535/2

PHYSICS

PAPER 2

NOVEMBER 2018

2¼ hours

BUDAKA PROGRESSIVE HIGH SCHOOL

END OF YEAR EXAMINATIONS 2018

Uganda Certificate of Education

S.3 physics

Paper 2

2 hours 15 minutes

INSTRUCTIONS TO CANDIDATES.

Answer **five** *questions.*

Mathematical tables and silent non-programmable calculators may be used.

These values of physical quantities may be useful to you.

Acceleration due to gravity $\qquad = \quad 10\text{ms}^{-2}$.

Speed of sound in air $\qquad = \quad 320 \text{ ms}^{-1}$.

Velocity of electromagnetic waves $\qquad = \quad 3.0 \text{ x } 10^8 \text{ ms}^{-1}$.

Density of mercury $\qquad = \quad 13,600 \text{ kgm}^{-3}$

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1. (a) Define the terms:

(i) Mechanical advantage   **(01 mark)**

(ii) Velocity ratio   **(01 mark)**

(b) A pulley system of velocity ratio 4 is used to raise a load of 16 kg force. An effort of 50 N is applied for 40 s to move the load through 1.2 m. Calculate the

(i) Mechanical advantage   **(03 marks)**

(ii) Efficiency of the machine   **(03 marks)**

(iii) Power developed by the effort.   **(03 marks)**

 (c) (i) Explain why the efficiency of a practical machine cannot be 100%.   **(02marks)**

(ii) Outline the steps which can be taken to improve the efficiency of the machine in (c) (i) above.
                                                                                                                  (02marks)

 (d) State one application of pulley systems.   **(01mark)**

2. (a) Define the following terms;

(i) Acceleration   **(01 mark)**

(ii) Displacement.   **(01 mark)**

(b) (i) State the principle of conservation of linear momentum.   **(01 mark)**

(ii) A body of mass 100g moving with a velocity of 10m s^{-1} makes a perfectly inelastic collision with a stationary body of mass 150g. Calculate the velocity with which the bodies move after collision.   **(04marks).**

(c)
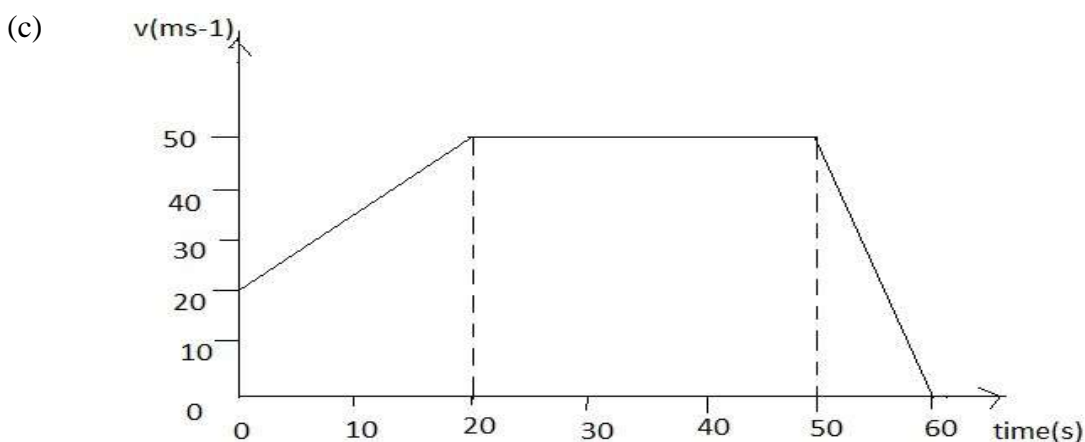
The diagram above represents a velocity time graph of a body in motion.

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

(ii). Calculate the total distance travelled. **(04 marks)**

(d). Briefly state the energy changes which take place when a ball is thrown vertically upwards in air until it lands on the ground. **(02 marks)**

3. (a) (i) What is meant by critical angle? **(01 mark)**

 (ii) Explain, with the aid of diagrams, how total internal reflection occurs. **(05 marks)**

 (b). A ray of light is incident on the water-glass interface at an angle of 42^0. Calculate the angle of refraction if   the refractive indices of water and glass are 1.33 and 1.52 respectively.
(03 marks)

(c). By scale drawing, determine the position, size and nature of the image formed by a convex lens of focal length 10cm when an object 2.5cm high is placed at a distance 15cm from the lens.
(06 marks)

(d). State one application of a converging lens. **(01 mark)**

4. (a). (i) Distinguish between e.m.f and terminal potential difference of a cell. **(02 marks)**

(ii) Briefly explain the defects of a simple cell and state how they are minimized. **(04 marks)**

 (b). What are the advantages of secondary cells over primary cells? **(02 marks)**

(c).
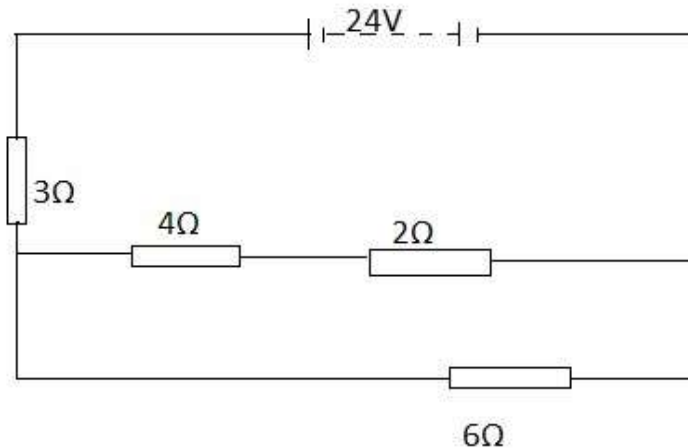
An accumulator of e.m.f. 24V and internal resistance of 2Ω, is connected to 3Ω, 4Ω, 2Ω, and 6Ω resistors as shown in the diagram above.

Calculate the

(i) current through the 6Ω resistor. **(04 marks)**

(ii) total power expended. **(02 marks)**

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(d). State two precautions which must be taken to protect an accumulator.   **(02 marks)**

5.   What is meant by a Longitudinal wave and a Transverse wave. Give an example each.
                                                                                              (03marks)

b) A vibrator in a ripple tank vibrates at $5Hz$. If the distance between 10 successive crests is
   37.8 cm, calculate,

(i) The wavelength of the wave.   **(02marks)**

(ii) The velocity of the wave   **(03marks)**

(c) Explain why open pipes are preferred to closed pipes in producing sound.   **(02marks)**

(e) Describe a simple experiment to demonstrate that sound waves require a material for their
    transmission   **(06marks)**

6   (a) Define the following:

   (i) Moment of a force about a point   **(01mark)**

   (ii) centre of gravity of a body.   **(01mark)**

   (b) (i) State the principle of moments.   **(01mark)**

   (ii) Describe an experiment to determine the mass of a uniform metre rule.   **(05 marks)**

   (c) A uniform beam AB, 4m long and mass 50kg rests horizontally on two supports placed 0.5m
       from A and B respectively. The beam carries a load of 75kg at a distance of 1.5m from A. Find
       the reactions at the supports.   **(06 marks)**

(d) A load of 12 N stretches a spring by 80 mm. Find the weight which produces an extension of
    60mm on the same spring.   **(02 marks)**

7. What is meant by the terms:

(i) temperature?   **(01mark)**

(ii) lower fixed point of a thermometer?   **(01mark)**

(b) (i) Briefly describe an experiment to determine the lower fixed point of a thermometer.
                                                                                   (04marks)

(ii) The difference between the upper and the lower fixed points of a thermometer is 67cm. If the
     mercury thread is 46cm above the lower fixed point, determine the temperature indicated on the
     thermometer in degrees Celsius.   **(02 marks)**

(c) State two advantages and two disadvantages of using mercury as a thermometric liquid
                                                                                   (04 marks)

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(d) (i) Distinguish between conduction and convection. **(02 marks)**

(ii) Why do solids conduct heat faster than liquids and gases? **(02 marks)**

8. (a) (i) Define the term pressure. **(01 mark)**

(ii) Give two factors that affect pressure in solids. **(02 marks)**

(iii) Calculate the minimum pressure exerted by a rectangular block of dimensions
10cm×15cm×20cm and mass 50kg. **(03 marks)**

(b) (i) What is meant by the term atmospheric pressure? **(01 mark)**

(ii) With the aid of a well labeled diagram, describe how a force pump raises water from a well.
(05 marks)

(c) (i) State the principle of transmission of pressure in fluids. **(01 mark)**

(ii) In the figure below, piston P has surface area $0.4m^2$ while Q has a surface area of $2.4m^2$. If a
downward force of 500N is exerted on P, find the maximum load which must be raised by Q.
(03 marks)
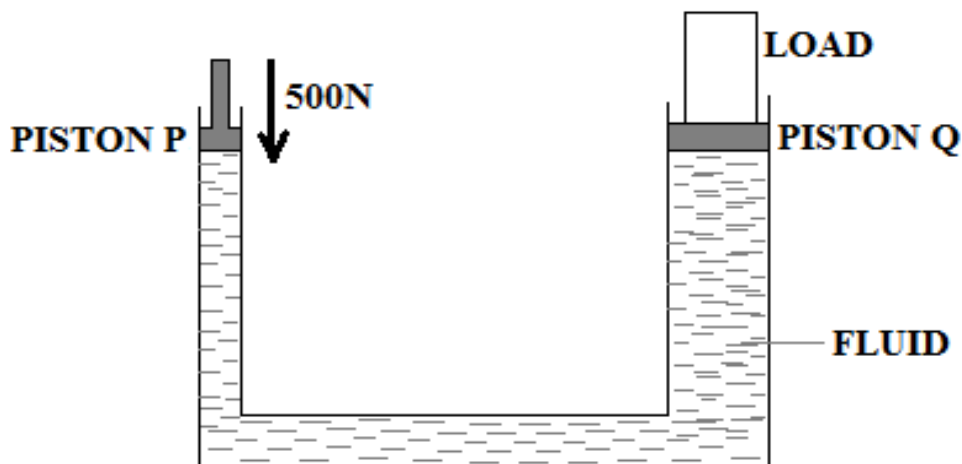
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Merry Christmas and prosperous new year-2019

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