

535/2
PHYSICS
Paper 2
17 July 2014
2 ½ hours

ENTEBBE JOINT EXAMINATION BUREAU

Uganda Certificate of Education PHYSICS

PAPER 2

2 hours 15 minutes

INSTRUCTIONS TO CANDIDATES

Attempt any five questions.

Any extra question shall not be assessed

Where necessary assume the following:

Acceleration due to gravity	=	10ms ⁻²
Speed of sound in air	=	320ms ⁻²
Specific heat capacity of water	=	4200 J kg ⁻¹ k ⁻¹
Specific heat capacity of copper	=	400 J kg
Specific latent heat of fusion of water	=	340000J Kg ⁻¹
Specific latent heat of vaporization of water	=	2260000J Kg ⁻¹
Velocity of electromagnetic waves	=	3.0 x 10 ⁸ ms ⁻¹

2014 0 - PH - 2 Entebbe Joint Examination Bureau: Physics Turn Over

1. (a) (i) Define the term diffusion. (01 mark)
- (ii) Describe an experiment to demonstrate diffusion in liquids. (03 marks)
- (iii) Explain why diffusion occurs more rapidly in a gas than in a liquid. (02 marks)
- (b) State **Hooke's Law**. (01 mark)
- (c) Describe an experiment to verify Hooke's law. (06 marks)
- (d) A mass of 0.5kg is hanging at one end of a suspended spring. The spring extends by 4 cm
- (i) Draw a diagram showing the forces acting on the mass in this position. (02 marks)
- (ii) If a further force of 1N is added to the mass, calculate the total tension in the spring. (02 marks)

2. (a) (i) Define **pressure**. (01 mark)
- (ii) State the principle of transmission of pressure. (01 mark)
- (b) Describe an experiment to show the relation between mechanical advantage and load using a block and tackle pulley system of velocity ratio 4. (06 marks)
- (c) A lever system as shown in Figure I below operates a simple hydraulic machine. The piston has a diameter of 5cm and the ram is of diameter 25cm. An effort of 360N is applied at the handle of the lever;
- If the machine is 92% efficient, find
- (i) The velocity ratio. (04 marks)
- (ii) The mechanical advantage. (02 marks)
- (iii) The value of the force, F (02 marks)

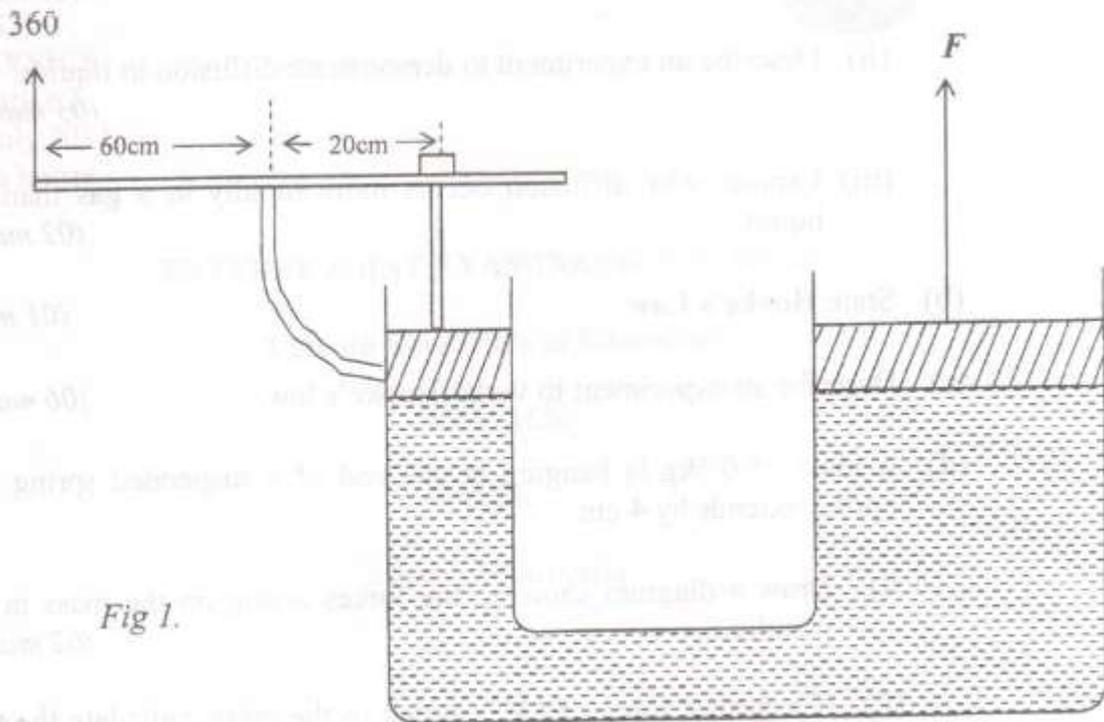


Fig 1.

3. (a) Define the term specific latent heat of vaporization. (01 mark)

(b) Describe an experiment to determine the specific latent heat of vaporization of steam. (07 marks)

(c) A copper container of heat capacity 80JKg^{-1} contains 0.8kg of water at 25°C . Dry steam is passed into water until the temperature of the container and water reaches 60°C .

Calculate the mass of steam condensed. (04 marks)

(d) (i) Explain what may happen if one is to cook from a very high altitude. (03 marks)

(ii) What is saturated vapour pressure? (01 mark)

4.(a) State three factors on which depends the magnitude of the force exerted on a wire carrying a current in a magnetic field. (03 marks)

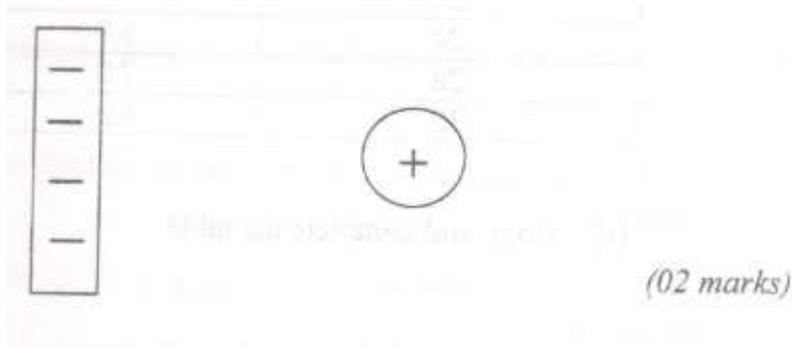
(b) With the aid of a labelled diagram, describe the action of an electric bell. (07 marks)

(c) A moving coil galvanometer has a coil of resistance 4Ω and gives when a current of 40mA passes through it.

Calculate the value of the resistance required to convert it to an ammeter which reads 24A at full scale deflection (06 marks)

5 (a) (i) State **the law of electrostatics.** (01 mark)

(ii) Draw an electric field pattern for a positive point charge placed near a negatively charged plate as shown.



(b) (i) Draw a labelled diagram of a gold -leaf electroscope. (03 marks)

(ii) State four uses of a gold leaf electroscope. (02 marks)

(iii) Explain, using suitable diagrams, how you can charge two metal spheres with equal but opposite charge simultaneously by induction. (05 marks)

(c) Indicate by use of diagrams, the surface distribution charge on conductors of the shapes that are;

(i) Spherical. (01 mark)

(ii) Rear shaped (01 mark)

(iii) Rectangular (01 mark)

6.(a) State the laws of reflection of light. (02 marks)

(b) By use of ray diagrams, explain;

(i) the two types of reflection of light (03 marks)

(ii) formation of a virtual image by a concave mirror (03 marks)

(C) In an experiment to determine the refractive index of water, a line drawn at the bottom of a thin - walled glass container and then partially filled with water.

By looking" vertically down into the water, the line appeared to have been raised by distance, d (cm). The following results were obtained by varying the depth D (cm) of water in the container.

Depth of water, D (cm)	Distance, d (cm)	Depth ($D-d$) (cm)
16	4.0	12.0
20	5.1	,.....
24	5.9
28	7.2
32	8.1

(i) Copy and complete the table. (02 marks)

(ii) Draw a suitable graph and use it to determine the refractive index of water. (06 marks)

7. (a) Give three differences between sound waves and light waves. (03 marks)

(b) (i) What is meant by **diffraction of waves**? (04 marks)

(ii) Draw diagrams to show how plane waves will appear when incident in a narrow opening and a wide opening. (03 marks)

(c) (i) Describe a simple echo method of determining the speed of sound in air. (04 marks)

(ii) Mention **two** sources of error in the experiment described in c (i) above.
(01 mark)

(iii) A pupil standing between two cliffs and 500m from the nearest cliff clapped his hands and heard the first echo after 3s and the second echo 2s later.

Calculate the distance between the cliffs. (04 marks)

8. Define the following terms:

(i) **Mass number** (01 mark)

(ii) **Isotopes** (01 mark)

(b) A radioactive nuclide decays by the emission of alpha - particles.

(i) What is **an alpha particle**? (01 mark)

(iii) What changes occur to the nucleus when an alpha particle is emitted?
(01 mark)

(iv) State two differences between alpha particles and beta particles
(02 marks)

(C) (ii) With the aid of a diagram, explain briefly how x - rays are produced.
(04 marks)

(ii) Mention one health hazard of x - rays. (01 mark)

(d) What IS meant by half -life of a radioactive element?
(01 mark)

(ii) Carbon - 14 is a radioactive nuclide with half-life of 4800 years.

A carbon source initially contains 5×10^6 atoms.

Calculate the time taken for 4.75×10^6 atoms to decay.

(04 marks)

END