



**Coimisiún na Scrúduithe Stáit
State Examinations Commission**

LEAVING CERTIFICATE EXAMINATION, 2017

AGRICULTURAL SCIENCE – HIGHER LEVEL

THURSDAY, 22 JUNE – MORNING, 9.30 – 12.00

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

[OVER]

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

- (a) (i) Name **two** species that might be included in a seed mixture in a short-term ley for silage.
(ii) Give a reason for **each** choice.
- (b) (i) Explain the term *biological control*.
(ii) Give **two** examples of biological control in agriculture, horticulture, or forestry.
- (c) (i) Give **two** structural differences between monocotyledonous (monocot) plants and dicotyledonous (dicot) plants.
(ii) Give **one** example of a monocot plant **and one** example of a dicot plant.
- (d) Classify **each** of the following rock types based on how they are formed:
(i) Marble
(ii) Granite
(iii) Basalt.
- (e) List **three** factors that determine the amount of protein required in an animal ration.
- (f) Outline **three** ways in which the structure of the leaf is suited to photosynthesis.
- (g) Give the dental formula of **each** of the following animals:
(i) Sheep
(ii) Pig.
- (h) (i) Name the nitrogen-fixing bacteria found in the root nodules of legumes such as clover.
(ii) Name **two** legumes other than clover.
- (i) (i) Explain the term *body condition score (BCS)*.
(ii) Give the correct BCS for a dairy cow
- Before calving
- At mating time.
- (j) Describe **one** function of **each** of the following mammalian reproductive hormones:
(i) FSH
(ii) Progesterone
(iii) Testosterone. **(60 marks)**

2. (a) Water is held in the soil in two main ways.
(i) Name **both** ways **and** explain how **each** works.
(ii) Give **two** benefits of artificial drainage in soils.
- (b) (i) Give **three** ways in which soil acidity increases over time.
(ii) Explain the mechanism at work in **each** case.
(iii) Describe **two** effects of increased soil acidity on crops.
- (c) Describe an experiment to show cation exchange in a soil sample. **(48 marks)**

3. Option One

- (a) Describe the main requirements of winter housing suitable for weanlings in a beef enterprise.
- (b) (i) Compare the winter feeding programmes for first and second winters in a two year calf-to-beef system **and** account for any differences.
(ii) Give the target weight for Hereford x Friesian steers at **each** of the following stages of the two year calf-to-beef system:
- Winter housing year 1
 - Winter housing year 2
 - Slaughter.
- (c) Slurry and farmyard manure (FYM) are the most significant waste products of winter housing in a beef enterprise.
Compare slurry and FYM under the following headings:
- (i) Nutrient value
 - (ii) Storage
 - (iii) Method of spreading
 - (iv) Disadvantages of spreading.

(48 marks)

OR

3. Option Two

- (a) Describe the following aspects of potato cultivation:
- (i) Soil suitability
 - (ii) Sowing
 - (iii) Weed control
 - (iv) Storage.
- (b) Describe the cultivation of a **named** cereal crop under the following headings:
- (i) Climate
 - (ii) Disease
 - (iii) Harvest date
 - (iv) Yield.
- (c) (i) Describe the physiological changes that occur during the ripening process in the cereal referred to above.
(ii) Describe **two** tests carried out by a grain merchant on harvested grain.

(48 marks)

[OVER]

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

- (a) To compare the digestibility of whole and rolled cereal grains.
- (b) To determine the quality of silage in a pit or bale.
- (c) To compare capillarity in two **named** soil types.
- (d) To measure the rate of transpiration in plants.

(48 marks)

5. (a) (i) List **two** qualitative tests **and two** quantitative tests normally carried out on milk.
(ii) Describe how you would carry out in the laboratory any **one** of the **quantitative** tests referred to above.
- (b) (i) Name **two** lowland sheep breeds **and** describe their bodily characteristics.
(ii) Explain fully why crossbred ewes are frequently used in a lowland sheep enterprise.
- (c) Reproductive efficiency is an important target in a beef-rearing enterprise.
(i) Explain the term *reproductive efficiency*.
(ii) Describe **three** factors affecting reproductive efficiency.

(48 marks)

6. (a) Describe how the dry matter digestibility (DMD) of a grass plant alters during its various stages of growth.
- (b) Describe **four** measures that can be used to maintain a high grass DMD for longer during the grazing season.
- (c) Explain how the ruminant stomach is suited to the digestion of plants in a grassland sward.

(48 marks)

7. (a) Many Irish suckler beef producers are currently taking part in the Beef Data and Genomics Programme which aims to improve profitability in the suckler sector. Elements of this programme include performance testing and progeny testing.
- (i) Explain the terms *performance testing* **and** *progeny testing*.
 - (ii) List **three** characteristics which are important in the selection of replacement heifers for a suckler enterprise.
- (b) Explain the following concepts in genetics **and** give an appropriate example in **each** case.
- (i) Incomplete dominance
 - (ii) Alleles
 - (iii) Continuous variation.
- (c) In mice the allele for wild type coat colour (W) is dominant to the allele for albino coat (w). The allele for straight hair (S) is dominant to the allele for bent hair (s). Two mice, heterozygous for both these genes, were mated. Taking care to differentiate clearly between uppercase and lowercase letters, explain with the aid of a Punnett square, the probability in **each** case that the offspring would have the following phenotypes.
- (i) Albino coat
 - (ii) Bent hair
 - (iii) Albino coat and bent hair
 - (iv) Wild type coat colour and bent hair.

(48 marks)

[OVER]

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

- (a) Describe, with the aid of a labelled diagram, the carbon cycle.
- (b) Phylum Arthropoda contains millions of species.
Class Insecta (insects) is the class from this phylum with the greatest agricultural importance.
 - (i) Outline the principal structural features of insects.
 - (ii) Name any **two** insect pests in agriculture **and** describe the damage they cause to **named** crops **or** animals.
- (c) Distinguish clearly between the members of any **three** of the following pairs of terms:
 - (i) *Flushing* and *sponging*.
 - (ii) *Aspect* and *topography*.
 - (iii) *Zoonoses* and *notifiable diseases*.
 - (iv) *Stem tuber* and *rhizome*.

(48 marks)

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

- (a) The influence of environmental temperature on weight gain in pigs.
- (b) The dense planting of coniferous trees in a forestry plantation.
- (c) The low earthworm population in intensively cultivated soils.
- (d) The presence of grit in the digestive tract of free-range poultry.
- (e) The deep ploughing of podzolic soils.

(48 marks)

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