



**Coimisiún na Scrúduithe Stáit  
State Examinations Commission**

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**LEAVING CERTIFICATE EXAMINATION, 2014**

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**AGRICULTURAL SCIENCE - HIGHER LEVEL**

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**THURSDAY, 19 JUNE – MORNING, 9.30 – 12.00**

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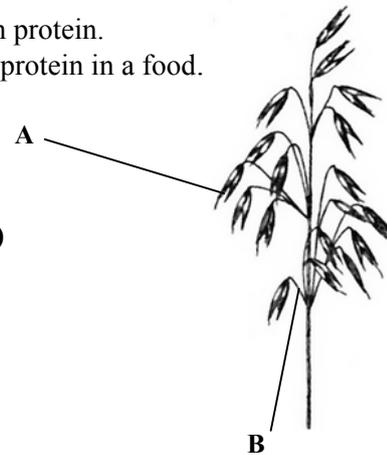
Answer any **six** questions.  
Question 1 carries 60 marks.  
All other questions carry 48 marks each.  
Write all your answers in the answer book.

**Total marks: 300 marks.**

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

- (a) Describe a method for the detection of adulteration of milk by water.
- (b) Give **three** functions of the lymphatic system in mammals.
- (c) Explain how the aspect of a field may affect the temperature of a soil in early spring.
- (d) Name **three** notifiable diseases of farm animals in Ireland.
- (e) Give **three** features of angiosperms.
- (f) Fully outline the role of lime in cation exchange.
- (g) Compare the structure of wind-pollinated and insect-pollinated flowers.
- (h) Give a full explanation why it is not recommended to spread nitrogen fertiliser on grassland in late autumn.
- (i)
  - (i) List the **four** chemical elements always present in protein.
  - (ii) Name the reagent used to test for the presence of protein in a food.
- (j)
  - (i) Identify the plant shown in the diagram.
  - (ii) To which family does this plant belong?
  - (iii) Name the parts labelled A and B.

(60 marks)



- 2.
- (a)
    - (i) What are the **two** main factors involved in the formation of metamorphic rocks?
    - (ii) Name **two** metamorphic rocks and in **each** case state which rock type it develops from.
    - (iii) Explain **one** way in which parent material influences the type of soil that eventually develops.
  - (b)
    - (i) Give **two** methods by which organic matter may be added to a soil.
    - (ii) Outline the importance of maintaining a satisfactory level of organic matter in a tillage soil.
  - (c) Describe a laboratory method to determine the amount of inorganic material in a sample of soil.

(48 marks)

**3. Option One**

- (a) During 2013 many farmers in Ireland experienced a fodder crisis. Describe any **two** circumstances, and their effects, that could contribute to a widespread shortage of fodder.
- (b) In 2013 a larger number of farmers than in recent years returned to haymaking as a method of conserving grass.
  - (i) Give the main reason for the return to haymaking.
  - (ii) Describe the main steps in conserving grass as hay **and** give a scientific reason behind **each** step.
- (c) Outline **four** grassland management practices used to achieve high-quality silage.

**(48 marks)**

**OR**

**3. Option Two**

- (a)
  - (i) The liver is often referred to as a storage organ. Name **two** substances that are stored in the liver of a farm animal.
  - (ii) Name **two** other locations in the animal body where metabolically useful substances are stored **and** indicate the substance stored in **each** case.
- (b) Liver fluke (*Fasciola hepatica*) is an endoparasite that occurs in the liver of some farm animals.
  - (i) To what phylum does *F. hepatica* belong?
  - (ii) Give **two** characteristics of members of this phylum.
  - (iii) Draw a diagram of an adult fluke, labelling any **three** structures.
- (c) Describe in detail, with the aid of a labelled diagram, the life cycle of the liver fluke.

**(48 marks)**

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

- (a) To assess the effect of liming on the growth of oats.
- (b) To investigate the effect of sprouting on the yield of early potatoes.
- (c) To determine the butterfat content of a sample of fresh milk.
- (d) To show that germinating seeds release energy.

**(48 marks)**

5. (a) Describe in detail how a **named** plant builds up a reserve of food in a tap root system.
- (b) Explain **each** of the following terms as used in the context of plant growth in the soil:
- (i) field capacity
  - (ii) permanent wilting point
  - (iii) available water.
- (c) Explain any **three** effects of drought on the development of crop plants.
- (d) The following table shows the water content of three soil samples.

Soil Sample	% Water at Field Capacity	% Water at Wilting Point
A	8	3
B	22	11
C	28	19

- (i) In which soil, A, B or C, would plants be less likely to wilt in a drought?
- (ii) Explain your answer.

**(48 marks)**

6. (a) Describe **four** visible features a dairy farmer would look for when selecting a replacement heifer for a dairy herd.
- (b) Describe the target weights, nutrition and housing of a replacement heifer in a spring-calving dairy herd at **each** of the following stages:
- (i) Newborn calf stage
  - (ii) Weanling stage
  - (iii) Yearling stage
  - (iv) Mating stage.
- (c) (i) Name any **two** substances secreted into an animal's digestive system **and** in **each** case name the organ that secretes it.
- (ii) Draw a diagram of the digestive system of a fowl **and** label **four** parts not found in mammals.

**(48 marks)**

7. (a) The DNA molecule carries genetic information.
- In which structures is DNA found in animal cell nuclei?
  - Explain how particular types of these structures determine the sex of individual animals.
- (b) Scientists in Scotland, where Dolly the sheep was cloned, recently announced a development in a project to produce animals resistant to infection. They have created a genetically modified pig using a new technique. The bonham (piglet), born in August 2012 and named Pig 26, was genetically engineered using DNA mutations.  
Explain the underlined terms.
- (c) In maize, the traits pigmy size (n) and crinkly leaf (r) are recessive to the traits normal size (N) and regular leaf (R).  
A maize plant, heterozygous for size and leaf shape, is self pollinated and 160 seeds are subsequently collected and germinated.
- Write the genotype of the parent using the above notation.
  - How many new plants would you expect to show:
    - crinkly leaves
    - regular leaves
    - normal size and regular leaves
    - pigmy size and regular leaves?
- (d) Give **two** reasons why male animals are castrated on farms.

(48 marks)

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

- (a) Describe the management of bonhams (piglets) from birth to weaning.
- (b) Describe in detail the production of a **named** cereal crop under **each** of the following headings:
- Soil suitability
  - Preparation of the seed bed
  - Sowing the seed
  - Use of fertiliser
  - Harvesting
  - Straw yield.
- (c) Highlight the main differences between the members of any **three** of the following pairs of terms:
- Glaciation* and *Gleisation*.
  - Epidermis* and *Epididymis*.
  - Antibodies* and *Antibiotics*.
  - Earthing up* and *Steaming up*.

(48 marks)

9. Give scientific explanations for any **four** of the following:
- (a) The ability of a young farm animal to digest bulky foods after weaning.
  - (b) Sub-soiling of a podzolic soil.
  - (c) The use of shelter belts on farms.
  - (d) The flushing of lowland ewes prior to mating.
  - (e) The presence of a red colour in the urine of a bought-in animal after six weeks grazing on the farm.

**(48 marks)**

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