535/2
PHYSICS
Paper 2
June. 2022
2¼ hours

EXTERNAL MOCK EXAMINATIONS 2022 (SET 2)

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 ms^{-2}
Specific heat capacity of water	= 4,200 $JKg^{-1}K^{-1}$
Specific heat capacity of copper	= 400 $JKg^{-1}K^{-1}$
Specific latent heat of fusion of water	= 340,000 JKg^{-1}
Speed of sound in air	= 330 ms^{-1}
Density of water	= 1,000 kgm^{-3}

1. (a) (i) State the principle of conservation of energy. *(01mark)*

(ii) Illustrate the principle in (a)(i) above with reference to a simple pendulum close to the ground. *(03marks)*

(b) A ball of mass $0.40kg$ falls from rest at a height of $3.0m$ onto a horizontal surface and rebounds to a height of $1.5m$.

(i) Find the kinetic energy just before the ball hits the surface *(02marks)*

(ii) Find the kinetic energy just after collision. *(02marks)*

(iii) Explain the difference between the two energies in b(i) and b(ii) above *(01mark)*

(iv) What is the change in momentum as a result of the collision? *(01mark)*

(c) (i) State **Archimedes' principle** *(01mark)*

(ii) Describe an experiment to verify Archimedes Principle *(04marks)*

2. (a) Define **moment of a forc**e *(01mark)*

(b) (i) State the **principle of moments** *(01mark)*

(ii) Describe an experiment to determine the mass of a metre rule using the principle of moments *(04marks)*

(iii) State any **one** practical application of the principle in b(i) above. *(01mark)*

(c) (i) State **two** conditions obeyed by a body in equilibrium under a set of parallel forces. *(01mark)*

(ii)

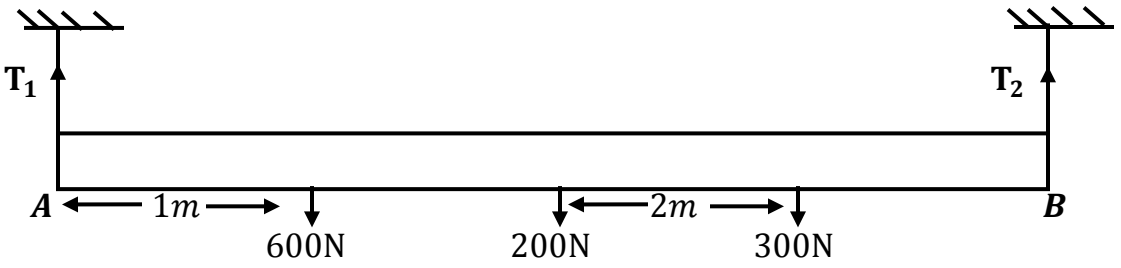

Fig. 1

A uniform rod AB of weight $200N$ and length $6m$ is suspended at its ends and is acted on by two forces of 600N and 300N as shown in Figure **1**. Calculate the tensile forces $\mathbf{T_1}$ and $\mathbf{T_2}$. *(04marks)*

(d) (i) Define **mechanical advantage** as applied to machines. *(01mark)*

(ii) Draw a graph to show the variation of mechanical advantage, MA with load of a machine. *(01mark)*

(iii) Explain why MA varies with load as you have shown. *(02marks)*

3. (a) Define each of the following terms as applied to wave motion;

(i) Wave front *(01mark)*

(ii) Wave length *(01mark)*

(b) (i) Describe a simple experiment to demonstrate interference of sound waves. *(04marks)*

(ii) Why does sound travel faster in solids than in gases? *(02marks)*

(c) (i) Explain why an open pipe is preferred to a closed pipe when used in producing different notes. *(03marks)*

(ii) The frequency of the third harmonic in a closed pipe is 250HZ. Find the length of the air column in the pipe. (*Speed of sound air is 320ms^{-1})* *(03marks)*

(d) Give **two** applications of ultrasonic waves *(02marks)*

4. (a) Define each of the following terms;

(i) **a virtual image** *(01mark)*

(ii) **principal focus of a convex lens** *(01mark)*

(b) (i) with the aid of a labeled diagram, describe a simple experiment to determine the focal length of a converging lens. *(04marks)*

(ii) Give **one** use of a converging lens *(01mark)*

(c) (i) Distinguish between **primary** and **secondary** colours *(02marks)*

(ii) Name the colour least deviated and the colour most deviated in the spectrum of white light by a glass prism. *(02marks)*

(d) Figure **2** shows a ray *AB* of light incident on a semi−circular glass block of retractive index 1.5

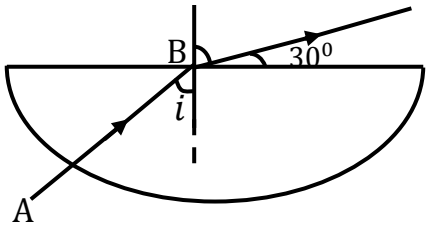

Fig. 2

(i) What is meant by **a ray of light**? *(01mark)*

(ii) Explain why the ray *AB* is not deviated on entering the glass block. *(02marks)*

(iii) Calculate the angle of incidence, i is at B. *(03marks)*

5. (a) (i) Define **evaporation** *(01mark)*

(ii) Using kinetic theory explain why evaporation causes cooling of a liquid. *(02marks)*

(b) Explain why;

(i) A wet cloth feels cold *(02marks)*

(ii) Spirit poured on a hand makes the hand feel cool *(02marks)*

(c) A metal can containing a volatile liquid is put in some water on a piece of wood as shown in Figure **3**.

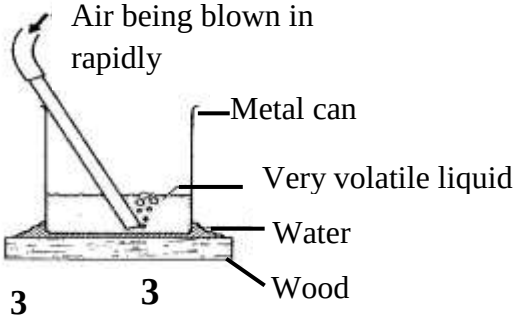

Fig. 3

Turn Over

(i) Explain what happens to the water after sometime of blowing in air. *(03marks)*

(ii) Explain the effect of blowing in air. *(02marks)*

(d) Explain how a clay pot is able to cool water in it. *(03marks)*

6. (a) Define the following terms as applied to magnetism.

(i) **Ferro magnetic materials** *(01mark)*

(ii) **Neutral point** *(01mark)*

(b) Figure **4** shows an electro magnet made by a metal object.

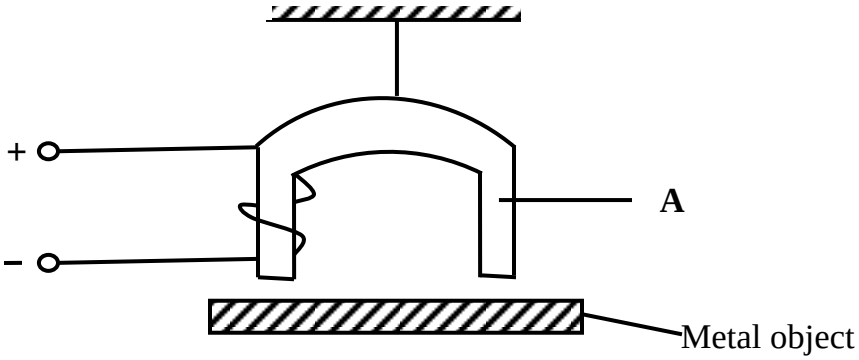

Fig. 4

(i) Name a suitable material for A and explain why it is made from this material. *(02marks)*

(ii) Name any **two** materials which the magnet will not attract. *(02marks)*

(iii) State **two** changes which a student can make so that a heavier metal object could be lifted by the electromagnet. *(02marks)*

(c) With the aid of a diagram, briefly describe the structure and action of an A.C transformer. *(04marks)*

(d) An electric power is generated at $11KV$, transformers are used to raise the voltage to $44KV$ for transmission over large distances using cables. The output of the transformers is $19.8mW$ and they are 90% efficient. Find;

(i) The input current to the transformer *(02marks)*

(ii) Output currect to the cables *(02marks)*

7. (a) Define each of the following forms of applied to electrical networks.

(i) A volt *(01mark)*

(ii) Internal resistance of a cell. *(01mark)*

(b) The circuit in Figure **5** shows a cell of emf 4V and internal resistance 2Ω connected to a net work of resistors.

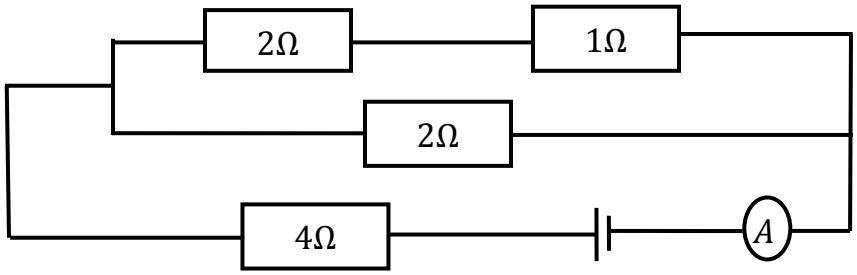

Fig.5

Find the reading of the ammeter *(04marks)*

(c) (i) What is meant by **Charging a body by induction**? *(01mark)*

(ii) Describe how a conductor may be charged negatively by induction. *(03maks)*

(d) (i) State **two** defects of a simple cell. *(02marks)*

(ii) How can one of the defects above be minimized in a simple cell. *(02marks)*

(e) Outline **two** steps taken to prolong the life of a lead-acid accumulator. *(02marks)*

8. (a) (i) Define the term **half life** as applied to radio activity. *(01mark)*

(ii) State **two** precautions which must be taken when handling radioactive materials. *(02marks)*

(b) The table below shows Count Rates of a certain radioactive material

Count rate(s^{-1})	6400	5380	3810	2700	1910	1350
Time (minutes)	0	1	3	5	7	9

(i) Plot a graph of count rate against time *(05marks)*

(ii) From the graph, estimate the half life of the material *(01mark)*

(c) State **two**:

(i) Industrial uses,

(ii) Medical uses of radioactivity *(04marks)*

(d) (i) What are **Alpha particles**? *(01mark)*

(ii) Explain why Alpha particles have a short range in air than beta particles. *(02marks)*

END