark)*
   (ii). Figure 6 below shows a battery of e.m.f 12v and negligible internal resistance connected to three resistors of resistance 3Ω, 6Ω and 8Ω

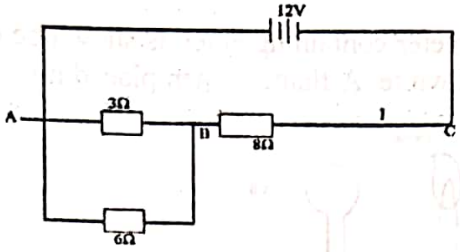

Figure 6

Find current I and p.d across AB *(03marks)*
(c). Explain why elements of electric fires are made of nichrome alloy *(01 mark)*
(d). State the two defects of a simple cell and state how each is minimized *(04 marks)*

7. (a). What is meant by;
   (i) Thermionic emission *(01 mark)*
   (ii) Cathode rays *(01 mark)*
   (b) Briefly describe how thermionic emission occurs *(02 marks)*
   (c) State the energy changes that take place in an x-ray tube *(02 marks)*
   (d) (i) Explain how intensity and penetrating power of rays produced in an x-ray tube may be varied *(03 marks)*
   (ii) Briefly describe how x-rays may be used to locate the broken part of a bone (03 mks)
   (iii) State one advantage of C.R. O *(01 mark)*
   (e) Uranium decays according to the nuclear equation below

$$^{235}_{92}U + ^{1}_{0}n \longrightarrow ^{x}_{56}B_a + ^{92}_{y}K_r + 3^{1}_{0}n$$

Find the values of x and y *(03 marks)*

8. (a)(i) Sate the domain theory of magnets *(01 mark)*
   (ii) Explain briefly how the arms of the clock can be shielded from the effect of the external magnetic field *(02 marks)*
   (iii) Explain what is observed when a magnet is freely suspended in air. (02marks)
   (b) Define the following terms *(01 mark)*
      (i) Ferromagnetic materials *(01 mark)*
      (ii)Diamagnetic materials *(01 mark)*
      (iii) Neutral point *(01 mark)*
   (c). With the aid of a labelled diagram, explain how an electric bell works *(04 marks)*
   (d) (i). A moving coil galvanometer has a coil of resistance 4Ω and gives a full-scale deflection when a current of 25mA passes through it. Calculate the value of resistance required to convert it into an ammeter which reads 15A at full scale deflection *(02 marks)*
   (ii). State two ways of minimizing energy loss in a transformer *(01 mark)*

END