Coimisiún na Scrúduithe Stáit
State Examinations Commission

LEAVING CERTIFICATE EXAMINATION, 2013

AGRICULTURAL SCIENCE – HIGHER LEVEL

THURSDAY, 20 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.

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

(a) Name **three** breeds of pig including at least **two** breeds suitable for outdoor (non-intensive) rearing.

(b) List **three** advantages of sowing maize under plastic.

(c) Describe briefly how you would test a food sample for the presence of a reducing sugar.

(d) Classify the following rock types:
(i) quartzite
(ii) shale
(iii) basalt.

(e) (i) In the case of the brown rat (*Rattus norvegicus*) on farms, give an example of damage caused:
1. in a livestock situation
2. in a crop situation.
(ii) Describe **one** method of controlling this pest.

(f) Briefly describe the lifecycle of *Babesia***,** the protozoan that causes red water fever.

(g) Compare slurry with farm yard manure (FYM).

(h) Give the precise location **and** function of the following body parts of a mammal:
(i) hepatic artery
(ii) hepatic portal vein.

(i) Draw a labelled diagram of a grass flower.

(j) State the approximate weight, in kg, at birth of:
(i) a dairy bull calf
(ii) a single lamb
(iii) a piglet (bonham).

(60 marks)

2. (a) The table below shows the results of soil tests carried out on samples from three different fields.

Field 1. A field sown with barley for the previous three years.
Field 2. A ploughed-in ley.
Field 3. A dairy paddock.

	Result A	**Result B**	**Result C**
Nitrogen test	high	low	medium
Phosphorus test	high	medium	medium
Potassium test	low	low	medium

(i) Match each field with its appropriate result **and** justify your choice in **each** case.
(ii) Which **one** of the three macronutrients above is **not** considered a serious pollutant of water?

(b) (i) State any **two** of the standards with which ground limestone must comply before it can be sold.
(ii) Mention **two** consequences of over-liming.

(c) Describe an investigation to determine the pH of a soil.

(48 marks)

3. Option One

(a) The common wild oat (*Avena fatua*) is described as a *noxious* weed.
(i) Give **three** reasons why this weed is considered noxious.
(ii) Name **two** other noxious weeds.

(b) The cultivated oat (*Avena sativa*) was once the most widely grown cereal in Ireland.
(i) Give **two** reasons for the decline in the cultivation of *Avena sativa*.
(ii) Give **two** reasons for sowing oats.

(c) (i) List **three** differences between complete and incomplete insect metamorphosis.
(ii) Name **one** insect that undergoes **each** type of metamorphosis.

(48 marks)

OR

3. Option Two

(a) Fostering lambs is a skill in sheep husbandry.
(i) Explain the term *fostering* in this context.
(ii) Outline **three** methods used in fostering lambs.

(b) (i) Discuss why overcrowding in cattle sheds can cause serious animal health problems.
(ii) Give **one** effect of overstocking in a paddock situation.

(c) (i) In the case of early fat lamb production, state:
1. a suitable *ram* breed
2. a suitable *ewe* type.
(ii) Justify your selection in **each** case.

(48 marks)

4. Describe laboratory or field experiments for any **two** of the following:

(a) To investigate the effect of structure on total pore space in a soil.

(b) To grow a culture of bacteria from the root nodules of clover.

(c) To estimate the amount of grass dry matter (DM) in a paddock.

(d) To determine the energy value of a farm foodstuff.

(48 marks)

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5. (a) Briefly outline the main principles in bull beef production.

(b) Outline the management principles for the dairy cow in mid-to-late lactation.

(c) Suggest reasons for a high total bacterial count (TBC) in milk.

(48 marks)

6. (a) Because of the prolonged rainfall in June and July 2012, farmers were advised to raise the cutting height of silage from 5 cm to10 cm.
(i) Suggest a scientific reason for this advice.
(ii) What are the negative effects of making silage in such weather conditions?

(b) (i) Explain the term *crop rotation*.
(ii) Name **two** crops that are commonly used in crop rotation **and** give a reason why **each** is used.

(c) (i) Draw a clearly labelled diagram of the internal structure of a leaf.
(ii) List **four** features of a leaf that enable it to maximise photosynthesis.

(48 marks)

7. (a) Explain **each** of the following terms: *Allele; Tetraploid; Metaphase.*

(b) In broiler hens, white plumage (W) is dominant to red (w). Comb length on the head is controlled by two alleles: long comb (L) and short comb (S). An intermediate condition, medium comb, occurs when a pure breeding long-comb bird is crossed with a short-comb bird.

Answer the following questions using the letters given above.

(i) State the genotype of a red and medium-comb chick.

(ii) State the genotype of a red and short-comb chick.

(iii) If a red and long-comb cock is crossed with a purebred white and short-comb hen, state the expected genotype **and** phenotype in the F1 generation.

(iv) If two F1 siblings are then mated, what is the probability that an F2 chick will have:
1. white plumage and medium comb?
2. red plumage and medium comb?
3. red plumage and short comb?

(c) Explain the advantages of sexed semen as sold by AI companies.

(48 marks)

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

(a) Outline the strategies, **other than crop rotation**, employed by organic farmers and environmentally conscious growers in dealing with:
(i) weeds
(ii) invertebrate pests
(iii) fungal diseases.

(b) Photosynthesis plays an important role in the carbon cycle.
(i) Outline the role of photosynthesis in the carbon cycle.
(ii) Write a balanced equation for photosynthesis.
(iii) Name **and** describe any **two** other stages in the carbon cycle.

(c) Distinguish between any **three** of the following pairs of terms:
(i) *Blackleg* in cattle and *Blackleg* in potatoes.
(ii) *Fodder beet* and *Sugar beet*.
(iii) *Haylage* and *Hay*.
(iv) *Maggots* and *Worms* in sheep.

(48 marks)

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

(a) The increasing popularity of *Holstein-Jersey* cross cows in dairying.

(b) The predominance of kale over other forms of winter forage crops in recent years.

(c) The micropropagation of new potato varieties.

(d) The agitation of slurry before spreading.

(e) Why pigs in some poorly-managed units have overfat carcases.

(48 marks)

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