education

Department:
Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE EXAMINATION - 2007

AGRICULTURAL SCIENCE P2

HIGHER GRADE

FEBRUARY/MARCH 2007

802-1/2

MARKS: 200

TIME: 2 hours

AGRICULTURAL SCIENCE HG: Paper 2

802 1 2E HG

X05

This question paper consists of 13 pages.

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.
2. This question paper consists of TWO SECTIONS: SECTION A and SECTION B.
3. Answer ALL the questions in the agricultural science context in the ANSWER BOOK provided.
4. Number the answers exactly as the questions are numbered.
5. Start each question on a NEW page.
6. Questions may be answered in any order, but subsections of a question must be kept together.
7. Non-programmable calculators may be used.
8. Write neatly and legibly.

SECTION A

QUESTION 1

1.1 Various possible options are provided as answers for the following questions. Write only the letter (A – D) next to the question number (1.1.1 – 1.1.10) in the answer book, for example: 1.1.11 D.

1.1.1 The spermatozoa during the natural breeding process are deposited into the …

A fallopian tubes.
B cervix.
C vagina.
D uterus. (2)

1.1.2 The hormone progesterone is necessary for the proper implantation of the fertilised ovum in the uterus. Where is this hormone secreted?

A Epididymis
B Testes
C Ovaries
D Corpus luteum (2)

1.1.3 Enzymes are responsible for the digestion of protein in the digestive tract. Which enzyme is an example of an enzyme that will digest protein?

A Salivary amylase
B Maltase
C Trypsin
D Cellulase (2)

1.1.4 The primary responsibility of the farming industry is to produce raw material and food, keeping with the principle of …

A optimal soil utilisation.
B maximal profit generation.
C optimal resource utilisation.
D maximum turnover. (2)

1.1.5 A factor which hampers the marketing of agricultural products is …

A elasticity of supply.
B standardisation.
C the pool system.
D the price of the product. (2)

1.1.6 What is a good example of working capital that is required by stock farmers?

A Feed
B Breeding cows
C Milking machines
D Crush pens (2)

1.1.7 The rumen micro-organisms digest cellulose to produce volatile fatty acids. What volatile fatty acids are produced?

A Acetic acid, butyric acid and pepsin
B Propionic acid, acetic acid and butyric acid
C Propionic acid, butyric acid and methane
D Butyric acid, acetic acid and hydrochloric acid (2)

1.1.8 A freemartin occurs in multiple births in cattle when ...

A a male calf develops in the same uterus with a normal female calf having separate placentas and blood supply.
B a female calf develops in the same uterus with a normal male having shared placentas and blood supply.
C both female calves are in the same uterus and the placenta and blood supply is shared.
D the male calf is larger than the normal female calf and space is restricted. (2)

1.1.9 A farming practice, which upsets the ideal of optimal resource utilisation on the farm, is ...

A crop rotation.
B bare cultivation.
C mulching.
D monoculture. (2)

1.1.10 The information required for the scientific planning of the cultivation of a country's total land surface is obtained through ...

A comprehensive soil surveys.
B large scale soil analysis.
C hydrological studies.
D studies on population growth. (2)

1.2 Give ONE word/term for each of the following descriptions:

1.2.1 The intellectual activity whereby a choice is made between alternatives of farming enterprises (2)

1.2.2 The progressive development of vegetation in an area through a series of different plant groupings or communities (2)

1.2.3 The alternate or rhythmic relaxation and contraction of the muscles in the wall of the oesophagus (2)

1.2.4 A digestive gland that has two functions, the exocrine portion and the endocrine portion (2)

1.2.5 The means used to promote the sale of agricultural products (2)

1.3 Change the underlined word(s) in each of the following statements. Write only the correct word(s) next to the question number (1.3.1 – 1.3.5) in the answer book.

1.3.1 The concept nutritive ratio is used to give an indication of the fat content of the feed. (2)

1.3.2 The changing of the oestrus cycle of all the cows in the herd so that they all come into oestrus approximately at the same time is known as synchronisation of ovulation. (2)

1.3.3 The epididymis is a tube of muscular tissue and is the common excretion canal for urine and semen. (2)

1.3.4 The dominant factor which determines the suitability of a region for the cultivation of a particular crop is the topography. (2)

1.3.5 The system of marketing according to which the farmer's product may be marketed as he/she wishes is called co-operative marketing. (2)

1.4 Choose an item/word(s) from COLUMN B that matches a/an item/word(s) in COLUMN A. Write only the letter (A – J) next to the question number (1.4.1 – 1.4.5) in the answer book, for example 1.4.6 K.

COLUMN A		COLUMN B	
1.4.1	Twin tail	A	sub-soiler
1.4.2	Embryo protection	B	sorting process of products
1.4.3	Dry roughage	C	lucerne
1.4.4	Ripper	D	abnormal spermatozoon
1.4.5	Standardisation and grading	E	maturation of spermatozoa
		F	storage process of products
		G	immature foetus
		H	allantoic cavity
		I	disc harrow
		J	silage (5 x 2) (10)

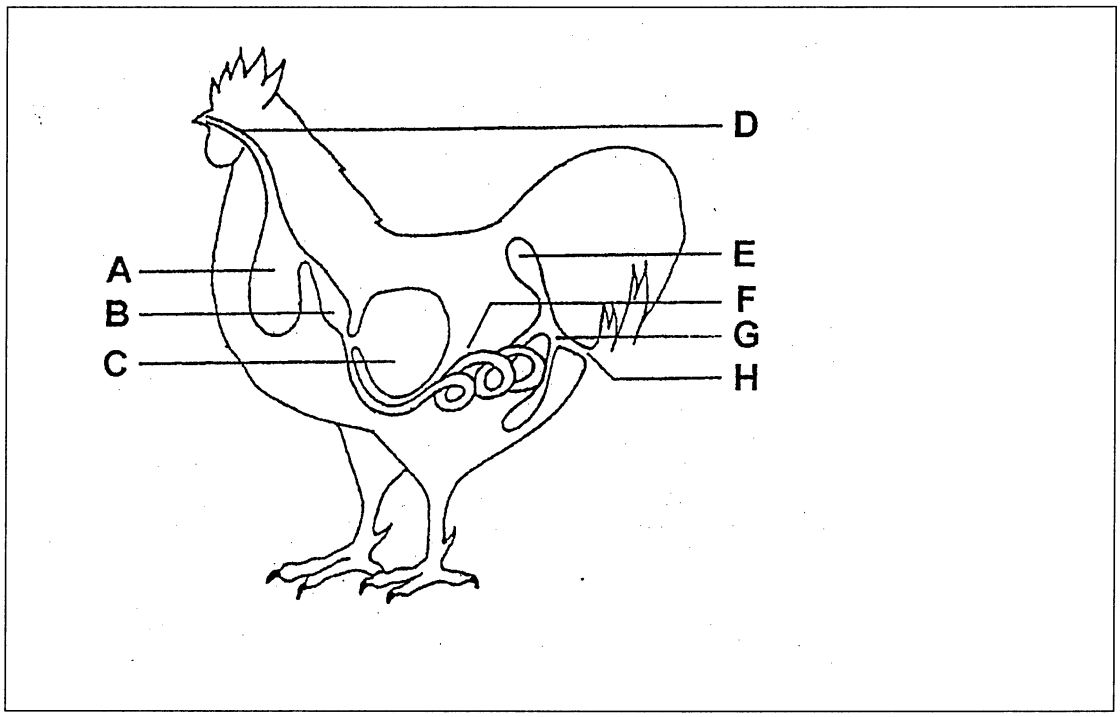
TOTAL SECTION A: 50

SECTION B

QUESTION 2: ANIMAL NUTRITION

Start this question on a NEW page.

2.1 Study the following diagram of the digestive system of the fowl and answer the questions that follow:



2.1.1 Identify the LETTER and mention the NAME of the part of the digestive system where the following processes take place:

(a) Grinding of ingested foodstuffs (2)

(b) Soaking and storage of food (2)

(c) Digestion of fats (2)

(d) Secretion of digestive enzymes (2)

2.1.2 The digestion of food in the true stomach of an animal is known as enzymatic digestion. Give a reason and identify THREE enzymes with their end products after reacting on the substrate to support this statement. (7)

2.2 Describe THREE requirements for microbial activity to take place in the rumen. (6)

2.3 Digestibility of feeds:

2.3.1 Calculate the digestibility co-efficient of the following ration fed to a dairy cow. The specifications of the ration are as follows:

Dry matter content of the ration	88%
Dry matter content of faeces	77%
Faeces excreted	3,5 kg
Feed intake of the cow	10 kg

Show ALL calculations. (6)

2.3.2 Explain the effect of the digestibility co-efficient that was calculated in QUESTION 2.3.1. (2)

2.4 From the following list of feeds choose a feed that will best fit each of the following descriptions. In each case write only the name of the feed.
List of feeds:

- Yellow maize meal
- Urea
- Silage
- Fish meal
- Oats straw
- Bone meal
- Lucerne
- Salt

2.4.1 A concentrate, which is used to fatten old cows (1)

2.4.2 A substance, which is used to regulate the intake of licks by cattle (1)

2.4.3 A non-protein source of nitrogen (1)

2.4.4 A protein-rich concentrate fed to pregnant ewes (1)

2.4.5 A protein-rich hay fed to growing calves (1)

2.5 Explain what each of the following terms means in an animal feeding programme:

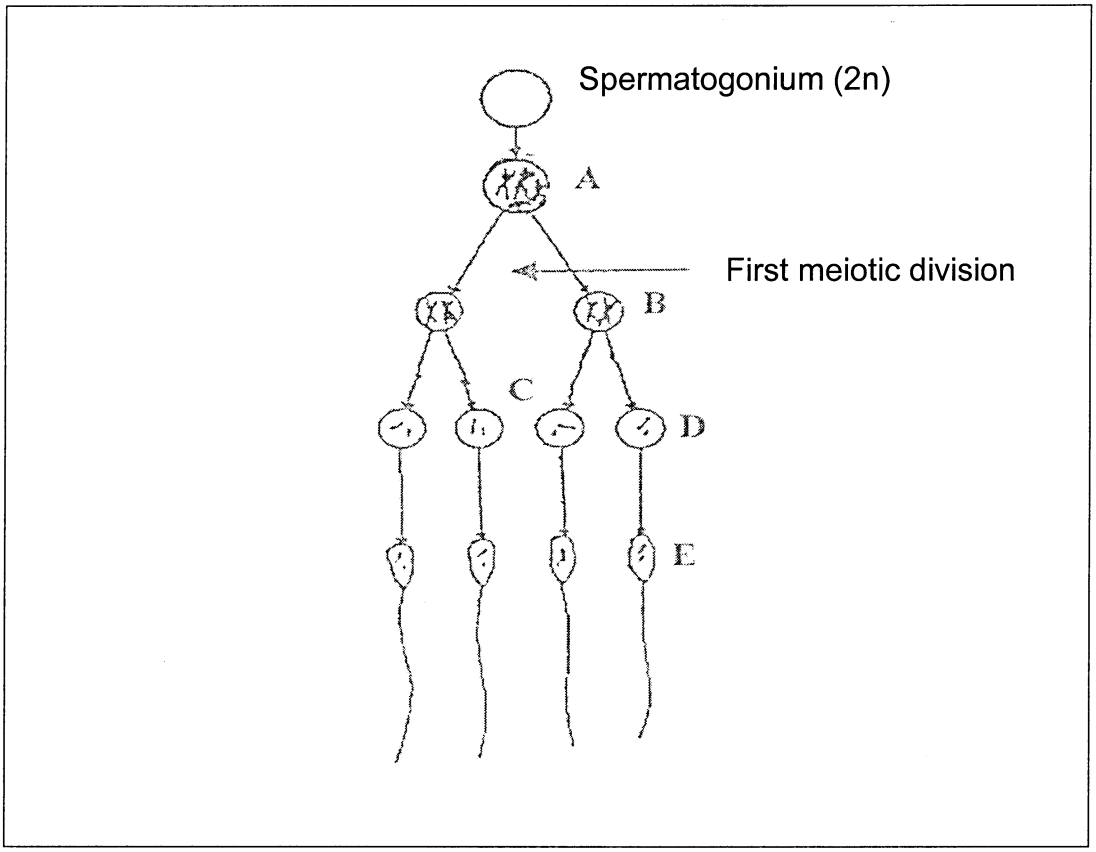
2.5.1 Balanced ration (3)

2.5.2 Dry roughage (3)
[40]

QUESTION 3: ANIMAL REPRODUCTION

Start this question on a NEW page.

3.1 The diagram below represents the process of spermatogenesis. Answer the following questions by referring to the diagram:



3.1.1 Identify the stages of spermatogenesis labelled A to E. (5)

3.1.2 Spermatogenesis occurs in which part of the testis? (1)

3.1.3 In which part of the testis do spermatozoa achieve mobility? (1)

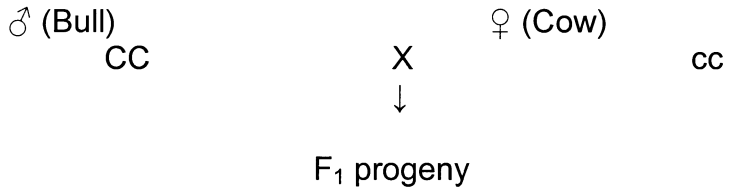
3.1.4 What would happen if there was no meiotic cell division? (2)

3.2 Answer the following questions on artificial insemination (AI):

3.2.1 As an agricultural advisor you are asked to do a presentation on artificial insemination at a local farmer study group. State the FIVE most important advantages of artificial insemination to a farmer. (5)

3.2.2 Describe FOUR characteristics of good semen quality. (4)

3.3 A commercial beef farmer buys a top quality bull to mate with a herd of non-descript cows, with the objective to improve the conformation of the herd. This will be achieved as follows:



Assume 'CC' represents the gene for good conformation and 'cc' represents the gene for poor conformation.

3.3.1 What will be the genotype of the F_1 progeny? (2)

3.3.2 What will be the phenotype of the F_1 progeny? (2)

3.3.3 The above example is an illustration of which breeding method? (2)

3.3.4 Identify FOUR advantages of the breeding method illustrated in QUESTION 3.3.3. (4)

3.4 Answer the following questions on parturition and milk production:

3.4.1 Explain how you would identify a cow that is approaching the time of calving. (5)

3.4.2 Discuss in point form, the process of milk ejection (milk release) in a dairy cow. (5)

3.4.3 Milk production drops more sharply in pregnant cows than in non-pregnant cows. Give TWO reasons for this drop in milk production. (2)
[40]

QUESTION 4: OPTIMAL RESOURCE UTILISATION

Start this question on a NEW page.

4.1 Tabulate the difference between bare cultivation and mulch cultivation by referring to the following aspects in the soil:

4.1.1 Aeration (2)

4.1.2 Compaction (2)

4.1.3 Structure (2)

4.2 Justify with FIVE reasons why crop rotation should be practised by farmers. (5)

4.3 Briefly distinguish between the following concepts:

4.3.1 Sourveld and sweetveld (4)

4.3.2 Selective grazing and zero grazing (4)

4.4 The period of rest for the veld is critical for sustainable production. A number of factors can influence the length of this rest period. Briefly explain how the following factors influence the length of rest period:

4.4.1 Number of camps (2)

4.4.2 Condition of veld (2)

4.4.3 Rainfall (2)

4.5 When soil surveys are carried out, one of the steps is the description of the morphological properties of each soil horizon. State another FIVE properties that should be described. (5)

4.6 Indicate the circumstances under which spray irrigation will provide the best results. (5)
[35]

QUESTION 5: AGRICULTURAL ECONOMICS

Start this question on a NEW page.

5.1 Read the following case study based on agricultural economics and answer the questions that follow:

> An emerging farmer in one of the provinces in South Africa has engaged himself in citrus production. His intention was to export fruit to other countries. His first produce was of good quality but the quantity could not meet the export demand. After the first year of production his orchard was wiped out by a wild fire during the dry season. Since the fire he has been battling to re-establish his orchard. Fortunately he was advised to join an agricultural co-operative. As a member of the co-operative things became easier for him as he was able to buy all his agricultural requirements at a reasonable discounted rate. Among other things he bought fencing material, fruit tree seedlings, fertilisers, irrigation equipment, et cetera. He hired a group of workers to erect the security fence around the orchard. Annually during peak periods of fruit harvesting he hires a special group for fruit picking. Ploughing of land and spraying of trees are done by the co-operative. His orchard has also been covered by insurance against any hazardous elements such as hailstorms, fire, et cetera. Presently his produce is exported without any problem because of standardisation and grading done by the co-operative and he earns the best possible profit from his produce.

5.1.1 Give FIVE reasons why you think an agricultural co-operative is more powerful than an individual farmer who operates on his/her own. (5)

5.1.2 Classify the temporary workers hired by the farmer according to the following categories and give a reason for your answer:

(a) Seasonal workers (3)

(b) Casual workers (3)

5.2 Answer the following questions on supply of and demand for agricultural products:

5.2.1 Distinguish between the supply of and demand for agricultural products. (6)

5.2.2 Supply FIVE factors determining the demand for an agricultural product. (5)

5.2.3 Indicate THREE ways of increasing the soil productivity in order to meet the demand for food and other raw material. (3)

5.3 Describe the following problems related to soil as a production factor:

5.3.1 Soil is subject to the law of diminishing returns. (2)

5.3.2 Physical composition of soil cannot be changed. (2)

5.4 A farmer has experienced a decrease in farm profit in the past two years. He has already identified problems which have caused the loss of income. Suggest TWO possible solutions for each of the following problems in order to improve the situation.

5.4.1 Lack of skills (2)

5.4.2 Poor labour management (2)

5.4.3 Scarcity of labour (2)
[35]

TOTAL SECTION B: 150

GRAND TOTAL: 200