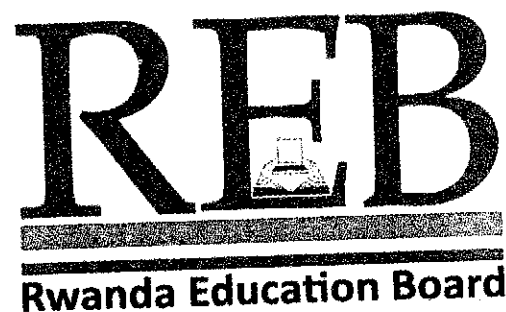


Physics I

011

13/11/ 2015 08.30AM - 11.30AM



ORDINARY LEVEL NATIONAL EXAMINATIONS, 2015

SUBJECT: PHYSICS I

DURATION: 3 HOURS

INSTRUCTIONS:

- 1) Write your names and index number on the answer booklet as they appear on your registration form and **DO NOT** write your names and index number on additional answer sheets of paper if provided.
- 2) Do not open this question paper until you are told to do so.
- 3) This paper has **THREE** sections **A**, **B** and **C**.

SECTION A: Attempt **ALL** questions.

(55marks)

SECTION B: Attempt any **THREE** questions.

(30marks)

SECTION C: Attempt **ONLY ONE** question.

(15marks)

- 4) Calculators and mathematical instruments may be used.
- 5) Use **only blue or black pen and pencil**.
- 6) Calculators and mathematical instruments may be used.

SECTION A: ATTEMPT ALL QUESTIONS. (55MARKS)

- 1) A piece of steel has a volume of 12cm^3 and mass of 96g.
Find the density of the steel. Express the answer in kg/m^3 . **(3marks)**
- 2) What is the difference between "distance" and "displacement"? **(3marks)**
- 3) (a) What is meant by the term "acceleration of a moving body"? **(1mark)**
- (b) The velocity of a car slows down uniformly from 98 km/h to 48 km/h in 10 seconds. Calculate the deceleration of the car. **(2marks)**
- 4) Explain why standing passengers in a fast moving bus continue to move forward when the bus stops suddenly. **(3marks)**
- 5) (a) Which quantity has the same unit as energy? **(1mark)**
- (b) An engine force of 5000N pulls a car 100m. Find the work done by the engine. **(2marks)**
- 6) (a) What is meant by "mechanical advantage" of a machine? **(1mark)**
- (b) What does the mechanical advantage of a machine depend on? **(1mark)**
- (c) Write the equation relating mechanical advantage, velocity ratio and efficiency of a machine. **(1mark)**
- (d) What are pulleys used for? **(1mark)**
- 7) (a) Why is it painful to carry a heavy parcel by a thin string? **(2marks)**
- (b) A block of metal produces an average pressure of 1000N/m^2 when resting on a flat surface of area 0.5 m^2 . Find the force exerted by the block. **(2marks)**
- 8) (a) Define the term "specific latent heat" of a substance. **(2marks)**
- (b) 17600J is given up when 8g of steam at 100°C condenses to 8g of water at 0°C .
Find the specific latent heat. **(2marks)**
- 9) (a) Give an example of self luminous object. **(1mark)**

- (b) Define the term a "light ray". **(1mark)**
- (c) A beam of light rays may be parallel, diverging or converging.
Which type of beam of rays is produced by headlamps of a car at night? **(1mark)**
- (d) State any one property of light. **(1mark)**
- 10) (a) State the laws of reflection of light at a plane surface. **(2marks)**
- (b) What is a simple periscope made of? **(1mark)**
- (c) What is the use of a simple periscope? **(1mark)**
- 11) (a) Why are plastic materials used to cover copper wires carrying electricity? **(2marks)**
- (b) The current I passing a section of a wire is 4 coulombs per second.
Calculate the quantity of charge passing the section of the wire. **(2marks)**
- 12) (a) Define the following terms:
- (i) Potential energy. **(1mark)**
- (ii) Kinetic energy. **(1mark)**
- (b) A car of mass 1000kg runs at a speed of 20m/s. Calculate the kinetic energy of the car. **(2marks)**
- 13) (a) What is the disadvantage of primary cells? **(1mark)**
- (b) What is the advantage of secondary cells? **(1mark)**
- (c) Where are secondary cells used? **(2marks)**
- 14) (a) State any two methods of making magnets. **(2marks)**
- (b) How can a magnet be demagnetized? **(2marks)**
- 15) (a) What is a magnetic field? **(1mark)**
- (b) Why are magnetic fields vectors? **(2marks)**

- (c) Between two like poles of a bar magnet there is point called neutral point. What is this neutral point?

(1mark)

SECTION B: ATTEMPT THREE QUESTIONS ONLY. (30MARKS)

- 16) (a) State laws of refraction of light?

(2marks)

- (b) Why does a ray of light travelling from air through a glass block bend towards the normal at the point where it enters the glass block?

(2marks)

- (c) When white light passes through a triangular glass prism it is refracted and different colours are produced.

- (i) Why is the white light split into many colours?

(1mark)

- (ii) Which colour is refracted most?

(1mark)

- (iii) Which colour is refracted least?

(1mark)

- (iv) Name the colours in order starting with the least refracted to the most refracted.

(1mark)

- (d) Which lens causes a beam of white light parallel to the principal axis:

- (i) to converge to a real focus?

(1mark)

- (ii) to diverge from a virtual focus?

(1mark)

- 17) (a) What is meant by the term "centre of gravity of a body"?

(2marks)

- (b) Mention the equilibrium states of a body.

(3marks)

- (c) Why is a tall person more likely to topple (fall down) when climbing a mountain than a short person?

(2marks)

- (d) A uniform metre rule is balanced at the 40cm mark when a load of 3N is hung at 10cm mark. Find the mass of the metre rule. Take $g = 10\text{N/kg}$.

(3marks)

- 18) (a) Explain the meaning of the following terms:

- (i) Temperature of a substance.

(1mark)

- (ii) Heat of a substance.

(1mark)

- (iii) The lower fixed point on Celsius scale of temperature.

(1mark)

- (b) Mercury and alcohol are used in thermometers.
- (i) State two properties of these liquids which make them suitable for use in thermometers. **(2marks)**
 - (ii) Why is alcohol thermometer more suitable for measuring low temperatures? **(2marks)**
- (c) Convert 30°C to Kelvin scale of temperature. **(2marks)**
- (d) Why does a clinical thermometer have a constriction above its bulb? **(1mark)**
- 19) (a) Explain the meaning of the following terms:
- (i) A good conductor of electricity. **(1mark)**
 - (ii) A bad conductor of electricity. **(1mark)**
- (b) Which of the following has more resistance to the flow of electric current : A long thin good conductor wire of electricity, and a short thick good conductor wire? Explain your answer. **(3marks)**
- (c) Three resistors of 2 Ohms, 4 Ohms and 6 Ohms are first connected in series and then disconnected and again connected in parallel. Determine the resistance:
- (i) In series. **(1mark)**
 - (ii) In parallel. **(2marks)**
- (d) What are the advantages of connecting resistors in parallel in a simple electric circuit? **(2marks)**
- 20) (a) Describe the structure of a simple mercury barometer. **(4marks)**
- (b) A height of the mercury column in a barometer is found to be 67.0 cm at a certain place. What would be the height of a water barometer at the same place? Density of mercury is $1.36 \times 10^4 \text{ kg/m}^3$ and density of water is $1.0 \times 10^3 \text{ kg/m}^3$. **(3marks)**
- (c) A man blows into one end of a U - tube containing water until the levels differ by 40.0 cm. If the atmospheric pressure is $1.01 \times 10^5 \text{ N/m}^2$ and the density of water is 1000 kg/m^3 , calculate his lung pressure. **(3marks)**

SECTION C: ATTEMPT ONE QUESTION ONLY. (15MARKS)

- 21) The table below shows the velocity of a moving body and the time taken by the body.

Time /s	Velocity/m.s ⁻¹
0	0
1	2
2	4
3	6
4	8
5	10

- (a) Plot the graph of velocity along vertical axis and time along horizontal axis using the data given in the above table. **(10marks)**
- (b) Determine the slope of the graph. Show on the graph how you find the slope. **(3marks)**
- (c) What does the slope represent? **(1mark)**
- (d) From the graph determine the velocity of the body when time is 2.5s. **(1mark)**
- 22) In an experiment to measure the unknown resistance by the ammeter – voltmeter method, a student obtained the following results.

Voltmeter reading/V	Ammeter reading /A
2.0	1.0
3.0	1.5
4.0	2.0
5.0	2.5
6.0	3.0
7.0	3.5

- (a) Plot the graph of potential difference, V (y - axis) against current, I (x - axis).

(10marks)

(b) Determine the slope of the graph. Show on the graph how you find the slope.

(3marks)

(c) State the relationship between the resistance, potential difference and current.

(2marks)

4. The fourth part of the document discusses the implications of the results and the conclusions drawn from the study. It highlights the significance of the findings and their potential applications in the field.

5. The fifth part of the document provides a summary of the key points and a final conclusion. It reiterates the importance of the study and the need for further research in this area.