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INTERMEDIATE CERTIFICATE EXAMINATION, 1959.

SCIENCE (Syllabus A).

TUESDAY, 9th 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. Define (*a*) force, (*b*) mass, (*c*) weight, (*d*) centre of gravity.
Describe, with the aid of a labelled diagram, a laboratory balance. Refer to the importance of the location of the centre of gravity in relation to the fulcrum.

[66 marks.]

2. Describe how you would construct a mercury barometer and explain how it works.

Mention two advantages an aneroid barometer has over a mercury barometer.

What reading on a glycerine barometer corresponds to a pressure of 29 in. of mercury ?

[Specific gravity of mercury=13·6, specific gravity of glycerine=1·26.]

[66 marks.]

3. State the law of flotation and describe, with the aid of a diagram, an experiment to demonstrate it in the case of a liquid other than water.

A solid cylinder, 12 cms. in length, floats vertically in water with 9 cms. of its length beneath the surface and in brine with 8·5 cms. of its length beneath the surface. Find (i) the density of the cylinder, (ii) the density of the brine.

[66 marks.]

4. Define (*a*) specific heat, (*b*) latent heat, (*c*) water equivalent of a calorimeter.

Describe fully how you would measure the specific heat of a given liquid.

How many grams of steam at 100°C. should be passed into 50 gms. of water at 10°C. in order to raise the temperature to 40°C. ?
[Latent heat of steam 536 cals. per gm.]

[67 marks.]

5. State (*a*) Boyle's Law, (*b*) Charles' Law.
Describe fully, with the aid of a diagram, an experiment which demonstrates Charles' Law.

The volume of a given mass of gas at 20°C. is 879 c.c. The temperature is reduced, the pressure remaining constant, until the volume is 759 c.c. Calculate the reduction in temperature.

[67 marks.]

SECTION II.

6. Give an account of the composition of the atmosphere. Mention which constituents are elements and which are compounds.

Describe the properties of the two principal constituents.

[66 marks.]

7. What is an oxide ?

Define (i) basic oxide, (ii) acidic oxide, (iii) salt, and give two examples of each.

Describe how you would prepare reasonably pure samples of each of the following, starting from the metal in each case :—(*a*) sodium nitrate, (*b*) calcium carbonate. Describe the action of heat on these substances.

[66 marks.]

8. Describe, with the aid of a sketch, how you would prepare and collect a few gas-jars of reasonably pure nitrogen peroxide. Give an account of its properties and describe the effect of change of temperature on it.

[66 marks.]

9. Describe, with the aid of a sketch, how you would prepare and collect dry carbon dioxide.

Give an account of the properties and uses of carbon dioxide.

Describe how you would measure the mass of a litre of carbon dioxide at S.T.P.

[67 marks.]

10. Define chemical equivalent.

Describe two different methods by which the chemical equivalent of magnesium may be measured.

When 2 gms. of magnesium were fully oxidised 3·33 gms. of magnesium oxide were formed. What volume of hydrogen at S.T.P. would be released by the action of 2 gms. of magnesium on a suitable acid ?

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

[67 marks.]