

532/2

PHYSICS

June 2016

2 ¼ hours

UGANDA CERTIFICATE OF EDUCATION

MOCK1 EXAMINATIONS S 2016

PHYSICS

Paper 2

2 hours 15 minutes

INSTRUCTIONS TO CANDIDATES:

Attempt any 5 questions

These values of physical quantities may be useful to you.

Acceleration due to gravity, g = 10 ms^{-2}

Specific heat capacity of water = $4,200 \text{ J kg}^{-1} \text{ K}^{-1}$

Specific heat capacity of copper = $400 \text{ J kg}^{-1} \text{ K}^{-1}$

- 1.(a) State Hooke's law of elasticity. (1 mark)
- (b) Describe an experiment to demonstrate Hooke's law. (5 marks)
- (c) A spring of natural length 8.0×10^{-2} m extends by 2.5×10^{-2} mm when a weight of 10 N is suspended on it.
- (i) Find the spring constant. (2 marks)
- (ii) Determine the extension when a weight of 15 N is suspended on the spring. (1 mark)
- (d) (i) Define moment of a force. (1 mark)
- (ii) The diagram in Fig.1 shows a uniform bar AB of length 1.2 m and weight 10 N under the action of some forces.
- Find the minimum force, F, needed to keep the bar in a horizontal position. (3 marks)

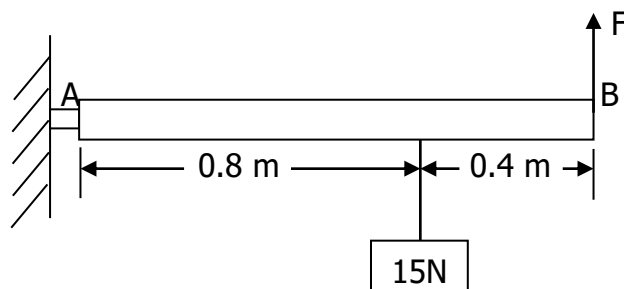


Fig. 1

- (e) (i) Define capillarity. (1 mark)
- (ii) Explain how capillary rise occurs in a narrow tube. (2 marks)
2. (a) (i) State the laws of refraction of light. (2 marks)
- (ii) Give two applications of total internal reflection. (2 marks)
- (b) Describe an experiment to determine the refractive index of the material of a rectangular glass block. (6 marks)
- (c) A ray of light incident on glass from air is refracted through 32° . If the refractive index of glass is 1.50, find the angle of incidence. (3 marks)
- (d) With the aid of a diagram, explain why a swimming pool appears shallower than its actual depth. (3 marks)

P.T.O.

3. (a) A drop of oil of volume $6.0 \times 10^{-3} \text{ cm}^3$ forms a patch of diameter 3.5 cm on a water surface.
- (i) Calculate the diameter of a molecule of the oil. (3 marks)
- (ii) State the **two** assumptions made. (1 mark)
- (b) (i) State Archimede's principle. (1 mark)
- (ii) A block of metal of mass 0.25 kg floats in mercury whose density is $1.36 \times 10^4 \text{ kgm}^{-3}$. Find the volume of the metal block which lies below the surface of the mercury. (3 marks)
- (c) (i) Explain why a metallic tin with an air-tight lid floats on the surface of water. (3 marks)
- (ii) Give **one** example where the principle in (c) (i) is used. (1 mark)
- (d) In a Brownian motion experiment, smoke was introduced into an illuminated glass cell and observed under a microscope.
Explain what is observed. (3 marks)
4. (a) Describe an experiment to charge a gold leaf electroscope negatively by induction. (4 marks)
- (b) A positively charged sewing needle is fixed in a cork and placed in a dark room. A candle flame is placed in front of the sharp end of the pin
Explain why the flame is blown away. (4 marks)
- (c) A battery of e.m.f. 12V is connected to resistors of resistances 4Ω , 10Ω and 15Ω as shown in Fig. 2.

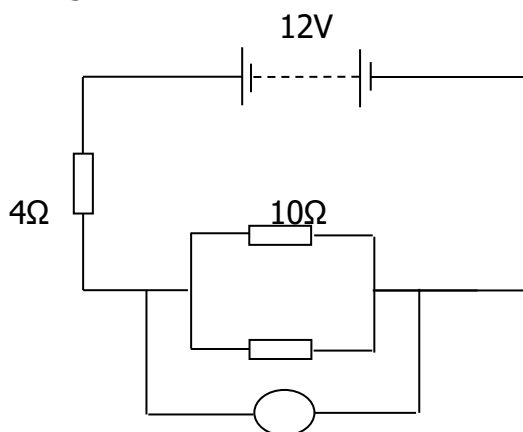


Fig. 2.

Determine the voltmeter reading.

(5 marks)

P.T.O.

- (d) (i) State Ohm's law. (1 mark)
- (ii) A light industry uses 20 kW of electrical energy to run its machines. How much does the industry pay for operating the machines for 8 hours if one unit of electrical energy costs 650 shillings? (2 marks)
5. (a) State any **two** differences between sound waves and light waves. (2 marks)
- (b) (i) Describe a simple experiment to determine the velocity of sound in air. (4 marks)
- (ii) Explain why the speed of sound is higher in solids than in air. (3 marks)
- (c) Two people P and Q stand in a straight line at distances of 330 m and 660 m respectively from a high wall. Find the time interval taken for P to hear the first and second sounds when Q makes a loud sound. (3 marks)
- (d) (i) What is a stationary wave? (3 marks)
- (ii) Name **one** musical instrument which produces stationary waves. (1 mark)
6. (a) (i) Draw a labeled diagram of a cathode ray oscilloscope. (4 marks)
- (ii) State the function of each part. (4 marks)
- (iii) Explain how the bright spot is formed on the screen. (3 marks)
- (b) A radioactive substance produces alpha particles, beta particles and gamma rays simultaneously which are directed midway between two parallel horizontal electrical plates which are oppositely charged.
- (i) Draw a diagram to show the path of the radiations between the plates. (3 marks)
- (ii) What happens when the radioactive substance is completely covered with an ordinary sheet of paper? (1 mark)
- (c) Give any **one** precaution taken by people who handle radioactive substances. (1 mark)
7. (a) (i) Give any **two** characteristics which a liquid used in a liquid-in-glass

thermometer should have. (2 marks)

(ii) Describe how the lower fixed point on a mercury-in-glass thermometer can be determined. (4 marks)

P.T.O.

(b) Explain this observation: A piece of thick glass removed from hot water and dipped into cold water will crack. (5 marks)

(c) (i) Define specific heat capacity. (1 mark)

(ii) A piece of copper of mass 4×10^{-2} kg at 200° C is quickly transferred into a copper calorimeter of mass 6×10^{-2} kg containing 5×10^{-2} kg of water at 25° C . Determine the final temperature of the mixture. (4 marks)

8. (a) (i) Define the term **line of force** as applied to magnetic fields. (1 mark)

(ii) Sketch the magnetic field between two south poles of a magnet placed close to each other. (2 marks)

(b) Explain, using the domain theory of magnetism, how magnetization is lost by heating a steel magnet. (3 marks)

(c) State **two** factors that affect the strength of an electromagnet. (1 mark)

(d) (i) With the aid of a labeled diagram, describe how a transformer works. (6 marks)

(ii) A transformer with 400 turns in the secondary circuit and 20 turns in the primary circuit has a p.d. of 240 V in the primary circuit. What is the p.d. in the secondary circuit? (3 marks)

END