basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE EXAMINATIONS/
NATIONAL SENIOR CERTIFICATE EXAMINATIONS

AGRICULTURAL SCIENCES P1

2022

MARKS: 150

TIME: 2½ hours

This question paper consists of 17 pages.

INSTRUCTIONS AND INFORMATION

1. This question paper consists of TWO sections, namely SECTION A and SECTION B.

2. Answer ALL the questions in the ANSWER BOOK.

3. Start EACH question on a NEW page.

4. Number the answers correctly according to the numbering system used in this question paper.

5. You may use a non-programmable calculator.

6. Show ALL calculations, including formulae, where applicable.

7. Write neatly and legibly.

SECTION A

QUESTION 1

1.1 Various options are provided as possible answers to the following questions. Choose the correct answer and write only the letter (A–D) next to the question numbers (1.1.1 to 1.1.10) in the ANSWER BOOK, e.g. 1.1.11 B.

1.1.1 … is the movement of food from the blood into the tissues.

A Absorption
B Digestion
C Assimilation
D Ingestion

1.1.2 An example of water-soluble vitamins:

A Vitamin A
B Vitamin E
C Vitamin K
D Vitamin B_1

1.1.3 The end products of cellulose digestion in the rumen:

A Butyric acid and amino acid
B Fatty acids and glycerol
C Acetic acid and propionic acid
D Propionic acid and glucose

1.1.4 The intake of feed in ruminant farm animals involves the following:

(i) Animals use their snouts to gather feed.
(ii) Feed is partially chewed and mixed with saliva to form a bolus.
(iii) The tongue pushes the bolus backward down the oesophagus into the rumen.
(iv) Feed is later brought back for re-chewing.

Choose the CORRECT combination:

A (i), (ii) and (iv)
B (i), (iii) and (iv)
C (i), (ii) and (iii)
D (ii), (iii) and (iv)

1.1.5 Narrow stalls used in intensive farming to keep pregnant sows throughout the period of 16 weeks:

A Pigsty
B Gestation crates
C Farrowing pens
D Deep litter

1.1.6 Equipment used to restrain a large ruminant animal so that it can be given medication:

A Crush
B Kraal
C Holding pens
D Grazing camp

1.1.7 ONE of the following is NOT a sign of poor health in farm animals:

A Animals are alert and lively
B Animals have dull and rough coats
C Pale and dull membranes of the eyes
D Difficult breathing and coughing

1.1.8 The following descriptions refer to external parasites:

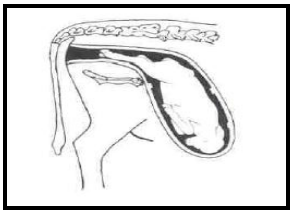
(i) Live on the skin of the host
(ii) May be transmitted to human beings through ingestion of infected meat
(iii) May secrete toxins
(iv) May damage the skin of farm animals

Choose the CORRECT combination:

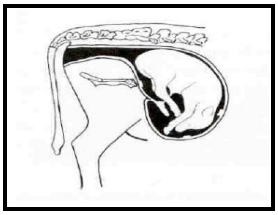
A (i), (ii) and (iv)
B (i), (iii) and (iv)
C (i), (ii) and (iii)
D (ii), (iii) and (iv)

1.1.9 Which ONE of the pictures below shows the normal foetal position?

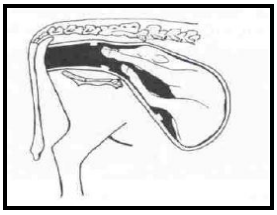
PICTURE A



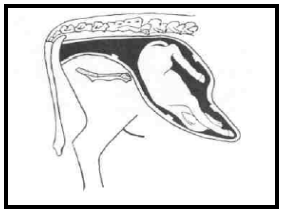
PICTURE B



PICTURE C



PICTURE D



A Picture A
B Picture B
C Picture C
D Picture D

1.1.10 Which ONE is the CORRECT sequence of the reproductive stages?

A Conception, gestation, parturition and lactation
B Parturition, conception, gestation and lactation
C Lactation, conception, gestation and parturition
D Gestation, lactation, conception and parturition (10 x 2) (20)

1.2 Indicate whether each of the descriptions in COLUMN B applies to **A ONLY**, **B ONLY**, **BOTH A AND B** or **NONE** of the items in COLUMN A. Write **A only**, **B only**, **both A and B** or **none** next to the question numbers (1.2.1 to 1.2.5) in the ANSWER BOOK, e.g. 1.2.6 B only.

COLUMN A			COLUMN B
1.2.1	A:	Osmosis	Passive absorption of volatile fatty acids through the rumen wall
	B:	Diffusion	
1.2.2	A:	Thyroid regulators	Chemical substances added to the feed of farm animals so that they become calm and eat more
	B:	Tranquilisers	
1.2.3	A:	Bunching	The tendency of sheep to stand closer together during hot conditions
	B:	Pawing	
1.2.4	A:	Ointment	Chemicals used to kill ticks and mites
	B:	Anthelmintic	
1.2.5	A:	Hermaphrodites	Animals which have both male and female reproductive organs
	B:	Freemartins	

(5 x 2) (10)

1.3 Give ONE word/term for each of the following descriptions. Write only the word/term next to the question numbers (1.3.1 to 1.3.5) in the ANSWER BOOK.

1.3.1 The percentage of feed that has not been excreted by an animal

1.3.2 An approach that combines the advantages of modern, traditional and complementary treatment to provide health care for farm animals

1.3.3 The failure of a cow to expel the placenta within 12 to 24 hours after parturition

1.3.4 The process of removing fertilised egg cells from a superior donor cow

1.3.5 The organelle in the mid-piece of a sperm cell supplying energy for movement (5 x 2) (10)

1.4 Change the UNDERLINED WORD(S) in EACH of the following statements to make them TRUE. Write only the answer next to the question numbers (1.4.1 to 1.4.5) in the ANSWER BOOK.

1.4.1 Nitrogen-free extract is a measure of the quality of protein in a feed.

1.4.2 A balling gun is a device used to administer liquid medication to farm animals to treat internal parasites.

1.4.3 Artificial insemination takes place when the bull is allowed to mount and service a cow.

1.4.4 The mesoderm is the outer germ layer from which skin, hooves and hair develop.

1.4.5 The stage of parturition during which the calf is pushed out is known as preparatory. (5 x 1) (5)

TOTAL SECTION A: 45

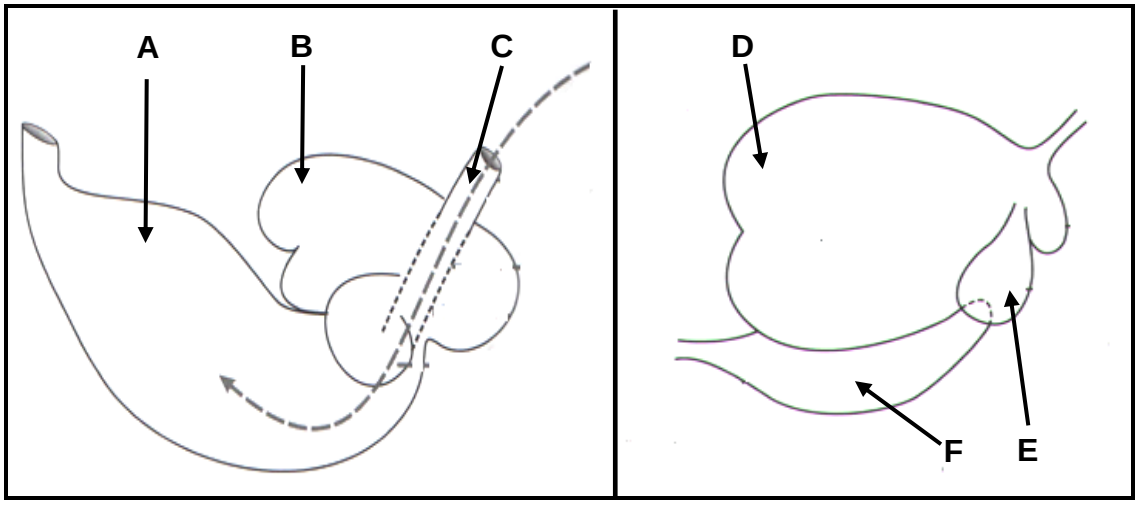
SECTION B

QUESTION 2: ANIMAL NUTRITION

Start this question on a NEW page.

2.1 The diagrams below show the stomach compartments of two ruminant farm animals.

DIAGRAM A **DIAGRAM B**



2.1.1 Indicate the stage of development of the ruminant farm animal represented by DIAGRAM **A**. (1)

2.1.2 Give TWO reasons that are visible in the diagram above to support the answer to QUESTION 2.1.1. (2)

2.1.3 Identify, in the diagrams above, the part where EACH of the following occurs (write only the letter):

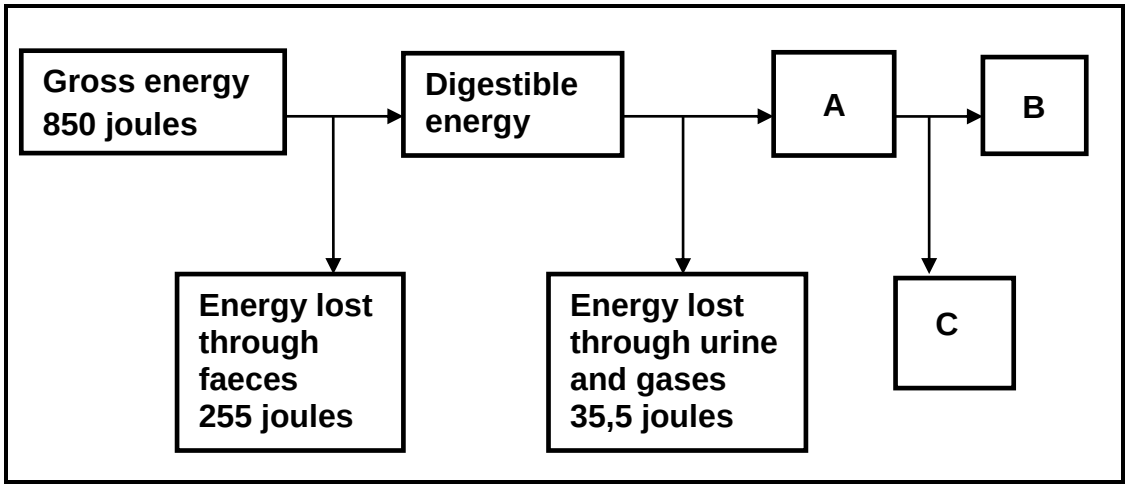
(a) Feed is fermented (1)

(b) Channelling of milk into the abomasum (1)

2.1.4 Indicate ONE adaptation feature of part **E** that enables it to absorb water from food. (1)

2.1.5 Name the part in the alimentary canal of a fowl that corresponds with part **F** above in terms of functioning. (1)

2.2 The schematic representation below illustrates the energy flow of feed.



2.2.1 Identify the energy represented by **A**. (1)

2.2.2 Calculate the digestible energy of this feed. Include the formula. (3)

2.2.3 Indicate the importance of the energy, represented by **B**, in animal production. (1)

2.2.4 State TWO aims of calculating the energy value of the feed. (2)

2.3 The table below shows the nutritional composition of two feeds.

COMPOSITION	FEED A	FEED B
Digestible carbohydrates	38%	26%
Digestible protein (DP)	8%	39%
Digestible fat	32%	24%
Nutritive ratio (NR)	1 **:** 7	1 **:** 4

2.3.1 Indicate the purpose for which **FEED B** can be used based on its nutritive ratio. (1)

2.3.2 Give a reason for the answer to QUESTION 2.3.1. (1)

2.3.3 Use the Pearson square method to calculate the ratio into which **FEED A** and **FEED B** should be mixed to get a feed with 16% DP. (4)

2.4 Complete the table below by naming the minerals, vitamins and deficiency symptoms. Write only **(a)** to **(e)** and the answers in your ANSWER BOOK.

MINERALS AND VITAMINS	DEFICIENCY SYMPTOMS
(a)	Parakeratosis
Vitamin A	**(b)**
Cobalt	**(c)**
(d)	Poor blood clotting
(e)	Anaemia

(5)

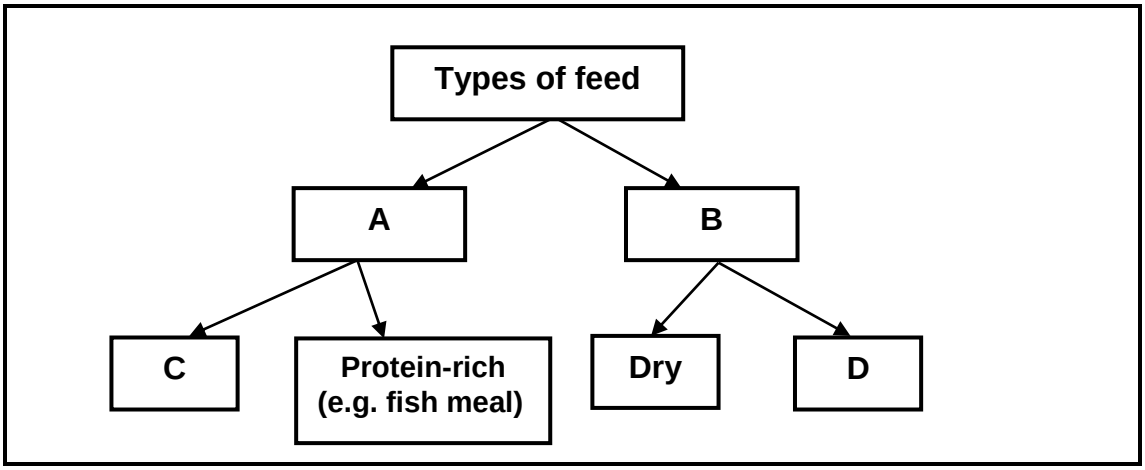
2.5 Name the components of feed most suitable for EACH of the following:

2.5.1 Acts as solvent (1)

2.5.2 Fattening of farm animals for slaughter (1)

2.5.3 Easy absorption of fat-soluble vitamins and calcium (1)

2.6 The schematic representation below shows types of feeds.



2.6.1 Classify the types of feeds represented by **A** and **B**. (2)

2.6.2 Identify **C** above. (1)

2.6.3 State TWO functions of **B** in animals. (2)

2.6.4 Give TWO feed examples of **D**. (2)
[35]

QUESTION 3: ANIMAL PRODUCTION, PROTECTION AND CONTROL

Start this question on a NEW page.

3.1 The information below includes two animal production systems practised on **FARM A** and **FARM B**.

ITEM	FARM A	FARM B
Area (Ha)	320	850
Labourers	30	8
Machinery	3 x big tractors	1 x small tractor 1 x donkey cart
Equipment	Abattoir with equipment	Kraal
Animals	1 200	103

3.1.1 Identify the animal production systems represented by **FARM A** and **FARM B** above. (2)

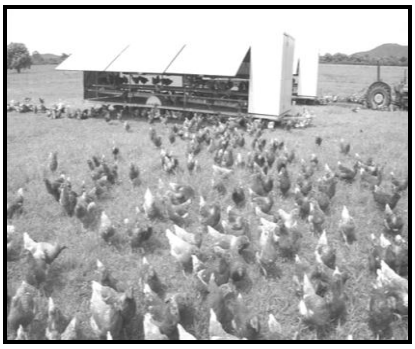
3.1.2 Give a reason for the production system identified in **FARM B** above in terms of space and the number of farm animals. (2)

3.1.3 Refer to the table above to indicate the high inputs for **FARM A**. (1)

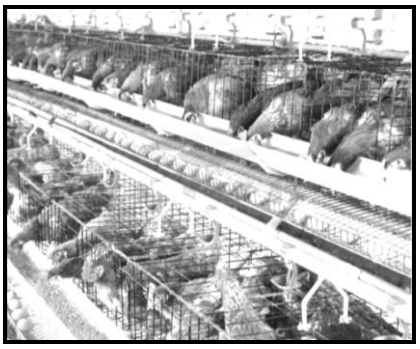
3.1.4 Name TWO ways in which the farmer at **FARM B** can increase animal productivity. (2)

3.2 The pictures below show different examples of intensive production systems.

PICTURE A



PICTURE B



PICTURE C

3.2.1 Match the pictures (A–C) above with the intensive production systems ((a)–(c)), e.g. (a) D:

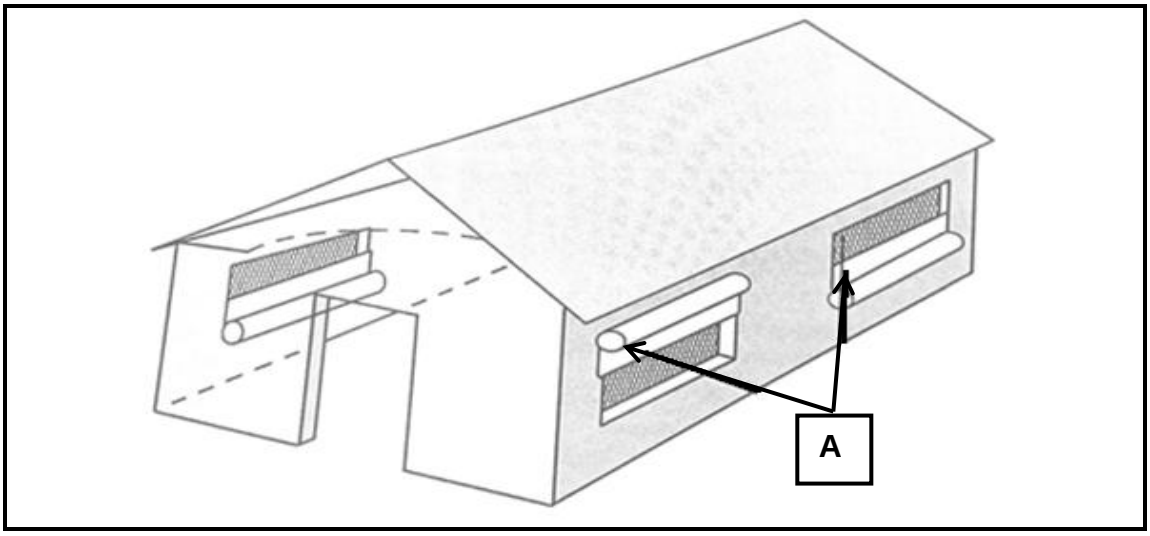
(a) Deep-litter system (1)

(b) Free-range system (1)

(c) Battery system (1)

3.2.2 Give TWO important reasons for shelters for farm animals. (2)

3.3 The picture below represents a facility for a broiler production enterprise.



3.3.1 Name the purpose of the equipment in the facility represented by **A** above. (1)

3.3.2 Name TWO other pieces of equipment that can be used to control temperature for chicks. (2)

3.3.3 State TWO factors to consider when building a facility such as the one above. (2)

3.4 The table below shows information on diseases in farm animals.

DISEASE	PATHOGENIC AGENTS/VECTOR	KEY SYMPTOMS	TYPE OF ANIMAL AFFECTED/INFECTED
Foot-and-mouth disease	**A**	Blisters on the feet, tongue, lips and mouth	Cattle
Tuberculosis	Bacteria	**B**	Farm animals
Redwater	**C**	Urine is red, dark to brown and jaundice occurs	Farm animals
D	Fungus	Red, thick, scaly, itchy, ring-like lesions	Cattle, sheep, pigs
Heart water	External parasite **E**	Nervous blinking, high fever and death	Cattle

3.4.1 Use the information in the table above to identify **A**, **B**, **C** and **D**. (4)

3.4.2 Identify the vector represented by **E**. (1)

3.4.3 State TWO financial implications of animal diseases. (2)

3.4.4 Identify, in the table above, the disease that can be transmitted from animals to human beings. (1)

3.5 The package insert below shows information on the medication of farm animals.

FOR ANIMAL USE ONLY

CINMYCORMION

Use for bacterial infection.
Administration and dosage: Intramuscular injection 2 mℓ/10 kg live body weight
Effect of overdose: Diarrhoea and blindness
Period retained in the body: 4 weeks
Storage instructions: Store in a cool place but do not freeze. (Below 20 °C)
Reg. No. F 2144, (ACT 36/1947)
Active ingredient: Tetracycline

3.5.1 Identify the method to administer the medication above. (1)

3.5.2 Identify in the package insert above the role of the state in medication production. (1)

3.5.3 The products of animals treated with the above medication cannot be consumed within two weeks of treatment. Justify this statement. (1)

3.5.4 Name TWO other methods that can be used to administer medication through injection. (2)

3.6 The pictures below show a poisonous plant and its seeds.

3.6.1 Identify the poisonous plant shown in the pictures above. (1)

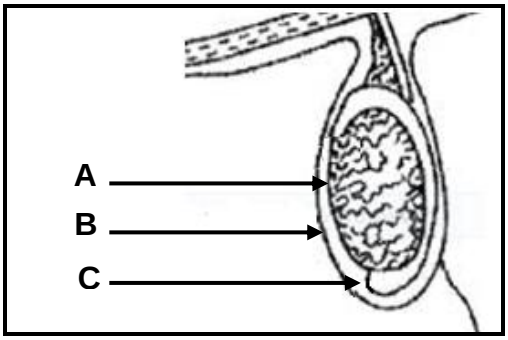
3.6.2 Indicate TWO measures a farmer can take to prevent plant poisoning. (2)

3.6.3 Name TWO ways in which farmers can treat farm animals that consumed the plant identified in QUESTION 3.6.1. (2)
[35]

QUESTION 4: ANIMAL REPRODUCTION

Start this question on a NEW page.

4.1 The diagram below illustrates parts of the reproductive system of a male farm animal.



4.1.1 Identify **B** and **C**. (2)

4.1.2 Indicate the hormone secreted by **A**. (1)

4.1.3 Name the condition that occurs when **A** remains in the body cavities. (1)

4.1.4 Explain the role of **B** in regulating the temperature of **A** in male farm animals. (2)

4.2 In livestock production the semen of superior animals is collected, diluted and preserved for future use.

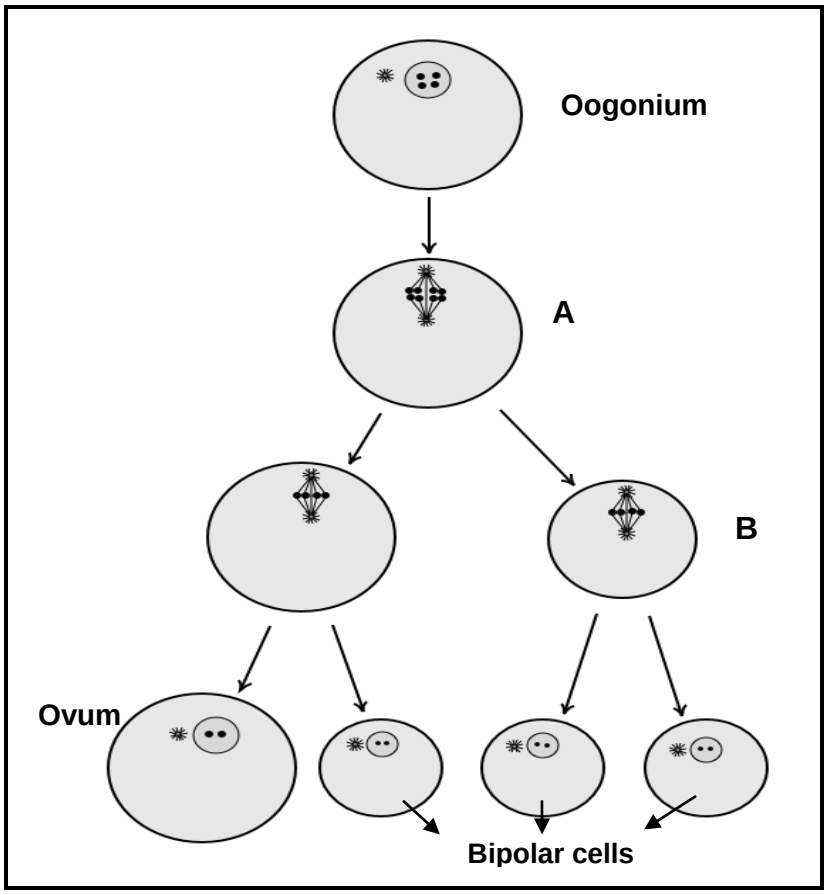
4.2.1 Name TWO methods that can be used to collect semen. (2)

4.2.2 Give TWO requirements for the collection of semen. (2)

4.2.3 State TWO functions of semen dilutants. (2)

4.2.4 State the temperature required for storing semen in liquid nitrogen for a longer period of time. (1)

4.3 The diagram below shows a process taking place during the reproduction cycle of a cow.



4.3.1 Identify the process illustrated in the diagram above. (1)

4.3.2 Name the type of cell division responsible for the formation of the following:

(a) Cells labelled **B** (1)

(b) Cells labelled **A** (1)

4.3.3 State the purpose of the cell division in QUESTION 4.3.2(a). (1)

4.3.4 Name the organ where EACH of the following cells are found:

(a) Spermatogonium (1)

(b) Oogonium (1)

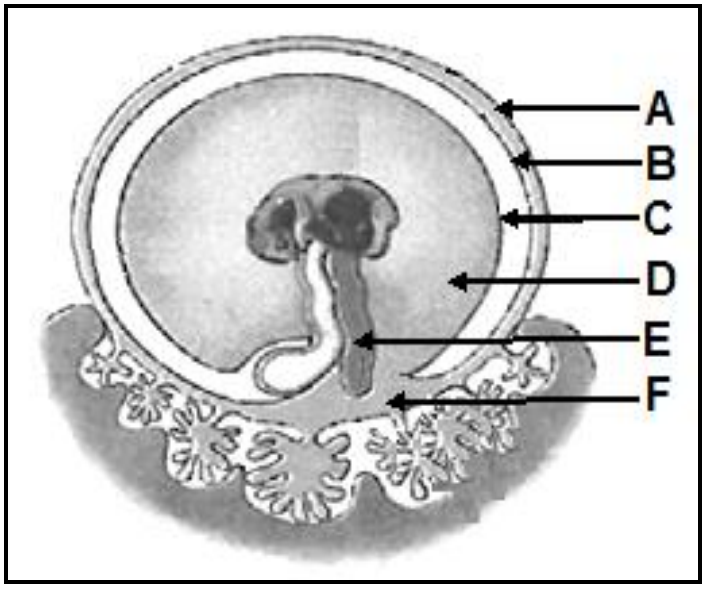
4.4 The table below shows the percentage (%) of butter fat and crude fibre in the milk of dairy cows during weeks 5–45 of lactation.

TIME (WEEKS)	BUTTER FAT (%)	CRUDE FIBRE (%)
5	4,3	4,1
10	4,4	4,2
15	4,4	4,3
20	4,5	4,4
25	4,5	4,6
30	4,6	4,8
35	4,6	4,8
40	4,6	4,9
45	4,7	5,0

4.4.1 Draw a combined bar graph representing the butter fat and crude fibre percentages for weeks 5–25 of lactation. (6)

4.4.2 Deduce, from the table above, the trend of crude fibre from weeks 25 to 45. (1)

4.5 The illustration below shows the developing embryo in the uterus of a cow.



4.5.1 Write down only the letter (**A** to **F**) of the part in the picture above that matches each of the following descriptions:

(a) The part that brings the blood of the cow and the foetus in close contact without mixing it (1)

(b) The membrane that collects the urine from the foetus (1)

(c) The membrane surrounding the foetus closest to the uterus of the cow (1)

4.5.2 State TWO functions of part **D**. (2)

4.6 The milk produced by the cow during the first three days after parturition differs from the normal milk.

4.6.1 Name the milk that is produced during the first three days after parturition. (1)

4.6.2 Give TWO reasons why it is important that a newborn calf receives the milk named in QUESTION 4.6.1. (2)

4.6.3 Give the term that refers to the period when milk production is at its highest point. (1)
[35]

TOTAL SECTION B: 105
GRAND TOTAL: 150