

535/2
Physics
Paper 2
July/August 2023
2 ¼ hours

ASSHU ANKOLE JOINT MOCK EXAMINATIONS

Uganda Certificate of Education

PHYSICS

PAPER 2

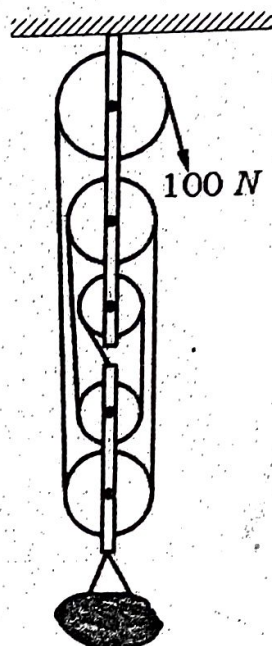
2HOURS 15MINUTES

INSTRUCTIONS TO CANDIDATES

- Answer any **FIVE** Questions
- Any Additional Question(s) answered will **not** be marked.
- Mathematical tables and silent non-programmable calculators may be used.
- These values of Physical Quantities may be useful to you:
 - Acceleration due to gravity = 10ms^{-2}
 - Specific heat capacity of water = $4200\text{ JKg}^{-1}\text{K}^{-1}$.
 - Specific heat capacity of copper = $400\text{ JKg}^{-1}\text{K}^{-1}$
 - Specific latent heat of fusion of water = 340000 JKg^{-1}
 - Speed of sound in air = 320ms^{-1}
 - Velocity of electromagnetic waves = $3.0 \times 10^8\text{ ms}^{-1}$.
 - Specific latent heat of steam is $2.26 \times 10^6\text{ JKg}^{-1}$.

- ✓ 1. (a)(i) Define a pulley
(ii)

(1mark)



The diagram above shows a block and tackle pulley system of efficiency 80%. It is used to raise a load through a height of 20 m with an effort of 100N. Find the energy wasted. (5marks)

- (iii) State one application of the system in a(ii) above. (1mark)

- (b)(i) Define the term atmospheric pressure (1mark)

- (ii) With the aid of a diagram, describe how you can measure gas pressure using a manometer. (4marks)

- (c)(i) State Pascal's Principle. (1mark)

- (ii) A hydraulic jack is used to lift a car by applying a force of 120 N at the pump. If the areas of the ram and pump pistons are 100 cm^2 and 1 cm^2 respectively, calculate the force that is applied to the ram. (2marks)

- (iii) State two properties that make a liquid suitable to be used in a hydraulic machine. (1mark)

- ✓ 2. (a)(i) Distinguish between conduction and convection of heat. (2marks)
- (ii) Describe the application of convection in ventilation of a room. (4marks)
- (b)(i) What is meant by the statement that specific latent heat of steam is $2.26 \times 10^6 \text{ JKg}^{-1}$. (1mark)
- (ii) Steam at 100°C is bubbled through 0.6 kg of water in a well lagged calorimeter of heat capacity 200 JK^{-1} at 20°C , until the final temperature is 95°C . Find increase in mass of the contents of the calorimeter (5marks)
- (c)(i) Explain the occurrence of land breeze (3marks)
- (ii) Explain what makes water a good coolant in car engines (1mark)

3. (a) Describe the function of each of the following in house wiring.
- i) A fuse
- ii) Earthing (2marks)
- (b) The element of a heater that works on 240 V has a resistance of 24Ω when working normally.
- i) Explain why the appliance should not be fitted with a 10A fuse. (2mark)
- ii) Find the cost of running the heater for 15 hours if the cost of a unit of electricity is sh.300. (3marks)
- (c)(i) Define electrostatic induction (1mark)
- (ii) Describe with diagrams, how to charge two metal spheres oppositely by induction. (4marks)
- (d) Explain how a building is safe guarded from lightening. (4marks)

- ✓ 4. (a)(i) What is meant by cathode rays? (1mark)
- (ii) With the aid of a labelled diagram, describe how cathode rays are produced by thermionic effect. (4marks)
- (b)(i) State three uses of tracers. (3marks)



(ii) A radio active source is brought near the cap of a positively charged electroscope. The leaf divergence reduces. Explain the cause of this observation. (2marks)

(c) Carbon undergoes a beta decay and turns into element N.

Write a balanced nuclear equation for the decay. (2marks)

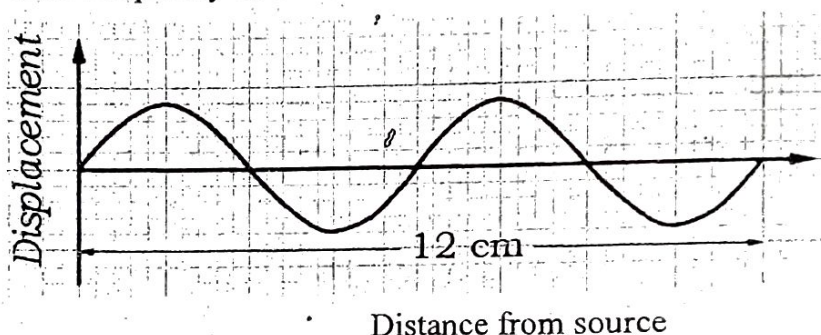
(d) What changes occur in atomic number and mass number of a radioactive atom if the nucleus emits.

i) alpha particle (2marks)

ii) gamma rays (2marks)

5. (a)(i) Define frequency of a wave (1mark)

(ii)



The diagram above shows a wave travelling at 24 cm s^{-1} . Find its frequency. (3marks)

(b)(i) Briefly explain why one can be heard around a corner but can not be seen around it. (2marks)

(ii) State one industrial and one medical use of echoes. (2marks)

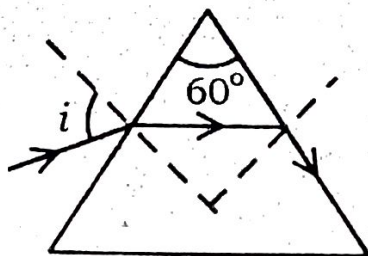
(c) Draw diagrams to show what happens when plane waves are incident on the gap between two obstacles in a ripple tank if the gap is

i) wide (2marks)

ii) narrow (2marks)

(d) Two men stand a distance apart beside a long metal fence. One man places his ear against the fence, while the other gives the fence a sharp knock with a hammer. Two sounds, separated by a time interval of 0.5 seconds are heard by the first man. If the speed of sound in the metal is 5280 m s^{-1} , how far apart are the men? (4marks)

6. (a) Define terms, focal length and optical centre as applied to a lens. (2marks)
- (b) When an object is placed at 60 cm from a convex lens, a real image of height 10 cm is formed at 30 cm from the lens. By graphical method find the,
- focal length of the lens (4marks)
 - height of the object (2marks)
- (c)



- The diagram above shows a path of a light ray through a glass prism of refractive index 1.50. Find i . (4marks)
- (d) Describe a simple experiment to demonstrate the principle of reversibility of light. (4marks)
- ✓ 7. (a)(i) State the law of flotation. (1mark)
- Explain why a ship is able to float in water yet it is made of steel (2marks)
 - An object floats in sea water of density $1.03 \times 10^3 \text{ Kg m}^{-3}$. It displaces a volume of 60 m^3 of sea water. Find the mass of the object. (3marks)
- (b) Describe an experiment to demonstrate the existence of surface tension. (4marks)
- (c)(i) Distinguish between elastic and inelastic collisions. (2marks)
- A trolley of mass 2 kg travelling at 5 ms^{-1} collides with a stationary trolley of mass 3 kg. After collision the two trolleys moved together at 2 ms^{-1} . Find the total kinetic energy of the trolleys after collision (4marks)

8. (a)(i) Distinguish between magnetic properties of soft iron and steel. (2marks)
- (ii) Briefly describe using a diagram how a piece of iron can be demagnetized by electrical method. (3marks)
- (b)(i) What is meant by magnetic shielding? (1mark)
- (ii) With a diagram, describe how an object can be magnetically shielded. (3marks)
- (iii) Give one example where magnetic shielding is applied (1mark)
- (c)(i) State the laws of electromagnetic induction. (2marks)
- (ii) With the aid of a diagram, describe the working of a d.c. motor. (4marks)

END