Coimisiún na Scrúduithe Stáit
State Examinations Commission

LEAVING CERTIFICATE EXAMINATION 2019

AGRICULTURAL SCIENCE – HIGHER LEVEL

MONDAY 17 JUNE – AFTERNOON 2:00 – 4:30

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) Give the target yield in tonnes per hectare of **each** of the following spring cereal crops:

(i) Barley
(ii) Wheat
(iii) Oats.

(b) Give **three** reasons for the dense planting of Irish coniferous forests.

(c) (i) What is meant by the term *vegetative reproduction*?
(ii) Give **two** examples of vegetative reproduction.

(d) List **four** characteristics of a loam soil.

(e) (i) What is meant by the term *zoonosis*?
(ii) Give **two** examples of zoonoses with relevance to agriculture.

(f) Nitrates and phosphates are important soil minerals.
In the case of **each:**

(i) Describe the test used to show the presence of the mineral.
(ii) Describe the colour change that indicates a positive result for the presence of the mineral.

(g) The liver is the largest internal organ in the mammalian body.
State **three** functions of the liver.

(h) (i) What is meant by the term *biological control*?
(ii) Give an example of biological control in agriculture.

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

(i) Nephron
(ii) Adrenal gland
(iii) Cerebrum.

(j) Why are practices such as sheep dipping and the use of pour-on essential in flock management?

(60 marks)

2. (a) Summer 2018 saw drought conditions across many parts of Ireland, which greatly affected both crop and grass growth.

(i) Explain the following terms:
1. *Moisture stress*
2. *Permanent wilting point*.

(ii) Available water capacity is an important term in the context of soils.
1. What is meant by the term *available water capacity*?
2. Which soil type has the highest available water capacity? Give **two** reasons for your answer.

(b) Agricultural land usually becomes more acidic over time.

(i) List any **four** causes of increasing soil acidity over time.
(ii) Explain in detail how any **one** of the above causes increases soil acidity.

(c) Describe an experiment to show flocculation in a soil sample.

(48 marks)

3. Option One

(a) Suckler cows in Ireland are frequently cross-breeds.

(i) Suggest **two** suitable breeds from which to produce cross-breed sucklers.
(ii) Describe the benefits of using cross-breed cows.
(iii) Explain the term *reproductive efficiency* in the context of the suckler herd.

(b) (i) Compare the growth rate of the suckled calf with that of the artificially-reared calf, from birth to weaning.
(ii) Describe the grazing management of the suckler herd.

(c) Compare bull-beef production with heifer-beef production.

(48 marks)

OR

3. Option Two

(a) Photosynthesis takes place mainly in the leaves of green plants.

(i) Give a balanced chemical equation for photosynthesis.
(ii) Outline **four** ways in which the structure of the leaf is suited to photosynthesis.

(b) Both photosynthesis and the activity of micro-organisms directly affect the feeding value of silage.
Discuss this statement using appropriate references to silage making.

(c) Micro-organisms can have both positive and negative effects in agriculture.
Describe **two** positive effects and **two** negative effects of micro-organisms in agriculture, other than in relation to post-harvest silage production.

(48 marks)

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

(a) To show the effect of a mineral deficiency on crop growth.

(b) To estimate the percentages of water and solids in a sample of milk.

(c) To show the presence of micro-organisms in the roots of a clover plant.

(d) To estimate the digestibility of a silage sample.

(48 marks)

5. (a) Describe the cultivation of potatoes under the following headings:

(i) Soil preparation
(ii) Planting
(iii) Weed control
(iv) Harvesting.

(b) Due to the possibility of fodder shortages, catch crops were widely sown in autumn 2018.

(i) Give **two** examples of catch crops.
(ii) Outline **one** possible rotation that includes a catch crop.
(iii) Other than being a source of animal fodder, outline **four** benefits of sowing a catch crop on a tillage farm.

(c) The use of glyphosate weedkillers, such as Roundup™, has recently been authorised by the EU for a further five years.

(i) Describe **two** situations in agriculture in which such broad-spectrum weedkillers might be used.
(ii) List **four** precautions that should be taken when using chemical sprays in agriculture, **and** give a reason for **each** precaution.

(48 marks)

6. (a) Soil compaction is common in Irish soils.

(i) Suggest **two** possible causes of soil compaction.
(ii) Describe **two** effects of soil compaction.
(iii) Explain how soil compaction may be remedied.

(b) Clover is often included in seed mixtures for grazing.

(i) Give **three** benefits of the inclusion of clover in a seed mixture.
(ii) Explain why white clover is used in grazing seed mixtures and red clover is used in silage seed mixtures.

(c) Slurry and farmyard manure (FYM) are widely used in Irish agriculture.
Compare slurry and FYM under the following headings:

(i) Composition
(ii) Organic matter content
(iii) Storage
(iv) Method of application.

(48 marks)

7. (a) Explain the following terms:

(i) *Pedigree herd*
(ii) *Recessive allele*
(iii) *Natural service*
(iv) *Independent assortment*.

(b) In the squash plant, the allele for white fruit (W) is dominant over the allele for yellow fruit (w), and the allele for flat fruit (F) is dominant over the allele for round fruit (f). Show the genotypes and phenotypes of the cross between two plants, heterozygous for both characteristics.

(c) (i) Outline **four** reasons why fruit flies (*Drosophila*) are used for genetics experiments.

(ii) On a lowland sheep farm with 100 ewes, the farmer noted at the end of the lambing season that she had 180 lambs born, of which 92 were rams.
Comment on the lambing percentage **and** on the almost equal number of male and female lambs.

(48 marks)

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

(a) Describe, with the aid of a labelled diagram, the life cycle of the liver fluke (*Fasciola hepatica*).

(b) (i) Draw a labelled diagram of a transverse section (T.S.) of a dicotyledonous (dicot) stem.
(ii) Outline **two** differences to be seen in the transverse sections of monocot and dicot stems.

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

(i) *Omasum* and *abomasum*
(ii) *Ureter* and *urethra*
(iii) *Split dressing* and *top dressing*
(iv) *Maintenance ration* and *production ration.*

(48 marks)

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

(a) The change in the digestibility of grass over the growing season.

(b) The culling of older cows from the dairy herd.

(c) A low rate of establishment of seedlings during a very wet spring.

(d) The practice of hedgerow conservation on Irish farms.

(e) Flushing of ewes prior to mating.

(48 marks)

Do not write on this page

Leaving Certificate – Higher Level

Agricultural Science

Monday 17 June
Afternoon 2:00 – 4.30