535/2
PHYSICS
PAPER 2
JULY 2022
2 1/4 HOURS

NATIONAL EDUCATION RESEARCH & EXAMINATIONS BEREAU
UCE NEREB NATIONAL MOCKS 2022
UGANDA CERTIFICATE OF EDUCATION
PHYSICS
Paper 2
2 Hours 15 Minutes

INSTRUCTIONS TO CANDIDATES:

- Attempt any five questions.
- Any additional question(s) answered will not be marked
- Mathematical tables and silent non–programmable electronic calculators may be used.
- These physical quantities may be useful to you.

Acceleration due to gravity	=	10ms–2
Specific heat capacity of water	=	4200Jkg–1 K–1
Specific heat capacity of copper	=	400Jkg–1K–1
Specific latent heat of fusion of water	=	340000Jkg–1
Speed of sound in air	=	320ms–1
Velocity of electromagnetic waves	=	3.0 x 108ms–1

1. (a) Define density and state its SI unit. (2 marks)

(b) (i) A ball bearing is dropped centrally into a tall jar containing oil. Describe the motion of the ball bearing. (3 marks)

(ii) If the ball bearing is of radius 0.5cm and density 7800kgm–3 and the oil is of density 800kgm–3, find the maximum viscous force on the ball bearing. (3 marks)

(c) (i) State Archimedes' principle. (1 mark)

(ii) Describe an experiment to verify Archimedes' principle. (3 marks)

(d) (i) State the law of flotation. (1 mark)

(ii) Explain why a ship is able to float on water despite of being made of metal. (3 marks)

2. (a) State the laws of refraction. (2 marks)

(b) Define the following terms as applied in convex lens.

(i) Optical centre. (1 mark)

(ii) Principal focus. (1 mark)

(c) An object 1cm tall is placed perpendicularly and onto the principal axis of a convex lens of focal length 20cm at a distance of 30cm from the optical centre of the lens. By accurate scale drawing, find the nature, position and magnification of the image formed. (5 marks)

(d) (i) Define the terms"critical angle" and "total internal reflection". (2marks)

(ii) Figure 1 shows the path of a ray of a light through the corner of a cube of ice.

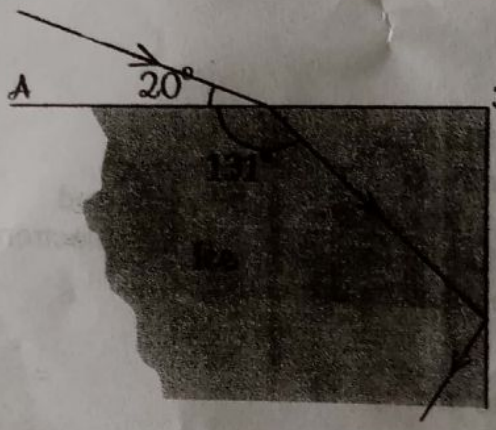

Figure 1

(i).

(ii). What is the critical angle in ice? marks)

3. (a) (i) Define an echo. (2 marks)

(ii) Explain how the walls of a discotheque should be designed in order to avoid noise pollution. (1 mark)

(b) (i) What is resonance? (3 marks)

(ii) Describe an experiment to determine the speed of sound by resonance method in a closed pipe. (1 mark)

(c) A child stands between two cliffs and makes a loud sound. If it hearts (5 marks)

(d) (i) What is diffraction?

(ii) Explain why sound waves produced by the same source from the same point is heard better at a distance at night than during day. (1 mark)

4. (a) (i) State Pressure law. (3 mark)

(ii) Describe an experiment to verify this law. (1 mark)

(b) A cylinder with a movable piston contains 1000cm3 of air at a temperature of 200oC. Calculate the volume of the gas if it is cooled to (6 marks)

10oC at constant pressure.
(3 marks)

(c) Define the term specific heat capacity of a substance. (1 mark)

(d) A copper block of mass 200g is heated to a temperature of 145oC and then dropped into a copper calorimeter of mass 250g which contains 300cm3 of water at 25oC.

(i) Calculate the maximum temperature attained by the water. (4marks)

(ii) Sketch a graph to show the variation of the temperature of the water with time. (1 marks)

5. (a) Define the joule. (1 mark)

(b) (i) State the principle of conservation of energy. (1 mark)

(ii) Mention any one renewable energy source and briefly describe how it is made use of by man. (2 marks)

(iii) Outline the process of production of electricity at a hydro – electric power station. (2 marks)

(c) Explain why a boy jumping from a table must bend his knees up to almost a squatting position. (3 marks)

(d) A ball of mass 0.5kg is rolled at a speed of 40ms–1 and it collides with another ball of mass 0.3kg moving at speed of 20ms–1 in the opposite direction. If the balls bounce off each other and they move in the direction of the 0.5kg mass with the 0.5kg mass moving with a speed of 13.6ms–1;

(i) Calculate the velocity of the 0.3kg mass. (3 marks)

(ii) Find the loss in kinetic energy and account for the loss. (3 marks)

6. (a) What is electromotive force? (1 mark)

(b) (i) With the aid of a labelled diagram explain the working of a simple cell. (4 marks)

(ii) Name two defects of simple cells and explain how these defects can be overcome. (4 marks)

(c) State Ohm's law. (1mar

(d) Four identical cells each of e.m.f. 1.5V and internal resistance 0.5Ω each are connected in a circuit as shown in the Figure 1 below.

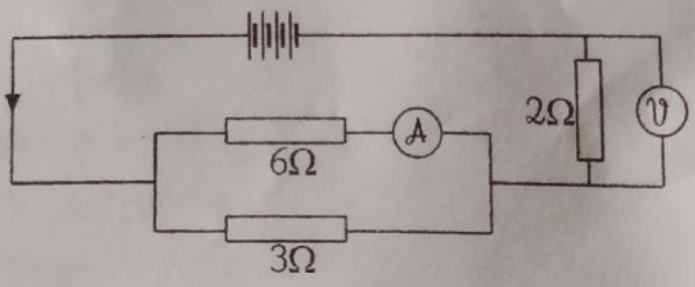

Figure 1

Find:

(i) the reading of voltmeter V. (3 marks)

(ii) the reading of the ammeter A. (2 marks)

(iii) the power dissipated in the 6Ω resistor. (1 mark)

7. (a) State any two factors which determine the magnitude of a force exerted on a current carrying conductor. (2 marks)

(b) With the aid of a labelled diagram, describe the structure and mode of action of a moving coil loud speaker. (5 marks)

(c) State three ways how power loss in transformers can be minimised and why? (3 marks

(d) A D.C motor has an armature resistance of 4 Ω. If it draws a current of 10A when connected to a supply of 200V, calculate the

(i) power wasted in the windings, (2 marks)

(ii) efficiency of the motor. (4 marks)

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

(ii) State two similarities between cathode rays and gamma rays. (2 marks)

(b) Describe a simple experiment to show that cathode rays are negatively charged. (2 marks)

(c) (i) What are radioisotopes? (1 mark)

(ii) Mention any two uses of radioisotopes. (2 marks)

(iii) A radioactive element has half – life of 4 minutes. Given that the original count rate is 256 counts per minute. Find the time taken to reach a count rate of 2 counts per minute. (3 marks)

(d) (i) What is nuclear fission? (1 mark)

(ii) Outline the process of production of electricity at a nuclear power station. (4 marks)

END