WARNING: You must return this section with your answer book otherwise marks will be lost.

Write Your Examination Number here

AN ROINN OIDEACHAIS

8797

LEAVING CERTIFICATE EXAMINATION, 1996

PHYSICS — ORDINARY LEVEL

THURSDAY, 13 JUNE — AFTERNOON 2.00 to 5.00

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) Which of the following is a vector quantity?

A. Mass
B. Speed
C. Volume
D. Density
E. Force.

Answer ☐ (6)

(ii) The acceleration due to gravity on the surface of the Moon is 1.7 m s^{-2}. The weight of a 4 kg mass on the surface of the Moon is

A. 0.4 N
B. 2.4 N
C. 4.0 N
D. 6.8 N
E. 39.2 N.

Answer ☐ (6)

(iii) The value assigned to the triple point of water is

A. 0 K
B. 37 K
C. 273.16 K
D. 100 K
E. –273 K.

Answer ☐ (6)

(iv) In the diffraction grating formula, $n\lambda = d \sin\Theta$, n represents the

A. angular displacement of the images
B. order of the image
C. grating constant
D. distance between the lines
E. wavelength.

Answer ☐ (6)

(v) The U-value of a structure may be increased by

A. adding insulation
B. removing insulation
C. increasing the temperature
D. reducing the temperature
E. doping.

Answer ☐ (6)

(vi) The frequency of the sound of a siren on an ambulance appears to decrease as the ambulance passes an observer. This is an example of

A. polarisation
B. the photoelectric effect
C. the thermionic effect
D. the Doppler effect
E. resonance.

Answer ☐ (6)

2. Answer *five* of the following.

(i) Albert Einstein proposed that mass and energy are related by the equation. ..... (6)

(ii) Name two methods of heat transfer

1. ..... 2. ..... (6)

(iii) The final image formed in the astronomical telescope is always ..... (6)

(iv) Green and magenta are ..... colours. (6)

(v) State one energy conversion that takes place in an electrical generator. .....

..... (6)

(vi) An ohmmeter is connected to a light dependant resistor (LDR) as shown in Fig. 1. What is observed as the intensity of the light falling on the LDR is increased?

.....

.....

..... (6)

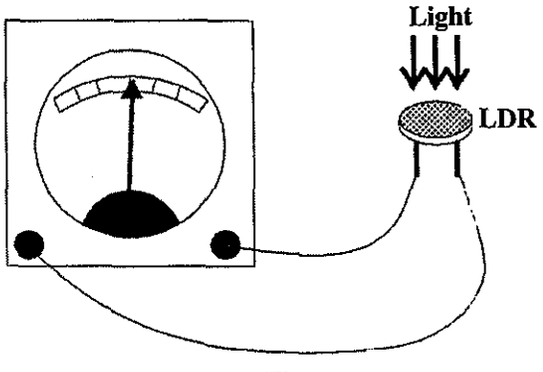

Fig. 1

3. Answer *five* of the following.

(i) What is meant by the frequency of a wave?

..... (6)

(ii) The unit of frequency is named after which German physicist?

..... (6)

(iii) Name the characteristic of a musical note that is altered if the frequency is varied.

..... (6)

(iv) Give the relationship between the frequency, velocity and the wavelength of a wave.

..... (6)

(v) State one difference between light waves and sound waves.

..... (6)

(vi) What is an ultrasonic wave?

..... (6)

4. Answer *five* of the following.

Fig 2 shows the circuit used in an experiment to verify Ohm's law.

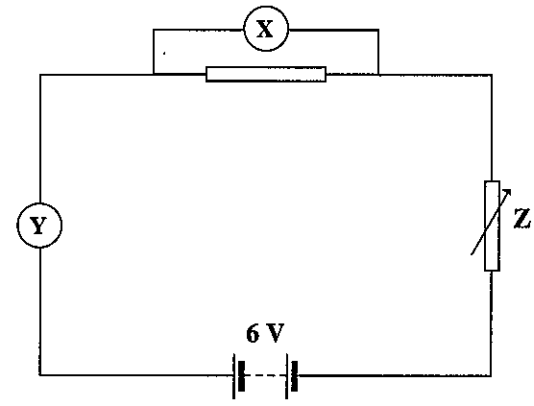

Fig. 2

(i) State Ohm's law.

.....

.....

..... (6)

(ii) What do the labels X and Y in Fig 2 stand for?

X.....

Y ..... (6)

(iii) What is the function of the item labelled Z?

..... (6)

(iv) Name a type of conductor which obeys Ohm's law. ..... (6)

(v) Name a type of conductor which does not obey Ohm's law. ..... (6)

(vi) Sketch, with labelled axes, a typical graph which might be obtained from this experiment. (6)

AN ROINN OIDEACHAIS

LEAVING CERTIFICATE EXAMINATION, 1996

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.

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5. The following is a part of a report given by a student of an experiment to measure the coefficient of dynamic friction.

"Weights were added to the pan until the block moved with a constant speed when given a gentle push. The weight of the block (W) and the weight in the pan (T) were then measured and the values were recorded. The procedure was repeated for different weights of the block and the table below was obtained."

Weight of block/N	5.5	7.5	9.5	11.5	13.5	15.5	17.5
Weight in pan/N	1.8	2.4	3.3	3.8	4.5	5.1	5.8

(i) Draw a labelled diagram of the apparatus which might have been used in this experiment. (9)

(ii) Using the data in the above table draw a graph of W against T. From the graph find the coefficient of dynamic friction between the block and the surface. (24)

(iii) State a difficulty which could arise in carrying out this experiment. (6)

6. In an experiment to determine the refractive index of glass a student placed a glass block on a sheet of paper and measured the angles of incidence and of refraction. The experiment was then repeated for two other angles of incidence. The readings obtained are tabulated below.

Angle of incidence / degree	20	40	60
Angle of refraction / degree	13	25	35

(i) Describe, with the help of a diagram, how the incident and the refracted rays could have been obtained in this experiment. (12)

(ii) Show in the diagram the angles of incidence and of refraction. (6)

(iii) Use the data given in the table to calculate an average value for the refractive index of glass. (21)

7. A student used a calorimeter and a thermometer in an experiment to verify Joule's law.

(i) Name the other pieces of apparatus which the student would use in the experiment. (9)

(ii) Draw a circuit diagram for this experiment. (9)

(iii) State the measurements which would be taken in this experiment. (12)

(iv) Sketch, with labelled axes, the type of graph which would be obtained from this 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. (*a*) Define acceleration. (6)

Outline a laboratory experiment to measure the acceleration of a body. (18)

A body which was initially travelling in a straight line with a velocity of 6 m s^{-1} accelerates uniformly and reaches a velocity of 10 m s^{-1} after 4 seconds. Calculate the acceleration of the body. (9)

(*b*) State the principle of conservation of momentum. (6)

An object of mass 0.06 kg, travelling at a speed of 500 m s^{-1}, strikes a body of mass 2 kg which is at rest. If the two objects join together after impact, what will be the speed of the combined body immediately after the impact? (18)

Give an everyday example of the principle of conservation of momentum. (9)

9. State the laws of reflection of light. (6)

Fig. 3 shows a ray of light (AO) striking a plane mirror M. ON is the normal to the mirror. What is the value of the angle of incidence? (6)

Draw a ray diagram to show the formation of (i) a real image, (ii) a virtual image, by a concave mirror. (12)

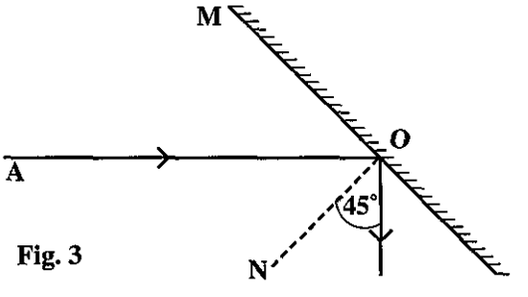

Fig. 3

Describe an experiment to measure the focal length of a concave mirror. (21)

An object is placed 20 cm in front of a concave mirror of focal length 12 cm. At what distance from the mirror will an image be formed? (12)

What is the nature and the magnification of the image formed? (9)

10. (a) Describe an experiment to investigate the magnetic field around a solenoid. (12)

Draw a sketch of the type of field you would expect to find. (6)

Give one method of increasing the magnetic flux density inside the solenoid. (9)

State one application of a solenoid. (6)

(b) State the laws of electromagnetic induction. (12)

A coil of wire (P) is connected to a battery as shown in Fig. 4. A second coil (S) is connected to a galvanometer (G). The two coils are linked by a soft iron core.

What happens to the galvanometer when the switch, K, is (i) closed and then (ii) opened? Explain. (6)

What changes should be made in the arrangement shown in Fig. 4 in order to use it to obtain high voltage a.c. from a low voltage a.c. source? (9)

What is the name given to the new arrangement? (6)

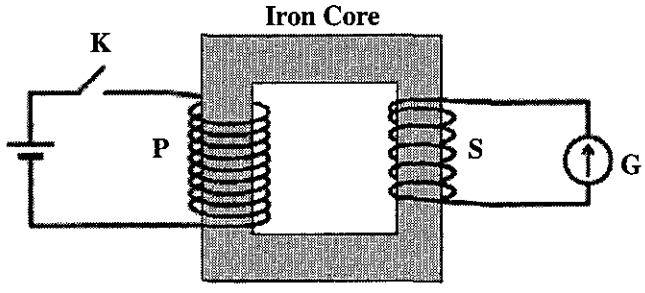

Fig. 4

11. (a) Explain the term semiconductor. (6)

Fig. 5 shows a lamp which is connected to X and a 6 volt battery.

Name and give the function of X.

Sketch the structure of X. (12)

Is the lamp lighting? Explain your answer. (6)

What is observed to happen when the switch S is closed? Explain your answer. (9)

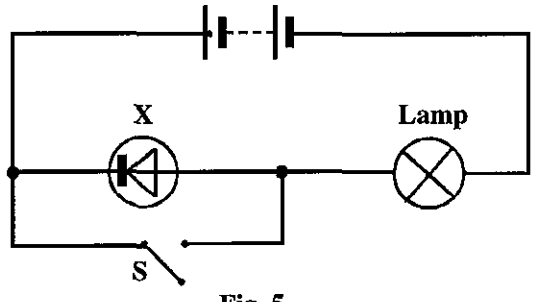

Fig. 5

(b) What are X-rays? Draw a labelled diagram of an X-ray tube. (18)

Explain the part played by electrons in the production of X-rays. (9)

Give *two* uses of X-rays. (6)

12. (a) What is an alpha-particle? (9)

Give two properties of alpha-particles emitted by a radioactive source. (6)

Name a device which may be used for detecting alpha-particles and outline its principle of operation. (18)

(b) "A nuclear fission reactor contains a fuel, control rods and a moderator". Explain the underlined terms. (18)

Name a suitable fuel for a nuclear reactor. (9)

Give one advantage and one disadvantage of nuclear fission compared to nuclear fusion as a source of energy. (6)

13. Answer any *two* of the following.

(a) Define pressure and give its unit. (12)

A tank contains 1600 kg of water. If the base of the tank has an area of 24 m^2, calculate the pressure exerted by the water on the base. (Take $g = 9.8\ m\ s^{-2}$). (12)

When the air is pumped out of the metal container shown in Fig. 6, it collapses. Explain why this occurs. (9)

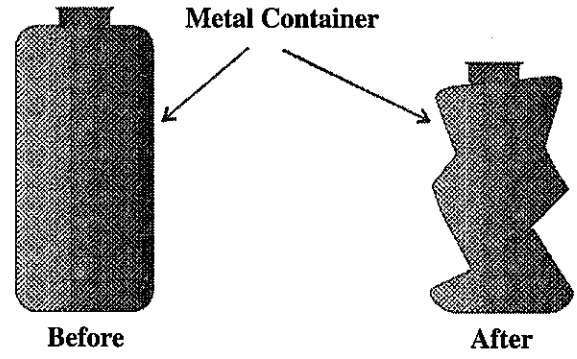

Fig. 6

(b) Draw a labelled diagram showing how a spectrum of white light may be obtained using a prism. (12)

List three types of radiation, other than visible light, which form part of the electromagnetic spectrum. (9)

Select one of the types of radiation which you named and describe how it may be detected. Give one of the uses which may be made of it. (12)

(c) Describe an experiment to show that the capacitance of a parallel-plate capacitor depends on the common area of its plates. (18)

A capacitor has a capacitance of 1,000 μF. What is the charge on the capacitor when the potential difference between its plates is 50 V? (9)

Give a use which is made of capacitors. (6)

(d) What is meant by the electrochemical equivalent of an element? (9)

When a current of 0.5 A is passed through a copper voltameter for 30 minutes, 3.0×10^{-4} kg of copper is deposited. Calculate the electrochemical equivalent of copper. (18)

Give an industrial application of electrolysis. (6)