

535/2

PHYSICS

Paper 2

2¼ Hours

UCE MOCK EXAMINATIONS

PHYSICS

Paper 2

2 hours 15 minutes

INSTRUCTIONS TO CANDIDATES

Answer any **five** 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 latent heat of fusion of water = $340,000 \text{ J kg}^{-1}$

- 1 (a) State the factors on which the pressure exerted by a fluid depends. (3 marks)
- (b) With the aid of a labeled diagram describe how a lift pump works. (5 marks)
- (c)

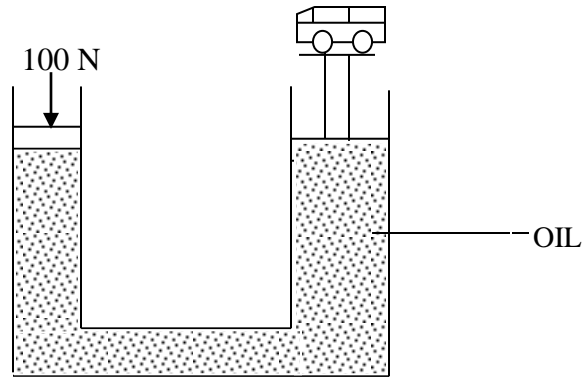


Fig.1

The diagram in Fig. 1 shows a hydraulic machine.

- (i) Give **one** example where this machine is used. (1 mark)
- (ii) If an effort of 100 N is applied at the smaller piston of area $4 \times 10^{-2} \text{ m}^2$, find the mass of the car raised if the area of the larger piston is $8 \times 10^{-2} \text{ m}^2$. (4 marks)
- (d) Explain why a sharp panga is preferred to a blunt panga when cutting a piece of wood. (3 marks)
2. (a) (i) Distinguish between potential energy and kinetic energy. (2 marks)
- (ii) State the energy changes which occur when a car collides with a wall. (2 marks)
- (b) A crane lifts a car mass of 1500 kg through a height of 3.2 m to load it onto a carrier. Find the work done against gravity. (2 marks)
- (c) (i) With the aid of a diagram, describe an experiment to determine the mechanical advantage of a pulley system of velocity ratio 3. (6 marks)
- (ii) Explain why the efficiency of a pulley system is less than 100%. (2 marks)
- (d) Give **two** examples where pulleys are used. (2 marks)

3. (a) With the aid of a labeled diagram, describe an experiment to show the variation of pressure of a fixed mass of a gas with temperature at constant volume. (6 marks)
- (b) A gas is enclosed in a container at a pressure of $3.6 \times 10^5 \text{ Nm}^{-2}$ when the temperature is 27°C . Determine the pressure of the gas after it is placed in a refrigerator and cooled to -3°C at constant volume. (3 marks)
- (c) (i) Define specific heat capacity. (1 mark)
(ii) A block of 4 kg of ice at -25°C is heated until it turns into a liquid at 0°C . Find the heat energy required. (4 marks)
- (d) Explain why one feels cold when he touches a steel pipe in the morning. (2 marks)
4. (a) (i) State the law of charges. (1 mark)
(ii) Describe an experiment to charge a gold leaf electroscope negatively by induction. (5 marks)
- (b) Explain why a positively charged pointed conductor on an insulating stand in air loses charge. (4 marks)
- (c) State the factors that affect the quantity of heat generated in a conductor by an electric current. (3 marks)

(d)

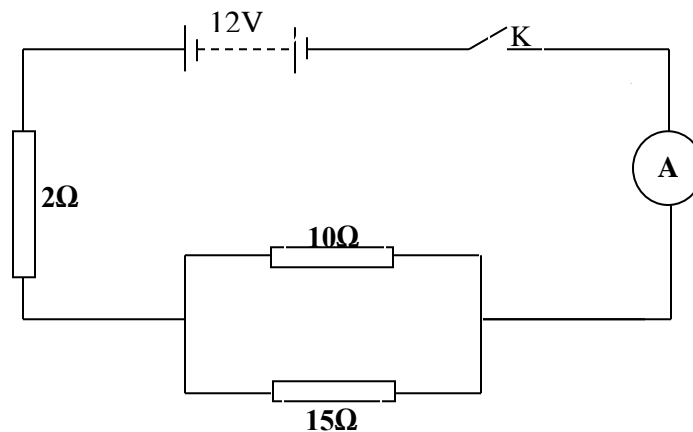


Fig.2

(d) The circuit in Fig. 2 shows a battery of e.m.f. 12V and negligible internal resistance connected to resistors of 2Ω , 10Ω , and 15Ω . Determine the ammeter reading when the switch K is closed. (3 marks)

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

(ii) Give **two** differences between cathode rays and gamma rays. (2 marks)

(b) (i) Describe how X - rays are produced in an X - ray tube. (4 marks)

(ii) Explain why tungsten is used as target material in X - ray tubes. (2 marks)

(c) (i) Distinguish between nuclear fusion and nuclear fission. (2 marks)

(ii) The half - life of a radioactive substance is 138 days. If a sample of the substance has 8×10^{10} undecayed atoms now, how many atoms will remain after 552 days? (3 marks)

(d) State **two** medical uses of radioisotopes. (2 marks)

6. (a) Group the following quantities into scalars or vectors:
mass, momentum, acceleration, time. (2 marks)

(b) Describe an experiment to determine the acceleration due to gravity using a simple pendulum (6 marks)

(c) A spear of mass 2.0 kg is thrown into a heap of sand and sinks 1.5 m into the sand. If the average force opposing its motion into the sand is 2,500 N, find the velocity with which it strikes the sand. (3 marks)

(d) Explain why a bus carrying standing passengers has a higher chance of overturning than one carrying seated passengers. (2 marks)

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

(ii) A boy of mass 48 kg sits at a distance of 1.2 m from a pivot of a sea saw to balance a girl of mass 40 kg. At what distance from the pivot is the girl seating? (2 marks)

7. (a) (i) State the laws of reflection of light. (2 marks)
- (ii) With the aid of a diagram, describe an experiment to show that light travels in a straight line. (6 marks)
- (b) Explain why a concave mirror is suitable for use in a car head lamp. (3 marks)
- (c) An object is placed 5 cm perpendicular to the principal axis of a concave mirror of focal length 10 cm. Using a scale diagram, find the position of the image. (5 marks)
8. (a) (i) Distinguish between refraction and diffraction of waves. (2 marks)
- (ii) Straight wave fronts are directed towards a barrier with a wide opening. Draw a diagram to show the behavior of the waves after reaching the barrier. (3 marks)
- (b) A man standing in a valley between two cliffs strikes a gong. He hears an echo from one cliff 0.7 s later and from the other 0.2 s after the first. Determine the width of the valley if the speed of sound is 340 ms^{-1} (4 marks)
- (c) (i) What is an echo? (1 mark)
- (ii) Explain why echoes are not heard in small classrooms. (2 marks)
- (iii) Describe how unwanted echoes are eliminated from concert halls. (2 marks)
- (d) Give **two** differences between light waves and sound waves. (2 marks)

END