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PHYSICS PAPER 2

MAY 2019

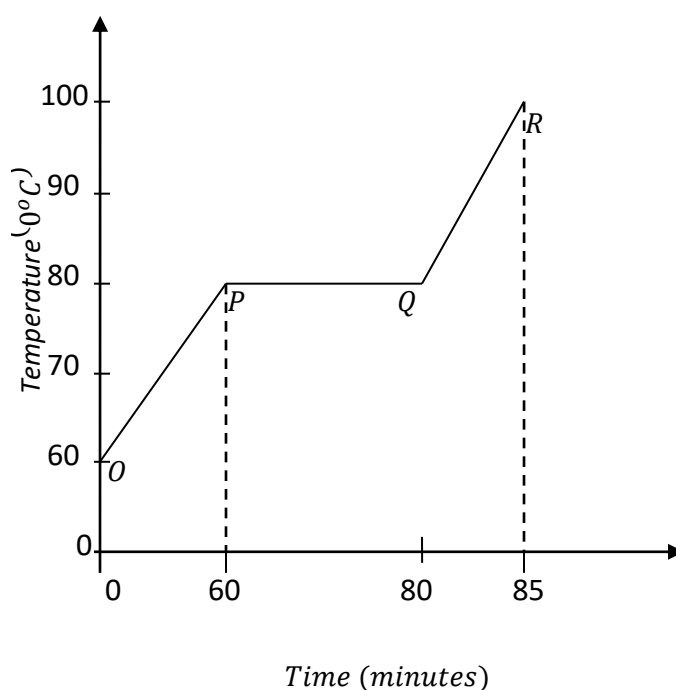
2 ¼ HOURS

DEPARTMENT OF PHYSICS
UGANDA CERTIFICATE OF EDUCATION
MOCK 1 EXAMINATIONS, 2019
PHYSICS PAPER 2
TIME: 2 ¼ HOURS

INSTRUCTIONS TO CANDIDATES:

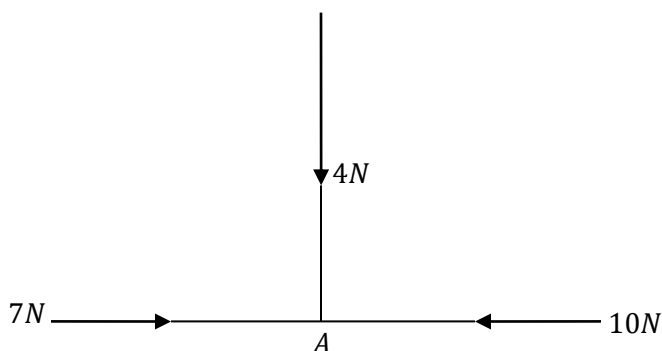
- Answer any **five** questions in the whole paper.
- Any additional questions attempted shall not be marked.
- Neat work attracts bonus mark.
- These physical quantity values be may useful to you:
 - *Acceleration due to gravity* $g = 10ms^{-2}$
 - *Specific heat capacity of copper* $= 400J kg^{-1}k^{-1}$
 - *Specific heat capacity of water* $= 4200J kg^{-1}k^{-1}$
 - *Specific latent heat of fusion of water* $= 340,000Jkg^{-1}$
 - *Speed of sound in air* $= 320ms^{-1}$
 - *Velocity electromagnetic waves* $= 3.0 \times 10^8ms^{-1}$

1. (a) What is meant by the term conduction as applied to heat. (01mk)
- (b) A composite rod made by joining a copper rod and a wooden rod. A piece of paper is wrapped several times round the joint. The composite rod is then passed through a Bunsen flame several times. Explain what is observed. (05mks)
- (c) The graph below shows the change of temperature of naphthalene heated from 60°C to 100°C in 85 minutes. Explain the features of the graph. (05mks)



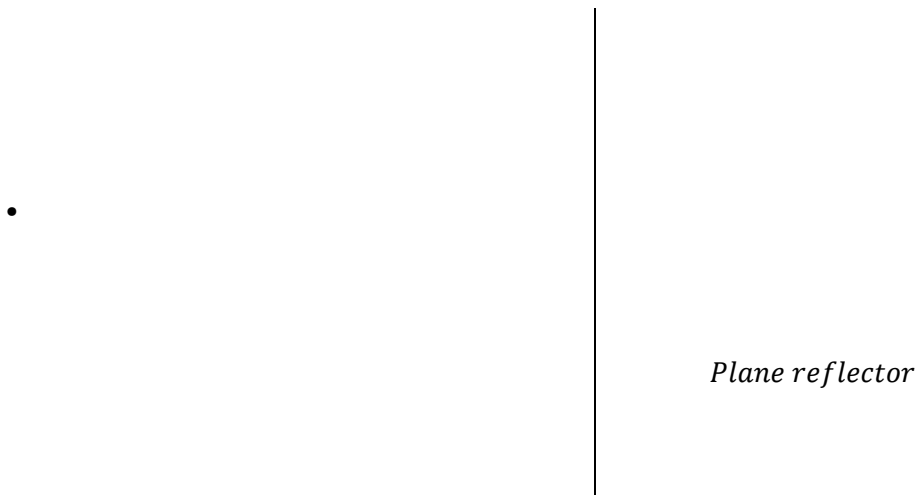
- (d) Dry ice of mass 50g at 0°C is put in a copper calorimeter of mass 1kg. The initial temperature of the calorimeter is 25°C . Find the amount of ice that melts. (05mks)
2. (a) Define uniform velocity. (01mk)
- (b) A ball of mass 500g is thrown vertically upwards from the ground with a velocity of 20m/s, calculate the;
- (i) maximum height attained. (03mks)
- (ii) potential energy gained at the maximum height. (02mks)

- (c) (i) Define Pressure? (01mk)
(ii) Explain why one feels more pain when pricked with a pin than with a nail. (03mks)
- (d) (i) Define Momentum. (01mk)
(ii) State Newton's second law of motion. (01mk)
(iii) A constant force acts on a body of mass 2kg for 8s and the body accelerates from $10ms^{-1}$ to $50ms^{-1}$. Find the magnitude of the force. (04mks)
3. (a) Categorize the following quantities into scalars and vectors, density, displacement, power and strain. (02mks)
- (b) Three forces of 10N, 7N and 4N act on a body of mass 250g.



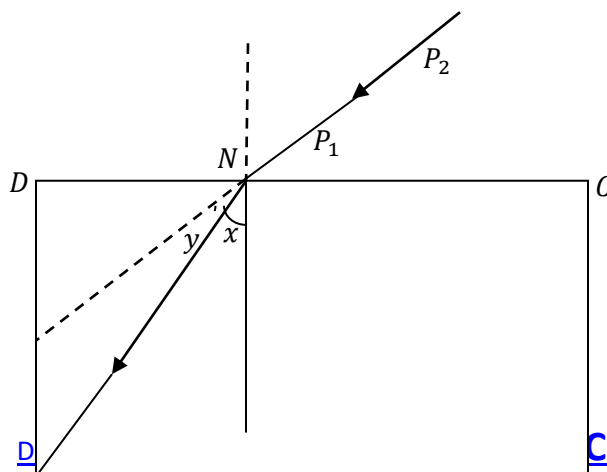
- Calculate:
- (i) Magnitude of the resultant force on A. (04mks)
(ii) Acceleration of A (02mks)
- (c) (i) State the principle of conservation of momentum. (01mk)
(ii) Explain briefly what happens when the neck of an inflated balloon is suddenly opened. (03mks)
- (d) (i) State the forces acting on a small metal ball falling through oil. (03mks)
(ii) What is meant by terminal velocity? (01mk)
4. (a) Define the term refraction of applied to waves. (01mk)

- (b) Draw a diagram to show how plane progressive waves are refracted as they travel from deep water to shallow water. (02mks)
- (c) The diagram below shows circular waves propagating towards a plane reflector.



- (i) Copy the diagram and show how the waves will be reflected. (02mks)
- (ii) If the wave is travelling with a velocity of 20m/s, calculate its frequency. (03mks)
- (d) (i) Describe briefly how you would determine the speed of sound in air by an echo method. (04mks)
- (ii) A student stands in between two cliffs and makes a loud sound. If the student hears the first echo in 2s, and the second echo in 3s, determine the distance between the two cliffs. (04mks)

- 5. (a) State the laws of refraction of light. (02mks)
- (b) While determining the refractive index of glass block, a student placed pins at P_1 and P_2 so that they are in line with the edge A of the block. The student then drew lines P_2N and NA as should below.



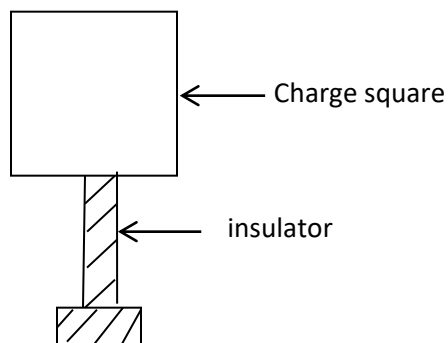
A

B

If angles x and y were measured and found to be 50° and 20° respectively, find the refractive index of glass. (04mks)

- (c) (i) What is meant by the focal length of a lens (01mk)
(ii) Describe a simple experiment to determine the focal length of concave lens. (4mks)
- (d) A convex lens of focal length 8cm when used as a magnifying glass forms an image of height 5cm at a distance 12cm from the lens. Draw a scale diagrams to find the;
(i) object distance (03mks)
(ii) height of the object (02mks)
6. (a) Define the following terms:
(i) Angle of dip. (01mk)
(ii) Angle of declination (01mk)
- (b) Draw a magnetic field pattern around a bar magnet placed with its axis in the magnetic meridian and with the South Pole pointing North. (02mks)
- (c) With the aid of a labeled diagram, describe briefly how an electric bell works. (06mks)
- (d) (i) Describe briefly how a steel bar can be magnetized by the single stroke method. (03mks)
(ii) Using the domain theory explain how the steel bar in d(i) is magnetized. (03mks)
7. (a) State the laws of electrostatics. (02mks)
- (b) Describe how a conductor in form of a sphere may be charged positively. (05mks)
- (c) (i) Draw a labeled diagram of a gold leaf electroscope (02mks)
(ii) State the functions of a gold leaf electroscope. (02mks)
- (d) (i) Explain why it is not possible to charge an insulator by induction (03mks)

- (ii) Show the charge distribution on a charged square conducting plate resting on an insulator as shown below. (02mks)



8. (a) What is meant by the following:
- (i) Radioactive decay (01mk)
 - (ii) Radio isotope (01mk)
- (b) A radioactive element has a half life of 30minutes, if the initial count rate is 512 per minute;
- (i) How long does it take to reach the count rate of 32 per minute? (03mks)
 - (ii) What fraction of the original number of atoms decay in this time? (02mks)
- (c) (i) What are cathode rays? (01mk)
- (ii) Describe briefly how cathode rays are produced in a cathode ray tube. (04mks)
- (iii) State two uses of the cathode ray oscilloscope. (02mks)
- (d) Define the following
- (i) Thermionic emission. (01mk)
 - (ii) Photo electric emission. (01mk)

END