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**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

SEPTEMBER 2023

AGRICULTURAL SCIENCES P1

MARKS: 150

TIME: 2½ hours

This question paper consists of 18 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 your calculations, including formulae, where applicable.
7. Write neatly and legible.

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, for example 1.1.11 A.

1.1.1 The chemical digestion in fowls occurs in the ...

- A crop.
- B proventriculus.
- C gizzard.
- D ventriculus.

1.1.2 The finger-like protrusions which act as heating rods in the rumen.

- A Papillae
- B Micro-fingers
- C Villi
- D Macro-villi

1.1.3 The fat-soluble vitamins needed for vital functions in the animal's body.

- A Cobalamin and vitamin K
- B Thiamine and vitamin E
- C Riboflavin and pyridoxine
- D Retinol and vitamin D

1.1.4 The following is the function of a juice secreted by the liver.

- (i) Stimulates the conversion of pepsinogen to pepsin.
- (ii) Changes the pH from acid to alkaline.
- (iii) Promotes the absorption of fatty acids.
- (iv) Increases the solubility of fats.

Choose the CORRECT combination:

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

1.1.5 Cattle become uncomfortable when they are ...

- A moved in a group.
- B following a leader.
- C separated from others.
- D treated in a familiar manner.

1.1.6 The following are basic guidelines when transporting farm animals:

- (i) Different animals should be transported together.
- (ii) Pregnant and injured animals should not be transported.
- (iii) Animals of different ages and gender should be separated.
- (iv) Whistling and cracking of whips when transporting on a road.

Choose the CORRECT combination:

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

1.1.7 The following is INCORRECT with regard to the life cycle of a one-host tick:

- A Eggs hatch into larvae
- B Larvae develop into nymphs
- C Larvae and nymphs live on an intermediate host
- D Nymphs develop into adults

1.1.8 Bacterial diseases that are contagious.

- A Anthrax and mastitis
- B Lumpy wool and polyneuritis
- C Avian flu and tuberculosis
- D Ringworm and anaplasmosis

1.1.9 The stage of courtship during mating is characterised by the ...

- A release of semen into the front part of the vagina.
- B intromission into the vagina.
- C erection of the penis stimulated by pheromones.
- D mounting the female animal to enable penetration.

1.1.10 The main reason for drying off a cow before the next lactation is to ...

- A ensure early conception.
- B reduce pregnancy problems.
- C shorten the gestation period.
- D allow the recovery of glandular tissues.

(10 x 2) (20)

- 1.2 Indicate whether each of the descriptions in COLUMN B apply 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, for example 1.2.6 B only.

COLUMN A			COLUMN B
1.2.1	A:	Urea	A protein supplement in the ration of ruminant animals during dry winter months
	B:	Biuret	
1.2.2	A:	Cud	Regurgitated bolus that is transported back to the mouth
	B:	Chyme	
1.2.3	A:	Improper handling	Stiffness of the meat after slaughtering
	B:	Proper handling	
1.2.4	A:	Liver fluke and chicken lice	Internal parasites in chickens
	B:	Bont tick and wireworm	
1.2.5	A:	Endoderm	Responsible for the development of the respiratory and digestive system
	B:	Ectoderm	

(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 An index used to determine the quality of protein in a feed
- 1.3.2 The system in which the production of animals and crops is mainly to feed the family
- 1.3.3 The condition where female animals experience problems during parturition
- 1.3.4 The system that carries waste products away from the tissues of the udder to excretory organs
- 1.3.5 The condition in bulls characterised by absence of sex urge

(5 x 2) (10)

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

1.4.1 A nutrition programme is a strategic plan for a livestock farmer to ensure availability of feed to meet the animals' requirements throughout the year.

1.4.2 Acute diseases are long lasting and occur repeatedly in the same animal.

1.4.3 Foreskin is a protective two-lobed sac that encloses and protects the testis.

1.4.4 The umbilical cord is a vascular membranous organ that brings the blood of the mother and the foetus into close contact.

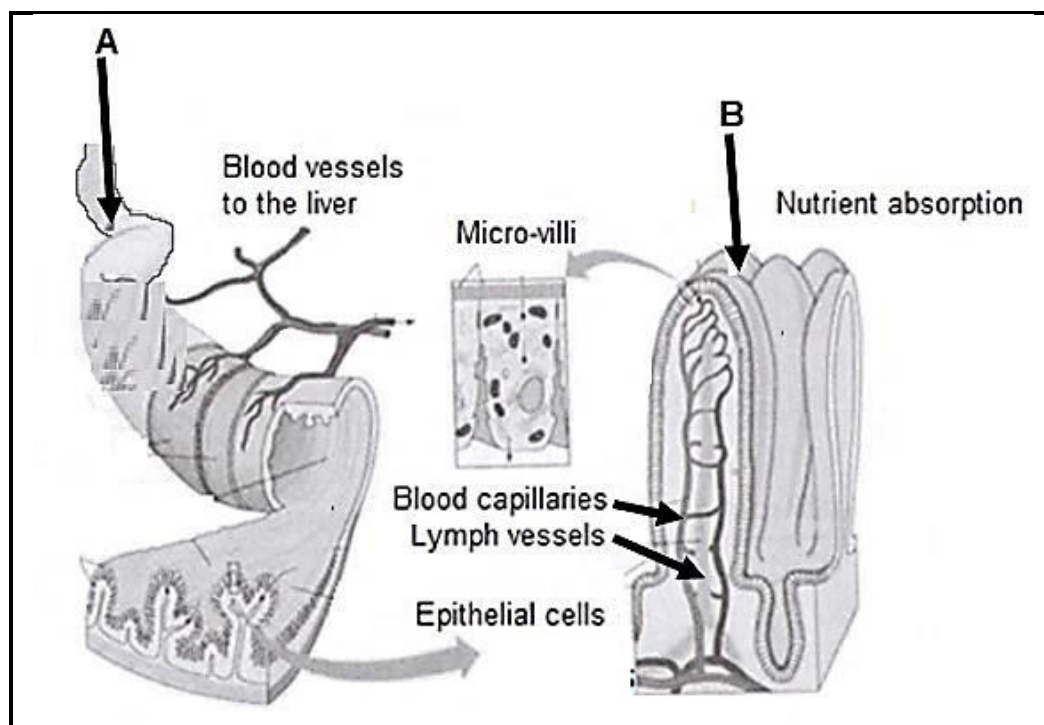
1.4.5 Embryo splitting is the process when blastocyst attaches to the walls of the uterus. (5 x 1) (5)

TOTAL SECTION A: 45

SECTION B**QUESTION 2: ANIMAL NUTRITION**

Start this question on a NEW page.

2.1 The diagram below shows a section of the alimentary canal of a farm animal.



- 2.1.1 Name the part of the alimentary canal labelled **A**. (1)
- 2.1.2 Give TWO adaptation features that are visible in the above illustration which enable part **B** to perform its function. (2)
- 2.1.3 Indicate the nutrient that is absorbed through each of the following:
- (a) Lymph vessels (1)
 - (b) Blood capillaries (1)
- 2.1.4 The inner lining of the part mentioned in QUESTION 2.1.1 is folded. Explain how these folds improve the absorption of food. (2)

2.2 The table below shows the feed components of a ration.

FEED COMPONENT	QUANTITY (kg)
Maize meal	50
Urea	5
Lucerne hay	70
Oat hay	40
Molasses	30

2.2.1 Identify the following from the ration in the table above:

(a) Energy-rich concentrate (1)

(b) Protein-rich roughage (1)

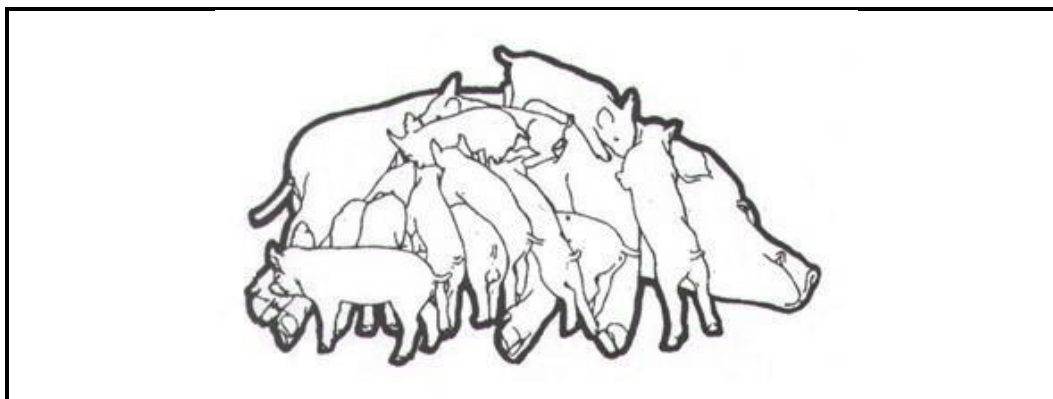
2.2.2 Name the type of an animal that can utilise the ration above successfully. (1)

2.2.3 Explain the answer in QUESTION 2.2.2 based on the composition of the ration and adaptation feature of an animal. (2)

2.2.4 Indicate the component of the ration above that can improve palatability and digestibility of oat hay. (1)

2.2.5 Use the data in the table above to plot a bar graph. (6)

2.3 The diagram below shows a sow and its litter.

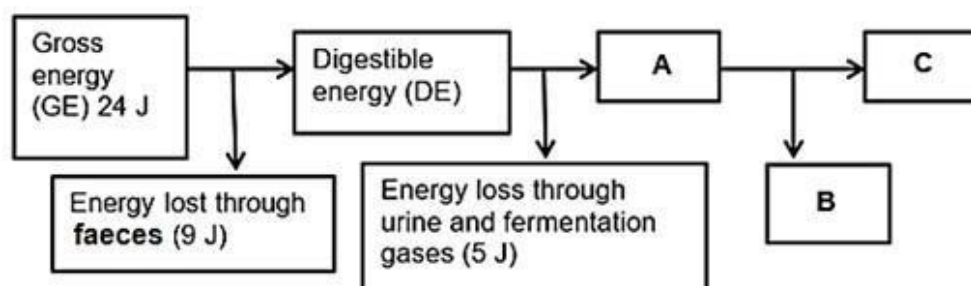


2.3.1 Name the mineral element that is likely to be deficient in this sow and litter when they are housed in a feeding pen with cement floors. (1)

2.3.2 Indicate ONE deficiency symptom of the mineral mentioned in QUESTION 2.3.1. (1)

2.3.3 Indicate the method in which this mineral deficient in sows can be supplemented. (1)

- 2.4 Maize meal and sunflower oilcake meal are mixed at a ratio of 8 : 20 to get the feed with 17% digestible protein content.
- 2.4.1 Indicate the part of the ratio that represents the sunflower oilcake meal. (1)
- 2.4.2 Explain your answer to QUESTION 2.4.1. (2)
- 2.4.3 Calculate the percentage of a carbohydrate-rich feed in the mixture. Show ALL calculations. (3)
- 2.5 The flow chart below illustrates the energy values of a feed.



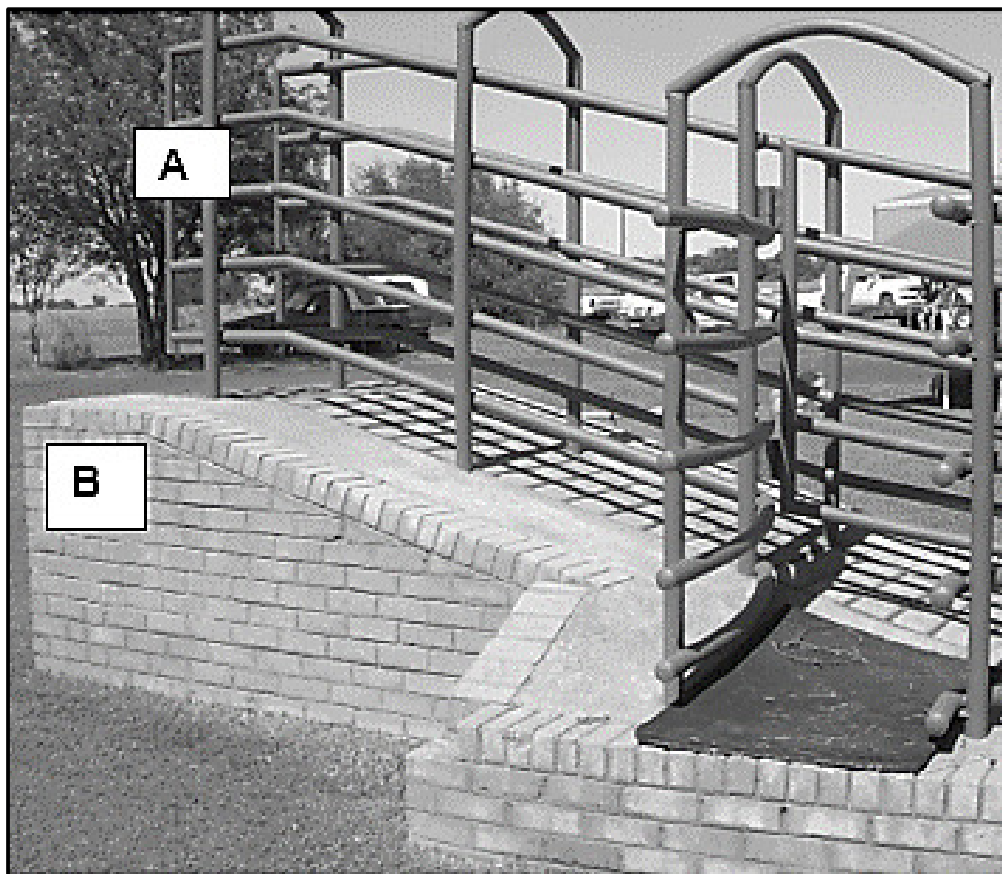
- 2.5.1 Identify the energy loss in **B**. (1)
- 2.5.2 The energy in **C** is important to farm animals. Justify this statement with TWO reasons. (2)
- 2.5.3 Calculate the energy value represented by **A**. (2)
- 2.5.4 State TWO aims of calculating energy value of the feed. (2)

[35]

QUESTION 3: ANIMAL PRODUCTION, PROTECTION AND CONTROL

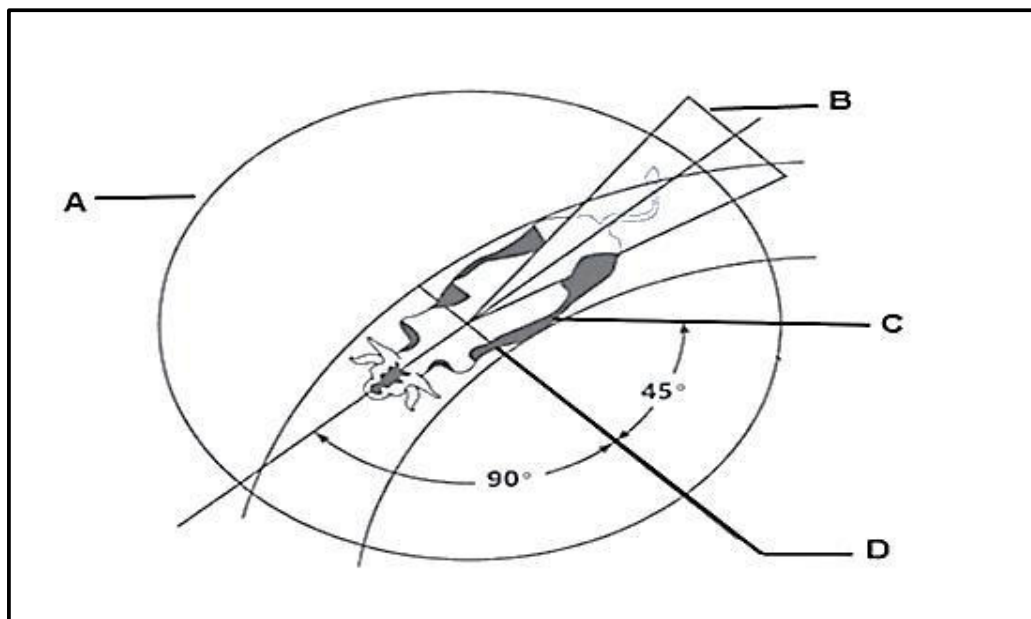
Start this question on a NEW page.

- 3.1 The picture below illustrates the facilities that are used when handling farm animals.



- 3.1.1 Identify the facility labelled **B**. (1)
- 3.1.2 Indicate the purpose of using the facility labelled **A**. (1)
- 3.1.3 The facility labelled **A** meets the safety criteria for handling large animals. Refer to the design features of this facility to justify the answer. (2)
- 3.1.4 State TWO reasons for the handling of farm animals using the facility labelled **A**. (2)

- 3.2. The diagram below illustrates different areas for the handler to consider when working with farm animals.



3.2.1 Indicate the letter applicable to each of the following positions:

- | | |
|--|-----|
| (a) The preferred distance of the animals to danger threat | (1) |
| (b) A point of balance | (1) |
| (c) For the handler to initiate movement | (1) |

3.2.2 Predict the behaviour of an animal when the handler approaches it at point labelled **B**. (1)

3.2.3 State TWO other common behaviour that can be displayed by cattle when under stress. (2)

3.3 Livestock farmers use different structures to shelter and house farm animals.

3.3.1 Indicate the purpose for which each of the following structures are used:

(a) Holding pen (1)

(b) Farrowing pen (1)

(c) Holding shed (1)

3.3.2 State THREE reasons for housing farm animals. (3)

3.4 The table below shows diseases that affect farm animals.

DISEASE	PATHOGEN	KEY SYMPTOMS	MODE OF TRANSMISSION	PREVENTION METHOD
A	Virus	Excessive salivation and aggression	Bite of infected animal	Immunisation
Mastitis	B	C	Flies	Good hygienic practices
D	Protozoa	Thin watery diarrhoea	Ingestion of feed contaminated with manure	E

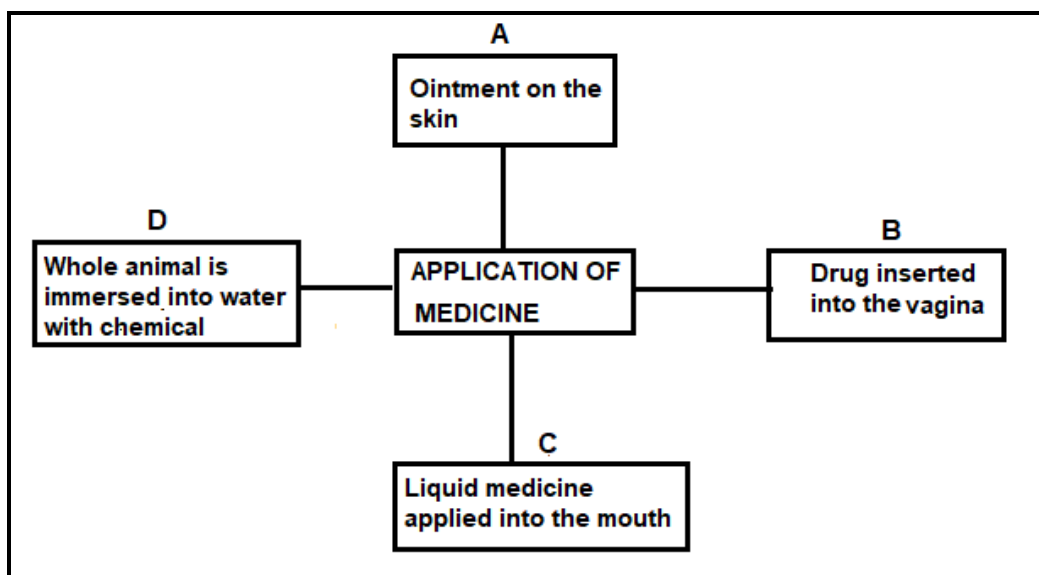
3.4.1 Label **A**, **B**, **C**, **D** and **E**. (5)

3.4.2 Indicate the role of the following in controlling animal diseases:

(a) The famer (1)

(b) The state (1)

- 3.5 The flow diagram below illustrates different methods of administering medicine to farm animals.



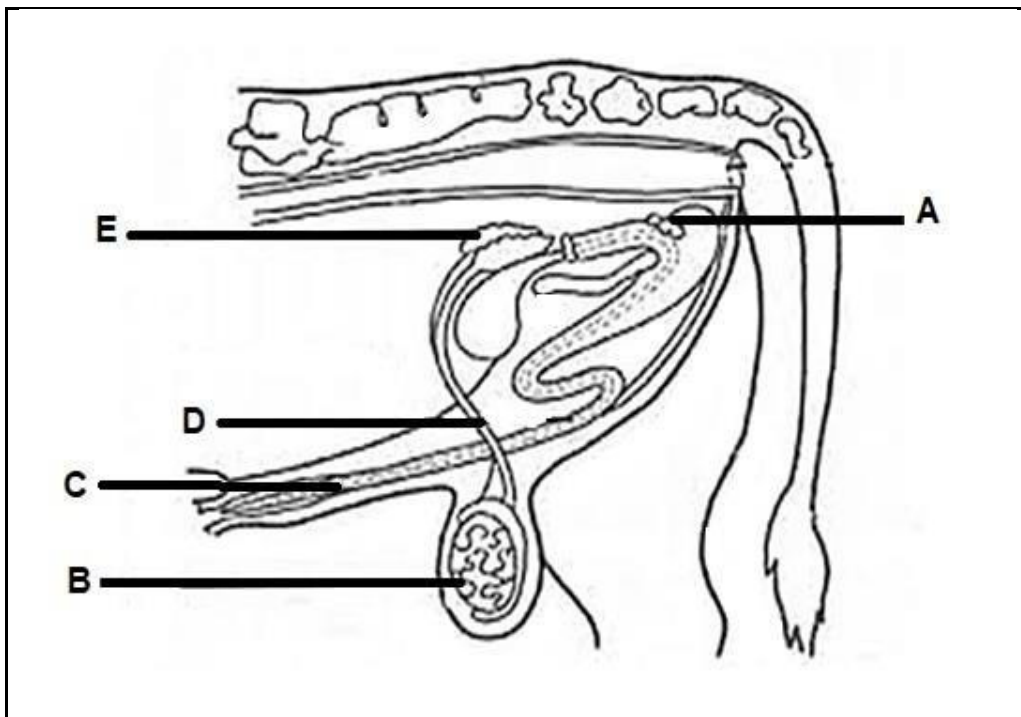
- 3.5.1 Name the method of applying medication to animals as illustrated in **A, B and D**. (3)
- 3.5.2 Indicate the letter that represents the method which is used to treat the following: (1)
- (a) Roundworm (1)
 - (b) Blue ticks (1)
- 3.5.3 State TWO ways in which medication can be used sustainably. (2)
- 3.6 Poisonous plants pose a threat to livestock because they can lead to death of animals if they consume them.
- 3.6.1 Name ONE poisonous plant that is normally found in pastures. (1)
- 3.6.2 State TWO measures a farmer can put in place to control plant poison in pastures. (2)

[35]

QUESTION 4: ANIMAL REPRODUCTION

Start this question on a NEW page.

4.1 The diagram below shows the reproductive system of a farm animal.



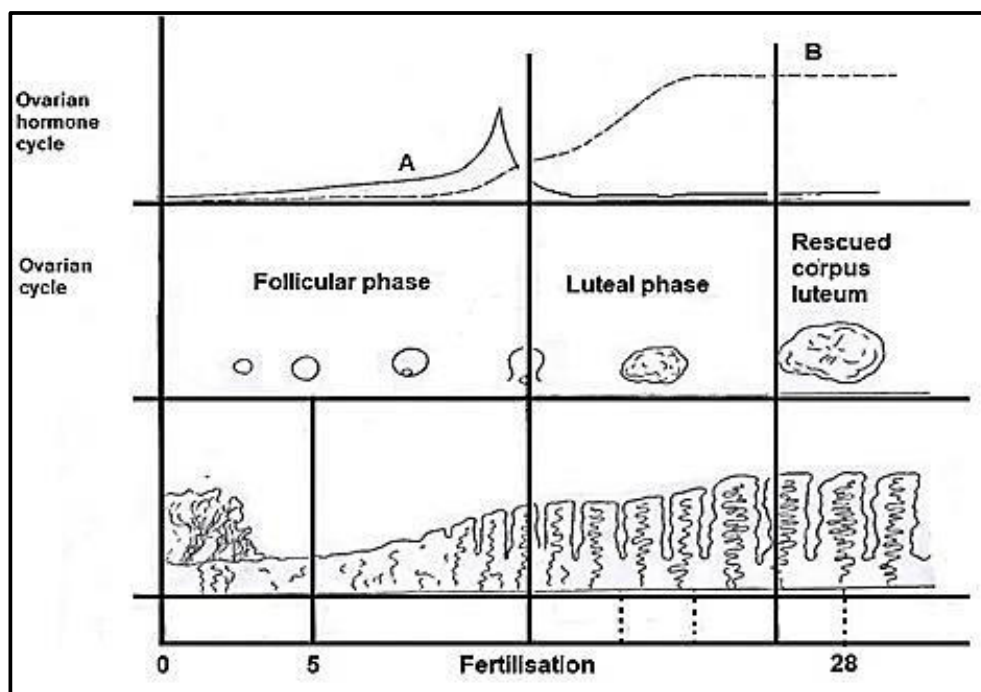
4.1.1 Identify the letter representing the part where each of the following occurs:

- (a) Feeding of sperm cells by SERTOLI cells during spermatogenesis (1)
- (b) Transportation of sperm cells to the urethra (1)
- (c) Secretion of a sticky liquid that provides energy for the sperm cells (1)

4.1.2 State TWO congenital defects of part **B** that may cause a complete loss of fertility in bulls. (2)

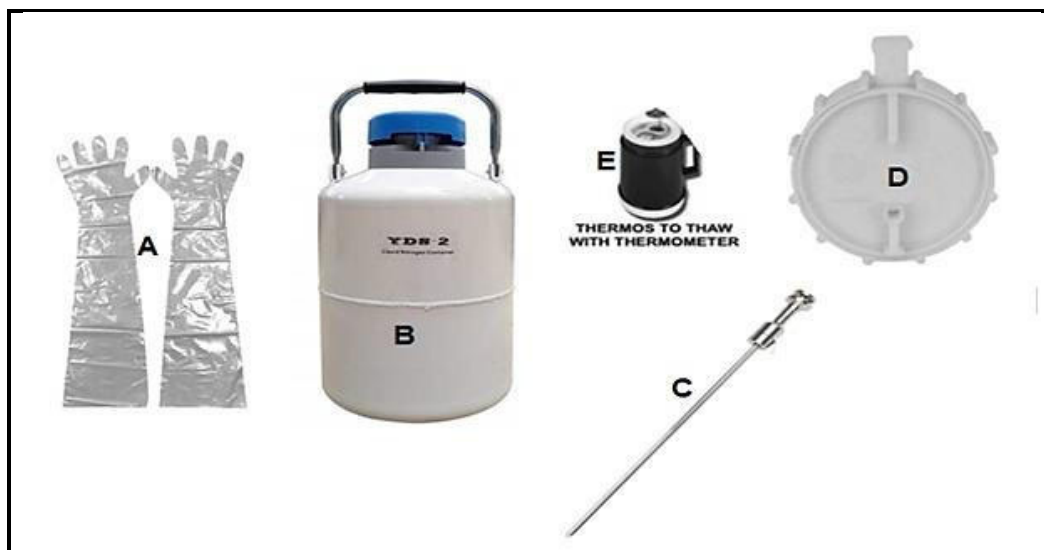
4.1.3 Indicate the role played by part **C** in reproduction. (1)

- 4.2 The diagram below illustrates the effect of the hormones released during the oestrus cycle.



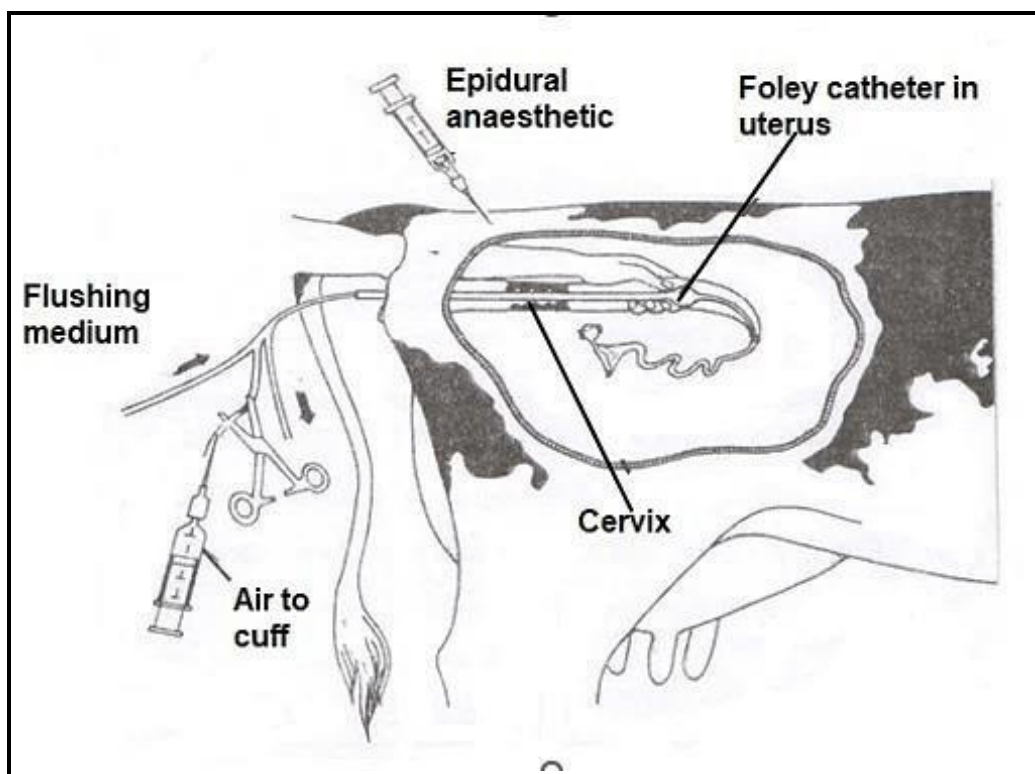
- 4.2.1 Indicate the duration of the oestrus cycle illustrated above. (1)
- 4.2.2 Identify the hormones illustrated in **A** and **B**. (2)
- 4.2.3 Indicate the following during the follicular phase: (1)
- Stage of oestrus cycle (1)
 - The hormone responsible (1)
- 4.2.4 Suggest TWO functions of the hormone labelled **B** when the cow in the oestrus cycle above becomes pregnant. (2)

4.3 The equipment below is used during artificial insemination.



- 4.3.1 Indicate the purpose of using equipment labelled **C**. (1)
- 4.3.2 State TWO basic requirements when using equipment labelled **B**. (2)
- 4.3.3 Identify the letter of the equipment that ensures the following:
- (a) Semen is not contaminated with pathogens by inseminator (1)
 - (b) Semen is ready for use after being kept frozen (1)
- 4.3.4 State ONE disadvantage of using the equipment in QUESTION 4.3 for the farmer. (1)
- 4.3.5 Indicate TWO advantages of artificial insemination. (2)

- 4.4 The diagram below illustrates a procedure followed when embryo transfer is done.



- 4.4.1 Identify the procedure illustrated above. (1)
- 4.4.2 Indicate the type of cow where the procedure above is performed. (1)
- 4.4.3 State the reason for using the type of cow mentioned in QUESTION 4.4.2. (1)
- 4.4.4 Name ONE aim of the technique used in the procedure illustrated above. (1)
- 4.4.5 State TWO disadvantages of the technique for the farmer. (2)

- 4.5 The flow chart below shows the path through which milk flows from where it is produced until it is released during suckling or milking.

Teat cistern → Milk ducts → Alveolus → Teat canal → Gland cistern

- 4.5.1 Rearrange in a sequential order, the steps with which the milk will flow from the point of production until milking or suckling. (5)

- 4.5.2 Indicate the following with regard to the milk let down process:

(a) TWO stimuli that initiate the process (2)

(b) The hormone involved (1)

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TOTAL SECTION B: 105

GRAND TOTAL: 150