INTERMEDIATE CERTIFICATE EXAMINATION, 1970

SCIENCE — SYLLABUS A

WEDNESDAY, 17th JUNE — MORNING, 9.30 to 12

Six questions to be answered, one question at least being chosen from each section.
All the questions carry the same number of marks.

A Periodic Table of the Elements may be had from the Superintendent.
You are recommended to use clearly labelled diagrams, where appropriate, to reduce the amount of lengthy descriptive work.

SECTION I

1. How would you show that the atmosphere exerts pressure?
What is the relationship (i) between the pressure and volume of a given mass of gas at constant temperature, (ii) between the volume and temperature of the gas at constant pressure?
How would you show that the pressure at a point in a liquid varies with (i) the depth, (ii) the density of the liquid?

2. Explain the terms work and energy.
Give examples, one in each case, of the generation of heat (i) by mechanical work, (ii) by chemical work, (iii) by electrical work.
What is meant by latent heat?
Calculate the amount of heat required (i) to raise the temperature of 10 gm. of water from 20°C to 60°C, (ii) to change the water at 60°C to steam at 100°C.
(Take the latent heat of steam = 540 cal. per gm.)

3. How does the conduction of electricity through metals differ from conduction through liquids?
A current is flowing through a given piece of wire. Show, with the aid of a circuit-diagram, how the resistance of the wire may be measured using an ammeter and a voltmeter.
Draw a diagram to illustrate the magnetic field produced when an electric current is passed through a straight wire.

4. Answer *three* of the following:
   (a) Describe briefly a method of measuring the density of a liquid. In what units is density expressed?
   (b) How would you show (i) Brownian movement, (ii) surface tension? What do these phenomena tell us about the kinetic nature of liquids?
   (c) What is dispersion of light?
   Describe how the existence of infrared and ultraviolet light may be demonstrated in the laboratory.
   (d) An electric lamp is marked 150W, 250V. What do these markings signify? How much does it cost to run the lamp for 12 hours at 1·5 pence per kilowatt-hour, the voltage supply being 250 volts, and what is the current in the lamp?
   (e) How would you show the equivalence of static and current electricity? In what respect do they differ from each other?

SECTION II

5. Describe how you would prepare and collect oxygen. (A clearly labelled diagram will suffice.)
What may be observed when (i) magnesium, (ii) sulphur, (iii) methane, is burned in oxygen? Name the products formed and say what effect they have, if any, on moist litmus.
Would fish live in water which had been boiled and allowed to cool? Give your reasons.

6. State briefly what you know about (i) electrons, (ii) protons, (iii) neutrons.
Write down the simple structure of an atom of (i) nitrogen, (ii) sodium, (iii) chlorine, showing electrons, protons and neutrons.
What are isotopes?

7. What is (i) an acid, (ii) a base, (iii) an indicator?
Given sodium hydroxide, how would you prepare any *three* of the following: sodium chloride, sodium sulphate, sodium nitrate, sodium carbonate?
Use an equation to show the effect of heat on sodium nitrate and name the products formed.

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8. *Answer three of the following:*

(a) Show by means of a clearly labelled diagram how you would prepare and collect methane. Indicate the shape of a methane molecule by means of a diagram.

(b) What do you understand by heat of neutralisation? Describe with the aid of a sketch of the apparatus how you would demonstrate the heat of neutralisation of hydrochloric acid and sodium hydroxide.

(c) If you were given strips of copper, magnesium and zinc, state what experiments you would perform in order to place these metals in the order of their activities. Write down these three metals in the order in which they occur in the activity series.

(d) What do you understand by an ion, an ion pair, an ion-exchanger?
How would you remove permanent hardness from water?

(e) Describe oxidation and reduction in terms of electron transfer, and give two examples.

SECTION III

9. Give an example of competition in a habitat you have studied. What type of habitat is it? Describe how a plant, which you name, is adapted to survive winter in that type of habitat. Give two ways in which a bird, which you name, is specially adapted to feeding in that type of habitat.
What do you understand by colonisation?

10. A boy gets a deep cut on his leg. The blood is observed to come out in spurts and to be a bright red in colour. Answer the following questions:

(a) What type of blood vessel has been cut?

(b) Why is the blood coming out in spurts?

(c) What is the principal gas carried by this blood?

(d) Where did the blood get this gas?

(e) What other gas is found in blood?

This boy, like all living things, needs energy. Which of the following, (i) or (ii), represents the process of respiration, and what process does the other represent?

(i) carbon dioxide + water + energy $\xrightarrow{\text{chlorophyll}}$ carbohydrate + oxygen.

(ii) carbohydrate (glucose) + oxygen $\longrightarrow$ carbon dioxide + water + energy.

11. A sample of soil from a field contains living and non-living parts. Name the things you would expect to find in the living part and in the non-living part.
The soil plays an important part in the life of the flowering plant. Briefly describe *two* ways in which the soil benefits the plant.
Draw three simple clearly labelled diagrams to show what happens to a seed between the time it arrives in the soil and the appearance of the shoot above the ground.

12. Answer *two* of the following:

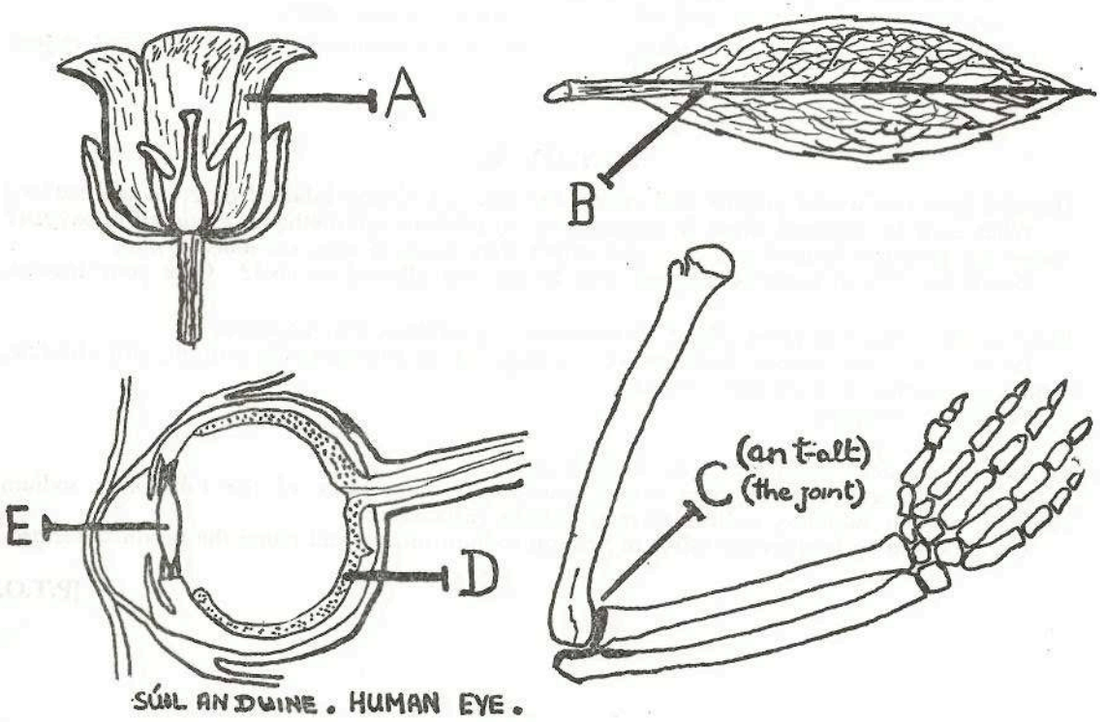
(a) List the characteristics of living things. Describe briefly the characteristic features by which plants and animals are distinguished from each other.

(b) Give labelled diagrams to illustrate the life history of the frog or of an insect which you name.

(c) How would you demonstrate the existence of bacteria and fungi in your surroundings?

(d) Explain the terms ovulation and fertilisation in respect of the mammal.
Distinguish between pollination and fertilisation in respect of the flowering plant.

(e) Name the parts labelled A, B, C, D, E in the diagrams below, and give one function of each of them.



SÚIL AN DUINE. HUMAN EYE.