Coimisiún na Scrúduithe Stáit
State Examinations Commission

LEAVING CERTIFICATE EXAMINATION 2020

AGRICULTURAL SCIENCE – HIGHER LEVEL

2 hours 30 minutes

Answer any **six** questions
Question 1 carries 60 marks
All other questions carry 48 marks each
Write all your answers in the answer book

Total marks: 300 marks

1. Answer any **six** of the parts (a) – (j).

(a) (i) What is meant by the term *noxious weed*?
(ii) Give **two** examples of noxious weeds.

(b) (i) What is meant by the term *incomplete metamorphosis*?
(ii) Give **one** example of incomplete metamorphosis.

(c) Outline **three** reasons for the practice of thinning forestry trees.

(d) Draw a labelled diagram to show the arrangement of the vascular tissues in a dicotyledonous (dicot) root.

(e) State the location in the mammalian body of **each** of the following parts:

(i) Humerus
(ii) Pituitary gland
(iii) Bowman's capsule
(iv) Cervix.

(f) Explain **each** of the following terms:

(i) Dagging
(ii) Tagging.

(g) Describe how the structure of the grass flower is suited to wind pollination.

(h) State the length of gestation, in days, for **each** of the following farm animals:

(i) Cow
(ii) Sheep
(iii) Pig.

(i) Classify **each** of the following into a principal rock type:

(i) Slate
(ii) Granite
(iii) Limestone.

(j) Explain the reason for rolling barley grains before feeding to cattle.

(60 marks)

2. (a) Cementation and separation are two processes that affect the development of a soil structure.

(i) What is meant by **each** of the terms *cementation* and *separation*?
(ii) Outline any **two** factors that contribute to cementation.
(iii) Outline any **two** factors that contribute to separation.

(b) Cation exchange capacity (CEC) is an important chemical property of soil.

(i) What is meant by the term *cation exchange capacity*?
(ii) Cation exchange capacity is lower in sandy soils than in clay soils.
Give **two** reasons for this.
(iii) Describe a method by which cation exchange capacity may be increased in a soil.

(c) Describe an experiment to test for the presence of a **named** soil mineral.

(48 marks)

3. Option One.

(a) Compare **two named** sheep production enterprises that are commonly practised in Ireland.

(b) Preparation at breeding time is an important aspect of good flock management. Discuss any **four** aspects of flock preparation prior to mating.

(c) Control of internal and external parasites is a routine feature of sheep husbandry. Describe any **four** methods to control **named** parasites in sheep.

(48 marks)

OR

3. Option Two.

(a) (i) Discuss **two** features that influence the geographical location of cereal crop production in Ireland.
(ii) Cereals in Ireland are sown as either winter crops or spring crops. Outline **four** differences between the growing of winter and spring cereals.

(b) Describe the cultivation of potatoes **or** of a **named** root crop under the following headings:

(i) Soil suitability
(ii) Choice of variety
(iii) Yield
(iv) Uses.

(c) Weeds, pests and diseases in crops can be controlled by direct or indirect methods. Describe any **two** methods of direct control and any **two** methods of indirect control.

(48 marks)

4. In the case of any **two** of the following, describe a laboratory or field method:

(a) To extract different pigments from a sample of grass.

(b) To show the action of a **named** animal enzyme.

(c) To compare capillarity in soil samples.

(d) To estimate the yield per hectare of a **named** root crop.

(48 marks)

5. (a) The dry period is of great importance to the overall performance of the dairy cow.

(i) Outline **two** reasons for the importance of the dry period.
(ii) Describe **two** features of the management of the dairy cow during the dry period.

(b) Accurate heat detection is crucial in the use of artificial insemination (AI) in the dairy herd.

(i) Describe any **two** methods of heat detection.
(ii) Give **two** advantages of the use of AI in the dairy herd.

(c) The hygiene quality and the composition of milk may affect the price per litre paid to the farmer.
Describe any **two** tests carried out on milk to determine hygiene quality **or** composition.
For each test described, state clearly if hygiene quality or composition is being determined.

(48 marks)

6. (a) Direct sowing is the traditional method of sowing grass seed in Ireland.

In relation to direct sowing of grass:

(i) Describe the stages involved in seed bed preparation.
(ii) Describe how the seed is sown.
(iii) Explain the benefit of this cultivation method in a loam soil.

(b) Paddock grazing may be described as being of great benefit to agriculture but of less benefit to the environment.

(i) Give **two** benefits of paddock grazing in livestock production.
(ii) Explain **two** ways in which paddock grazing may be harmful to the environment.

(c) Compare the contrasting methods of grass conservation in hay making and in silage making.

(48 marks)

7. (a) Mitosis and meiosis are forms of cell division that occur in all agriculturally important organisms.
Describe, with the aid of labelled diagrams, the stages of mitosis.

(b) Meiosis occurs during the production of male and female gametes.

(i) Explain the significance of meiosis in gamete formation.
(ii) Outline the process of crossing-over which occurs during meiosis and explain its significance.

(c) In the bean plant, hairless leaf (H) is dominant over hairy leaf (h), and straight petiole (S) is dominant over spiral petiole (s). A bean plant, heterozygous for both conditions, was self-fertilised and the seeds were collected and germinated and grown to maturity.

(i) Outline the details of this cross.
(ii) State what proportions of the offspring plants you would expect to see with:
1. Hairless leaf
2. Straight petiole
3. Spiral petiole
4. Hairless leaf together with spiral petiole.

(48 marks)

8. Answer any **two** of the parts (a), (b), (c).

(a) It is said that agriculture is the single largest contributor to Irish greenhouse gas emissions.

(i) Use a labelled diagram to illustrate the carbon cycle.
(ii) With reference to the carbon cycle, suggest **two** ways in which the emissions from agriculture could be reduced to help meet Ireland's climate change targets.

(b) The overuse of antibiotics to control bacterial diseases in farm animals can lead to these and other bacteria becoming resistant to antibiotics.

(i) Name **two** common bacterial diseases of farm animals, which are treated with antibiotics.
(ii) Outline how antibiotic resistance develops in bacteria.
(iii) Suggest a method of disease control other than using antibiotics.

(c) Distinguish clearly between the members of any **three** of the following pairs of terms:

(i) *Ruminant* and *monogastric* digestive systems
(ii) *Transpiration* and *translocation*
(iii) *Saturated flow* and *unsaturated flow* in soils
(iv) *Hypogeal germination* and *epigeal germination*.

(48 marks)

9. Give scientific explanations for any **four** of the following:

(a) Sprouting or 'chitting' of early potatoes.

(b) The presence of grit in the digestive tract of fowl.

(c) A high incidence of leatherjackets in cereal crops, following grass.

(d) Deep ploughing of a podzol soil.

(e) The increased nitrogen content of slurry produced by winter-finishing cattle.

(48 marks)

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