

535/2
PHYSICS
Paper 2
Nov./Dec. 2020
2¼ hours



WAKISO-KAMPALA TEACHERS' ASSOCIATION (WAKATA)

WAKATA MOCK EXAMINATIONS 2020

Uganda Certificate of Education

PHYSICS

Paper 2

2 hours 15 minutes

INSTRUCTIONS TO CANDIDATES:

Answer **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 $= 10 \text{ ms}^{-2}$

Specific heat capacity of water $= 4,200 \text{ JKg}^{-1}\text{K}^{-1}$

Specific heat capacity of copper $= 400 \text{ JKg}^{-1}\text{K}^{-1}$

Specific latent heat of fusion of water $= 340,000 \text{ JKg}^{-1}$

Speed of sound in air $= 330 \text{ ms}^{-1}$

Density of water $= 1,000 \text{ kgm}^{-3}$

1. (a) (i) What is meant by **acceleration due to gravity**? (01mark)
(ii) Describe an experiment to determine acceleration due to gravity using a pendulum bob. (06marks)
- (b) Explain briefly why a person feels heavier than usual at the instant an elevator starts accelerating upwards. (02marks)
- (c) A bomb is released vertically down wards from a fighter jet moving at a horizontal velocity of 100ms^{-1} and 2km high as shown in figure 1

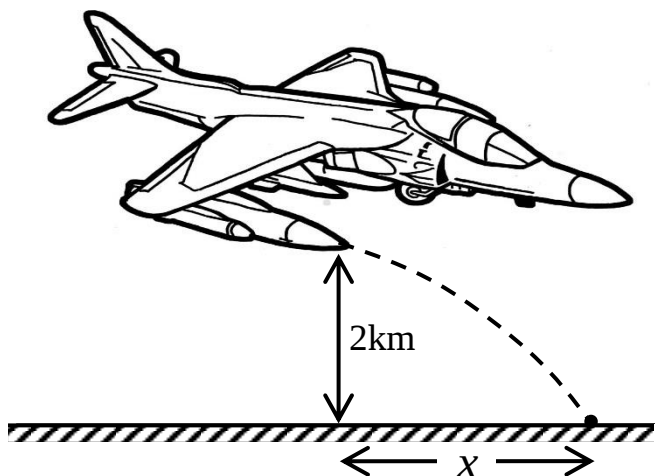


Fig. 1

Find the;

- (i) distance x moved by the bomb. (03marks)
 - (ii) velocity with which the bomb is moving on striking the ground. (04marks)
2. (a) (i) State **Pascal's principle of transmission of pressure**. (01mark)
(ii) Describe an experiment to verify Pascal's principle of transmission of pressure (03marks)
 - (b) (i) Explain why it is difficult to take a drink using a straw with a hole. (02marks)
(ii) State **two** uses of pressure measurement. (02marks)
 - (c) A U – tube of cross – sectional area 0.5cm^2 has some mercury first poured in, then 7cm^3 of liquid X is poured through one limb and 4.5cm^3 of liquid Y is poured through the other limb. If liquid X has a density of 1000kgm^{-3} and liquid Y has a density of 800kgm^{-3} , calculate the;
 - (i) difference in levels between the mercury surfaces. (05marks)
 - (iii) difference in levels between the surfaces of liquid X and Y. (01mark)
3. (a) (i) What is **diffusion**? (01mark)
(ii) Describe an experiment to demonstrate the diffusion of a solute in a solvent. (04marks)
 - (b) Explain what happens to the molecules of a heated solid as more and more heat is added. (03marks)
 - (c) (i) Define a **spring constant**. (01mark)
(ii) A 5.0 cm long spring was used in an experiment. When a 200g mass was suspended using a mass hanger on the spring its new length became 6.5 cm. When the mass on the hanger was changed to 410g, the length of the spring changed to 8.0cm. Calculate the constant, K , of the spring. (04marks)

(d) State **two** ways how concrete may be made to withstand tensional forces. (02marks)

4. (a) Define **resonance** as applied to sound waves. (01mark)
- (b) Describe an experiment to demonstrate resonance in an air tube. (04marks)
- (c) Figure 2 shows a cross section of a ripple tank in which **A** is a straight dipper attached to a vibrator and **B** is a barrier with two gaps.



Fig. 2

- (i) Sketch the diagram showing the waves produced when **A** vibrates perpendicular to the water surface. (02marks)
- (ii) State **two** properties of waves shown in your diagram. (02marks)
- (d) Sound of frequency 264 Hz has a velocity of 320 ms^{-1} . At a later time, the temperature changed and the velocity increased to 330 ms^{-1} . Calculate the change in wave length and explain why increase in temperature increases velocity of sound. (05marks)
- (e) State **two** applications of beats. (02marks)

5. (a) State the conditions for total internal reflection to occur. (02marks)
- (b) Figure 3 shows light incident on a glass prism and refracted.

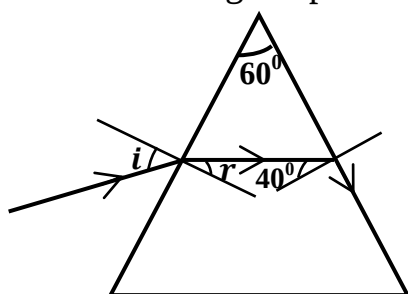


Fig. 3

Find the size of angle i .

- (c) Using a ray diagram show how a converging lens is used as a magnifying glass. (03marks)
- (d) Distinguish between secondary and primary colours. (02marks)
- (e) Explain why an object illuminated by white light appears
- (i) black (02marks)
- (ii) coloured (02marks)

6. (a) (i) Define **specific latent heat of fusion of a solid**. (01mark)
- (ii) Describe a simple experiment to determine the specific latent heat of fusion of ice using an electric current. (06marks)
- (b) 1.8 kg of water is put in an ice making machine. If the water is at 40°C and the machine removes heat at a rate of 200 J/s , how long would it take to convert it into ice at -15°C ? (*specific latent heat capacity of ice* = $336,000 \text{ Jkg}^{-1}$
specific heat capacity of ice = $2,100 \text{ Jkg}^{-1} \text{K}^{-1}$) (04marks)

- (c) State what happens when salt is added to ice. (01mark)
- (d) Explain how a green house is able to maintain higher temperatures than the surroundings. (03marks)
- (e) State **one** use of forests in the reduction of the green house effect. (01mark)

7. (a) Define
- (i) **Self induced emf.**
- (ii) **Mutual induction** (02marks)
- (b) With the aid of a diagram, describe the action of a step up transformer. (05marks)
- (c) Explain briefly how power is transported from Owen falls dam to your home. (03marks)
- (e) A cell of Emf, E and internal resistance, r is connected to resistors of 2Ω , 4Ω and 6Ω as shown in figure 4.

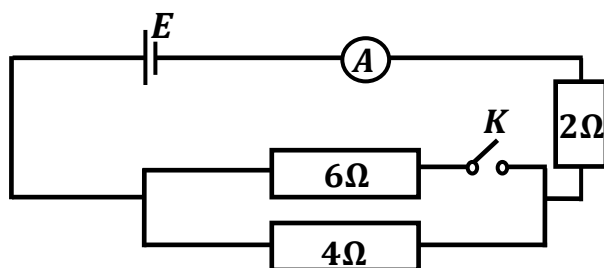


Fig. 4

When switch K is open, the ammeter reads 2.00A and when K is closed, ammeter reads 2.64A . Calculate:

- (i) internal resistance, r of the battery. (04marks)
- (ii) energy lost per second in driving current through the cell when the switch, K is open. (02marks)

8. (a) What is meant by;
- (i) **Photo electric emission** (01mark)
- (ii) **Thermionic emission** (01mark)
- (b) List **two** applications of photo cells. (02marks)
- (c) State the energy changes that take place in an X –ray tube. (02marks)
- (d) (i) Explain how intensity and penetrating power of X –rays produced in an X –ray tube may be varied. (03marks)
- (ii) Briefly describe how X –rays may be used to locate the broken part of a bone. (03marks)
- (e) Uranium ${}_{92}^{235}\text{U}$ decays according to the nuclear equation below.
- $${}_{92}^{235}\text{U} + {}_0^1\text{n} \longrightarrow {}_{56}^x\text{Ba} + {}_{y}^{92}\text{Kr} + 3{}_0^1\text{n}$$
- Find the values of x and y . (03marks)
- (f) Give **one** advantage of a Cathode Ray Oscilloscope (C.R.O) as a voltmeter. (01mark)

END