# AN ROINN OIDEACHAIS
## (Department of Education).

## INTERMEDIATE CERTIFICATE EXAMINATION, 1960.

## SCIENCE (Syllabus A).

*WEDNESDAY, 15th 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. State the principle of Archimedes and describe fully how you would demonstrate it by experiment in the case of a liquid other than water.

A solid weighs 15·5 gms. in air and 11·5 gms. in water. Calculate (i) its volume, (ii) its density, (iii) its apparent weight in brine of specific gravity 1·05.

[66 marks.]

2. Describe how to construct and graduate an alcohol thermometer. Compare the advantages and disadvantages of mercury and alcohol thermometers.

Describe fully how you would measure the melting-point of a substance such as beeswax.

[66 marks.]

3. Describe each of the following and give an account of an experiment you have done in connection with it :—(i) a simple pendulum, (ii) a spiral spring, (iii) Hare's apparatus.

[66 marks.]

4. (*a*) Explain the terms (i) conduction, (ii) convection, (iii) radiation, and give two examples in each case to illustrate your answer.

(*b*) Describe a simple form of central heating system and explain how the heat is dispensed from it, *or*, give an account of the thermos flask and the theory on which it is based.

[67 marks.]

5. Describe fully how you would measure the latent heat of fusion of ice.

A calorimeter weighing 15 gms. contains 20 gms. of liquid, of specific heat 0·8, at 12°C. When 0·5 gms. of dry steam at 100°C. is added the temperature of the resulting mixture is 28°C. Find the specific heat of the substance of which the calorimeter is made.

[Latent heat of steam=536 cals. per gm.]

[67 marks.]

## SECTION II.

6. Describe how you would prepare and collect (i) oxygen, (ii) nitrous oxide.

Give an account of the properties of these two gases, referring particularly to the points of difference.

[66 marks.]

7. What do you understand by (i) a saturated solution, (ii) a supersaturated solution ? Give an example in each case.

How would you show that tap-water contains (i) dissolved gases, (ii) dissolved solids ?

Describe fully how you would measure the solubility of a given salt at 35°C.

[66 marks.]

8. Describe the effect of heat on the following and name the products formed :—

    (i) crystalline copper sulphate,

    (ii) crystalline ferrous sulphate,

    (iii) sodium bicarbonate,

    (iv) potassium nitrate,

    (v) a mixture of sodium chloride and concentrated sulphuric acid,

    (vi) a mixture of litharge and carbon.

[66 marks.]

9. Give an account of the allotropes of sulphur and describe how any two of them may be prepared.

Describe the preparation and properties of sulphur dioxide.

[67 marks.]

10. Describe fully how you would measure the chemical equivalent of copper (i) by reduction, (ii) by oxidation.

183 c.c. of hydrogen, at 17°C. and at a pressure of 750 mm. of mercury, were released by the action of an acid on one gram of a metal. Calculate the equivalent of the metal.

[A litre of hydrogen at S.T.P. weighs 0·09 gms.]

[67 marks.]