535/2
Physics
Paper 2
2 ¼ hours

ACEITEKA JOINT MOCK EXAMINATIONS 2018

Uganda Certificate of Education

PHYSICS

PAPER 2

TIME: 2¼ HOURS

Instructions:

Answer any five questions

Any additional questions answered will not be marked

These values of physical quantities may be useful to you;

Acceleration due to gravity	$= 10 ms^{-2}$
Specific latent heat of vaporization of water	$= 2.26 \times 10^{6} Jkg^{-1}$
Specific heat capacity of water	$= 4{,}200\ Jkg^{-1} K^{-1}$

1. (a) (i) Name the instrument you would use to measure the diameter of a pendulum bob. (1 mark)

   (ii) Describe how the density of a small piece of stone can be determined. (4 marks)

   (b) A builder has $2.5m^3$ of concrete delivered to a building site. If he wants it to be carried up on a wheelbarrow which carries a load of 600N per trip, determine the number of trips he will make given that the density of concrete is $3000kgm^{-3}$ (5 marks)

   (c) In a hydraulic brake system

   (i) Give one reason why oil is used instead of air. (1 mark)

   (ii) What would be the effect if an air bubble enters the system? (1 mark)

   (d) A nurse applies a force of 6N to inject a patient. If the area of the sharp end of the needle is 8×10^{-6} m^2, find the pressure exerted on the patient's body. (2 marks)

2. (a) (i) Define Brownian motion. (1 mark)

   (ii) With the aid of a labeled diagram, describe how Brownian motion can be demonstrated in a laboratory. (5 marks)

   (b) A uniform beam AB of length 1m and weight 20N is suspended using a string at a distance of 0.40m from A.

   (i) State the principle of moments. (1 mark)

   (ii) Draw a diagram to show the forces acting on the beam. (1 mark)

   (iii) Find the distance from A at which a weight of 8N should be suspended so that the beam is in equilibrium (3 marks)

   (c) Explain why it is easy to open a door when the door handle is fixed away from the hinge. (2 marks)

   (d) A man pushes a block of mass 24kg along a rough horizontal floor using a force of 90N. The friction force between the floor and the block surface is 48N. Determine the

acceleration of the block. (3 marks)

3. (i) State the pressure law as applied to gases. (1 mark)
(ii) With the aid of a labeled diagram, describe an experiment to verity the pressure law. (5 marks)

(b) Dry air at a pressure of 2,500 Nm^{-2} and a temperature of 27°C is heated at a constant volume to a pressure of 2,950 Nm^{-2}. Find the new temperature. (3 marks) (c) Use the kinetic theory of matter to explain what happens to the pressure of a fixed mass of gas when compressed at constant temperature.
(2 marks) (d) (i) Define latent heat of vaporization
(1 mark)
(ii) Water of mass 600g at 30°c is contained in a brass colorimeter of mass 500g. If 70g of pure steam is bubbled into the water and the temperature rises to 89.5°c, find the specific heat capacity of brass. (4 marks)

4. (a) With the aid of a labeled diagram, explain diffuse reflection (4 marks) (b) Give two reasons why convex mirrors are suitable for use as driving mirrors.
(2 marks)
(c) An object of length 2cm is placed 5cm infront of a concave mirror of focal length 10cm perpendicular to the principal axis. Use a scale diagram to find
(i) the position of the image. (5 marks)
(ii) the magnification (2 marks)

(d)

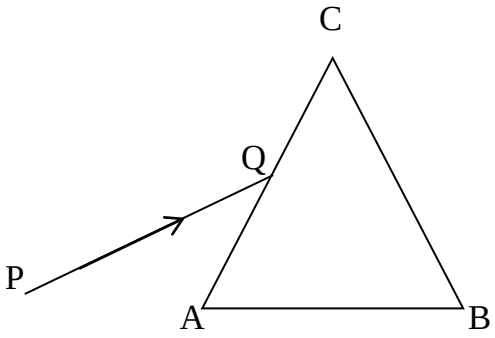

Fig 1

The diagram in Fig 1 shows a ray of white light incident on a glass prism. Explain what happens to the ray as it passes through the prism. (3 marks)

5. (a) Define the following terms as applied to **waves**.
   (i) amplitude (1 mark)
   (ii) frequency (1 mark)

   (b) A progressive wave of frequency, f, and wavelength, □, is moving at a speed, v
   Derive an equation to show the relation between f, □ and v. (3 marks)
   (c) A radio signal is transmitted at a frequency of **2.5MHz**. Find the wavelength of the
   signal. (2 marks)
   (d) Describe an experiment to show that sound does not travel through a vacuum

   (5 marks)
   (e) (i) What is **an echo**? (1 mark)
   (ii) Explain why echoes are not heard in a small room. (3 marks)

6. (a) Distinguish between the nature of an alpha particle and a beta particle (1 mark)

   (b) A nitrogen nuclide $^{16}_{7}N$ decays to become an oxygen nuclide by emitting a beta particle.
   (i) Write down an equation to show this process. (2 marks)

   (ii) If the half life of the nuclide $^{16}_{7}N$ is 7.3 seconds, calculate the fraction of the original radioactive isotope remaining after 29.2 seconds. (3 marks)
   (iii) Give **two** medical uses of radio isotopes. (2 marks)

   (c) (i) What are **cathode rays**? (1 marks)
   (ii) Cathode rays are made to strike a metal plate of high melting point. Describe what happens at the metal plate. (3 marks)
   (d) Describe the working of the electron gun in **a cathode ray oscilloscope**. (4 marks)

7. (a)(i) Define **a neutral point** as applied to a magnetic field. (1 mark) (ii) Two bar magnets are placed on a table such that the North-poles are close and face each other. Sketch their magnetic field. (2 marks)

(b) Give **two** differences between an unmagnetized steel bar and a magnetized steel bar of identical dimensions. (2 marks)

(c)

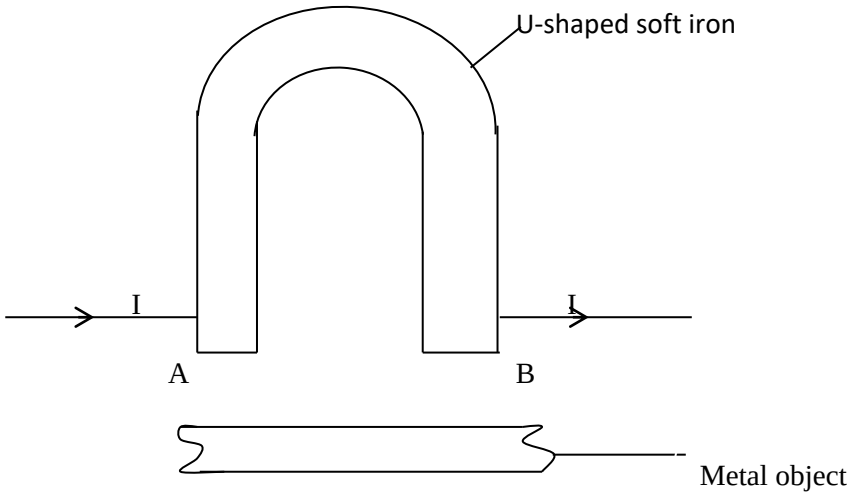

Fig 2

The diagram in fig.2 shows a U-shaped soft iron bar to be used as an electromagnet to lift metal objects

(i) Draw the diagram to show the complete winding of the coil round the iron bar so that opposite poles are induced on the ends A and B of the iron bar. (2 marks)

(ii) Label the magnetic poles induced. (1 mark)

(iii) Suggest **two** ways of increasing the strength of the magnet. (2 marks)

(d) With the aid of a labeled diagram, describe how an alternating current generator works. (6 marks)

8. (a) Describe how a gold leaf electroscope can be used to detect the presence of charge on a glass rod. (3 marks) (b) Explain how an insulator gets charged by rubbing (3 marks)

(c) With the aid of a circuit diagram, describe an experiment to verify **Ohm's law.** (6 marks)

(d)

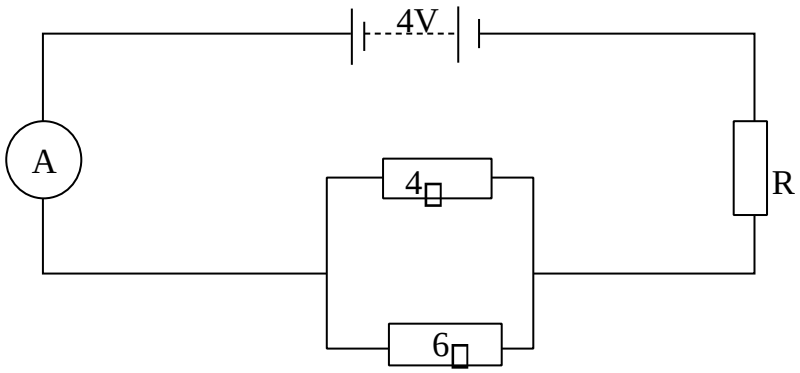

Fig 3

Fig 3 shows a battery of emf 4V and negligible internal resistance connected to resistors of resistances 4Ω, 8Ω and RΩ. Determine the value of R if the ammeter reading is 0.5A (4 marks) ***END***