

Physics I

011

31/10/ 2014 08.30am - 11.30am



ORDINARY LEVEL NATIONAL EXAMINATIONS, 2014

SUBJECT: PHYSICS I

DURATION: 3 HOURS

INSTRUCTIONS :

1. Do not open this question paper until you are told to do so.
2. Write your names and index number as they appear on your registration form.
3. This paper has **THREE** sections **A** , **B** and **C**.

SECTION A : This section is compulsory

(55 marks)

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

(30 marks)

SECTION C : Attempt **Only one** question.

(15 marks)

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

SECTION A : ATTEMPT ALL QUESTIONS. (55marks)

1. The following are quantities common in Physics : mass, weight , density, force , velocity and speed. Which quantities are:

(a) vectors ?

(b) scalars ?

(1.5marks)

(1.5marks)

2. Why is the density of sea water not the same as the density of distilled water?

(3marks)

3. Explain why solids have a fixed shape? Use the kinetic nature of molecules in solids to explain your answer.

(3marks)

4. Why is the sharp edge of a knife thin?

(3marks)

5.(a) What is the unit of power?

(1mark)

(b) A man lifts 50kg of sugar through a vertical distance of 1.5m . Calculate the work done. Take $g = 10\text{N/kg}$

(2marks)

6. (a) What is the difference between displacement and distance?

(2marks)

(b) A car has a velocity of 60km/hr. How far does it travel in 20 minutes?

(2marks)

7.(a) Explain why water has maximum density at about 4°C .

(2marks)

(b) Give two reasons to explain why mercury is a good liquid for use in a thermometer .

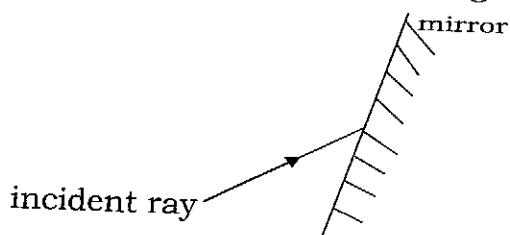
(2marks)

8.(a) Explain why a pencil that is partly immersed in a liquid, appears bent at the surface.

(2marks)

(b) The figure below shows a ray of light travelling towards the face of a plane mirror. Copy the diagram and complete its path after leaving the surface of the mirror. Label your diagram.

(2marks)



9. (a) What factors does conduction of heat in solids depend on ?

(2marks)

(b) Although the earth absorbs a lot of heat from the sun during the day, its temperature does not continue to rise every day. Explain this phenomenon. **(2marks)**

10. Explain each of the following :

(a) Experiments on electrostatics do not work well on humid days.

(2marks)

(b) An uncharged metal rod causes the leaf of a charged electroscope to collapse.

(2marks)

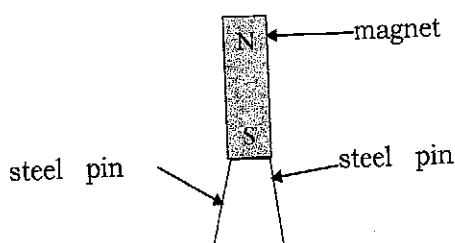
11. A 1.5V cell has an internal resistance of 0.25Ω . It is connected in series with a 0.35Ω resistor, what current flows?

(4marks)

12.(a) Which of the following materials are strongly attracted by a magnet : wood, iron, glass and nickel ?

(1mark)

- (b) Explain why two steel pins hang from the end of a vertical bar magnet do not hang vertically. (3marks)



13. (a) Explain why, when a stone is thrown upwards it rises and then falls to the ground again. (3marks)

- (b) A student of mass 60kg runs with a velocity of 2m/s. Calculate the kinetic energy. (1mark)

14. (a) Explain why, in houses electric lamps are connected in parallel. (2marks)

- (b) A circuit consists of $6.0\ \Omega$ and $3.0\ \Omega$ in parallel arrangement and a p.d of 12V is connected across the whole circuit. Calculate the current in the circuit. (2marks)

15. (a) Explain why in a pin-hole camera, the size of the hole must not be too large. (1mark)

- (b) State properties of an image formed in a pin-hole camera. (3marks)

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

- 16.(a) Give an example of (i) a luminous object. (1mark)

- (ii) a non-luminous object. (2marks)

- (b) Why are translucent glasses used in toilet windows? (2marks)

- (c) What is the difference between the principal focus of a converging lens and the principal focus of a diverging lens. Illustrate your answer using diagrams of these lenses. (5marks)

- (d) Give an application of a diverging lens. (2marks)

- 17.(a) Why do corrugated iron sheet roofs make cracking noises as a day gets hotter and as the day gets colder? (3marks)

- (b) Why are immersion heaters placed at the bottom of hot water tanks? (3marks)

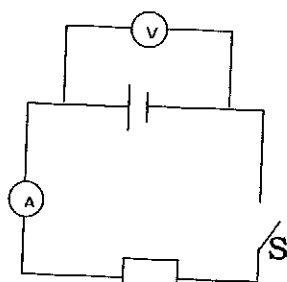
- (c) Why does milk in a bottle keep cool when the bottle stands in water in a porous pot in dry weather days? (2marks)

- (d) How much heat is needed to raise the temperature by 10°C of 5kg of a substance of specific heat capacity $300\text{J/kg}^\circ\text{C}$? (2marks)

18. (a) State any two effects of an electric current. (2marks)

- (b) Why does a voltmeter have a high resistance while an ammeter has a low resistance? (2marks)

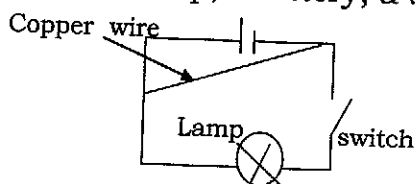
(c)



The voltmeter, V and the ammeter, A readings in the circuit above when switch S is open are 3.0V and 0.0A and when the switch is closed are 2.4V and 2.0A. Calculate the internal resistance of the cell.

(3marks)

(d) The diagram below shows a lamp, a battery, a switch and a copper wire.



i) When the switch is on, the lamp does not give light. Explain why.

(2marks)

ii) What is this effect called ?

(1mark)

19.(a) Calculate the pressure exerted on a level ground by a man whose mass is 70kg and the area of his both feet is 250cm^2 . Give the answer in Pascals (Pa). Take $g = 10\text{N/kg}$

(2marks)

(b) Explain why water is not suitable as a barometer liquid.

(3marks)

(c) Explain how it is possible to drink a fanta drink using a straw.

(3marks)

(d) Why is an aneroid barometer better for measuring pressure at various altitudes?

(2marks)

20.(a) What is meant by the term "inertia" of a body?

(2marks)

(b) What is the relation between force F, mass m and the acceleration produced a of a moving body?

(1mark)

(c) The force in a rope pulling a body is 100N. The mass of the body is 40kg and the frictional force is 20N. i) Find the resultant force.

(1mark)

(ii) calculate the acceleration.

(2marks)

(d) State Newton's third law.

(2marks)

(e) Why does one feel pain when he/she boxes or hits a hard surface with a fist?

(2marks)

SECTION C : ANSWER ONLY ONE QUESTION (15marks)

21. Describe an experiment you can carry out to determine the density of a very small piece of dry wood which has irregular shape. The piece of wood does not sink into water.

(15marks)

22.(a) With aid of a labelled diagram describe an experiment to show how the heat radiated from a hot object depends on the nature of the surface.

(12marks)

(b) State three applications of this effect.

(3marks)