AN ROINN OIDEACHAIS

INTERMEDIATE CERTIFICATE EXAMINATION, 1972

SCIENCE—SYLLABUS B

THURSDAY, 15th JUNE—AFTERNOON, 2.30 to 5

Six questions in all to be answered, including at least **two** from Section I, at least **one** from Section II and at least **one** from Section III. All questions carry equal marks.

SECTION I

1. The table below shows the analysis of mineral matter in three samples of soil.

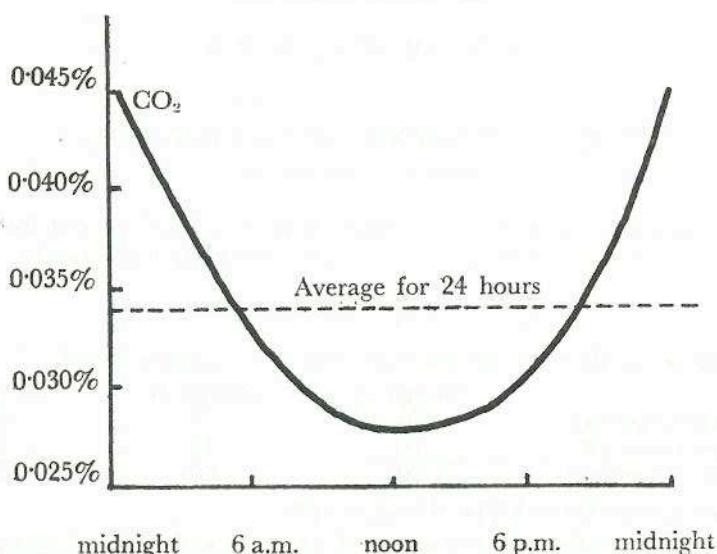|	Sample A	Sample B	Sample C
Percentage clay	70	5	35
Percentage silt	10	15	10
Percentage sand	20	80	55

   (a) From the data given, state the soil type of each sample.

   (b) How does the particle size affect the movement of water through each soil type.

   (c) Give two effects that could be caused by the addition of organic matter to each sample.

   (d) In the case of each of the three soil types, state some of its advantages and disadvantages (if any) in farming.

2. (a) What is a fungus?

   (b) Name a fungus you have examined and give a rough sketch of its structure. How does this fungus get its food and how does it reproduce?

   (c) Name one disease caused by a fungus and state some of the symptoms. How is the disease prevented?

3. (a) Name a habitat you have studied and supply the following information with respect to that habitat:—

   (i) four producer species of plants;

   (ii) two carnivores;

   (iii) two herbivores;

   (iv) one omnivore.

   (b) Arrange the species you have mentioned so as to show a simple food chain.

   (c) State the relationship which exists between the body size of an animal and its numbers in the habitat.

   (d) How did you attempt to find the range of animal species present in the habitat?

   (e) Give three reasons why it is difficult to make an exact study of all types of animals in a habitat.

4. (a) State *two* ways in which proteins and carbohydrates resemble one another.

   (b) What is the general effect of digestive enzymes on the molecule size of proteins and carbohydrates?

   (c) What are the locations in the digestive system in which (i) protein-splitting enzymes and (ii) carbohydrate-splitting enzymes are added to food?

   (d) What functions do proteins and carbohydrates serve in the body?

5. A pure breeding variety of tall peas was crossed with a pure breeding variety of dwarf peas. All the progeny were tall. These tall peas were then crossed with one another and many of the progeny were tall, but some were dwarf. The sequence of events may be shown as follows:

	♂		♀
Parents	Tall	×	Dwarf
	TT	×	tt
Possible gametes	T	×	t
Possible combination	Tt (first generation—all tall)		

Parents	Tall	×	Tall
	Tt	×	Tt
Possible gametes	T, t × T, t		
Possible combinations	TT, Tt, Tt, tt (second generation)		

   (a) What is meant by (i) TT, (ii) t?

   (b) Write down the symbol used for the hybrid.

   (c) What is the ratio of tall to dwarf progeny in the second generation?

   (d) Explain very briefly why all first generation peas were tall.

   (e) How, in your opinion, was the cross carried out?

[P.T.O.

6. The graph hereunder shows the variation in the percentage of carbon dioxide in samples of air taken from between the leaves of tall grass at regular intervals during a 24-hour period in the month of May.

0·045%   CO₂

0·040%

0·035%   Average for 24 hours

0·030%

0·025%

midnight   6 a.m.   noon   6 p.m.   midnight

(a) Between what times, approximately, was the carbon dioxide concentration below average and explain why this was so.

(b) Why was the concentration of carbon dioxide above average outside of that period?

(c) Using the same time divisions as those shown on the above graph, sketch a new graph on similar lines to show generally how you think the oxygen concentration would vary in the same situation. (Exact percentages are not expected.)

SECTION II

7. You are given five gas jars, each filled with one of the following gases: oxygen, nitrogen, carbon dioxide, ammonia and hydrogen.

(a) What tests would you carry out so as to identify each gas?

(b) In the case of any *two* of the gases that react chemically during the tests, state the reaction that occurs between the gas and the material used to identify it. Illustrate *one* of these reactions by a chemical equation.

8. (a) Distinguish between (i) an element and a compound, (ii) a compound and a mixture.

(b) Classify each of the following as an element, a compound or a mixture: air, carbon dioxide, hydrogen, water, mercury, ammonia, starch.

(c) How would you obtain a sample of salt from a mixture of sand and salt?

(d) Describe, with the aid of a sketch of the apparatus, how you would get a sample of pure water from sea water.

9. Write notes on any *two* of the following topics.
(i) Brownian Movement. (ii) Water as a solvent. (iii) pH of soils. (iv) The Nitrogen Cycle. (v) Light as a Form of Energy.

SECTION III

10. (a) What is a cyclone? Show by means of isobars how atmospheric pressure varies in a cyclone. Indicate wind directions (for the northern hemisphere).

(b) Give reasons for the type of weather associated with cyclones.

(c) How are readings on the school barometer affected by the passage of a cyclone over your area?

11. Explain any *four* of the following:

(a) how day and night occur;

(b) why water when heated to 100 °C shows no further rise in temperature until it changes state;

(c) why fog forms along river basins;

(d) why it is possible to use a vacuum flask to keep the contents either cool or warm;

(e) how Seán, whose weight is only 35 kg sitting at one end of a see-saw 4 metres long and supported at its mid-point, can balance his uncle who weighs 105 kg;

(f) why mercury rather than water is used in thermometers.

12. A piece of copper of mass 2 kg is suspended in a bunsen flame. The copper is then quickly transferred to a vessel containing water of mass 5 kg and at 7 °C (280 K). The temperature rises to 27 °C (300 K). Assuming that there is no loss of temperature to the surroundings and ignoring the heat gained by the material of the vessel, calculate the temperature of the bunsen flame.
[If using SI units, take the specific heat capacity of water to be 4200 J/kg K and that of copper to be 400 J/kg K.
If not using SI units, take the specific heat of copper to be 0·1 calories per gramme per °C.]

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