

## INTERMEDIATE CERTIFICATE EXAMINATION, 1963.

## SCIENCE (Syllabus A).

FRIDAY, 14th JUNE.—Evening, 3 to 5.30.

(Not more than six questions are to be attempted, of which three must be taken from Section I, and three from Section II. Illustrate your answers by means of diagrams wherever possible.)

## SECTION I.

1. Describe fully how you would measure (i) the length of a curved line, (ii) the area of Ireland from a map, (iii) the volume of a potato. (66 marks.)

2. Distinguish between mass and weight.

Describe any experiment you have performed using (i) a spiral spring, (ii) a simple pendulum. In each case state the purpose of the experiment and indicate the results you obtained. (66 marks.)

3. State the law of flotation and describe an experiment to illustrate the truth of the law.

Describe, with the aid of a diagram, a hydrometer and explain how it is used to measure the density of a liquid.

A rectangular block of wood, 10 cm. x 10 cm. x 1 cm., floats in water. If a mass of 60 gm., placed on top of the block, is just sufficient to submerge the block entirely, calculate the density of the wood. (66 marks.)

4. Describe the methods by which heat is transmitted and give an example in each case.

Give a full account of how you would measure the coefficient of apparent expansion of a liquid.

How would you find the true coefficient of expansion of the liquid? (67 marks.)

5. State (i) Boyle's Law, (ii) Charles' Law.

Describe, with the aid of a diagram, an experiment to demonstrate Charles' Law.

The volume of a given mass of gas, at 7°C. and at a pressure of 770 mm. of mercury, is 600 c.c. Find its volume at 27°C. and at a pressure of 750 mm. of mercury. (67 marks.)

## SECTION II.

6. Name three substances which evolve oxygen on heating.

Give an account of the physical and chemical properties of oxygen.

Describe what may be observed when each of the following is burned in oxygen, name the product formed and mention the effect, if any, of the product on moist litmus:— (a) iron, (b) magnesium, (c) phosphorus, (d) sulphur. (66 marks.)

7. Describe fully how you would prepare and collect nitric acid. Give an account of its properties.

Name any three salts of nitric acid, describe how you would prepare a reasonably pure sample of any one of them and give an account of its properties. (66 marks.)

8. Give an account of how you would prepare and collect nitrous oxide.

Describe the properties of nitrous oxide and compare and contrast them with those of nitric oxide and nitrogen peroxide (nitrogen dioxide). (66 marks.)

9. Describe, with the aid of a sketch of the apparatus, how you would prepare carbon dioxide and measure its density.

Give an account of the properties and uses of carbon dioxide. (67 marks.)

10. Define chemical equivalent.

Describe how you would measure the chemical equivalent of a metal by the reduction of its oxide.

When 1.597 gm. of a certain oxide was reduced 1.117 gm. of the metal was obtained. Calculate the chemical equivalent of the metal.

598 c.c. of hydrogen, at 17°C. and at a pressure of 750 mm. of mercury, were released by the action of excess acid on one gram of another metal. Find the equivalent of this metal. (A litre of hydrogen at S.T.P. weighs 0.09 gm.) (67 marks.)