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Question 1

(a) State **five** reasons why government should enact laws to regulate the use of land for agriculture. [5 marks]

(b) A cocoa farmer has just acquired 10 *hectares* of farmland and is considering the type of farm power to use for tillage operations.

(i) Advise the farmer on the most appropriate type of farm power to use. [1 mark]

(ii) State **four** reasons for the answer in **1(b)(i)**. [4 marks]

(c) Mention **one** function **each** of the following parts of a seed planter:

(i) seed tube;

(ii) furrow opener;

(iii) hopper;

(iv) seed metering device;

(v) furrow wheel. [5 marks]

(d) List **three** machines used in processing crops after harvesting. [3 marks]

Observation

Candidates' performance in Question 1 was above average although many of them could not state the functions of parts of the seed planter. Furthermore, many candidates listed tillage implements like plough, harrow, cultivator e.t.c. in Question 1(d) instead of crop processing machines; thus losing marks.

The expected answers include:

1. (a) **Reasons why government should enact laws to regulate the use of land for agriculture**

- Encourage enterprising farmers acquire land for agriculture.

- Ensure proper use of agricultural land
- Prevent land fragmentation which discourages large scale farming
- Safeguard farmers against unreasonable eviction /land grabbing
- Facilitate government programmes/schemes like Green Revolution which requires large expanse of farmland
- Reduce litigation on lands/land disputes
- Encourage the production of certain farm produce
- Facilitate land improvement programmes like irrigation, drainage, dams
- Encourage commercial agriculture.
- Encourage the acquisition of certificate of occupancy (C of O)/title deed/security of tenure

(b) (i) **Most appropriate type of farm power to use for tillage operations on the cocoa farmland**

- Mechanical power

(ii) **Reasons for using mechanical power on the cocoa farmland**

- Saves labour/makes labour available for other farm operations
- Reduces drudgery/make tillage operation less tedious
- Saves time/timeliness of tillage operations/faster
- Reduces the cost of operation/cost effective
- Reduces health hazards
- Makes it possible to cultivate large hectares of farmland
- More efficient

(c) **Functions of the following parts of a seed planter**

(i) **Seed tube**

- Directs seeds from the base of the hopper into the soil

(ii) **Furrow opener**

- Digs hole in front of the seed drill into which the seeds

(iii) **Hopper**

- Contains/keeps the seeds to be planted

(iv) **Seed metering device**

- Regulates the dropping of seeds from the seed box/hopper into the seed tube

(v) **Furrow wheel**

- Presses the soil to cover the seeds dropped in the hole

(d) **Machines used in processing crops after harvesting**

- | | | |
|-----------------------|-------------------------|-------------------|
| - Thresher | - Combine harvester | - |
| Sheller | | |
| - Grinder | - Grain dryer | - Juice extractor |
| - Mixer | - Press/Hydraulic press | - Rice huller |
| - Palm kernel cracker | - Mill/hammer mill | - Bailer |
| - Rice polisher | - Decorticator | - Ring |
| macerator | | |
| - Straw Chopper | - Grater | - Sterilizer |
| - Winnowing machine | - Blender | |

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Question 2

(a) Explain **each** of the following cropping systems:

1. *monocropping*;
2. *mixed cropping*;
3. *mixed farming*;
4. *crop rotation*.

[8 marks]

(b) A crop farmer observed that the leaves of the orange plants on the farm turned purple with **most** of the immature fruits dropping.

- (i) Identify the nutrient deficient in the orange plants. [1 mark]
- (ii) List **four** inorganic fertilizers that could correct the nutrient deficiency observed in the orange plants. [4 marks]

(c) Name **five** materials that could be used to attract bees to a new beehive. [5 marks]

Observation

- Only few candidates were able to explain the cropping systems in Question 2(a). Most candidates only defined the cropping systems; thus losing marks.
- Although many candidates were able to identify the nutrient deficient in the orange plants, only few could list the inorganic fertilizers that could correct phosphorus deficiency in orange plants. Majority of them were mentioning nitrogenous fertilizers.
- Many candidates had difficulty in naming materials that could be used to attract bees to a new bee hive.

The expected answers include:

2. (a) **Explanation of the following cropping systems**

(i) **Monocropping**

- This is the cultivation of only one type of crop on a piece of land at a given time
- The crop is harvested before another crop is planted
- The soil nutrients for the crop may be exhausted

(ii) **Mixed cropping**

- This refers to the cultivation of two or more crops simultaneously on the same piece of land at the same time
- Guards against crop failure
- Ensures effective use of soil nutrients
- It is practised where land is scarce

(iii) **Mixed farming**

- This refers to the cultivation of crops and rearing of farm animals on the same piece of land at the same time.
- Reduces cost of production
- Crop residues serve as feed for farm animals.
- Animal dung serves as organic manure for the crops.

(iv) **Crop rotation**

- This is the cultivation of different crops on the same piece of land in a definite sequence from year to year.
- Improves soil fertility
- Checks pests and disease

(i) **Nutrient deficient in the orange plants**

Phosphorus

(ii) **Inorganic fertilizers that could correct phosphorus deficiency observed in the orange plants**

- | | |
|-------------------------|---------------------------------|
| • Basic slag | - Ammonium polyphosphate liquid |
| • Dicalcium phosphate | - NPK fertilizer |
| • Diammonium phosphate | - Mono-ammonium phosphate |
| • Single superphosphate | - Rock phosphate |
| • Triple superphosphate | |

(c) **Materials that could be used to attract bees to a new beehive**

- | | | |
|---------------------------|-----------------------------|-------------------|
| - Raffia wine | - Locust beans | - Honey bee wax |
| - Cocoa beans juice | - Pineapple juice | - Mango juice |
| - Palm wine/sweet syrup | - Lemon grass essential oil | - Propolis |
| - Bait hive/swam trap | - Molasses | - Pheromone lures |
| - Old frame with bee comb | - Quercetin chemicals | |
| - Dry cassava flour | - Sugar | |

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Question 3

- (a) Explain **four** causes of damage to maize during storage. [8 marks]
- (b) **Two** heterozygous tall plants, **Tt** were crossed in an experiment. Using a genetic diagram,
 (i) show all the possible offspring that could result from this cross. [2 marks]
 (ii) determine the:
 I. genotypic ratio of the offspring;
 II. phenotypic ratio of the offspring. [2 marks]
- (c) State Mendel's **first** and **second** laws of inheritance. [4 marks]
- (d) Mention **two** forage grasses. [2 marks]

Observation

Question 3 was not popular among candidates and performance was below average.

- (a) Many candidates displayed lack of knowledge of the causes of damage to maize during storage and responses were poor.
- (b) Candidates showed an improvement in questions on genetics because many of them were able to show the genetic cross as well as determine the genotypic and phenotypic ratios of the offspring. However, Mendelian laws of inheritance was poorly answered.
- (c) The performance of many candidates in Question 3(d) was abysmal due to wrong spelling of botanical names of forage grasses as well as failure to adhere to the scientific convention in writing botanical names.

The expected answers include:

3. (a) **Explanation of causes of damage to maize during storage**

(i) **High humidity**

- High humidity often leads to mould formation, thus reducing the quality of maize

(ii) **Pests**

- The presence of pests reduces the quality of maize
- Pests reduces the quantity of maize
- Reduces the viability of seeds ; thus the germination rate

(iii) **Pathogens**

- The presence of moulds and other fungi reduces the quality of stored maize

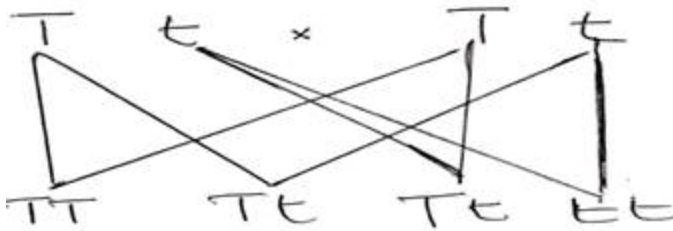
(iv) **Heat generated during storage**

- This enhances the formation of moulds, thus reducing the quality of maize

(v) **Poor Storage Structure:**

- Leaking roof allows water to get into the stored maize; thus leading to mouldiness
- Allows infestation of pests and pathogens

(b) (i) **Possible offspring that could result from the cross**



(ii) I. **Genotypic ratio of the offspring**

1:2:1

II. **Phenotypic ratio of the offspring** 3:1

(c) **Mendel's laws of inheritance**

First law (Law of segregation of genes)

Genes occur in pairs and are transmitted independently from one generation to another

Second law (Law of independent assortment of genes)

Genes for different traits are sorted separately from one another such that the inheritance of one trait is not dependent on another

(d) **Forage grasses**

- Guinea grass/*Panicum maximum*
- Stubborn grass/*Eleusine indic*
- Elephant grass/*Pennisetum purpureum*
- Giant star grass/*Cynodon plectostachyus*
- Southern gamba grass/ *Andropogon tectorum*
- Rhodes grass/*Chloris gayana*
- Bermuda grass/Bahana grass/*Cynodon dactylo*
- Spear grass/*Imperata cylindrica*
- Carpet grass/*Axonopus compressu*
- Kikuyu grass/*Pennisetum clandestinum*
- Northern gamba grass/*Andropogon gayana*

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Question 4

(a) Complete the table below.

<i>Crop</i>	<i>Botanical name</i>	<i>Classification based on use</i>	<i>Method of propagation</i>
Onion	<i>Allium cepa</i>	- Vegetable - Spice	- Seed - Sett - Bulb
Ginger	<i>Zingiber officinale</i>	- Spice	- Rhizome
Jute	<i>Corchorus olitorius</i>	- Fibre - Vegetable	- Seed

[9 marks]

(b) A poultry farmer plans to rear broilers in a deep litter house measuring 36 *m* long and 10 *m* wide. If a floor space of 0.36 *m*² per adult chicken is recommended for broiler production, calculate the number of broilers that the farmer can rear.

[4 marks]

(c) State **five** advantages of introducing legumes in a pasture.

[5 marks]

Observation

Candidates' performance in Question 4(b) and (c) was above average. However, several candidates lost marks in Question 4(a) due to failure to adhere to the scientific convention of writing botanical names as well as lack of knowledge of the method of propagating ginger and classification of jute based on its use.

The expected answers include:

4. (a) **Completion of Table**

<i>Crop</i>	<i>Botanical name</i>	<i>Classification based on use</i>	<i>Method of propagation</i>
Onion	<i>Allium cepa</i>	- Vegetable - Spice	- Seed - Sett - Bulb
Ginger	<i>Zingiber officinale</i>	- Spice	- Rhizome
Jute	<i>Corchorus olitorius</i>	- Fibre - Vegetable	- Seed

(b) **Calculation on the stocking density of broilers**

$$\begin{aligned} \text{Length of deep litter house} &= 36 \text{ m} \\ \text{Breadth of deep litter house} &= 10 \text{ m} \\ \text{Area of deep litter house} &= \text{Length} \times \text{Breadth} \\ &= 36 \text{ m} \times 10 \text{ m} \\ &= 360 \text{ m}^2 \end{aligned}$$

METHOD 1

$$\text{Recommended floor space per adult chicken} = 0.36 \text{ m}^2$$

1 broiler occupies 0.36 m^2 floor space

x broiler occupies 360 m^2 floor space

$$0.36 \text{ x} = 360 \text{ m}^2 \text{ x } 1$$

$$0.36 \text{ x} = 360 \text{ m}^2$$

$$\text{x} = \frac{360 \text{ m}^2}{0.36 \text{ m}^2}$$

$$\text{x} = 1,000 \text{ broilers}$$

OR

METHOD 2

$$\text{Number of broilers} = \frac{\text{Area of deep litter house}}{\text{Floor space per adult chicken}}$$

$$\begin{aligned} \text{Number of broilers} &= \frac{360 \text{ m}^2}{0.36 \text{ m}^2} \\ &= 1,000 \text{ broilers} \end{aligned}$$

(c) **Advantages of introducing legumes in a pasture**

- Extend the growing season of pastures
- Improve the quality/palatability of forage
- Reduce nitrogen fertilizer requirements of pastures/increase nitrogen content of soil
- Reduce susceptibility to pests and diseases
- Increase organic matter content of soils
- Control/suppress weed growth
- Reduce soil erosion
- Produce higher yield of herbage
- Provide balanced/complete diet
- Serve as cover crop

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Question 5

(a) Explain **each** of the following terms in animal nutrition:

- i. *balanced diet*;
- ii. *maintenance ration*;
- iii. *production ration*;
- iv. *malnutrition*.

[8 marks]

(b) State **six** effects of malnutrition on farm animals. [6 marks]

(c) Mention **four** nursery practices in the production of tomato. [4 marks]

Observation

Question 5 was quite popular among candidates and performance was above average. However, many candidates defined the terms in animal nutrition in Question 5(a) instead of explaining them; thus losing marks. Furthermore, some candidates misconstrued nursery practices in tomato production with post-planting operations in crop production.

The expected answers include:

5. (a) **Explanation of terms in animal nutrition**

(i) **Balanced diet**

- A balanced diet is a diet that contains all the essential nutrients in the right quantity and quality for livestock feeding
- The essential nutrients are carbohydrates, proteins, fats, vitamins, minerals and water

(ii) **Maintenance ration**

- This is the ration fed to farm animals in order to maintain normal functioning of the body system

- Maintains animals' body weight
- Supplied to non-productive animals

(iii) **Production ration**

- This refers to the ration fed to farm animals to enable them produce animal products e.g. meat, milk, eggs.
- Supplies nutrients above maintenance ration.

(iv) **Malnutrition**

- Malnutrition is a condition in which an animal shows evidence of nutritional deficiency
- Malnutrition occurs when a ration does not supply all the essential nutrients in the right proportion and quality

(b) **Effects of malnutrition on farm animals**

- Reduces productivity
- Causes diseases e.g. ketosis
- Loss of appetite/poor appetite
- Slow growth
- Failure
- Could lead to death
- Anaemia
- Poor appearance
- Dullness
- Stunted growth
- Reduction in quality of animal products
- Reduces resistance to diseases
- Fatigue
- Reproductive failure
- Haemorrhage
- Physical deformity
- Loss of weight/emaciation
- Stunted growth
- Nervousness

(c) **Nursery practices in tomato production**

- Watering/irrigation
- Rogueing
- Shading
- Thinning
- Fertilizer application/manuring
- Pest control
- Pricking-out
- Disease control
- Preparation of nursery seedbeds/seed trays/ seed boxes
- Sowing of seeds
- Weeding

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Question 6

- (a) The table below illustrates a basic economic principle in agriculture. *Use it to answer questions 6(a)(i) to 6(a)(iii).*

<i>Quantity of fertilizer used (bag)</i>	<i>Tomato yield (kg)</i>
0	2
2	6
4	9
6	11
8	10
10	5
12	4

- i. On the graph sheet provided, plot a graph showing the relationship between fertilizer used and tomato yield. Use a scale of 2 cm to 2 units on the x axis and 2 cm to 2 units on the y axis. [4 marks]
- ii. Describe the relationship between the fertilizer used and tomato yield.. [2 marks]
- iii. Suggest the **most** appropriate quantity of fertilizer to be applied on the tomato farm. [1 mark]
- (b) State **three** effects of subsidy withdrawal on agricultural production. [3 marks]

(c) List **four** print media that could be used to disseminate information about a new variety of maize to farmers. [4 marks]

(d) Name **two** insect pests **each** of the following crops:

(i) maize;

(ii) orange. [4 marks]

Observation

1. Question 6 was very popular among candidates and marks were above average for most candidates. Most candidates could state the management practices carried out in poultry production.
2. This question was fairly attempted by candidates.
3. Many candidates could not mention the marketing services in agricultural production but mixed it up with problems of agricultural marketing.

The expected answers include:

6. (a) Management practices carried out in poultry production

- Candling
- Feeding
- Sexing
- Watering
- Egg handling
- Sanitation
- Incubation
- Housing
- Hatching
- Debeaking
- Brooding
- Vaccination
- Turning of litter/litter management
- Caponization
- Age group rearing
- Control of parasites

(b) Advantages of dehorning in cattle production

- Less space is required for feeding
- The animals eat more conveniently and grow faster
- Dehorned animals are more attractive and therefore yield more money
- They are easy to transport in vehicles from one area to another
- They are more safe to handle/docile
- It prevents injury of animals/handlers

(c) Marketing services in Agricultural production

- Standardization/grading
- Financing
- Packaging
- Assemblage
- Transportation
- Processing
- Storage
- Distribution
- Risk bearing/insurance
- Advertising

(d) Problems of agricultural marketing in West Africa

- Scattered sources of supply/small holdings
- Inadequate transportation
- Inadequate processing facilities
- Inadequate storage facilities
- Non-uniform weights and quantity measuring devices
- Inadequate financing
- Poor marketing skills/systems
- Adulteration of produce
- Instability of prices
- Inadequate market research
- Inadequate information about production and marketing
- Activities of middlemen

- Perishability of farm produce

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