UGANDA CERTIFICATE OF EDUCATION

535/2

PHYSICS PAPER 2

2 hours 15 minutes.

INSTRACTIONS TO CANDIDATES

Attempt any FIVE questions

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

These values of physical quantities may be useful to candidates.

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

Specific heat capacity of water = $4200J\ kg^{-1}\ K^{-1}$

Speed of light in vacuum = $3.0 \times 10^{8} m\ s^{-1}$

Speed of sound in air = $330m\ s^{-1}$

Density of water = $1000kg\ m^{-3}$

(1) (a) Define the terms:

(i) Mechanical advantage (1 mark)

(ii) Velocity ratio (1 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 (3 marks)

(ii) Efficiency of the machine (3 marks)

(iii) Power developed by the effort. (3 marks)

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

(2marks)

(ii) Outline the steps which can be taken to improve the efficiency of the machine in (c) (i) above. (2marks)

(d) State one application of pulley systems. (1mark)

2. (a) Define the following terms;

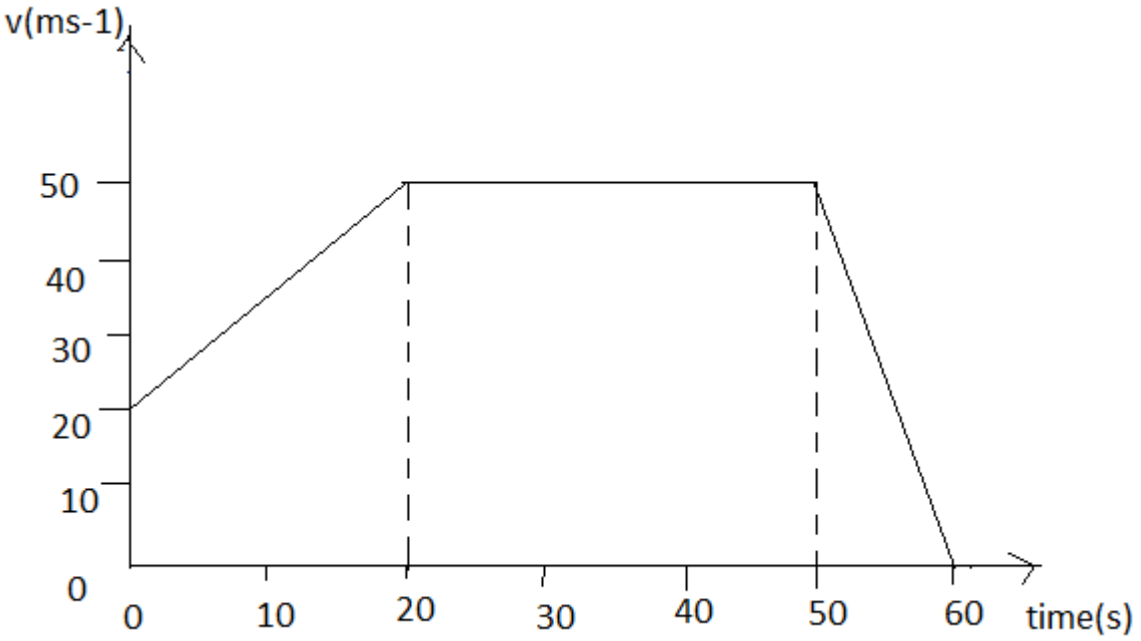
(i) Acceleration (1 mark)

(ii) Displacement. (1 mark)

(b) (i) State the principle of conservation of linear momentum. (1 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. (4marks).

(c)



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

(i). Describe the motion of the body. (3 marks)

(ii). Calculate the total distance travelled. (4 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. (2 marks)

3. (a) (i) What is meant by critical angle? (1 mark)

(ii) Explain, with the aid of a diagram, how total internal reflection occurs.

(5 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. (3 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. (6 marks)

(d). State one application of a converging lens. (1 mark)

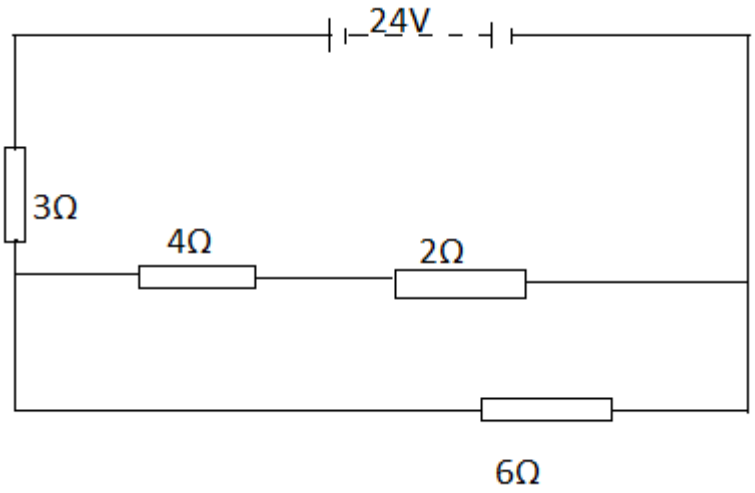
4. (a). (i) Distinguish between *e.m.f* and *terminal potential difference* of a cell.

(2 marks)

(ii) Briefly explain the defects of a simple cell and state how they are minimised. (4 marks)

(b). What are the advantages of secondary cells over primary cells? (2 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. (4 marks)

(iii) total power expended. (2 marks)

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

(2 marks)

5. (a)(i). Define specific latent heat of fusion. (1 mark)

(ii) Describe an experiment to determine the specific latent heat of fusion of ice. (6 marks)

(b). Two kilograms of ice at -10^0C is heated until it changes to steam at 100^0C.

(i). Sketch a graph to show how the temperatures changes with time (3 marks)

(ii). Calculate the thermal energy required at each section of the graph sketched in b (i) above. (6 marks)

Specific latent heat of fusion of ice = 3.36×10^5J kg^{-1} K^{-1}

Specific latent heat of vaporisation of water = 2.26×10^6J kg^{-1}

Specific heat capacity of ice = 2.1×10^3J kg^{-1} K^{-1}

6. (a) (i). What are cathode rays*?* (1 mark)

(ii). State two properties of cathode rays. (2 marks)

(b) (i). Draw a well labelled diagram of a cathode ray oscilloscope C.R.O.

(4 marks)

(ii). State one function of each of the parts labelled in (b) (i) above. (4 marks)

(iii). State one use of a C.R.O. (1 mark)

(c) (i). Distinguish between hard and soft X-rays. (2 marks)

(ii). Briefly explain how X-rays are produced (diagram not required). (2 marks)

7. (a) (i). What is meant by the term *neutral point* as applied to magnetism?

(1 mark)

(ii). Sketch the resultant magnetic field pattern of a bar magnet placed horizontally with its North Pole pointing north in the earth's magnetic field.

(2 marks)

(b) Use the domain theory to explain the following;

(i). Magnetic saturation. (1 mark)

(ii). Demagnetisation. (1 mark)

(c) (i). State Lenz's law of electromagnetic induction. (1 mark)

(ii). Describe, with the aid of a labelled diagram, how a simple a.c. generator works. (7 marks)

(iii). Sketch the variation of the e. m.f. generated with time for the generator in (c) (ii) above. (2 marks)

(iv). State the modification which can be made to convert the a.c. generator to a d.c. motor. (1 mark)

8. (a) (i). What is meant by a radioisotope? (1 mark)
(ii) State one biological and one industrial application of radioisotope.(2 marks)

(b) Give two differences between nuclear fusion and nuclear fission. (2 marks)

(c) (i) With the aid of a labelled diagram, describe how X-rays are produced.

(6 marks)

(ii) State four properties of X-rays. (2 marks)

(iii) State two precautions taken in an X-ray laboratory. (2 marks)

(iv) State one hazard of X-rays. (1 mark)

END