

535/2

Physics

Paper 2

April 2019

2¼ Hours

MWALIMU EXAMINATIONS BUREAU

UCE END OF TERM I RESOURCE EXAMINATIONS 2019

S.4 PHYSICS

PAPER 2

2 HOURS 15 MINUTES

INSTRUCTIONS

- Answer any five (5) questions.
- Mathematical tables and silent non-programmable calculators may be used.
- These values of physical quantities may be useful to you
 - Accelerating due to gravity = 10ms^{-2}
 - Specific heat capacity of water = $4200\text{J kg}^{-1}\text{K}^{-1}$
 - Specific latent heat of fusion of water = 340000J kg^{-1}
 - Density of water = 1000kgm^{-3}
 - Speed of sound in air = 330ms^{-1}
 - Velocity of electromagnetic waves = $3.0 \times 10^8\text{ms}^{-1}$

1. (a) Explain what is meant by mutual induction as applied to transformers. (02 marks)
- (b) (i) Describe the mode of operation of a step up transformer. (04 marks)
- (ii) State any **three** causes of energy losses in a transformer and state how they can be minimized. (03 marks)
- (c) (i) A transformer with 1200 turns on the primary coil and 500 turns in the secondary coil is designed to step down voltage from 240V. If the current in the primary coil and secondary coil is 3A and 5A respectively, calculate the efficiency of the transformer. (03 marks)
- (ii) Name **two** domestic devices which use a transformer. (02 marks)
- (d) An electric lamp is rated 240V, 30W. Calculate the current which this lamp draws when connected to a 240V power supply. (02 marks)

2. (a) Define the following as applied to radioactivity;
 - (i) half – life, (01 mark)
 - (ii) isotopes. (01 mark)
- (b) State the changes that occur in the nucleus of a radioactive atom if it emits.
 - (i) γ - rays, (02 marks)
 - (ii) α - particle, (02 marks)
 - (iii) β - particle. (02 marks)
- (c) Compare the penetrating power of the emissions referred to in (b) above. (02 marks)
- (d) In 168 seconds, the activity of a radioactive element falls to one – eight of its original value. What is its half life? (03 marks)
- (e) State **three** uses of radioactivity. (03 marks)

3. (a) Define the term specific heat capacity of a liquid. (01 mark)
- (b) With aid of a suitable diagram describe a simple experiment to determine the specific latent heat of fusion of ice. (06 marks)
- (c) A $2\frac{1}{2}$ litre electric kettle of mass 1.4kg and heating element rated 1KW is filled with water at a given temperature. If the water took 10 minutes to reach boiling point of 100°C , what was the temperature of water? (Specific heat capacity of material of kettle is $400 \text{ J Kg}^{-1} \text{ K}^{-1}$) (04 marks)
- (d) Explain the following observations:
 - (i) water is preferred in cooling car engines to many other liquids. (02 marks)
 - (ii) the boiling point of water is higher at lower altitudes. (02 marks)
- (e) State **one** physical property which changes with temperature. (01 mark)

4. (a) (i) What is sound? (01 mark)
- (ii) Describe with the aid of a diagram an experiment to determine the speed of sound in air using resonance method. (05 marks)
- (b) (i) Distinguish between a node and antinode. (02 marks)
- (ii) Sketch diagrams of stationary waves corresponding to fundamental note and first overtone in a closed pipe. (03 marks)
- (iii) What is an open pipe preferred to a closed pipe? (01 mark)
- (c) A progressive wave travels a distance of 31.5m in 20 seconds. If the distance travelled is equivalent to the distance between 10 consecutive crests, calculate the;
- (i) wave length of the wave, (1½ marks)
- (ii) period of the wave. (2½ marks)
5. (a) (i) Define pressure and state its S.I unit. (02 marks)
- (ii) Explain why the balloon in a room bursts when the temperature of the room increases. (03 marks)

(b)

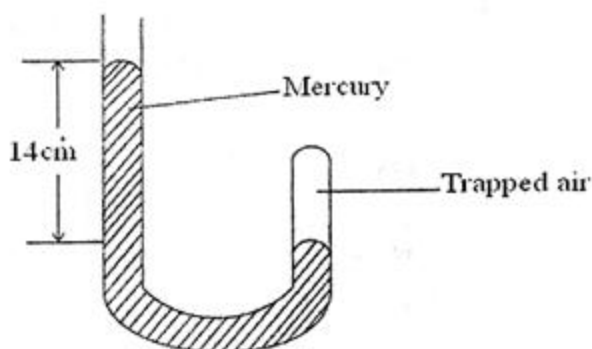


Fig. 1

A gas is trapped by mercury in a *J* – tube at atmospheric pressure of 760mmHg as shown in figure 1 above. Calculate the pressure exerted by the trapped gas in Nm^{-2} . (02 marks)

- (c) Describe with aid of a labeled diagram, how a force pump works. (05 marks)
- (d) (i) State the law of conservation of energy. (01 mark)
- (ii) A stone of mass 0.2kg is throw vertically upwards and attains a maximum potential energy of 16J . Calculate its initial velocity. (03 marks)

6. (a) (i) What is a primary colour? (01 mark)
 (ii) Give **two** examples of primary colours. (01 mark)
- (b) With the aid of a diagram explain dispersion of white light by a glass prism. (06 marks)
- (c) An object of height 1cm is placed vertically on the principle axis of a convex lens of focal length 10cm at a distance of 12.5cm from the lens. By graphical method, determine the position and height of the image formed. (04 marks)
- (d) State **two** applications of convex lenses. (02 marks)
- (e) Explain the appearance of a blue pen in white light. (02 marks)
7. (a) (i) State ohms law. (01 mark)
 (ii) Name **two** sources of emf. (01 mark)
- (b) The network of resistors is connected to two cells of emf 1.5V each and internal resistance of 2.0Ω each as shown in figure 2..

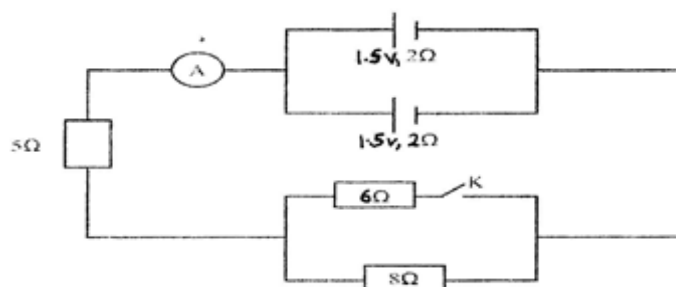


Fig. 2

Determine the reading of the ammeter, A, when the switch is;

- (i) open, (03 marks)
- (ii) closed, (04 marks)
- (c) Find the power dissipated in the 5Ω resistor if the switch, K is closed. (03 marks)
8. (a) (i) What is a machine? (01 mark)
 (ii) With aid of relevant examples, give the **three** classes of levers. (03 marks)
- (b) A lifting tackle has 2 pulleys in each block. An effort of 40N lifts a load of 120N . Calculate the;
- (i) mechanical advantage, (02 marks)
- (ii) efficiency of the machine. (03 marks)
- (c) (i) State Hooke's law, (01 mark)
 (ii) Describe an experiment to verify Hooke's law (06 marks)

End