Write your Examination Number here

AN ROINN OIDEACHAIS

LEAVING CERTIFICATE EXAMINATION, 1988

PHYSICS — ORDINARY LEVEL

FRIDAY 17 JUNE — AFTERNOON 2.00 to 5.00

0015460

Answer **all** questions in Section A.

Answer **two** questions from Section B and **three** questions from Section C.

SECTION A (120 marks)

Answer each question in this section.

Each question carries the same number of marks.

Write your answers in the spaces provided.

Write your examination number at the top.

Be sure to return this section of the examination paper, enclosing it in the answer book you use in answering Sections B and C.

1. Answer *five* of the following items, (i), (ii), (iii), etc. In the case of each item write the letter corresponding to the correct answer in the box provided.

(i) An object of mass 3 kg moving with a velocity of $4\ m\ s^{-1}$ has a kinetic energy of

A. 18 J
B. 36 J
C. 48 J
D. 12 J
E. 24 J.

Answer ☐ (6)

(ii) The acceleration due to gravity, g

A. is the same at all points on the surface of the earth
B. decreases with distance from the earth
C. increases with distance from the earth
D. depends on the mass of a body
E. is in a direction away from the centre of the earth.

Answer ☐ (6)

(iii) Fig. 1 shows an object (O) placed between the centre of curvature (C) and the focus (F) of a concave mirror. The image formed is

A. inside the focus
B. between the focus and the centre of curvature
C. at the focus
D. at the same position as the object
E. outside the centre of curvature.

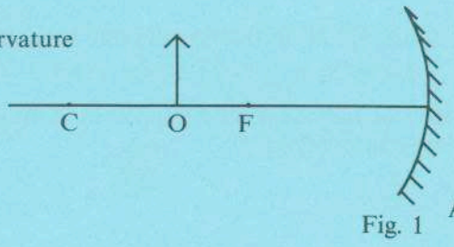

Fig. 1

Answer ☐ (6)

P.T.O.

(iv) Which of the following *cannot* be polarised?

A. infra-red waves
B. radio waves
C. X-rays
D. sound waves
E. ultra-violet rays.

Answer ☐ (6)

(v) The photoelectric effect is

A. the emission of electrons from a heated metal
B. the deflection of electrons in an electric field
C. the bombarding of a metal with electrons
D. the deflection of electrons in a magnetic field
E. the emission of electrons from a metal when light falls upon its surface.

Answer ☐ (6)

(vi) A current passing through a copper sulphate solution deposits 8×10^{-4} kg of copper at the cathode. If the current is doubled and allowed to pass for the same amount of time, the mass of copper deposited is

A. 4×10^{-4} kg
B. $1{\cdot}6 \times 10^{-3}$ kg
C. 2×10^{-4} kg
D. $3{\cdot}2 \times 10^{-3}$ kg
E. $6{\cdot}4 \times 10^{-7}$ kg.

Answer ☐ (6)

2. Answer *five* of the following.

(i) Define velocity .....

..... (6)

(ii) State the principle of conservation of momentum .....

.....

..... (6)

(iii) Give a practical application of latent heat .....

..... (6)

(iv) State Ohm's law .....

..... (6)

(v) The temperature 373 K on the Kelvin scale is equivalent to ..... on the Celsius scale. (6)

(vi) The frequency of the sound of a hooter on a train appears to ..... as the train moves towards an observer. (6)

3. The electroscope in Fig. 2 may be used to detect charge.

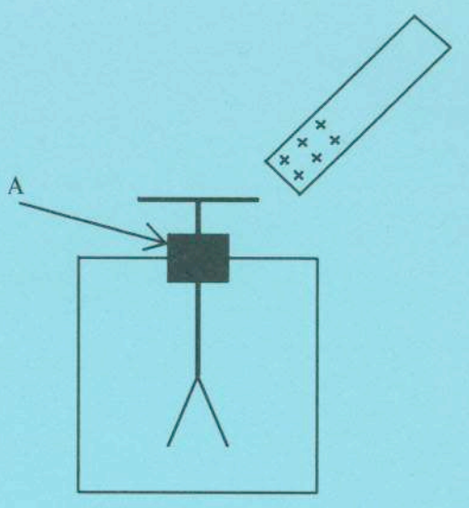

Fig. 2

Answer *five* of the following.

(i) The unit of charge is ..... (6)

(ii) A body may be given a charge by .....

..... (6)

(iii) Indicate the charge (*a*) on the cap, (*b*) on the leaves, of the electroscope in Fig. 2 .....

..... (6)

(iv) The function of the part labelled A in Fig. 2 is .....

..... (6)

(v) What will happen to the leaves of the charged electroscope in Fig. 2 when a conductor is brought into contact with the cap of the electroscope? .....

..... (6)

(vi) Give an everyday example of static charge .....

..... (6)

4. Answer *five* of the following.

(i) Give two radiations which are emitted from radioactive isotopes .....

..... (6)

(ii) State a precaution which should be taken when using ionising radiations .....

..... (6)

(iii) What is meant by the half-life of a radioactive isotope? .....

..... (6)

(iv) Name an instrument used to detect radioactivity .....

..... (6)

(v) Give a useful application of radioactive isotopes .....

..... (6)

(vi) What is meant by nuclear fission? .....

..... (6)

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PHYSICS—ORDINARY LEVEL

Section A is on a separate sheet which provides spaces for your answers. The completed sheet should be enclosed in your answer book.

Write your answers to Sections B and C in your answer book.

SECTION B (80 marks)

Answer **two** of the questions from this section.
Each question carries the same number of marks.

5. The apparatus shown in Fig. 3 was used in an experiment to measure the coefficient of dynamic friction.

Weights were added to the pan (Fig. 3) until the block moved with a constant speed when given a slight push. The weight of the block and the weight in the pan were measured. The weight of the block was then increased and more weights were added to the pan until the block again moved with a constant speed when given a slight push. The procedure was repeated for different weights of the block and the following table shows the data for the experiment.

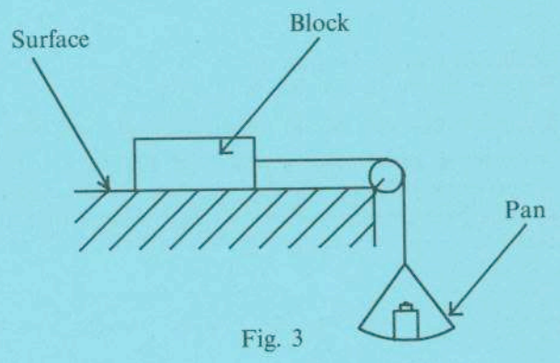

Fig. 3

Weight of block/N	4·7	6·7	8·7	10·7	12·7	14·7	16·7
Weight in pan/N	1·6	2·3	3·0	3·7	4·4	5·1	5·8

(i) Draw a simple diagram to show two of the forces acting on the block. (6)

(ii) Using the data in the above table draw a suitable graph on graph paper. From the graph find the coefficient of dynamic friction between the block and the surface. (27)

(iii) Mention a difficulty that could arise in performing the experiment. (6)

6. The following is part of a student's account of an experiment to measure the wavelength of monochromatic light.

"The apparatus was set up as shown in the diagram. After the apparatus had been adjusted a number of measurements were taken. From these measurements the wavelength of the light was calculated."

(i) Show, by means of a labelled diagram, a suitable arrangement of apparatus in this experiment. (12)

(ii) State the measurements which the student would have taken in the experiment. (15)

(iii) How can these measurements be used to calculate the wavelength of monochromatic light? (12)

7. In an experiment to investigate the variation of the resistance of a metallic conductor with temperature the resistance of a coil of wire was measured at a number of different temperatures.

(i) Draw a circuit diagram for the experiment, labelling each component. (18)

(ii) How may the temperature of the metallic conductor be varied in the experiment? (12)

(iii) Sketch the type of graph which you would expect to obtain from the experiment. (9)

SECTION C (200 marks)

Answer **three** questions from this section.

Each question carries the same number of marks.

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8. Define force. State Newton's second law of motion. (15)

Describe a laboratory experiment to illustrate Newton's second law of motion. (24)

A body of mass 2 kg accelerates uniformly from rest to a velocity of $8\ m\ s^{-1}$ in a time of 4 seconds. Calculate

(i) the acceleration of the body during this time;

(ii) the force required to produce the acceleration. (27)

9. Define (i) energy, (ii) power.
What is meant by specific heat capacity? (18)

Describe how you would measure the specific heat capacity of a liquid *or* a metal. (24)

An electric kettle with a power of 1,500 watts takes ten minutes to raise the temperature of 2·4 kg of water from 10°C to 100°C. Calculate (i) the number of joules of energy supplied by the kettle, (ii) the specific heat capacity of the water. (Assume that all the energy supplied by the kettle is used to heat the water.) (24)

10. Explain the terms (i) loudness, (ii) pitch, in relation to sound waves. (18)

Outline how resonance of sound may be demonstrated in the laboratory. (18)

The natural frequency of vibration of a string depends on its length. How may this be shown in the laboratory? (18)
Give two other factors on which the natural frequency of a string depends. (12)

11. Outline a laboratory experiment to show the presence of a magnetic field. (15)

What is meant by electromagnetic induction? State *one* of the laws of electromagnetic induction. (18)

Fig. 4 shows an induction coil.

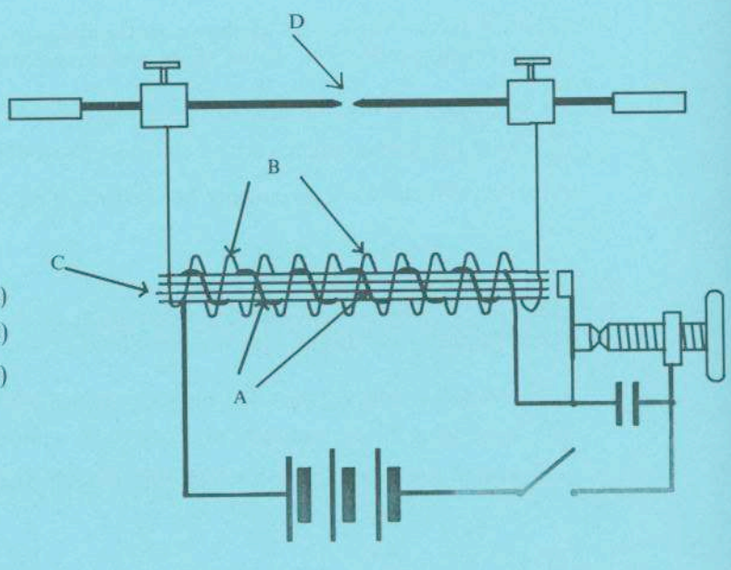

Fig. 4

Answer the following questions.

(i) For what purpose is an induction coil used? (6)

(ii) Name the parts of the coil labelled A, B, C. (18)

(iii) Indicate what happens at D in Fig. 4. (9)

12. What is a semiconductor?
How may an intrinsic semiconductor be made into an extrinsic semiconductor? (12)

Sketch the structure of (i) a semiconductor diode, (ii) a transistor. (15)

Give one use of a semiconductor diode. (6)

Fig. 5 shows a circuit which may be used in an experiment to plot the characteristic curve of a semiconductor diode. Describe how you would perform the experiment and sketch the graph which you would expect to obtain. (33)

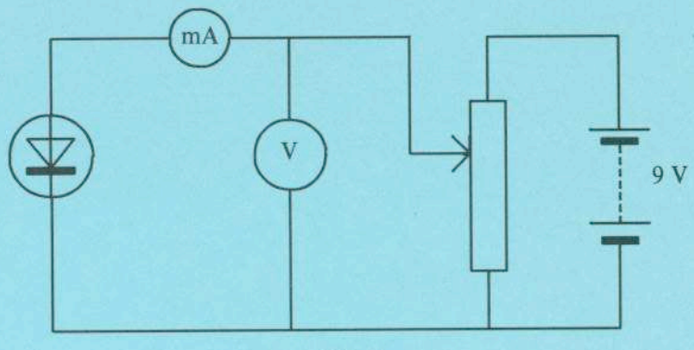

Fig. 5

13. Answer any *two* of the following.

(*a*) Draw a ray diagram to show the formation of a real image by a converging lens. (12)

An object is 16 cm away from a converging lens of focal length 10 cm. At what distance from the lens will the image be formed? What is the magnification of the image? (21)

(*b*) State the three methods by which heat energy may be transferred. Give an example of each method. (18)

Indicate one way in which solar heating might be used in a building. How may the U-value of a structure be reduced? (15)

(*c*) What is the function of a fuse in a household circuit? (6)

Which of the following fuses would be suitable for a lighting circuit? 6 A 16 A 30 A (6)

Draw a sketch of a household lighting circuit which contains two light bulbs, labelling the switches and the live wires. (21)

(*d*) Compare electrons and protons under the headings (i) charge, (ii) mass. (12)

Describe how a beam of electrons may be produced. (15)

State one everyday application of a beam of electrons. (6)