

535/2
PHYSICS
Paper 2
July/Aug. 2019
2¼ Hours



UGANDA TEACHERS' EXAMINATIONS SCHEME
Uganda Certificate of Education
JOINT MOCK EXAMINATIONS
PHYSICS
Paper 2
2 hours 15 minutes

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:

<i>Acceleration due to gravity</i>	10ms^{-2}
<i>Specific heat capacity of water</i>	$4200\text{Jkg}^{-1}\text{K}^{-1}$
<i>Specific heat capacity of Ice</i>	$= 2100\text{Jkg}^{-1}\text{K}^{-1}$
<i>Specific heat capacity of copper</i>	$= 400\text{Jkg}^{-1}\text{K}^{-1}$
<i>Specific latent heat of fusion of Ice</i>	$= 336000\text{Jkg}^{-1}$
<i>Specific latent heat of vaporization of water</i>	$= 2260000\text{Jkg}^{-1}$
<i>Density of water</i>	$= 1000\text{kgm}^{-3}$
<i>Density of mercury</i>	$= 13600\text{kgm}^{-3}$
<i>Speed of sound in air</i>	$= 340\text{ms}^{-1}$

1. (a) (i) Define pressure and state its S.I unit (02 marks)
 (ii) Describe an experiment to show that pressure in liquids increase with increase in depth. (04 marks)
- (b) (i) Explain what is meant by stp? (02 marks)
 (ii) A fixed volume of gas has a volume of 200cm^3 , temperature of 127°C and pressure of $2.5 \times 10^5 \text{ Pa}$. Calculate its volume at stp. (04 marks)
 (iii) Using the kinetic theory, explain what happens when temperature of a fixed mass of gas at constant volume is increased. (04 marks)
2. (a) (i) Distinguish between cohesion and adhesion (02 marks)
 (ii) Draw a sketch to show the behavior of water in a capillary tube dipped in water. (02 marks)

- (b) A circular wire frame has a thread loosely tied across points A and B. The frame is dipped into a soap solution forming a film as shown in figure 1 below

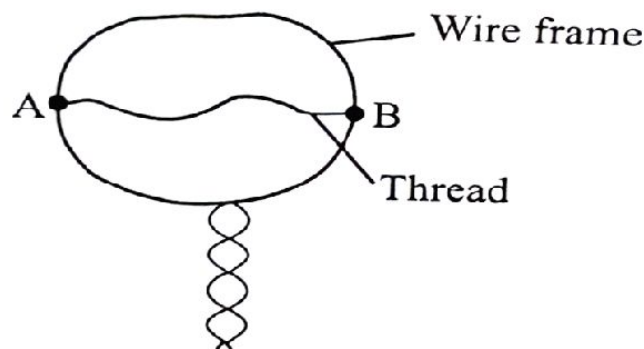


Fig. 1

The soap film is pierced above the thread.

- (i) Draw a diagram to show the new shape of the thread. (01 mark)
- (ii) Explain the shape in (b) (i) above (02 marks)
- (c) A steel wire of length 50cm is acted on by a tensile force of 70N and stretches it to a new length of 52cm. If the cross section area of the wire is $2 \times 10^{-6} \text{ m}^2$, calculate the;
 - (i) tensile strain in the wire (02 marks)
 - (ii) tensile stress caused (02 marks)
 - (iii) Young's module of the wire (02 marks)

- (d) Explain why bicycle frames are made hollow (03 marks)
- (a) (i) state any three characteristics of electric field lines (03 marks)
- (ii) Draw electric field patterns for two negative single charges near each other. (01 mark)

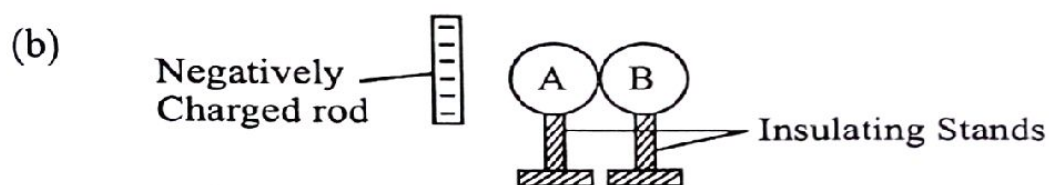


Fig. 2

Figure 2 shows a negatively charged rod held near spheres A and B which are in contact with each other.

- (i) State the type of charges on the spheres A and B while the rod is in the position shown. (02 marks)
- (ii) Explain what happens to the spheres A and B after the rod is taken away. (03 marks)
- (c) Explain how a gold leaf electroscope is charged by induction using a negatively charged rod. (3 marks)
- (d) Explain how a lightning conductor works. (04 marks)
- (a) (i) Distinguish between heat and temperature. (02 marks)
- (iii) Give any two reasons why water is not used as a thermometric liquid. (02 marks)
- (b) When the bulb of a thermometer is placed in contact with a hot body, the reading of the thermometer first decreases before rising. Explain why the reading first decreases and then increases. (04 marks)

(c) (i) The length of mercury thread in an ungraduated thermometer is 25mm when the thermometer is immersed in ice at 0°C and 250mm in steam at 100°C . What temperature corresponds to the thread length of 61mm? (02 marks)

(ii) State any two types of thermometers with their corresponding thermometric properties. (02 marks)

(d) (i) Define specific heat capacity. (01 mark)

(ii) The following results were obtained in an experiment to determine the specific heat capacity of brass.

-	Voltmeter reading	=	12.0V
-	Ammeter reading	=	2.5 A
-	Temperature rise	=	20°C
-	Mass of brass	=	1.2 kg
-	Time taken	=	10 minutes

Calculate the specific heat capacity of brass. (03 marks)

5. (a) (i) what is a wave? (01 mark)

(ii) A radio wave makes $1\frac{1}{2}$ cycles in 6.0×10^{-7} seconds. Calculate the frequency of the wave. (03 marks)

(b) (i) Define a stationary wave (01 mark)

(ii) State any two properties of stationary waves (02 marks)

(c) A string of natural length 20cm fixed between two points is made to vibrate with the fundamental frequency.

(i) Sketch a diagram to show the vibration. (02 marks)

(ii) Calculate the wave length of the progressive waves along the string. (02 marks)

(iii) Calculate the speed of the waves along the string given that the frequency of vibration is 50Hz. (02 marks)

(d) State three factors that affect frequency of a vibrating string with fixed ends. (03 marks)

(a) (i) Distinguish between primary and secondary cells. (02 marks)

(ii) Using a well labeled diagram, describe how a secondary cell can be recharged. (04 marks)

(b) A cell of emf 2V and internal resistance 0.5Ω is connected to two resistors of resistances 3Ω and 2Ω connected in series.

(i) Calculate the total resistance of the circuit (02 marks)

(ii) What is the total current supplied by the cell? (02 marks)

(c) (i) Describe an experiment to verify ohm's law. (05 marks)

(ii) State one case where ohm's law does not apply. (01 mark)

(a) Define the following terms

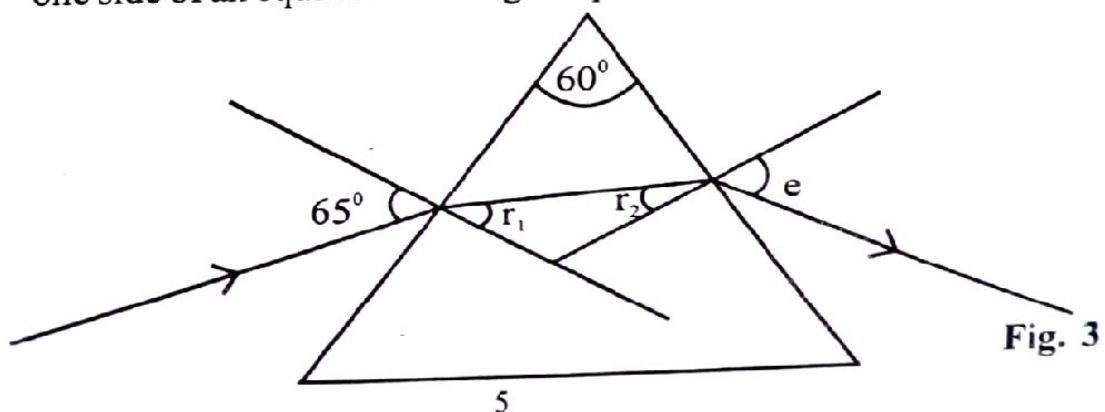
(i) Critical angle (01 mark)

(ii) Total internal reflection (01 mark)

(b) (i) What is refractive index of a material? (01 mark)

(ii) Describe an experiment to measure refractive index of water. (05 marks)

(c) Figure 3 below shows a ray of yellow light incident at an angle of 65° on one side of an equilateral triangular prism of refractive index 1.52.



- (i) Find the value of angle e (05 marks)
- (ii) State and explain what would be observed if the ray above were of white light. (04 marks)

8. (a) Define the following terms

- (i) Atomic number (01 mark)
- (ii) Mass number (01 mark)

- (b) (i) What are isotopes? (01 mark)
- (ii) Give two examples of elements that show isotopic behavior . (01 mark)

(c) What is meant by the following terms?

- (i) Thermionic emission (01 mark)
- (ii) Photo electric emission (01 mark)

(d) State the conditions necessary for photo electric emission to take place. (02 marks)

- (e) (i) With aid of a labeled diagram, describe the structure and action of an x-ray tube. (06 marks)
- (ii) How can the penetrating power of x-rays be increased in an x-ray tube? (02 marks)

END