Coimisiún na Scrúduithe Stáit
State Examinations Commission

LEAVING CERTIFICATE EXAMINATION, 2016

AGRICULTURAL SCIENCE - HIGHER LEVEL

THURSDAY, 23 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) Clover is a member of which plant phylum?
(ii) Mention **three** features of plants belonging to this phylum.

(b) (i) Explain the term *biological oxygen demand* (*BOD*).
(ii) Outline **three** farming practices that would help maintain a low BOD.

(c) Draw a labelled diagram of the fungus *Rhizopus* (bread mould).

(d) (i) What are notifiable diseases?
(ii) Give **three** examples of such diseases.

(e) Why is scutch grass (*Agropyrens repens*) such a difficult weed to eradicate in a cereal crop?

(f) State the location **and** function of the following structures in mammals:
(i) Villi.
(ii) Nephrons.
(iii) Cervix.

(g) Give **three** reasons why a high humus content is more beneficial than a high clay content, in a soil.

(h) (i) What are catch crops?
(ii) Give **three** advantages of their use on a mixed farm.

(i) Explain why respiration is important in the germination of seeds.

(j) (i) Name **two** bacterial diseases of pigs.
(ii) Give **one** symptom of **each** disease.

60 marks

2. (a) Compare a podzol soil with a brown earth soil under the following headings:
(i) Drainage.
(ii) Fertility.
(iii) pH.

(b) Identify **and** explain any **four** factors that affect the development of a soil structure.

(c) An experiment to determine soil texture by sieving was carried out, and the results were as follows:
Sand: 60%
Silt: 25%
Clay: 15%

(i) Describe how this experiment was carried out.
(ii) To which type of farm enterprise is this soil best suited?
(iii) Suggest **three** reasons for your choice.

48 marks

3. Option One

(a) Discuss the management practices which contribute to low levels of ewe and lamb mortality at lambing time.

(b) Compare a lowland sheep production system with a hill sheep production system under the following headings:
(i) Choice of breed.
(ii) Stocking rate.
(iii) Management practices.
(iv) Lambing percentage.

(c) Describe the main characteristics to be considered when selecting a grass variety for grazing.

48 marks

OR

[OVER]

3. Option Two

(a) Describe the management practices necessary to maximise the growth of housed weanlings during their first winter.

(b) Describe a suitable grazing system which might be used in a beef enterprise to achieve optimum production.

(c) Beef is classified using the EU beef carcase classification system.
(i) Outline the main features of this system.
(ii) Using this system, indicate a suitable score for a highly productive Continental beef animal **and** a British crossbred beef animal.
(iii) Describe a suitable strategy which could be used to improve the classification of Irish beef cattle in the future.

48 marks

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

(a) To show the effect of magnesium deficiency on the growth of a plant.

(b) To estimate the yield of a named root crop.

(c) To measure the energy value of an animal foodstuff.

(d) To determine the effect of shading on the botanical composition of a pasture.

48 marks

5. (a) The average lactation yield and the fat and protein composition of milk for three dairy breeds are shown in the table below:

Breed	Milk Yield (kg)	Fat (%)	Protein (%)
A	4350	5.3	4.1
B	6450	4.1	3.5
C	5240	4.8	3.9

(i) Which breeds are represented by A, B, and C?
(ii) Give a reason for your choice in **each** case.
(iii) State the percentage (%) value of fat **and** protein in colostrum.

(b) The fat content of the milk of individual cows can be affected by many factors. List **and** explain any **four** of these factors, other than breed.

(c) Discuss how the age **and** condition of breeding heifers in a dairy herd may influence the date of first calving.

48 marks

6. (a) Weeds, pests and diseases in crops may be controlled by direct and indirect methods.
(i) What is meant by indirect control?
(ii) Describe **three** methods of indirect control commonly used in Irish agriculture.

(b) Explain **four** characteristics that would determine the suitability of a soil for root crops.

(c) (i) Give **four** possible causes of lodging in cereal crops.
(ii) Describe **two** sources of damage to potato tubers during storage.

48 marks

7. (a) Explain **each** of the following terms:
(i) *F1 hybrids.*
(ii) *Continuous variation.*
(iii) *Back cross.*
(iv) *Incomplete dominance*.

(b) In cattle, the allele for black coat (B) is dominant to the allele for white coat (b), and the allele for the polled condition (P) is dominant to the allele for horned (p). A bull, heterozygous for both traits, is mated with a horned, white cow.
(i) Give the genotype of the bull used in this cross.
(ii) List the possible genotypes resulting from this cross.
(iii) What is the probability that a calf from this cross would be white and horned?
(iv) What is the probability that a calf from this cross would be horned? Explain your answer.
(v) State Mendel's Law of Segregation.

(c) The Economic Breeding Index (EBI) is widely used in dairying to identify genetically superior animals to improve dairy production in Ireland.
(i) List any **two** sub-indices of the EBI.
(ii) Outline the factors that determine **each** sub-index listed.

48 marks

[OVER]

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

(a) The leatherjacket and the wireworm are the larval stages of two important crop pests.
- (i) Name the adult stages of
  1. the leatherjacket,
  2. the wireworm.
- (ii) Describe the damage caused by **each** of these pests.
- (iii) Name the phylum to which they belong.
- (iv) Describe **three** structural features of members of this phylum.
- (v) Distinguish fully between complete and incomplete metamorphosis.

(b) The correct amount of nitrogen fertiliser is of great benefit to crop growth, but excessive nitrogen can have negative effects.
Discuss this statement.

(c) Distinguish clearly between the members of any **three** of the following pairs of terms:
- (i) *Crossbreeding* and *crossing-over*.
- (ii) *Active transport* and *active immunity*.
- (iii) *Transpiration* and *translocation*.
- (iv) *Nitrification* and *denitrification*.

48 marks

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

(a) The reduced incidence of liver fluke (*Fasciola hepatica)* infestation in cattle grazed on well-drained pasture.

(b) The movement of water from the soil through a plant and into the atmosphere.

(c) The use of cross-breed sows in pig production.

(d) The use of acid as an additive in silage making.

(e) An increase in the yield of crops exposed to higher levels of carbon dioxide in a greenhouse.

48 marks

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