CANDIDATES’ ITEM RESPONSE ANALYSIS REPORT FOR THE ADVANCED CERTIFICATE OF SECONDARY EDUCATION EXAMINATION (ACSEE) 2019

134 AGRICULTURE
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FOREWORD

The Agriculture Candidates’ Items Response Analysis Report on the Advanced Certificate of Secondary Education Examination (ACSEE) 2019 was written in order to provide feedback to students, teachers, parents, policy makers and other education stakeholders on the candidates’ performance in Agriculture subject.

The Advanced Certificate of Secondary Education Examination marks the end of two years of advanced level secondary education. It is a summative evaluation which, among other things, shows the effectiveness of education system in general, and education delivery system in particular. Essentially, candidates’ response in the examination is a strong indicator of what the education system was able or unable to offer to the candidates in their two years of Advanced Secondary Education.

The performance in Agriculture subject in 2019 was generally good. Majority of the candidates who passed the examination scored the lower pass grades. This report highlights the reasons for the candidates’ low scores in this subject. The analysis established that lack of good understanding of some topics, inadequate field practical skills and failure to understand the requirements of some questions were the factors for poor performance. It has been noted that candidates who scored high marks were knowledgeable on the topics as well as practical skills and met the requirements of the questions.

The feedback provided in this report will enable the education administrators, school managers, teachers and students to come up with proper measures for improving candidates’ performance in future examinations administered by the Council.

Finally, the Council would like to thank all Examinations Officers, Examiners and all who participated in the preparation of this report.

\[\text{Dr. Charles E. Msonde}\]

\[\text{EXECUTIVE SECRETARY}\]
1.0 INTRODUCTION

This report presents the performance of the candidates who sat for the Advanced Certificate of Secondary Education Examination in Agriculture subject in 2019. The 2019 Agriculture Examination was set according to the examination format issued in 2011, which was derived from the 2009 Agriculture syllabus.

The examination comprised of three papers namely, 134/1 Agriculture 1 and 134/2 Agriculture 2, both being theory papers. A practical paper was also involved that is 134/3 Agriculture 3. All papers consisted of short answer questions.

Paper 1 consisted of three sections; A, B and C. Section A consisted of five questions. In this section candidates were required to answer three questions. Section B and C had two questions each. Candidates were required to answer one question from each section. Each question carried 20 marks. Paper 2 consisted of two sections; A and B, containing five questions each. The candidates were required to answer five questions by choosing at least two questions from each section. Each question carried 20 marks. Paper 3 consisted of three questions and the candidates were required to answer all of them. Question 1 carried 20 marks, while questions 2 and 3 carried 15 marks each.

The general performance in this year’s examination was good. Candidates who sat for the examination were 664 from 14 examination centers. The performance indicates that 654 (98.49%) candidates passed, whereas 10 (1.51%) candidates failed the examination. Candidates’ performance in this year’s examination has increased by 0.28 percent compared to the last year (2018). Table 1.1 summarizes performance of the candidates who sat for ACSEE 2019 in terms of grades.

### Candidates’ Performance by Grades

<table>
<thead>
<tr>
<th>Grades</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>S</th>
<th>F</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>0</td>
<td>0</td>
<td>34</td>
<td>96</td>
<td>66</td>
<td>9</td>
<td>5</td>
<td>210</td>
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<tr>
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<td>10</td>
<td>72</td>
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<td>153</td>
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<td>10</td>
<td>106</td>
<td>292</td>
<td>219</td>
<td>27</td>
<td>10</td>
<td>664</td>
</tr>
</tbody>
</table>

Source: NECTA Statistics Book, pg 6, ACSEE, 2019

The following section presents performance analysis in each question. The analysis highlights the requirements of each question, candidates responses and possible reasons for their good, average or poor performance. In the analysis, the
performance is considered as poor, average or good performance by considering the candidates’ score percentage wise. Scores ranging between 0-34, 35-59 and 60-100 is regarded as poor, average and good, respectively. Some extracts of the answers showing candidates’ responses have been included to illustrate the cases presented.

2.0 ANALYSIS OF THE CANDIDATES’ PERFORMANCE IN EACH QUESTION

2.1 134/1 AGRICULTURE 1

2.1.1 Question 1: Farm Power

The question consisted of four parts namely (a), (b), (c) and (d) carrying 20 marks. The candidates were required to: (a) name the engine component which convert reciprocating motion to rotary motion, (b) identify eight systems which are commonly found on a tractor engine and give a function for each, (c) briefly describe the operations of petrol and diesel fuel engines and (d) outline the function of each of the following components of battery ignition system in a petrol fuel engine: (i) coil (ii) distributor (iii) condenser (iv) spark plug and (v) battery.

The question was attempted by 327 (49.2%) candidates, of which 68 (20.8%) scored from 0 to 6.5 marks, 201 (61.5%) scored from 7 to 11.5 marks and 58 (17.7%) scored from 12 to 20 marks. The analysis shows that the general performance of the candidates in this question was good because 259 (79.2%) candidates scored from 7 to 20 marks. Figure 1.1 shows the distribution of the candidates’ scores.
According to Figure 1.1, the candidates performed well in this question. The candidates who performed well in this question were able to provide correct responses in parts (a), (b) and (d). This signifies good mastery of the topic on farm power. Majority of the candidates were able to name the engine component which converts reciprocating motion to rotary motion in part (a). Furthermore, the candidates managed to identify correctly the eight systems which are found on a tractor engine and their functions in part (b). Moreover, they outlined correctly the functions of components of battery ignition system in part (d). This indicates that they had enough knowledge on the theoretical and practical aspects of the tractor engine.

However, most of the candidates could not provide correct responses to part (c) of the question due to misunderstanding of the demand of the question. Most of them gave explanations on events in four stroke power engine such as Intake/induction stroke, compression stroke, power stroke and exhaust stroke instead of describing the operations of petrol and diesel fuel engines. This shows that the candidates lacked competence on the operations of engines. Extract 1.1.1 is a sample of good responses in question 1.
(a) The component is called a \textit{SHAF}.

(b) \textbf{E}ight \textbf{s}ystems.

(i) \textbf{F}uel \textbf{s}ystem: It is a system to collect fuel. It should deal with the provision of correct amount of fuel to the engine for ignition.

(ii) \textbf{L}ubrication \textbf{s}ystem: It deals with lubricating different moving parts of the engine and body of the tractor.

(iii) \textbf{E}lectrical \textbf{s}ystem: It provides means of light, starting tractor, and operating indicators in the tractor.

(iv) \textbf{V}alve \textbf{s}ystem: A system consisting of devices which control opening and closing of valves like camshaft to allow fuel to enter in cylinders.

(v) \textbf{H}ydraulic \textbf{s}ystem: Is a system which is used for attachment of other implements, trailers, and other at power take off.

(vi) \textbf{C}ooling \textbf{s}ystem: It is a system which keeps the tractor's engine at correct temperature.

(vii) \textbf{I}gnition \textbf{s}ystem: It is a system which deal with fuel ignition to produce power.

(viii) \textbf{T}ransmission \textbf{s}ystem: It is a system which deals with power transmission from engine to rearward.
4. **Operation of petrol and diesel engines**

   **(a) Petrol engine.**
   - It uses petrol fuel to produce power.
   - Operation begins when:
     - Fuel from tank passes through system of filter to be filtered, then clean fuel enters the carburettor, where it mixes with air to form fuel-air mixture. Then fuel-air mixture is injected into the combustion chamber, where it is compressed and ignited to produce power.

   **(b) Diesel engine.**
   - It uses diesel fuel to produce power.
   - Operation begins when:
     - Clean air alone is taken to the combustion chamber and converted by high temperature.
     - The clean fuel enters the injector pipe and pumped at high pressure then injected through a system of injector nozzles to make the droplets.
     - The fuel droplets are taken into the combustion chamber where they meet with hot compressed air. Ignition occurs and power is produced.

   **(c) In car.** This is made of thin twisted wires which are powered by current produced from the batteries so that it can be distributed to the specific places.
Extract 1.1.1

This is a sample of the responses from the candidate who provided correct responses in all parts of the question.

The candidates who performed poorly in this question were unable to provide correct responses in most parts of the question. In part (a), the candidates failed to name the engine component which converts reciprocating motion to rotary motion by giving responses such as camshaft and connecting rod. In part (b) the candidates failed to identify eight systems which are commonly found on a tractor engine and the function of each system. Examples of incorrect responses given by the candidates were like diesel system- is used to generate heat and power to the tractor engine, petrol system-used to generate power in the tractor engine. Some candidates in this group managed to name just few systems but failed to give their functions. In part (c), the candidates provided incorrect responses like: tillage operation from the large farm, harvesting in the farm by using machines operated by the tractor engine, harrowing, carry the load by using the tractor engine instead of describing the operations of petrol and diesel fuel engines. In part (d), most of the candidates also failed to outline the function of the named components of battery ignition system in a petrol fuel engine. Incorrect responses provided were such as (i) coil- is used to allow fuel to move from the pipe to the engine. (ii) distributor- is used to distribute fuel to where it is necessary. (iii) condenser is used to pump fuel to the engine, (iv) spark plug- is used to test the charge of the engine. (v) battery- supply electric current for lighting when the engine is off. Generally, this indicates that the candidates had inadequate knowledge and skills on tractor and its operations. Extract 1.1.2 exemplify poor responses from one of the candidates in question 1.
This is an extract from one of the candidates who failed to provide correct responses in all parts of the question.

### 2.1.2 Question 2: Farm Workshop

The question consisted of three parts; (a), (b) and (c) carrying 20 marks. The candidates were required to; (a) (i) give the meaning of the term protective gears as used in farm workshop (ii) describe five protective gears used in the farm workshop (b) (i) suggest three main safety precaution to be considered in farm workshop (ii) briefly explain the use of fire extinguisher in the farm workshop (c) account for six factors to be considered when siting a farm workshop.

The question was attempted by 542 (81.6%) candidates, from which 145 (26.8%) scored from 0 to 6.5 marks, 251 (46.3%) scored from 7 to 11.5 marks and 146 (26.9%) scored from 12 to 18 marks. These statistics indicate that the
performance of the candidates was good because 397 (73.2%) candidates scored from 7 to 18 marks. Figure 1.2 shows the distribution of the candidates’ scores.

![Pie chart showing distribution of candidates' scores: 26.9% Weak, 26.8% Average, 46.3% Good.]

**Figure 1.2: Candidates’ Performance on Question 2**

The analysis shows that candidates who had good performance in this question did well in almost all parts of the question. Majority of the candidates gave correct meaning of the term protective gears and also described well the protective gears in the farm workshop in parts (a) (i) and (a) (ii) respectively. Likewise the candidates suggested correctly the safety precautions to be considered in the farm workshop in part (b) (i) and explained well the use of fire extinguisher in part (b) (ii). Nevertheless, besides giving correct responses for the factors to be considered in siting a farm workshop in part (c), some of the candidates provided incorrect responses. For example, one of the candidates responded: *type of work to be done, availability of materials, availability of labour to work and availability of power source.* This suggests that the candidates had insufficient knowledge in the topic on farm workshop. Examples of good responses are shown in extract 1.2.1 in question 2.
(c) W Googles.
- Are used by the former during welding to prevent eye damage.

(ii) Overall Cloth.
- This help the former to prevent the Clean Cloth worn inside from getting dirty.
- Also prevent injuries in the workshop if the worker would wear loose clothes.

(b) ii.
- Precaution Safety precaution against working place.
  (i) The bench should be cleaned.
  (ii) The tools should be cleaned and stored in a tool rack.
  (iii) The surrounding environment must be clean.

(b) Safety precaution against personal injury.
  (i) All painted tools should be kept in good condition.
  (ii) Keep the floor clean and dry.
  (iii) Be careful when using operated saws.

(c) Safety precaution against fire hazards.
  (i) The fire extinguisher should be accessible and known where it is placed.
  (ii) Direct heat sources should not brought near flammable liquids.
  (iii) Flammable liquids should be stored in an approved
Extract 1.2.1
The extract indicates good responses from one of the candidates who attempted parts (a) and (b) correctly. In part (c), the candidate missed one point, thus could not score full marks.

The candidates who performed poorly in this question failed to provide correct responses to most parts of the question. In part (a) (i), majority of the candidates
failed to give the meaning of the term protective gears. Some of the incorrect responses provided by the candidates were; protective gears in farm workshop refer to the tools part of machine which is used for controlling the movement of the machine and protect it from damage, protective gears in farm workshop are instrument used to protect farm tools for the meaning of protective gears in part (a) (i). In part (a) (ii) the candidates did not managed to describe the protective gears used in the farm workshop. For examples, one of the candidates responded: starting gears, stopping gears, controlling movement gears, clutch, gear box, don't run in the workshop, avoid smoking in the workshop, do not use the machine if you do not understand. Moreover, the candidates were unable to suggest safety precautions to be considered in the farm workshop in part (b) (i). Some of the candidates provided incorrect responses like; there should be fire extinguishers in the workshop so as to avoid fire risks, after using the instrument clean properly and arrange in a good manner so that they can be well maintained, avoid entrance of children or unauthorized people in the workshop. In part (b) (ii), majority of the candidates also failed to explain the use of fire extinguisher in the farm workshop. The response from one of the candidates was: used to help shutting down fire in case fire burning when occurred in the workshop. Few candidates in this group managed to explain the use of fire extinguisher in the farm workshop. In part (c), the candidates also failed to account for the factors to be considered when siting a farm workshop. The candidates gave incorrect responses like; site or position selection, height, length, width, facilities, availability of materials. The responses provided by the candidates signify lack of knowledge on the area of farm workshop. Extract 1.2.2 exemplifies poor responses from one of the candidates in question 2.
Gear box is used to stop the machine during farm operations.
- Gear
- Appen
- Tractor gear
- Planter gear

5. Three main safety precautions to be considered in farm workshop are:
   Do not test the sharpness of the tool or equipment by using free hands; this is because some tools are very sharp hence they cause injury.
   Do not sit in the workshop, this is because injury may occur when some tools are not well arranged hence it can get or cause accidents.
   Do not smoke near the tools and equipment and other properties which catch fire, this is because fire and break may occur in the workshop hence may cause destruction of farm workshop and other properties.

ii) Use of fire extinguisher in the farm workshop is to prevent destruction of properties when fire and break occur. Fire extinguisher is used to prevent fire hazards.

6. To account for six factors to consider when setting a farm workshop:
   i) Availability of materials, these are materials used
The extract shows a sample of a poor response from a candidate who provided incorrect responses in almost all parts except part (b)(ii).

### 2.1.3 Question 3: Farm Structures

This question comprised of four parts, namely (a), (b), (c) and (d) carrying 20 marks. The candidates were required to: (a) differentiate (i) concrete block and mud brick (ii) concrete and mortar (iii) foundation and footing (b) briefly explain three factors influencing the design of farm structures (c) enumerate six features of a good storage structure (d) suggest five farm structures and for each give its importance to farmers.

The question was attempted by 578 (87%) candidates, in which, 36 (6.2%) scored from 0 to 6.5 marks, 230 (39.8%) scored from 7 to 11.5 marks and 312 (54%) scored from 12 to 20 marks. This signifies a good performance because 542 (93.8%) candidates scored from 7 to 20 marks. Candidates’ scores are shown in Figure 1.3.
The analysis show that majority of the candidates had good performance because they provided correct responses in almost all parts of the question. In part (a), most of the candidates were able to differentiate the parameters given in (i), (ii) and (iii). In part (b), the candidates managed to explain the factors influencing the design of farm structures. The candidates correctly enumerated features of a good storage structure and also suggested well farm structures and their importance to farmers in part (c). This shows that the candidates were knowledgeable on farm structures. Extract 1.3.1 indicates one of the candidate’s good responses in question 3.
(i) Concrete block is a hard block material which is made by using concrete which contain aggregate aggregates and cement.

While

Mud brick is the one material which formed by using mud and soil

(ii) Concrete is the mixture of sand and soil with aggregates (small stones) which form hard concrete structure.

While

Mortar is the material which used to form bond between two or more substances. Example in building some form of thing like houses, we use soil as mortar.

(iii) Foundation is the part which support superstructure building.

While

Footing is the lowest part of the foundation.

(b) The following are the factors which influence the design of the farm structure:

1. The intended use of the structure; the farmer should build a certain structure according to the needs of the designed structure.

2. The prevailing natural conditions like precipitation, temperature, and sun. The farmer should look the natural conditions when constructing the farm structures which later can help for the farm business.
(b) (iii) The economical ability of the farmer, also
    if the farmer has low capital can not force
    to construct the structures which need high
    expensive.

C. The following are the features of good storage
    structure
    (i) It must be able to protect moisture content
    (ii) It must protect pests and other
        organisms which can cause damage
        to the farm products.
    (iii) A good storage structure should be able
        to protect direct contact with to the
        machines like tractors and full tank and
        flammable liquids.
    (iv) It must be able prevent from theft
        and loss of tools in the farm
    (v) It must be able to protect from the
        dust and other unhygienic produce
    (vi) It must be constructed with a hard
        wall especially concrete wall.

(d) (i) Spray pole structure
    — help in controlling external parasites.
    — like ticks

(ii) Fish pond structure
    — help the farmer to keep the fishes hence
    provide food to the farmer and increase
    the farmer income when selling them.

(ii) Fence structure
    — This help to minimize the chance of
Extract 1.3.1
This is a sample of the responses from one of the candidate who provided correct responses to all parts of the question.

The analysis indicates further that, some candidates performed poorly in this question. Their poor performance was attributed to candidates’ inability to provide correct responses to most parts of the question. In part (a) (i), the candidates failed to differentiate between concrete block and mud brick by providing incorrect responses like: concrete block is the block that is made up by sand, gravel, and cement while mud brick is the blocks formed by the combination of soil (clay) and water, (ii) concrete is the mixture of different materials like sand, cement, and water to form stone concrete while, mortar is the tools used during the mix of cement and then to smoothing the house (iii) foundation is the structure which give ventilation hence control air and wind movement while footing is the process of measuring the length of the angles within the roof. In part (b), the candidates failed to provide correct responses on the factors influencing the design of farm structures and gave incorrect responses like; roofing structure, wall materials, climate. Likewise, in part (c), majority of the candidates incorrectly enumerated features of a good storage structure. Examples of incorrectly responses from one of the candidates were strength of the structure, stability of the material, conductance capability, fire resistance, durability of structure. Majority of the candidates in this group also failed to suggest farm structures and give their importance to the farmers in part (d). For examples one of the candidate responded: foundation, wall and roof. Only few candidates attempted correctly this part. The candidates who performed poorly in this question had inadequate knowledge on the theoretical aspects and poor practical experience on farm
structures. Extract 1.3.2 is a sample of poor responses from one of the candidates in question 3.

2) To differentiate between the following:
   i) Concrete block and mud brick.
      Concrete block is the block that is made up by the components of concrete like sand, gravel and cement.
      While mud block is the block formed by the combination of soil (clay) and water.
   ii) Concrete. Is the material formed by sand, cement and gravel.
      While

3) Mortar — is the combination of water and cement. Attached to the wall of the roof.

3i) Foundation — is the structure which give ventilation hence control the wind movement.
      While footing — is the process of measuring the length of the angles within the roof.

3ii) Three factors influencing design of every structure:
      Size of the farm: When designing a farm structure the size of the farm must be included that the size of the farm must be large enough to avoid interaction among farmers.
      Availability of materials: When designing a farm structure there must be the availability of materials that are used in the construction of farm structures.
      Hence there must be good infrastructure.
      Availability of skilled personnel: When the farmer design the good farm structure there must be the presence of skilled person in order to construct the buildings which are strong without any weakness due to technical knowledge.
Excerpt 1.3.2

The extract shows a sample of poor response from the candidate who provided incorrect responses to almost all parts except in part (a) (ii).

2.1.4 Question 4: Farm Mechanization and Machinery

The question comprised of four parts: (a), (b), (c) and (d) carrying 20 marks. The candidates were required to: (a) compare a seed drill with a planter (b) briefly explain seven functions of the seed drill components, (c) elaborate four functions of double mouldboard plough and (d) briefly describe the mode of operation performed by a combine harvester.

The question was attempted by 54 (8.1%) candidates only, in which 25 (46.3%) scored from 0 to 6.5 marks and 29 (53.7%) scored from 7 to 11.5 marks. The analysis shows that the general performance was average because 29 (53.7%)
candidates scored from 7 to 11.5 marks. Distribution of candidates’ scores is shown in Figure 1.4

![Bar chart showing candidate percentage distribution with bars for Weak, Average, and Good scores at 46.30%, 53.70%, and 3.00% respectively.]

**Figure 1.4: Candidates’ Performance on Question 4**

In this question most of the candidates had average performance because they provided correct responses in parts (a), (b) and (c), but failed in part (d). In part (a), the candidates were able to compare seed drill with planter as the question demanded. In part (b), the candidates managed to explain functions of the seed drill components, although majority were not able to exhaust all the points. In part (c), the candidates correctly elaborated the functions of double mouldboard plough. However, majority of the candidates failed to describe the mode of operation performed by a combine harvester. Some of the candidates explained the functions of other harvesting machines instead of a combine harvester. Some of the candidates explained the functions of other harvesting machines. The responses given by the candidates justify the fact that the candidates had inadequate knowledge and lack adequate practical skills in most of the farm implements. Extract 1.4.1 is one of the candidates’ good responses in question 4.
Extract 1.4.1
This is a sample of the responses from the candidate who provided correct responses in parts (b) and (c) and correctly responded to some parts of (a) and (d).

The candidates who performed poorly in this question were unable to provide correct responses to most of the parts in the question. In part (a), the candidates failed to compare seed drill with a planter by providing incorrect responses like; seed drill is the machine which sowing seed through dropping seed in the continuous furrow and covered while planter is the machine which involve
seedling not seed example of planter is paddy planter. In part (b), most of the candidates failed to give explanations on functions of the seed drill components. Examples of incorrect responses given were such as used to deliver the seed, used to meter out the seed, used to ensure the correct amount of seed if being placed in a particular hole, used to carry the seed used to atomize the seed. Likewise in part (c), the candidates failed to elaborate functions of double mouldboard plough by providing incorrect responses like; it is used for losing strength of the soil, it is used for burning grasses and other materials, it is used for pulverizing soil slice, it is used for leveling aggregates and pads. In part (d), the candidates also did not manage to describe the mode of operation performed by a combined harvester. Instead of describing the operations of the machinery, most of the candidates outlined the use of machinery such as the combine harvester is the machine which is used to harvest the cereal crops, after harvesting it process the crop to reduce the bulkiness of the crop for easy storage, it is also used for planting crops in the field. The responses from the candidates imply that they lacked knowledge and practical exposure on farm implements, as shown in extract 1.4.2 in question 4.
Extract 1.4.2

This is a sample of poor responses from one of the candidates. The candidate provided incorrect responses in all parts of the question.

2.1.5 Question 5: Introduction to Irrigation

The question comprised of three parts, that is (a), (b) and (c) carrying 20 marks. The candidates were required to: (a) enumerate three equipment used to carry out overhead irrigation at the home garden (b) explain the following surface irrigation methods (i) free flooding (ii) checks (iii) boarders (iv) basin (v) furrow and (c) outline seven factors to be considered when operating sprinkler irrigation system.

The question was attempted by 492 (74.1%) candidates, in which 183 (37.2%) scored from 0 to 6.5 marks, 226 (45.9%) scored from 7 to 11.5 marks and 83 (16.9%) scored from 12 to 17 marks. The analysis shows that the candidates performed well because 309 (62.8%) candidates scored from 7 to 17 marks. Figure 1.5 shows the distribution of the candidates’ scores.
Figure 1.5 illustrates that candidates’ performance was good. Most of the candidates who had good performance attempted correctly most parts of the question. The candidates managed to enumerate equipment used to carry out overhead irrigation at the home garden in part (a). In part (b), the candidates were also able to explain the named surface irrigation methods. Most of the candidates in this group correctly outlined factors to be considered when operating sprinkler irrigation system in part (c). However, some candidates provided incorrect responses such as availability of labour, type of soil, topography of the area, type of crop, an area which is easily eroded by water, an area with even topography as the factors to be considered when operating sprinkler irrigation system. Generally, the candidates had good mastery of various irrigation methods and systems. Extract 1.5.1 exemplify good responses from one of the candidates in question 5.
### (a) Watering cans

There are containers having a handle with a small sized perforation which are used to water plants in small scale, such as garden trees surrounding the home. Watering is done at the top of plants or water flows from the watering cans facing downward through the perforations.

- **(ii) Sprinklers** (small sized sprinklers), are used in large scale where large amount is required, since at home little amount is required for irrigation. These small sized sprinklers are used for overhead irrigation.

- **(iii) Perforated containers** (sometimes perforated containers made up of plastics and metals are placed above the plants and water is placed on them so that once flow downward through the holes in form of drops like rainfall.

### (b) Free flooding

Free flooding is a type of surface irrigation in which water from the source is directed to the farm directly without any control. Free flooding is mostly done on paddy and rice fields. The level of water in a farm is controlled by opening and closing flow of water from the source by creating barriers.

- **(ii) Checks**: These are barriers which are built alongside the water channels as water move from the source to the field during irrigation to prevent water seepage to unrequired land. The checks may be made of concrete, stones or bricks.

- **(iii) Boarders**: These are demarcation which separate between one irrigation pathway and another. These are normally applied to surface irrigation, especially in
Extract 1.5.1

The extract represents good responses in the question. The candidate attempted well almost all parts of the question except in part (c) where he/she missed one of the points.

The analysis indicates further that some candidates performed poorly in the question. In part (a), the candidates failed to enumerate the equipment used to carry out overhead irrigation at the home garden. Some of the incorrect responses provided in this part were tank- for carry or store the water for irrigation, lift pump- this help to push the water or to apply water into the garden, nozzles- this help the water to be applied in pressure form in the garden. In part (b), the candidates were not able to explain the named surface irrigation methods and provided incorrect responses. For example checks- this is the method of the surface irrigation whereby water is allowed to flow in the entire area of the field, boarders- this is the irrigation which take place between the row of the plant and

| (v) | Basin irrigation. This is a method of surface irrigation in which water from the source is supplied to the field whereby the level of water in a field is controlled by side barriers called dikes. After a certain level of water has been supplied, the source may be ceased. Water is confined only in eastern part of the farm by the dikes. |
| (vi) | Furrow irrigation. This is the irrigation method in which channel for delivering water from the source to the farm are dug. Therefore the canals/water channels are used to supply water to the field either directly or may be carried by containers from the furrow canal to the field crop plant. |
| (c) | Factors to be considered when operating sprinkler irrigation system: |
| | (a) The direction of prevailing wind; sprinkler irrigation must be done during the periods of absence of prevailing wind because prevailing wind lead to water loss through drift. |
| | (b) The pumping pressure of water must be checked; the pressure of water determine the speed of reduction of sprinkler, therefore the supplied water must have a reasonable pressure for proper spraying of water by a sprinkler. |
| | (c) Enough water must be supplied to the sprinkler so as to generate large pressure for rotating sprinkler and hence spraying of water more efficiently. |
another row in the farm, furrow- this is the irrigation system which applied into the surface of the soil by using sprinkler methods. Moreover, in part (c), the candidates also failed to outline factors to be considered when operating sprinkler irrigation system and provided incorrect responses as the type of crop to be irrigated, the soil depth, consider topography of the place, skilled labour for repair and connecting leakage system, soil physical properties, total cost of running program, capital available. Poor responses given by the candidates indicate insufficient knowledge and skills on irrigation methods and systems. Extract 1.5.2 portrays a sample of poor responses in the question.

| Equipment used to carry out overhead irrigation at the home garden: |
|---|---|
| i/ Source of water (darn) |
| ii/ Lateral |
| iii/ Pump |

| (p) i/ Exea flooding: |
|---|---|
| n is the type of irrigation which apply for allowing water stream the water source and leaves free above the exit on the soil: |
| ii/ Checks: |
| ii/ Boarders |
| iii/ Basin |
| n is the method of surface irrigation which allow water on the soil from the water source such as darn |
| v/ Furrow |
| n is the method of surface irrigation which make leaching on the ground around the leaves of the crops and allow water to pass through |

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2.1.6 Question 6: Introduction to Soil Science

The question consisted of four parts; (a), (b), (c) and (d) carrying 20 marks. The candidates were required to: (a) define the term weathering as used in soil formation (b) briefly explain two types of rock weathering and show how they relate to each other (c) explain the four main agents of weathering work on rocks (d) give one chemical equation in each case, explain any five processes involved in chemical weathering of rocks.

The question was attempted by 326 (49.1%) candidates, of which 161 (49.4%) scored from 1 to 6.5 marks, 161 (49.4%) scored from 7 to 11.5 marks and only 4 (1.2%) scored from 12 to 13 marks. Generally, the performance was average because 165 (50.6%) candidates scored from 7 to 13 marks. Candidates’ scores are shown in Figure 1.6.
The analysis indicates that although most candidates’ performance was average, some few candidates had good performance in this question. The candidates were able to provide correct responses in almost all parts of the question. In part (a) the candidates correctly defined the term weathering and managed to explain the types of weathering in part (b). However, the candidates failed to give the relationship of the two types of weathering in part (b). In part (c), the candidates were also able to explain how the agents of weathering work in rocks. In addition, the candidates managed to explain the processes in chemical weathering but failed to give the associated chemical equations for the processes. In general, the candidates seemed to possess good understanding of the process of weathering. Extract 1.6.1 is a sample of responses from a candidate who did well in question 6.
### Weathering

- **Chemical Weathering**
  - This is a type of weathering where the rock particle is broken down as a result of chemical reaction.
  - Example: Some rocks produce Carbonic acid which reacts with water forming Carbonic acid solution of acid, thus disintegrates the soil particles held together.
  - Also, carbonic acid (from acid rain) may reach the rock surface and disintegrate.

- **Mechanical Weathering**
  - This is a physical disintegration of the rock particle.
  - It may be caused by vibration, movement of living organisms, or mass wasting and also alternate freezing and wetting.
  - It involves abrasion, exfoliation (peeling off the rock particle due to expansion and contraction during the day and night).

<table>
<thead>
<tr>
<th>Relationship Between Mechanical and Chemical Weathering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical weathering weakens the rock particles by breaking or rounding with the rocks forming weak aggregates, hence exposing the rock easily to mechanical weathering.</td>
</tr>
<tr>
<td>Chemically weakened rock, therefore, is easily broken down by water, wind, mass wasting, and other mechanical agents.</td>
</tr>
</tbody>
</table>
Living organisms:
- The activities of burrowing animals, like earthworms, result in breaking down of soil (weathering).
- Movement of large herds of animals, people, as well as heavy vehicles, influences weathering of the soil mechanically.
- Plant roots penetrate the soil, thereby breaking rock particles, and also they produce carbon dioxide from root respiration which dissolves in soil forming acidic solution which exposes soil to chemical weathering.

Water:
- Moving water causes mechanical breakdown of rock particles of the soil.
- Acid rainrooms the acidic solution of weak carbonic acid which reaches the rock and weakens it by making it unstable and vulnerable to mechanical weathering.
- Water is also involved in processes like solution, hydration and hydrolysis of rock particles.

Wind:
- Fast moving air sweeps away rock particles gradually, particularly dry sandy rocks, after a considerable period of time, mechanical weathering has occurred on the rock particle.

Temperature:
- Rise and fall of temperature that is alternately heating and cooling of the soil causes the rock particle to become unstable and vulnerable to
6C) Mechanical weathering.
- Alternate drying and contraction and expansion also cause exfoliation (peeling off of rock particles due to contraction and expansion of rock during day and night).

6D) Redox process.
- The process involves oxidation and reduction processes on the rock particles. Alternate changes in oxidation states of an element forming rock cause a rock to become unstable and exposed to mechanical weathering.
- It is common in soil (rocks) formed by trampling.

\[
\text{Fe}^{3+} \xrightarrow{\text{oxidation}} \text{Fe}^{2+} \xrightarrow{\text{reduction}} \text{Fe}^{3+}
\]

Unstable Stable

6E) Solution processes.
- In this process, water acts as a solvent where water dissolves a rock particle forming solution.
- It is common to soluble rocks which form solutions with water thereby becoming unstable.

Example:

\[
\text{H}_2\text{O} + \text{Na}_2\text{CO}_3 \rightarrow \text{Na}_2\text{CO}_3 + 2\text{H}_2\text{O}
\]

Solution.

6F) Hydration process.
- In this process, water reacts with a rock particle, forming a hydrated compound. Some rocks-
Extract 1.6.1

This is a sample of good responses from a candidate who gave correct responses in almost all parts.

The candidates who had poor performance provided incorrect responses in most parts of the question. In part (a), the candidates failed to define the term weathering. An example of incorrect response given by one of the candidate was weathering is the process in which the soil either by chemical or physically are broken down into small particles by which can be deposited to form the soil. Consequently, in part (b) the candidates also failed to give explanation of the two types of rock weathering and their relationship. Some of the incorrect responses
provided were indigenous rock: is the type of rock whereby the natural rock disintegrate to each other due to the presence of higher temperature or pressure to form soil particles. Sedimentary rock is the type of rock which formed when the rock undergoes exfoliation and disintegration. In part (c), some candidates in this group managed to name few agents of weathering but failed to explain how they work in rocks. Other candidates provided incorrect responses such as land, labour, capital and entrepreneurship.

In part (d), which required the candidate to explain five processes involved in chemical weathering of rocks, the candidates, provided incorrect responses as flocculation is the breaking down of parent rock by using chemicals on reaction between calcium carbonate and water. \[ \text{CaCO}_3 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{CO}_3 + \text{Ca(OH)}_2 \]
exfoliation refers to the process in which large particle disintegrate into smaller particles to form soil. \[ \text{Fe}_2\text{SO}_4 + \text{H}_2\text{O} \rightarrow \text{Fe}^{3+} + \text{SO}_4^{2-} \]
Abration refers to the process of weathering to form a soil under reduction process. \[ 2\text{CuS} \rightarrow \text{Cu}_2\text{O} \]
Carboxylation; this is the process whereby the carbondioxide is added to the rocks containing the mineral elements that react with it and cause weathering, Crystallization is the process which involve the crystallization of rocks. Inability to provide correct responses in most parts of the question signify inadequate knowledge on weathering process. Extract 1.6.2 illustrates candidate’s poor responses in the question.
by primary weathering - the natural physical breaking down of particles from large particles to small particles exemplifying these physical weathering are: crystal growth, and thermoexpansion.

Secondary weathering
the natural chemical breaking down of large particles into small particles example of chemical weathering are:
- 
- hydration
- hydration
   This is among the main agents of weathering and
   rock decomposition. The stronger the strength of the soil aggregates,
   the larger the surface area and break down into smaller
   particles but when the strength of the soil aggregates is
   weak it would be very difficult also in breaking do
   wn of large particles into smaller particles due to the
   large size of the strength. The soil aggregates may take
   time to start to be broken down into small parti
   cles.

7. Temperature
   Temperature is the other mechanism of degradation.
   When there is higher temperature the soil aggregates dis
   sassociate into smaller particles compare to the time
   where there is low temperature it would take time
   for the soil aggregates to breakdown into small
   particles. Although the temperature the higher the
   higher breakdown of large particles into sma
   ll particles and vice versa.

Bacterial: Bacteria is one of th
   main agents of weathering work on rocks
   Bacteria acts may lead to breakdown of larg
   e particles into smaller particles. This is where the
   bacteria help to extract the soil aggregates break
   down into large particles into smaller particl
The extract represents one of the poor responses in which the candidate gave incorrect responses in most parts of the question except in part (a).

2.1.7 Question 7: Introduction to Soil Chemistry

The question consisted of three parts, namely (a), (b) and (c) carrying 20 marks. The candidates were required to: (a) explain five factors affecting composition of farmyard manure. (b) briefly explain the following terminologies as used in fertilizer application: (i) fertilizer (ii) fertilizer analysis (iii) fertilizer grade (iv) fertilizer ratio and (c) outline any six function of essential plant nutrients.

The question was attempted by 337 (50.8%) candidates, in which 198 (58.8%) scored from 0 to 6.5 marks, 126 (37.3%) scored from 7 to 11.5 marks and 13 (3.9%) scored from 12 to 18.5 marks. The general performance in the question was average, because 139 (41.2%) candidates scored from 7 to 18.5 marks. The candidates’ scores are summarized in Figure 1.7.
As per Figure 1.7, the general performance of the candidates in question was average. Most of the candidates who had good performance provided correct responses in most parts of the question. In part (a) the candidates managed to explain the factors affecting composition of farm yard manure. In part (b), the candidates attempted well items (i) and (ii) but failed to explain terminologies in items (iii) and (iv). Examples of incorrect responses for the terminologies were (iii) fertilizer grade: this is the quality of fertilizers synthesized and applied to the farm, fertilizer grade refer to the content that fertilizer contain, (iv) fertilizer ratio is the relative proportional of element and nutrients in which the fertilizer composed, fertilizer ratio: this is the amount of fertilizers used per land cultivated (hectre). The candidates responded correctly on the functions of essential plant nutrients in part (c). The analysis of their performance suggests that the candidates were knowledgeable enough on plant nutrition. Extract 1.7.1 shows responses from one of the candidates with good performance in question 7.
(a) Five factors affecting composition of farmyard manure:

Farmyard Manure: A type of manure from farm animals and its waste like litter and feed remains.

(i) Type of Animal:
- Composition of farmyard manure depends on type of animal rests content, quantity. Manure is very nutrient to its composition is high relative to the pig farmyard.

(ii) Age of Animal:
- Adult animal composition is high than that of calf. Composition in adult is high due to its supplement. In ruminant feed is much acted by bacteria hence contain more extra nutrients but calf has not well developed rumen, but also adult has high digestibility.

(iii) Litter material used:
- Also composition of farmyard depends on litter material that are used in protection and the hay used here. Some litters enter nutrients and have high absorptive and highly decomposed but farmyard will contain high composition of nutrients.

(iv) Feed eaten by an animal:
- Also feed determines the nutrient content of farmyard material. If the animal eat nothing feeds like concentrates, legumes, manure will be high composition.
7. (v) Digestibility of an animal:
- Different animals have different digestibility.
  Some have high digestibility while others have low or little digestibility. So if the animal feeds well digested it means that marine waste that comes out will contain less compositional nutrient rather than that with low digestibility.

3. Fertilizer: This is an inorganic substance (made from industry which contain variety nutrient in correct proportion and ratio for proper growth of plants) like urea, CN, DAP, TSP, NPK, JS.

4. (ii) Fertilizer analysis: It's a process of analysis composition of a fertilizer by looking ratio of nutrients it contain.

3. (iii) Fertilizer grade: It is a rating of fertilizer in graded according to quantity and quality of components it contain.


5. Function of essential plant materials:
   (v) Thy acid in transcription of food within the plant from one cell to another or from one tissue to another.
This is a sample of good responses from a candidate who gave correct responses in most parts, except that he/she failed to provide correct responses in part (a).

The candidates who performed poorly in this question failed to respond correctly to almost all parts of the question. The candidates could not provide correct responses on the factors affecting the composition of farm yard manure in part (a). Some of incorrect responses provided were as preparation method- the farm yard manure is affected by the method used for its preparations, climatic condition-conditions such as rainfall and very dry condition affects the composition of farm yard manure, black colour- the rate of decomposition is determined by the black colour due to absorption of heat, residual- presence of residual increase composition of manure, while absence lowers the composition of manure. In part (b), the candidates failed to provide correct explanations on the named terminologies, as shown in; (i) fertilizer; this is the substance added to the plant which increase one or more nutrients. (ii) fertilizer analysis is the process of determining the different types of fertilizer, is the evaluation of fertilizer to know
its productivity and efficiency. (iii) fertilizer grade refer to the content that a fertilizer contain, (iv) fertilizer ratio is the relative proportional of element and nutrients in which the fertilizer composed. In part (c), the candidates were also unable to outline the functions of the essential plant nutrients by giving incorrect responses like; ensure supply of ions to the plants, reduce the effect of plant deficiency during production, improve the structure of the soil, they are used in seed germination, to avoid deterioration and ensure production of high yield. The incorrect responses provided by the candidates in this question shows that the candidates had insufficient knowledge on plant nutrition. Extract 1.7.2 shows responses from one of the candidates with poor performance in question 7.
This is an example of poor responses from the candidate who failed to give correct responses to all parts of the question. The candidate showed the lack of knowledge on plant nutrition.
2.1.8 Question 8: Agricultural Production Economics

The question comprised of three parts; (a), (b) and (c) carrying 20 marks. The candidates were required to: (a) study the given curves of different product - product relationships and describe the relationships between (i) $Y_1$ and $Y_2$, (ii) $Y_3$ and $Y_4$, (iii) $Y_5$ and $Y_6$, (iv) $Y_7$ and $Y_8$, (b) give the meaning of the following as used in production economics (i) production function (ii) total products (iii) average product (iv) marginal product and (c) briefly explain two characteristics of each of the three regions of the production functions.

The question was attempted by 477 (71.8%) candidates, among which 109 (22.9%) scored from 0 to 6.5 marks, 213 (44.6%) scored from 7 to 11.5 marks and 155 (32.5%) scored from 12 to 18.5 marks. The analysis suggests that the general performance was good because 368 (77.1%) candidates scored from 7 to 18.5 marks. Figure 1.8 shows the distribution of the candidates’ scores.

\[\begin{array}{ccc}
\text{Candidate Percentage} & 100.00 & 90.00 \\
\text{WEAK} & 22.90 & \\
\text{AVERAGE} & 44.60 & \\
\text{GOOD} & 32.50 & \\
\end{array}\]

**Figure 1.8: Candidates’ Performance on Question 8**

In view of Figure 1.8, the general performance of the candidates in the question was good. The candidates who did well in the question attempted correctly most parts of the question. In part (a), the candidates managed to describe the product-product relationships given. Likewise, in part (b) the candidates were also able to give the meaning of the named parameters. In part (c), the candidates were able to explain the characteristics of the three regions in production function though not exhaustful. Their performance is an evidence that the candidates had good
understanding of the topic on production economics. Extract 1.8.1 indicates one of the candidates’ good responses in question 8.

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(1) \( y_1 \) and \( y_2 \), the relationship is 
Complementary relationship this is the relationship 
between two products in the case A product \( y_1 \) and \( y_2 \) where by the increase of one product 
cause cause the increase of another product

(2) \( y_1 \) and \( y_2 \) the relationship is called 
Product relationship where by when one product 
(\( y_1 \)) increase the other product (\( y_2 \)) 
remain fixed or value

(3) \( y_3 \) and \( y_4 \) these are competitive products 
where by the increase of one product (\( y_4 \)) 
cause the decrease of another product (\( y_3 \))

(4) \( y_5 \) and \( y_6 \) these are complementary products 
this is where by when production of one product 
(\( y_5 \)) increase or decrease cause the production 
of another also to increase or decrease

(5) \( y_3 \) and \( y_5 \) these are supplementary products 
that is where by when the production of one product 
increase (\( y_3 \)) does not affect the production of 
another products (\( y_5 \))

(6) Production Function is the physical relationship 
between the input used in production and the 
cutput produced &

(7) Real productivity refers to the total or sum of 
all products in the farm.
Extract 1.8.1

This is a sample of good responses whereby the candidate provided correct responses in most parts of the question except in part (b) (iii) and (b) (iv).

It was noted further that the candidates who performed poorly provided incorrect responses in most parts of the question. In part (a), the candidates failed to describe the product-product relationships given in the curves. Some of the candidates described the types of elasticity instead of product-product relationships. Moreover, the candidates failed to give the meaning of the given parameters and provided incorrect responses such as (i) production function is product obtained from the farm output, is the type of product to produce goods
and services on the production function, is the type of production which involves
the production of the economic, (ii) total product is the sum of output produced
(iii) average product is the marginal product per total product, average product
is the product obtained when the farm sells farm products, (iv) marginal product
is the change of product over the change of demand, is the change in total
product over total product, is the marginal product per total product, marginal
product is the product obtained when the farm sells products to the farmer
boundaries. In part (c), few of the candidates managed to give the characteristics
of either region I or region III, while majority failed to explain the characteristics
required. Examples of incorrect responses given were: land function, labour
function and market function. Regions of production function; Total product-it
determine the total whole product, it determine the total whole value of inputs,
Marginal product-it determine the value of output if decrease or increase,
Average product-it determine the difference between the value of output and the
value of input, it determine the amount of product produced. This is an indication
that the candidates had insufficient knowledge on production economics. Extract
1.8.2 shows one of the candidates’ poor responses in question 8.
1.8.2 The extract is a sample of poor responses from one of the candidate who provided incorrect responses in all parts of the question due to lack of knowledge on production economics.

2.1.9 Question 9: Introduction to Agricultural Prices

The question consisted parts (a), (b) and (c) carrying 20 marks. The candidates were required to: (a) (i) give the meaning of the term oligopoly (ii) give four characteristics of oligopoly market condition (b) briefly describe the following functions of marketing: (i) standardization (ii) financing (iii) risk bearing (iv) market intelligence (v) price setting and (c) give the difference between black market and open market.

The question was attempted by 186 (28%) candidates, in which 70 (37.6%) scored from 1 to 6.5 marks, 88 (47.3%) scored from 7 to 11.5 marks and 28 (15.1%) scored from 12 to 18 marks. The general performance in this question
was good because 116 (62.4%) candidates scored from 7 to 18 marks. Distribution of the candidates’ scores is summarized in Figure 1.9.

![Pie Chart](chart.png)

**Figure 1.9: Candidates’ Performance on Question 9**

The analysis shows that majority of the candidates performed well in this question. In part (a) most of the candidates were able to give the meaning of the term oligopoly and its characteristics. However, some few candidates provided incorrect responses such as oligopoly *is the situation whereby there is a large number of firm at a particular area in order to increase the production*, oligopoly *is the type of market whereby there is only one seller in the market and many buyers in this there is less competition since there is only one seller* in part (a) (i) and *no competition in the market, higher cost of goods for buyer, seller get enough profit since she/he is dominant market, no fair and free exchange, interdependence, investment barriers, barriers of entry or exit, presence of transport cost* in part (a) (ii) for the characteristics of oligopoly market conditions. It was also noted that the candidates who performed well were able to describe the named marketing functions and correctly gave the difference between black market and open market in parts (b) and (c) respectively. Responses provided by the candidates show their good mastery on the area of agricultural marketing. Extract 1.9.1 exemplifies good responses from one of the candidates in question 9.
Oligopoly - This is the type of market for agricultural products characterized by small number of firms which sell substantial share of the total output.

In oligopoly, the sellers must sell their products at identical prices so as to remain in the business. If a seller set a higher price, he will not sell anything but if the seller set a price that is lower than what other sellers charges, all of his product will be bought but he is likely to incur losses.

(iii) Characteristics of Oligopoly market condition

There are several sellers selling a similar products.

- The number of firms is so small that each firm sell a substantial share of the total output.

- When one seller changes price and output, it affects the sales of his competitors.

- Rival sellers depend upon each other in formulating price and output policies. That is, each seller set price and output levels of his product after studying carefully the price and output levels of other producers.
(ii) Standardization
- This is the process of producing crops of quality required by the market.
- It means demands of good quality product processed by manufacturers and processors.
- Standardization involves preservation of the product which is constantly available to consumers throughout the year.

(iii) Financing
- The marketing involves many operations: growing, buying and selling, transportation and storage. The marketing institutions must bear the costs of running these operations.
- The institutions must also keep financial accounts of the business transaction involved in the marketing process and liaise with organized market process in order to ensure a smooth flow of goods from the producers to consumers.

(iv) Risk bearing
- The handling of agricultural goods is risky; they may be stolen, they may catch fire, they may be destroyed by rodents or insects. This means that handling of agricultural crop goods is risky. The marketing institution must bear all risks in order to minimize the risks.

(v) Marketing intelligence
- This means needs human skills to operate, grading, improving products quality, and price and customer handling and management.
This is a sample of response from the candidate who performed well in all parts of the question except in part (b) where he/she provided weak responses.

The candidates with poor performance had almost all parts of the question incorrectly attempted. In part (a) (i), the candidates failed to give correct meaning of the term oligopoly. An example of incorrect response from one of the candidates was oligopoly is the marketing condition in which there is interaction between the buyers and sellers within the same marketing condition. Similarly, in part (a) (ii) the candidates failed to give characteristics of oligopoly market condition by giving incorrect responses like; no competition in the market, higher cost goods for buyer, seller get enough profit since she/he is dominant market. In part (b), the candidates also did not managed to describe the given marketing functions. Examples of incorrect responses provided were standardization as the equalization of the commodity or price at a reasonable factor in the marketing, financing- include marketing product to be free from unnecessary costs like transport cost by financing taxes, risk bearing- is the situation whereby the market manager is taking about the problems occur even though the cause of the problem is not exactly known, marketing intelligence- is the situation in which all the process involved in the market are controlled well without causing any effect on the production process. In part (c), the candidates were unable to give the
difference between black market and open market. Most of them managed to provide the definition of the two types of markets instead of differentiating them. This group of candidates proved to possess inadequate knowledge on agricultural marketing. Extract 1.9.2 indicates poor responses from one of the candidates in question 9.

Extract 1.9.2
This is a sample of responses from a candidate who performed poorly in question. The candidate only managed to provide one correct response in part (b) (v).
2.2 134/2 AGRICULTURE 2

2.2.1 Question 1: Plant Breeding

This question comprised of two parts: (a) and (b) carrying 20 marks. The candidates were required to: (a) write a brief account on eight advantages and four disadvantages of using pedigree method of plant breeding and (b) outline the general procedures which are used in developing crop varieties by mass selection.

The question was attempted by 85 (12.8%) candidates, of which, 74 (87.1%) scored from 0 to 6 marks, 10 (11.7%) scored from 7 to 11.5 marks and only one (1.2%) scored 13 marks. The general performance was poor because 11 (12.9%) candidates scored from 7 to 13 marks. Figure 2.1 shows the distribution of the candidates’ scores.

![Figure 2.1: Candidates’ Performance on Question 1](image)

The analysis has revealed that the candidates with poor performance in this question provided incorrect responses in both part of the question. In part (a), the candidates failed to give the advantages and disadvantages of pedigree method in plant breeding. Most of the candidates failed to meet the demand of the question by giving the advantages and disadvantages of breeding in general, instead of those for pedigree method. In part (b), the candidates also failed to outline the general procedures which are used in developing crop varieties by mass selection. Examples of the incorrect responses provided by candidates were *produce plants which are resistant to pests and diseases, produce plants with high productivity*. 


The responses given by this group of candidates show that the candidates had inadequate knowledge on plant breeding. Extract 2.1.1 is an example of candidate’s poor responses in question 1.

<table>
<thead>
<tr>
<th>1</th>
<th>Pedigree method - 1st</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a</td>
<td>Pedigree method is the type of breeding system method in which selection of individual organisms for the future generation is based on the common ancestors. The following are the advantages and disadvantages of pedigree method of plant breeding.</td>
</tr>
<tr>
<td>1b</td>
<td><strong>Advantages of using Pedigree method of Plant breeding:</strong></td>
</tr>
<tr>
<td>1c</td>
<td>→ It helps in producing production of high quality and quantity since its selection is based on the performance of common ancestors with good performance.</td>
</tr>
<tr>
<td>1d</td>
<td>→ It helps to produce products with desirable characteristics since through considering the past performance the future ones may also have the same characteristics.</td>
</tr>
<tr>
<td>1e</td>
<td>→ It provides employment to people for searching about the data of the best past ancestors performance since for pedigree method to be done to obtain a new variety research should be done first.</td>
</tr>
<tr>
<td>1f</td>
<td>→ It helps to produce a new variety that performs better than a standard variety during production.</td>
</tr>
<tr>
<td>1g</td>
<td>→ It helps to produce varieties that are resistant to pests and diseases.</td>
</tr>
<tr>
<td>1h</td>
<td>→ It helps to improve the genetic information of the plants crossed over.</td>
</tr>
<tr>
<td>1i</td>
<td>→ It helps to produce products with good resistant to harsh environmental conditions (Example: drought).</td>
</tr>
</tbody>
</table>
This is a sample of responses from a candidate who performed poorly in all parts of the question due to inadequate knowledge on plant breeding.

The candidates who performed well in this question were able to provide some responses which were relatively correct in both parts of the question. For example, candidates provided advantages and disadvantages of pedigree method and outlined procedures for developing crop varieties using mass selection in part (a) and (b), respectively. Generally, the candidates had insufficient knowledge in plant breeding. Extract 2.1.2 denotes good responses as provided by one of the candidates in question 1.
| (iii.) Pedigree method - A method of plant breeding used for self-pollinated plants in which the plants are chosen by looking the performance and records of their ancestors.

**Advantages of using Pedigree method in plant breeding:**

1. It is the method in which the inferior genotypes are eliminated through pedigree selection as breeders select individuals according to the records of their ancestors hence the desirable and superior genotypes are retained in the population.

2. It provides the genetic information that cannot be obtained from other breeding systems.

3. It provides the plant individuals that give high yield since the superior genotypes are retained and hence improve the mean production.

4. The plant individuals obtained by pedigree selection are highly adaptable to the environmental conditions such as pest concentration and droughts.

5. It provides plant individuals that are highly resistant to the crop pests, infections and diseases.

6. The plant individuals obtained by this method give a high quality product and yield.

7. Plant individuals obtained by pedigree method grow and mature easily and faster.
<table>
<thead>
<tr>
<th>1.2.1.</th>
<th>(iii). The desirable characteristics from ancestors are retained in the population.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Advantages of using pedigree method of plant breeding:</strong></td>
</tr>
<tr>
<td></td>
<td>(i). It requires more experience of plant breeding. The plant breeders who are not well trained and experienced cannot work to better in pedigree selection method.</td>
</tr>
<tr>
<td></td>
<td>(ii). It requires more labour.</td>
</tr>
<tr>
<td></td>
<td>(iii). It requires more time and effort to carry out pedigree method.</td>
</tr>
<tr>
<td></td>
<td>(iv). It is time-consuming method since it involves carefully taking of information.</td>
</tr>
</tbody>
</table>

| 1.5 | **Mass Selection:** The method of plant breeding in which the individual plants are selected by looking phenotypic make up. Therefore, the individual are phenotypically chosen. The seeds are harvested and composited to obtain the superior plant individuals. |
|     | General procedure which are used in developing crop varieties by mass selection. |
|     | **First year:** Select few to hundreds plants, harvest the seeds and compose together. |
|     | **Second year:** Grow the harvested seeds in a preliminary yield trial and compare with a standard variety as a check. |
|     | **Third year to Sixth year (3rd to 6th):** Continue with preliminary yield trials and allow adaptability to the environment. |
|     | **Seventh year:** Release variety to the farmers. |
|     | The seventh year is the last year whereby the crop varieties are multiplied in number and released to the farmers. |

**Extract 2.1.2**

The extract shows good responses from the candidate who performed well in almost all parts, except part (b).
2.2.2 Question 2: Plant Diseases

The question had three parts, namely (a), (b) and (c) carrying 20 marks. The candidates were required to (a) given the symptoms of the disease (i) give the name of the disease (ii) give the causative agent of the disease and write its scientific name (iii) suggest six cultural measures for the disease, (b) enumerate seven reasons as to why people study plant diseases and (c) briefly explain four major factors influencing the occurrence of epiphytotic diseases in the field.

The question was attempted by 171 (25.8%) candidates, in which 153 (89.5%) scored from 0 to 6.5 marks and 18 (10.5%) scored from 7 to 10 marks. The general performance in this question was poor because 18 (10.5%) candidates scored from 7 to 10 marks. The candidates’ scores are shown in Figure 2.2.

![Candidate Percentage](image)

**Figure 2.2: Candidates’ Performance on Question 2**

The analysis indicates that most parts of this question were not attempted well by majority of the candidates. In part (a), many candidates failed to identify the disease in part (a) (i) by giving the names of different diseases such as blight and mosaic, instead of Fusarium wilt consequently. Failure to identify the disease resulted into the failure to give the name of the causative agent of the disease and writing its scientific name in part (a) (ii). The candidates also did not manage to suggest the correct cultural control measures in the field, hence provided incorrect responses like burying of the crop residues, crop rotation, plant spacing and flooding. In part (b), some candidates managed to give few reasons as to why people study plant diseases. Majority of the candidates responded incorrectly by giving responses such as knowing the habitats of pathogens, to
know the right time of disease to attack crops, to get the knowledge of controlling plant disease, to stop bad beliefs e.g. witch crafts when crops are affected by the diseases, to assist people to know favorable conditions for disease occurrence. Similarly, in part (c), the candidates were unable to explain major factors influencing the occurrence of epiphytotic diseases in the field. The candidates misunderstood the meaning of epiphytotic diseases, hence provided irrelevant responses like presence of host plant, presence of pathogen, late planting. The performances of the candidates imply lack of knowledge and practical experience on plant diseases. Extract 2.2.1 illustrates one of the poor responses in question 2.

<table>
<thead>
<tr>
<th>2.</th>
<th>@ (i) Coffee berry disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ii)</td>
<td>Scientific name: Cellatirnecum kahawae</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(iii)</th>
<th>Crop rotation</th>
</tr>
</thead>
<tbody>
<tr>
<td>This is done by planting different types or families of crops in different areas of land. Each year with different plant growth.</td>
<td></td>
</tr>
</tbody>
</table>

- Early planting. The planting should be done early before the time in order to make it more resistant to disease. |

- Planting of resistant varieties. The farmer should use the resistant varieties that can tolerate the effects of pathogens. |

- Total removal of the plant species that have been affected. The affected crops should be removed from the field and burn all the remains. |

- Tillage. The field should be done with tillage to correct things soil to be down in order to break the life cycle of the pathogen.
This extract is a sample of poor responses from one of the candidates who lack knowledge and skills on plant diseases.
Most of the candidates who had average performance provided correct responses in part (b), but responded incorrectly in parts (a) and (c). In part (a) (i), the candidates failed to identify the disease while being given the symptoms. Some of the incorrect responses provided were bacterial and viral diseases. Incorrect identification of the disease caused the candidates also not to be able to identify the causative agent of the disease and suggest cultural control measures for the disease in part (a) (ii) and (a) (iii) respectively. In part (b), majority of the candidates were able to give reasons as to why people study plant diseases. Failure to define epiphytotic diseases caused the candidates to fail in explaining the major factors influencing the occurrence of epiphytotic diseases in part (c). This suggests that the candidates had insufficient knowledge on plant diseases. Extract 2.2.2 is a sample of responses from a candidate with average performance in question 2.

<table>
<thead>
<tr>
<th>2</th>
<th>(a) Coffee berry disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) Common name: Coffee berry blight</td>
<td></td>
</tr>
<tr>
<td>(ii) Scientific name: Colletotrichum kahawae</td>
<td></td>
</tr>
<tr>
<td>(iii) Cultural control measures for the disease</td>
<td></td>
</tr>
<tr>
<td>(a) Crop rotation</td>
<td></td>
</tr>
<tr>
<td>(b) Growing coffee resistant varieties</td>
<td></td>
</tr>
<tr>
<td>(c) Good field sanitation</td>
<td></td>
</tr>
<tr>
<td>(d) Observe dead leaves</td>
<td></td>
</tr>
<tr>
<td>(e) Application of manure and fertilizers</td>
<td></td>
</tr>
<tr>
<td>(f) Growing early in the season</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(b) Importance of study plant disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) Study of plant disease provide employment opportunities from the different companies and industries</td>
</tr>
<tr>
<td>(ii) Study of plant disease give us effective way of controlling different pest and disease</td>
</tr>
<tr>
<td>(iii) Study of plant disease enable the farmers to improve the quality production of crops</td>
</tr>
</tbody>
</table>
Extract 2.2.2
The extract represents responses from a candidate with average performance. The candidate provided correct responses in part (b) only.

2.2.3 Question 3: Crop Pests
This question consisted parts (a), (b) and (c) carrying 20 marks. The candidates were required to; (a) state five fundamental principles of crop protection (b) mention five effects of crop pests and (c) give the scientific names of the following storage pests (i) Lesser grain borer (ii) Common rat (iii) Warehouse moth, (iv) Red flour beetle (v) Zebrutes bruchid.
The question was attempted by 235 (35.4%) candidates, among which 93 (39.6%) scored from 0 to 6.5 marks, 85 (36.1%) scored from 7 to 11.5 marks and 57 (24.3%) scored from 12 to 17 marks. The performance was good because 142 (60.4%) candidates scored from 7 to 17 marks. Figure 2.3 shows the distribution of the candidates’ scores.

![Pie Chart]

**Figure 2.3: Candidates’ Performance on Question 3**

Candidates with good performance in this question provided correct responses in parts (a) and (b), but failed in part (c). In part (a), the candidates correctly stated the fundamental principles of crop protection and correctly mentioned the effects of crop pests in part (b). However, majority of the candidates did not managed to give the scientific names of the named pests in parts (c). In this part some candidates failed to follow the scientific rules in naming organism. The general performance indicates that candidates had good understanding in the topic on crop protection. Extract 2.3.1 indicates an example of good responses from one of the candidates in question 3.
(ii) Exclusion: Exclusion is the removal of the all pests which may cause harm to crops. It is done before they have not been yet established. Exclusion is done by removing all pests and disease causing organisms before crops have been attacked.

(iii) Avoidance: This is a technique in which the cause of disease are get rid off (Avocado). This is done by creating an unfavourable condition for the pathogen to establish. For example, early planting may be done to avoid the attack of pests such as maize stalk borer and American holworm.

(iv) Immunization: This is a principle of crop protection which involves creating immunity in the plant so that once disease causing organisms affect them, they cannot be affected. Instead, they can reset the effects. This is done by application of engineering (genetic engineering) principles or by injection of immunity.

(v) Protection: This involves the use of good methods of crop protection to keep the plant free from attack of pathogens. Protection can involve the use of chemicals or mechanical equipments before the infection has occurred to obscure the plants. For example, the use of copper based fungicides to control protect the coffee plants from coffee berry disease at the season prior to rain season.

(vi) Eradication: This is a principle of crop protection which involves the removal of disease causing pathogens after they have affected the crops. This is done to prevent further spread of disease to other crop plants. For example, uprooting and burning or burning of affected plants.
Extract 2.3.1
This is a sample of the responses from a candidate who performed well in most parts of the question except for part (b) and (c) (iv).

The analysis shows further that the candidates who performed poorly in this question provided incorrect responses in parts (a) and (c). Some of the candidates provided correct responses in part (b). In part (a), the candidates failed to state the fundamental principles of crop protection. Incorrect responses provided were as coffee berry disease, causative agent - pygum spp, cultural control method; crop rotation, early planting, use of resistant varieties, seed dressing, burning, proper spacing. Other candidates in this group provided general methods of controlling weeds and pests such as chemical, biological, mechanical, cultural instead of crop protection principles. In part (b), a number of candidates managed to outline the effects of crop pests. In part (c), the candidates failed to give the scientific names of the named pests. Considering the responses provided by the candidates,
it can be generalized that the candidates had poor knowledge on crop protection. Extract 2.3.2 exemplifies one of the poor responses in question 3.

<table>
<thead>
<tr>
<th>Q3</th>
<th>a) i) Chemical Control methods</th>
<th>ii) Biological Control methods</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>iii) Physical Control methods</td>
<td>iv) Cultural Control methods</td>
</tr>
<tr>
<td></td>
<td>v) Legislative Control methods</td>
<td></td>
</tr>
<tr>
<td>b) i) Increase cost of production to the Farmer</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ii) Lower yield of production</td>
<td></td>
</tr>
<tr>
<td></td>
<td>iii) Some of the post hoc vector of disease</td>
<td></td>
</tr>
<tr>
<td></td>
<td>iv) Lower the viability of productive the Farmer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>v) Reduction profit reductions to the Farmer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>vi) Lower grain losses: R. solanacearum</td>
<td></td>
</tr>
<tr>
<td></td>
<td>vii) Common rot - R. solanacearum</td>
<td></td>
</tr>
<tr>
<td></td>
<td>viii) Mosaic mark: S. phytophylacter intactis</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ix) Ail flow halted: S. monilis gallinacea</td>
<td></td>
</tr>
<tr>
<td></td>
<td>x) Zea mays - Zea mays, spp.</td>
<td></td>
</tr>
</tbody>
</table>

Extract 2.3.2
This is a sample of poor response from the candidate who provided incorrect responses to all parts of the question.

2.2.4 Question 4: Plant Diseases
The question had parts: (a) and (b) carrying 20 marks. The candidates were required to: (a) briefly describe the following terminologies as used in plant diseases (i) signs (ii) symptoms (iii) animated plant diseases (iv) abiotic plant diseases and (b) identify causative agent, two typical symptoms and two control measures for each of the following plant diseases (i) cotton blight (ii) tobacco mosaic (iii) Black stem rust of wheat (iv) Groundnut rosette.

The question was attempted by 391 (58.9%) candidates, out of which 79 (20.2%) scored from 0 to 6 marks, 206 (52.7%) scored from 7 to 11 marks and 106 (27.1%) scored from 12 to 18 marks. The analysis suggests that the performance was good because 312 (79.8%) candidates scored from 7 to 18 marks. Candidates scores are distributed in Figure 2.4.
The analysis indicates that most parts of the question were correctly attempted by the majority of the candidates. A number of candidates provided correct responses in most parts of this question. In part (a), most of the candidates clearly described the named terms in part (a) (iii) and (a) (iv). However, many candidates did not describe correctly parts (a) (i) and (a) (ii). Examples of incorrect responses given by the candidates in parts (a) (i) and (a) (ii) were sign - this is the physical effects of symptoms that show by the plant during inoculation of disease to the plant for example wilting of the plant leaf; symptoms - is the appearance of colour from light green to dark green. In part (b), the candidates correctly identified the causative agent, typical symptoms and control measures for the diseases named in parts (b) (i), (ii), (ii) and (iv). This indicates that the candidate had adequate knowledge and field practical skills on the named plant diseases. Extract 2.4.1 illustrates responses from one of the candidates who did well in question 4.

**Figure 2.4: Candidates’ Performance on Question 4**
4. (i) Sign: These are physical evidences that indicate the presence of disease on plants. Example of sign include the presence of pest or pathogen on the plant or presence of soft or white powder on plant surface which indicate powdery mildew. Also presence of vegetative and reproductive structure on the surface of the plant are sign indicating disease infestation.

(ii) Symptoms: These refer to the alteration in the physiological condition of the plant as a result of disease evidence including observable and non-observable. Example of disease symptoms include necrosis, wilting, chlorosis, gull formation and canker. These symbolize the presence of certain disease on plant body.

(iii) Animated plant diseases: these are plant diseases caused by bioke factors. These bioke factors are living things they interfere with normal physical condition of the plant example of these factors include bacteria, fungi, nematodes, virus and worms. Diseases such as cassava mosaic virus disease, blight and rossette are found in this category.

(iv) Abiotic plant diseases: These are plant diseases that are caused by the environmental factors. They are non-pathological diseases. Environmental factors such as moisture content (less or more), temperature, soil pH and
Availability of nutrients either in excess or deficient can cause abiotic plant diseases. Examples of these diseases can be wilting and Blossom end rot in tomatoes.

(b) Cotton blight
Causative agent: Xanthomonas spp

Symptoms:
→ Necrotic lesions on leaves as a result of death of tissue
→ Wiltting of the leaves and reduced lemma.

Control measures:
→ Use chemicals to kill the fungi
→ Crop rotation

(iii) Tobacco mosaic
Causative agent: Tobacco mosaic virus

Typical Symptoms:
→ Dark necrotic spots on tobacco leaves
→ Yellowing of the leaves due to
→ Leaf curling and Malformation

Control measures:
→ Use resistant varieties of tobacco
→ Burning of all affected tobacco and its residues
This extract is an example of responses from the candidate who performed well in almost all parts of the question, exception for part (a) (i) and (ii).

The candidates who performed poorly in this question provided incorrect responses in almost all parts of the question. In part (a), the candidates incorrectly described the named terms in parts (a) (i), (ii) and (iii). Few of the candidates responded correctly in part (a) (iv). Examples of incorrect responses on the named parts were signs-this is the physical structure appearance of disease in the plant part species, symptoms- this is the internal and external appearance of disease in the plant part, Animated plant disease- this is the process of normal morphological which result to abnormal biological of non-living organisms. In part (b), the candidates were also unable to identify the causative agent, typical symptoms and control measures for named diseases in parts (a) (i), (ii), (iii) and
(iv). Examples of incorrect responses provided were (i) Cotton blight; the causative: *phytophore spp*, the symptoms: *appearance of spores, white powder and black sports*, control measures: *early planting, timely harvesting* (ii) Tobacco mosaic; causative agent: *phytophona spp*; symptoms: *powdery mildew, chlorosis*, control measures; *good sanitation, crop rotation*. (iii) Black stem rust of wheat; caused by *uromycets*, symptoms; *formation of black dots, formation of black spores*, Control measures: *Uprooting diseased plant, crop rotation* (iv) Groundnut rossete; causative agent: *fungi* symptoms; *formation of coloured dotes*, Control measures: *crop rotation, use of fungicides*. The performance suggests that the candidates had poor understanding of the terms used in plant diseases and the named plant diseases, as extract 2.4.2 illustrates in question 4.
9. Signs
- These are internal features that show and explain the condition of the plant.
- Signs in plant disease can not be observed by naked eyes.

10. Symptoms
- These are external features that explain and show the outside condition of the plant.
- These condition can be observed by eyes.

11. Animated plant disease.
- There are plant diseases that have been observed.
- Animation of plant diseases is done by closely observation of the plant to the time the plant become affected.

- This is the plant diseases that is initiated by non-living organisms and materials.
- Such improper accumulation of minerals to plant roots can cause plant disease.

13. Causative agent, typical symptoms and control measure
- Cotton blight
  - Causative agent is cotton strain
  - Symptoms are
    - Wilt of the leaves
    - Yellowing of the leaves
  - Control measures are
    - Crop rotation
    - Application of pesticides
Extract 2.4.2
This extract is a candidate’s poor responses in which he/she did not do well in all parts of the question.

2.2.5 Question 5: Introduction to Weed Science
The question comprised of four parts, namely (a), (b), (c) and (d) carrying 20 marks. The candidates were required to: (a) briefly explain six environmental factors that affects the performance of the herbicides (b) give six reasons of formulating pesticides (c) briefly outline three non-insecticidal pest control measures available to farmers and (d) briefly describe five features that have made weeds to have competitive edge.

The question was attempted by 609 (91.7%) candidates in which 34 (5.6%) scored from 2 to 6.5 marks, 239 (39.2%) scored from 7 to 11.5 marks and 336 (55.2%) scored from 12 to 19 marks. The analysis shows that the candidates’
performance was generally good because 575 (94.4%) candidates scored from 7 to 19 marks. Summary of the candidates scores is illustrated in Figure 2.5.

![Pie chart showing performance distribution of candidates](image)

**Figure 2.5: Candidates' Performance on Question 5**

The candidates who did well in this question had good performance in parts (b), (c) and (d) but did not do well in part (a). In part (b), the candidates managed to give reasons for necessity of formulating pesticides. In part (c), the candidates provided correct responses on non-insecticidal pest control measures available to farmers. Moreover, in part (d) the candidates managed to describe features that have made weeds to have a competitive edge. However, most of the candidates did not exhaust all the correct responses in part (a) which concern with the environment factors that affect the performance of the herbicides. Generally, the candidates were knowledgeable enough on matters related to weeds and their control. Extract 2.5.1 indicates good responses from a candidate who performed well in question 5.
5(a) Performance will be poor.

(b) Drought.
In drought condition, weeds are characterized by low water content in which the low water content will not facilitate efficient reaction between the targeted weeds and herbicides applied.

5(b) Reason to formulate pesticides.
1) To simplify the application process.
2) To increase effectiveness of pesticides on pests and this is when the pesticides are formulated to a required concentration.
3) To simplify handling of pesticides.
4) For easy storage.
5) For easy transport since when they are well formulated their concentration will be lowered facilitating easy transport by farmers.
6) If they are well formulated, they can remain active for a long time and be applied again.

5(c) Non-chemical pest control measures.
1) Biological measures which involve introduction of living organisms in controlling pests, for example cats are introduced in places to feed on rats.
2) Mechanical measures which involve physical removal of pests from an area.
3) Legislative measures through inspection, certification, and quarantine.
This extract is a sample of good responses from one of the candidate who did well in all parts of the question, except that he/she missed one point in part (a).

The candidates who performed poorly in this question were unable to provide correct responses to almost all parts of the question. In part (a), the candidates failed to explain the environmental factors that affect the performance of the herbicide. The candidates provided incorrect responses like; time for application, weed adaptability, resistance of weed. In part (b), most of the candidates failed to give reasons of formulating pesticides. Examples of incorrect responses were to ensure correct pesticides is applied, to ensure correct amounts of pesticides, to ensure that the pesticides used is for the required pest, to facilitate proper working of the pesticides in the field. Similarly in part (c), the candidates were unable to outline the non-insecticidal pest control measures available to farmers. Incorrect responses such as trap crop, close season, planting resistant varieties were provided by the candidates in part (c). In part (d), most of the candidates did not managed to describe five features that have made weeds to have a competitive edge. They provided incorrect responses as: resistance of the weed, adaptability of the weed. Incorrect responses provided by candidates is the indication that the candidates had inadequate knowledge on the area of weeds and
their control. Extract 2.5.2 shows a sample of poor responses from one of the candidates in question 5.

<table>
<thead>
<tr>
<th><strong>Question 5</strong></th>
<th><strong>Sample Response</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The factors that affect the performance of the herbicides.</td>
<td>1. The area with low nutritive value.</td>
</tr>
<tr>
<td>2. The area which have occurred with erosion of the soil.</td>
<td>2. Weeds.</td>
</tr>
<tr>
<td>3. Low fertility.</td>
<td>3. They are buried.</td>
</tr>
</tbody>
</table>

**Explanation**

1. Low fertility. These are the environmental factors which affect the performance of the herbicide even be applied while the area it's nature can produce to the factors.
2. Weeds. These are other environmental factors which affect the performance of the herbicide, while other weeds it is difficult to remove from the soil.
3. Buried. This are bad odors that may occur to the environment and its environmental factors which may cause the poor performance of the herbicide even be applied.
4. Eroded. The soil due to the performance of the herbicides to the area, these will not decay while to the soil the organic matter from the soil has removed so that by the other can cause the poor performance of herbicides.
### Extract 2.5.2
This extract exemplifies one of the poor responses from the candidate who responded incorrectly in most parts of the question, except in part (c) where he/she provided two correct points.

<table>
<thead>
<tr>
<th>Part</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>5(a)</td>
<td>Low nutritive value there are the other environmental factors that affect the performance of the herbicide while its natural area have nutritive value so even the herbicide can be applied with no improvement.</td>
</tr>
<tr>
<td>5(b)</td>
<td>It is necessary to formulate herbicide.</td>
</tr>
<tr>
<td>1.</td>
<td>To control the damage to both living and non-living things</td>
</tr>
<tr>
<td>2.</td>
<td>To prevent disease occur to the environment</td>
</tr>
<tr>
<td>3.</td>
<td>To produce area to have good quality production</td>
</tr>
<tr>
<td>4.</td>
<td>To produce disease resistant to both living things and non-living things</td>
</tr>
<tr>
<td>5.</td>
<td>To produce the quality produced to the area</td>
</tr>
<tr>
<td>6.</td>
<td>To produce the yield of crops when formulated to the specific area</td>
</tr>
<tr>
<td>5(c)</td>
<td>Three non-insecticidal pest control measure available to farmers</td>
</tr>
<tr>
<td>1.</td>
<td>Cultural control</td>
</tr>
<tr>
<td>2.</td>
<td>Biological control</td>
</tr>
<tr>
<td>3.</td>
<td>Chemical control</td>
</tr>
<tr>
<td>5(d)</td>
<td>The area to have good quality of production may make the competitive edge.</td>
</tr>
<tr>
<td>5(e)</td>
<td>The area to have high composition of production due to organic matter has production to produce.</td>
</tr>
<tr>
<td>5(f)</td>
<td>The soil to have high production there can make the area that can make competitive edge.</td>
</tr>
<tr>
<td>5(g)</td>
<td>Better utilization these also in the field can make the competitive useful edge while maybe the crop was poison to control to the field and it is poison.</td>
</tr>
<tr>
<td>5(h)</td>
<td>Weeding there are process of making the area or uprooting the area by mechanical that is dusting but the effect has still competitive edge due to its value such but grass-ware also might never release.</td>
</tr>
</tbody>
</table>
2.2.6 Question 6: Introduction to Animal Health

The question consisted of four parts that is (a), (b), (c) and (d) carrying 20 marks. The candidates were required to: (a) briefly outline five stages of the life cycle of one host tick, (b) explain six damages caused by ticks on feeding to an animal (c) mention five ways of controlling ticks in the pasture and (d) list four effective characteristics of acaricides.

The question was attempted by 342 (51.5%) candidates, in which 62 (18.1%) scored from 2 to 6.5 marks, 155 (45.4%) scored from 7 to 11.5 marks and 125 (36.5%) scored from 12 to 17 marks. The candidates’ performance in this question was good because 280 (81.9%) candidates scored from 7 to 17 marks. The distribution of the candidates’ scores is illustrated in Figure 2.6.

![Candidates' Performance on Question 6](image)

**Figure 2.6: Candidates’ Performance on Question 6**

The candidates who had good performance in this question did well in parts (a), (c) and (d). Most of the candidates could not exhaust all the points correctly in part (b). The candidates correctly outlined the stages of the life cycle of one host tick in part (a). The candidates were also able to mention ways of controlling ticks in pastures, and correctly listed effective characteristics of acaricides in parts (c) and (d), respectively. Nevertheless, most of the candidates did not manage to provide all correct responses demanded on the damages caused by ticks on feeding to an animal in part (b). Some of the incorrect responses on damages caused by ticks provided by candidates were cause east coast fever, diseases and pains. Generally, majority of the candidates proved to be
knowledgeable on ticks and their control. Extract 2.6.1 illustrates a sample of good responses from one of the candidates in question 6.

6. a) Life cycle of one host tick: five stages
   i) Adult female tick mate with male then it suck blood from the host and engage and drop to the ground and lay eggs.
   ii) Eggs are hatched to larvae in the ground
   iii) Larvae move to the pasture and suck blood from the host engaged the fall to the ground and molt to a pupa.
   iv) Pupa find the same host suck blood then engaged and fall into the ground and molt to adult.
   v) The adult find the same host suck blood engaged and the life cycle of tick state again.

b) Damage caused by ticks on feeding to an animal:
   i) Ticks cause skin irritation to the animal
   ii) Excessive ticks in the animal cause anaemia.
   iii) Ticks lead to the ulcers on the skin of the animals
   iv) Ticks provide predisposition factors to the disease of animals like foot and mouth disease.
   v) Ticks can cause wariness to the animals especially those found on the toes of the animals.
   vi) Ticks make animal products of bad quality example skin (leather) quality will be treated.
Extract 2.6.1

This extract shows an example of good responses from the candidates who provided correct responses in almost all parts of the question, except parts (b) and (d).

Items response analysis from the candidates who performed poorly in this question showed that the candidates responded incorrectly in almost all parts of the question. In part (a), the candidates failed to outline stages of the life cycle of one host tick by providing incorrect responses like: *female tick lay eggs in the ground, eggs hatch into larvae, the larvae change to nymph and engorged to adults while still on the host, the larvae climb the tree and waiting the passing animal, adults falls the ground and lay the eggs and died.* In part (b), the candidates failed to explain damages caused by ticks on feeding to an animal. Incorrect responses provided were: *causes the diseases to host, emaciation, lower the qualities of products, cause the wounds to udder at milking period, lower milk production.* Additionally in part (c), the candidates were unable to mention five ways of controlling ticks in the pasture by providing incorrect responses like *spraying animals with herbicides before grazing, biological control like birds,*
spraying herbicides with vegetation, cultivation/use of tick repellant plant. In part (d), incorrect responses like; produces bad smell, under high ratio can cause death of animal, are chemical in nature, mixed with water to form solution for dipping were given as effective characteristics of acaricides which was incorrect. The analysis revealed that the candidates had inadequate knowledge on ticks and their control. An example of poor responses is shown in extract 2.6.2 in question 6.

<table>
<thead>
<tr>
<th>6a</th>
<th>The give stages of the life cycles of one host ticks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Tick lay the egg to the field for the worm y</td>
</tr>
<tr>
<td>2.</td>
<td>Surviving with</td>
</tr>
<tr>
<td>3.</td>
<td>Climbing to the host as it's life to begin with</td>
</tr>
<tr>
<td>4.</td>
<td>Hunting to the host then after basking fall again to the field, for the other generation</td>
</tr>
<tr>
<td>5.</td>
<td>After fall to the field under complete autamorphosis to the satisfied area as it's life</td>
</tr>
</tbody>
</table>
5. Lastly climbing again to the best as it is life
where it's living.

6. The damage caused by the ticks on the feeding to
an animal:
   a. Irritation this means that the tick can cause
the body of the organism to have an ejection
the removal of skin or hair to their body.

5. Nymph node there are the other damage causes
by the ticks to the other body up on organisms
due to their feeding.

3. Skin cast there are the other damage thatique
animal it's skin show alert to come up during
animal to be in good health while its skin
is such showing like body affected within animal
are feeling cold.

4. Animal become decided to come up during animal
was good good health to its physical appearance.

5. Lose or appetite these are damage caused by
the ticks which make the animal to lose
appetite while affected with the damage
of ticks to their bodies.

6. To lose body weight these are the other damage
ge caused by the ticks to an body of animal.
Extract 2.6.2

This extract is a sample of candidate’s poor responses. The candidate provided incorrect responses in almost all parts of the question, but in part (c), he/she had two points correct.

2.2.7 Question 7: Pasture Agronomy

The question was divided into four parts: (a), (b), (c) and (d) carrying 20 marks. The candidates were required to: (a) account for the seven reasons which may cause lack of legumes in the pastures, (b) describe four factors that affects yield potential of pasture species, (c) briefly explain five qualities of a good pasture
and (d) suggest four possible strengths of zero grazing as compared to other systems of grazing.

The question was attempted by 588 (88.6%) candidates, out of which 57 (9.7%) scored from 1 to 6 marks, 368 (62.6%) scored from 7 to 11 marks and 163 (27.7%) scored from 12 to 17 marks. Generally the performance was good because 531 (90.3%) candidates scored from 7 to 17 marks. Figure 2.7 shows the distribution of the candidates’ scores.

![Figure 2.7: Candidates’ Performance on Question 7](image)

Item response analysis shows that candidates did well in most parts of this question, exception for part (a). In part (b), the candidates managed to describe factors that affect yield potential of pasture species. The candidates clearly explained qualities of a good pasture and suggested the strengths of zero grazing as compared to other systems of grazing in parts (c) and (d) respectively. However, most of the candidates did not manage to provide all the points needed correctly in part (a). This performance suggests that the candidates had enough knowledge on pasture. Examples of good responses from one of the candidates are illustrated in extract 2.7.1 in question 7.
7.(a) Reasons for the lack of legumes in pasture

(i) Legumes are suppressed by grasses; grasses suppress legumes in the pasture hence cause them to disappear in pasture.

(ii) Preference of the animals; Many animals prefer legumes than grasses due to their nutritive value hence cause them to lack in pasture as they eat them more.

7.(b) Other factors affecting yield potential of pasture species

(i) Soil fertility - The fertile soil determine the yield of pasture that could be produced; when the soil is non fertile hence yield increase and if it is of low fertile hence low yields result.

(ii) Pest and Disease; When there is occurrence of pest and disease in the pasture farm hence the yield potential decrease.
Extract 2.7.1

This extract shows a response from the candidate who provided correct answers to almost all the parts of the question, but failed part (a) (vi).

The analysis indicates further that the candidates who performed poorly in this question failed to provide correct responses in most of the items. In part (a), the candidates failed to account for reasons which may cause lack of legumes in the pastures. Examples of incorrect responses given were: legumes has acid, it has large amount of water, it contain large amount of ion, it contain large amount of nutrients, it has more carbohydrate. In part (b), the candidates were also unable to describe factors that affect yield potential of pasture species. For example, one of the candidates responded: type of grasses, irritability, amount of water for photosynthesis. Moreover, in part (c), the candidates had problems in explaining qualities of a good pasture as they gave incorrect responses such as must be dry, accountability, irritability. In part (d), the candidates also had difficulties in suggesting for possible strengths of zero grazing. For example, one of the candidates provided incorrect responses like need more labour, is the grazing of
cutting grass animals and give in the room. The responses given by the candidates is an indication that they had inadequate knowledge enough on pasture agronomy. Extract 2.7.2 indicates one of the poor responses from one of the candidates in question 7.

Extract 2.7.2
The extract indicates responses from a candidate who provided incorrect responses in almost all parts of the question, except for part (c) where the candidate gave a correct point.
2.2.8 **Question 8: Introduction to Animals Nutrition**

The question consisted of three parts, (a), (b) and (c) carrying 20 marks. The candidates were required to give brief explanation of how feed intake is affected by (a) feed processing (b) animals associated factors (c) food associated factors.

The question was attempted by 360 (54.2%) candidates, in which 28 (7.8%) scored from 1 to 6.5 marks, 148 (41.1%) scored from 7 to 11.5 marks and 184 (51.1%) scored from 12 to 19 marks. General performance in the question was good, because 332 (92.2%) candidates scored from 7 to 19 marks. Candidates scores are summarized in Figure 2.8.

![Figure 2.8: Candidates’ Performance on Question 8](image)

The analysis establishes that the candidates who had good performance in this question managed to provide correct responses in all parts of the question. They correctly explained how feed intake in farm animals is affected by feed processing, animal associated factors and food associated factors in parts (a), (b) and (c). In each of these parts the candidates provided most of the correct responses, thus demonstrating good understanding of factors affecting feed intake in farm animals. Extract 2.8.1 illustrates good responses from one the candidates in question 8.
91

(a) Feed processing: Intake of processed feed in animals is higher than unprocessed feed. This is because processed feed increases the surface for rumen to be taken by animal and also has high digestibility.

(b) Animal associated factor:

(i) Capacity of rumen: If capacity of rumen to carry food is less, the intake of food will be less. Also, rumen's capacity of carrying large amount of food. The intake of food in animal will be highly large.

(ii) Featulus of animal: Featulus animal has ability to take in small amount of feed and so that intake of feed in animal will be very low.

(iii) Sex of animal: Male animal has ability to eat large amount of feed than female animal and so that the intake of feed is highly in male animal than in female animal.

(iv) Species of animal: There are some of species whose eat large volume of feed while others eat small amount of feed. (Cattle and indigenous)

(v) Health of animal: Healthy animal has ability to eat large amount of feed whereas that feed intake in health animal is highly large.

(vi) Disease: Animal that are affected by disease has low ability to eat small amount of feed and so that diseased animal has low feed intake.

(vii) Genetic potential of animal: Most of animal eat much of gene of different characters when there are some of gene resulting to the eating of large amount of feed when others eat small amount of feed.
This extract represents responses from a candidate who showed good understanding of the factors affecting feed intake in farm animals. The candidate missed one point in part (a).

It was also noted that the candidates who performed poorly failed to provide correct responses in all parts of the question. In part (a), the candidates failed to give explanation on how feed processing affect feed intake in farm animals. An example of incorrect response was feed processing is the process of changing the form of edible substances into smaller form in order to be easily assimilated, absorbed and digested by the animal, hence this can affect the feed intake during digestion because the amount of feeds is easily being fed to animals.
Furthermore, the candidates gave incorrect responses such as growth rate of the animal—normally animals which grow very fast requires more feed intake and vice versa, animal factor—the consideration of the species of an animal to be given the type of feed whether is male or female animals, feed composition—the components to be mixed with feed should be considered, preparation of feed—the feed should be prepared at a time which are suitable for the species of the animal, feed ingredient—is the amount of feed composition eaten by the animal to acquire the individual good health as explanations on how animal associated factors affect feed intake in a farm animal in part (b). In part (c), the candidates also did not manage to explain how food associated factors affect feed intake in farm animals. Examples of incorrect responses given were, amount of feed—the ratio of feed is equal to the ratio of ingredient required in the feed, sex of the animal—biological difference between male and female due to feeding of feed eaten, feed composition—the ratio of feed given to the animal is very high nutrients and should be suitable. Candidates’ performance analysis implies that the candidates had poor understanding of the factors affecting feed intake in farm animals. Responses in Extract 2.8.2 shows poor performance from one of the candidate in question 8.
(iv) Animal factors: the consideration of the species of an animal to be given, the type of feed, whether it is male or female animals.

(i) Feed composition: the component to be mixed with feed. Examples are molasses, hormone and antibiotics responsible.

(ii) Preparation of feed: the feed should be prepared at a time which are suitable for the species of the animal.

(iii) Feed ingredient: the amount of feed composition eaten by the animal to acquire the individual with good health.

(iv) Metabolizable energy: the energy produced by the young animal is different from the adult. So, the feed given to the young should have a high amount to that of the adult.
2.2.9 Question 9: Livestock Reproduction, Breeding and Improvement

The question had three parts, namely (a), (b) and (c) carrying 20 marks. The candidates were required to: (a) (i) give the meaning of the term animal breeding (ii) briefly explain five usefulness of animal breeding in the improvement of animal production (b) (i) elaborate five suitability of inbreeding systems in the improvement of livestock.(ii) outline four negative effects of inbreeding in the improvement of animal production and (c) enumerate five ways in which pedigree selection is important in the improvement of animals production.
The question was attempted by 322 (48.5%) candidates, of which 193 (59.9%) scored from 1 to 6.5 marks, 122 (37.9%) scored from 7 to 11 marks and 7 (2.2%) scored from 12 to 17 marks. The general performance was average because 129 (40.1%) candidates scored from 7 to 17 marks. Figure 2.9 presents the distribution of the candidates score.

**Figure 2.9: Candidates’ Performance on Question 9**

In this question, candidates who performed well were able to give correct responses in parts (a) and (b). However, most of the candidates provided poor responses in part (c). In parts (a) (i) and (ii) the candidates clearly gave the meaning of animal breeding and correctly explained the usefulness of animal breeding in the improvement of animal production. The candidates also elaborated well the suitability of inbreeding system in the improvement of livestock, and correctly outlined its negative effects in parts (b) (i) and (b) (ii). However, most of the candidates did not manage to enumerate ways in which pedigree selection is important in the improvement of animal production in part (c). Incorrect responses given were like pedigree selection is a quite effective as proper records of ancestry are maintained at each generation, characteristics are easily predicted and examined since proper records are maintained. The analysis indicates that the candidates had an adequate knowledge on the concept of animal breeding and inbreeding system. An example of good responses in question 9 is illustrated in Extract 2.9.1.
Extract 2.9.1

The extract represents responses with good performance. The candidate provided most of the correct responses, but he/she missed some few points in parts (b) (i) and (c).
Analysis of the responses from the candidates who performed poorly in this question showed that the candidates attempted incorrectly in almost all parts of the question. In part (a) (i), the candidates failed to give the meaning of animal breeding, the reason which also led them to fail in explaining the usefulness of animal breeding in the improvement of animal production in part (a) (ii). An example of incorrect response for the meaning of animal breeding was *the process of how to improve the production of the animal in terms milk, meat and others while; it help animal in order to improve the rate of reproduction means they reproduce faster, they provide animal which are essential for farm operation.* In part (b), most of the candidates also were unable to elaborate the suitability of inbreeding and outline its negative effects in the improvement of animal production in parts (b) (i) and (b) (ii), respectively. The candidates provided responses such as *in order to get pure breed animals, to have the animals which have the same ancestor, to the animal which have the good quality in the same ancestor, in order to know the performance record of their common ancestor and it can cause the inheritance bad characteristics to the animal, transmission of venereal diseases to the animals, the animal has bad quality like poor production and are not resistant to diseases as negative effects of inbreeding in the improvement of animal production.* Likewise in part (c), the candidates failed to enumerate ways in which pedigree selection is important in the improvement of animal production. Responses like *by considering the performance record of their common ancestor, the body conformation of the animals, the physiology of the animal either it is sick or health, The breed of the animal which is highly productive, the age of the animal- by considering the age which is suitable for production is 3-4 years justify poor performance in this part.*

Generally, the candidates had inadequate knowledge on the concept of animal breeding and breeding systems. Extract 2.9.2 is a sample of one of the poor responses from one of the candidates in question 9.
Animal breeding: It is the process of how to improve the production of animals in terms of milk, meat, and other.

Usefulness of Animal breeding Improvement
- In order to get the animal which are resistant to pest and disease
- In order to get the high yield in production example milk, meat, skin
- It helps animal in order to improve the rate of reproduction that means they reproduce fast
- They provide the animal which are resistant to harsh environmental conditions
- They provide animal which are very stronger and healthier which are essential for farm operation

Suitability of Inbreeding System
- In order to get the pure breed animals
- To have the animal which have the same ancestor
- To know the animal which have the good quality in the same ancestor
- In order to know the performance record of their common ancestor
Extract 2.9.2
This extract is an example of poor response from the candidate who managed to give only two points correct in part (a) (ii).

2.2.10 Question 10: Environmental and Technological Challenges in Agricultural Development

The question was divided into four parts, namely (a), (b), (c) and (d) carrying 20 marks. The question required the candidates to: (a) give the meaning of the following terms (i) Biotechnology, (ii) Modern technology and (iii) Conventional technology, (b) briefly describe three environmental risks associated with Genetically Modified Organisms, (c) Identify four important effects resulted from global warming that poses a big challenge to agriculture in most parts of developing world and (d) briefly explain six potential benefits of Genetically modified organisms in production of crops.
The question was attempted by 213 (32.1%) candidates, in which 117 (54.9%) scored from 1.5 to 6.5 marks, 90 (42.3%) scored from 7 to 11.5 marks and 6 (2.8%) scored from 12 to 17 marks. The analysis indicates that the general performance in the question was average because, 96 (45.1%) candidates scored from 7 to 17 marks. Figure 2.10 shows the distribution of the candidates’ scores.

![Figure 2.10: Candidates’ Performance on Question 10](image)

It has been established that the candidates with good performance were able to respond correctly to parts (a) (i), (b) and (d). In part (c), most of the candidates provided correct responses for some items while failing in others. Similarly, most of them failed to provide correct responses in parts (a) (ii) and (a) (iii). In part (a) (i), the candidates managed to give the meaning of the term biotechnology. The candidates also were able to describe environmental risks associated with Genetically Modified Organism and explained correctly potential benefits of Genetically Modified Organisms in production of crops in parts (b) and (d) respectively. In part (c), despite the facts that most of the candidates identified correctly important effects resulted from global warming that poses a big challenge to agriculture in most parts of developing world but they could not exhaust all the points correctly. Additionally, the candidates did not manage to give the meaning of the terms modern technology and conventional technology in parts (a) (ii) and (a) (iii) respectively. An example of incorrect response of the meaning of modern technology from one of the candidate was the application of science through modern method in organism like surgical methods and equipment method, whereas conventional technology was defined as: is the knowledge or application of science through conventional use in organisms, occurs to organisms have god knowledge. The candidates proved to be competent
enough on sustainable agriculture and genetically modified organisms. Extract 2.10.1 is a representative sample of good responses from one of the candidates in question 10.

| Biotechnology | This is the technology which involves the use of synthetic materials to produce like plastics to produce usable substances example plastic rice. |
| Modern technology | It is the technology which is more advanced than example genetic modified organism nowadays involve crossing of different genes from different species which is more advance compared to past technology of mutation by radiation and other things. |
| Conventional technology | This is the technology which involve the use of synthetic/industrial materials in agriculture and other activities example the use of |
So pesticides, insecticides, herbicides, fertilizers are often used to improve yield.

1. Loss of biodiversity: Due to genetically modified organisms, local and autecophylic species tend to disappear as people prefer much species with high yield like those generated from (GMO) genetically modified organisms. Hence, pure species do not being planted hence tend to disappear.

2. Development of herbicides resistant weeds: Nowadays there is a lot of weeds which are more tolerant and resistant to herbicides which tend to decrease yield and farmers increase the cost of production as tend to use a lot of money to eradicate these weeds.

3. Development/introduction of allel gene: Due to genetic modified organisms there is introduction of allele which cause allergies (Allel) to both animals and plants which future may cause death.

4. Bring about drought:
- Climatic change
- Floods
- Plants wilting
This extract is a sample of responses from a candidate with good performance. The candidate responded correctly in almost all parts of the question, except in part (a) (i).

The candidates who performed poorly in this question had almost all parts of the question incorrectly responded. In part (a), the candidates failed to give the meaning of the given terms. For example, in part (a) (i), biotechnology was incorrectly defined as *the study of application of science in living organisms* by one of the candidates. In parts (a) (ii) and (a) (iii), modern technology and conventional technology were also incorrectly defined as modern technology is *the application of science through modern methods*, while conventional technology is *the knowledge or application of science through conventional use in organisms*. Additionally, in part (b), the candidates were unable to describe
environmental risks associated with genetically modified organism by providing incorrect responses as *global warming, deforestation, ozone layer depletion*. Similarly, the candidates failed to identify important effects resulted from global warming that poses a big challenge to agriculture in most parts of developing world in part (c). Examples of incorrect responses given were *the global increase in temperature makes growth of crops impossible, global warming cause cancer to many people*. In part (d), genetic engineering of bacteria has given rise to discovery of ways to manufacture hormones and antibiotics to be used in life, *it helps in increasing level of economy to the farmers, it ensure the well utilization of land by the farmer on production* were some of the incorrect responses provided by candidates as potential benefits of genetically modified organisms in production of crops. These candidates had poor understanding in the sub-topic on sustainable agriculture and genetically modified organisms. A sample of poor responses in question 10 are indicated in Extract 2.10.2.

| 10. (a) i) Biotechnology: is the technology controlled scientifically.  
| ii) Modern technology is the new technology from the local technology.  
| iii) Conventional technology is the technology where by the new technology adopted from local technology that mean to improve the local technology by adding something |
b) Land pollution: The use of chemicals in the area for a long time can cause land pollution of the soil.

- Reduce yield of production: The use of genetically modified organisms (GMOs) can lead to reduced yield of production because of lowering nutrients in the soil.

- Lead to soil erosion: The use of genetically modified organisms (GMOs) can lead to reduced soil fertility, leading to soil erosion when genetically modified organisms are applied for a long time.

- Lead to unhygienic soil
- Lead to hunger.

- Increase the yield of production when using genetically modified organisms, the yield of produce increases.
Extract 2.10.2
This extract is a sample of responses from the candidate who performed poorly in almost all parts of the question, except part (d) where he/she gave two correct points.

2.3 134/3 AGRICULTURE 3

2.3.1 Question 1: Agricultural Engineering and Land Planning

The candidates were provided with specimens: E₁-piston rings, E₂-oil filter, E₃-clutch plate, F₁-jack plane, F₂-smoothing plane, F₃-sash clamp, F₄-G-clamp, F₅-cross pein hammer, G₁-union, G₂-Bushing, G₃-Tee, G₄-Coupling, and G₅-Set of galvanized pipes.

The question consisted of three parts, namely (a), (b) and (c) carrying 20 marks.

The candidates were required to: (a) (i) identify each of the specimen E₁, E₂, and E₃ (ii) suggest the two types of specimen E₁ and their functions,(iii) outline three indicators that would alert the tractor operator that specimen E₁ is worn out (iv) give the name of the unit in transmission system in which specimen E₃ belong and describe its operating principle (b) (i) identify each of the specimen F₃, F₄ and F₅ (ii) describe the use of specimen F₁, F₂ and F₅ (iii) differentiate the use of
specimen $F_3$ and $F_4$ (c) (i) identify specimen $G_1$, $G_2$, $G_3$ and $G_4$ (ii) indicate the arrangement of specimens and name the fitting they are going to use when they want to join specimen $G_5$.

The question was attempted by 664 (100%) candidates, of which 9 (1.4%) scored from 5 to 6.5 marks, 337 (50.7%) scored from 7 to 11.5 marks and 318 (47.9%) scored from 12 to 16 marks. General performance of the candidates in this question was good because 655 (98.6%) candidates scored from 7 to 16 marks. Figure 3.1 shows the distribution of the candidates’ scores.

![Figure 3.1: Candidates’ Performance on Question 1](image)

Good performance of the candidates in this question was a result of providing correct responses in most parts of the question. In part (a) (i) the candidates correctly identified the specimen given, and they also suggested the two types of specimen $E_2$ and their functions in part (a) (ii) correctly. Likewise, part (a) (iii) of the question that demanded the candidates to outline three indicators that would alert the farm tractor operator that specimen $E_1$ is worn out was well attempted by the candidates. The candidates failed to give the name of the unit in transmission system in which specimen $E_3$ belong, and to describe its operating principle in part (a) (iv). Examples of incorrect responses provided in this part were clutch, gear box, and transmission system. Generally, in this part, candidates showed adequate knowledge and practical skills on area of engine parts.

In part (b), most of the candidates were able to identify the specimen given in part (b) (i), and correctly described the use of the named specimens in part (b) (ii). In addition, the candidates also correctly differentiated the use of the named
specimens in part (b) (iii) showing to be knowledgeable enough and adequately equipped with practical skills on carpentry work.

In part (c), most of the candidates identified correctly the specimens provided in part (c) (i), but failed to indicate the arrangements of the specimens to be used in joining specimen G₅. In this part, most of the candidates failed to meet the demand of the question because instead of identifying specimens they stated the functions of the pipe fittings. This suggests that the candidates had inadequate knowledge and practical skills on fitting pipes. An example of good responses in question 1 is shown in Extract 3.1.1.
<table>
<thead>
<tr>
<th>Specimen</th>
<th>Name of specimen</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1</td>
<td>Piston ring</td>
<td></td>
</tr>
<tr>
<td>E2</td>
<td>Oil Filter</td>
<td></td>
</tr>
<tr>
<td>E3</td>
<td>Clutch plate</td>
<td></td>
</tr>
</tbody>
</table>

57. Suggest the two types of specimen E3 and their function:
- Oil control ring:
  - Prevent the leakage of compressed heat energy between the cylinder walls.
  - Used to prevent the leakage of oil from the engine crankcase to the combustion chamber.
- Clutch plate:
  - Name of the unit is Clutch
  - Operation: Used to connect and disconnect power from the engine or engine drives
1. Identify each of Specimen F₃, F₄ and F₅.

<table>
<thead>
<tr>
<th>Specimen</th>
<th>Name of Specimen</th>
</tr>
</thead>
<tbody>
<tr>
<td>F₃</td>
<td>Sash demolition clamp</td>
</tr>
<tr>
<td>F₄</td>
<td>G-clamp</td>
</tr>
<tr>
<td>F₅</td>
<td>Cross-pane hammer</td>
</tr>
</tbody>
</table>

2. Describe the use of Specimen F₁, F₂ and F₅.

   **Specimen F₁**
   - It is a general purpose plane used for both smooth and rough the plane or wood surface on wood work.

   **Specimen F₂**
   - It is used for smoothing the surface of plane after a jack or try plane has been used.

   **Specimen F₅**
   - Used for driving in nails, swaging and reverse.

3. Differentiate the use of Specimen F₃ and F₄.

<table>
<thead>
<tr>
<th>Specimen F₃</th>
<th>Specimen F₄</th>
</tr>
</thead>
<tbody>
<tr>
<td>9. Specimen F₃ is used for holding wood work at set position when glue hardens.</td>
<td>9. Specimen F₄ used for holding objects securely during cutting and layout operation.</td>
</tr>
</tbody>
</table>

4. Identify Specimen G₁, G₂, G₃ and G₄.

<table>
<thead>
<tr>
<th>Specimen</th>
<th>Name of Specimen</th>
</tr>
</thead>
<tbody>
<tr>
<td>G₁</td>
<td>Union</td>
</tr>
<tr>
<td>G₂</td>
<td>Bushing</td>
</tr>
<tr>
<td>G₃</td>
<td>Tee</td>
</tr>
<tr>
<td>G₄</td>
<td>Coupling</td>
</tr>
</tbody>
</table>
Extract 3.1.1
This extract is a sample of responses from the candidate who performed well in all parts, except part (a) (iv) and (c) (ii) where he/she provided insufficient responses.

Few candidates who performed poorly had incorrect responses in parts (a) and (c) (ii). Most of the candidates provided correct responses in parts (b) and (c) (i). In part (a), the candidates failed to identify the specimens provided in part (a) (i), consequently failed to suggest types of specimen E₁ and their functions. Moreover, due to inadequate knowledge and practical skills on parts of the engine, the candidates failed to outline indicators that would alert the farm tractor operator that specimen E₁ is worn out in part (a) (iii). The candidates also did not manage to give the name of the unit in transmission system in which specimen E₃ belong, and failed to describe its operating principle in part (a) (iv). Similarly, in part (c) (ii), the candidates were unable to indicate the arrangements of the pipe fittings to be used in joining specimen G₅. Instead of indicating the arrangements of the pipe fittings, most of the candidates outlined the functions of the pipe fittings. Other candidates responded incorrectly by drawing the pipe fittings. The incorrect responses provided by the candidates in this part justify their poor knowledge and practical skills on fitting pipes.

However, most of the candidates exhibited good understanding and practical skills on carpentry work by responding correctly in part (b) of the question. The candidates identify correctly the specimens in part (b) (i) and described well the use of the specimens given in part (b) (ii). The candidates also managed to differentiate the use of the given specimens in part (b) (iii). In addition, they correctly identified the specimens provided in part (c) (i). Extract 3.1.2 is a sample of responses from a candidate who scored low marks in question 1.
1. To identify specimens:

<table>
<thead>
<tr>
<th>Specimen</th>
<th>Common names</th>
</tr>
</thead>
<tbody>
<tr>
<td>E₁</td>
<td>Piston ring</td>
</tr>
<tr>
<td>E₂</td>
<td>Oil filter</td>
</tr>
<tr>
<td>E₃</td>
<td>Clutch plate</td>
</tr>
</tbody>
</table>

ii/ Two type of specimen E₁

iii/ Indicator that would alert the farm tractor operator that specimen E₁ is worn out:

- When specimen E₁ is worn out, it cause the oil or fuel to leak, and cause small power which form by compression.

iv/ Specimen E₃ it have on the unit in lubrication system:

- It is operating for engage gear.
Extract 3.1.2
This extract is an example of poor responses. The candidate only managed to identify some of the specimens in part (a) (i), (b) (i) and (c) (i) only.

2.3.2 Question 2: Crop Science and Production and Soil Science
The candidates were provided with specimens: H1-Triple superphosphate (TSP) fertilizer, H2-Sulphate of Ammonia fertilizer, I1-Tomato plant suffering from bacterial wilt, I2-Cassava leaves affected by mosaic virus and I3-Maize weevil.

This question had two parts, (a) and (b) carrying 15 marks. In part (a), the candidates were required to (i) identify specimen H1 and H2, (ii) outline four characteristics of specimen H2, (iii) give the use of specimens H1 and H2, (iv) state the stage of crop development in which specimen H2 is recommended for application, (b) (i) identify specimen I1 by its botanical name, (ii) mention the disease in specimen I1 and its causative agent, (iii) identify the disease in specimen I2, (iv) list two methods in which the disease in specimen I2 is
transmitted, (v) write scientific name of specimen I₃, (vi) mention three crops that are the main host of specimen I₃ and (vii) suggest whether I₃ is a field or storage pest, and give two reasons for the answer provided.

This question was attempted by 664 (100%) candidates, of which 36 (5.4%) scored from 2.5 to 5 marks, 285 (42.9%) scored from 5.5 to 8.5 marks and 343 (51.7%) scored from 9 to 13 marks. Generally, the performance was good because 628 (94.6%) candidates scored from 5.5 to 13 marks. Figure 3.2 is the candidates’ scores in the question.

![Figure 3.2: Candidates’ Performance on Question 2](image)

Candidates Items Response Analysis indicates that the candidates with good performance provided correct responses in most parts of the question, but failed in part (b) (i), (ii) and (vii). In part (a), most of the candidates responded correctly by identifying correct specimen in part (a) (i). In part (a) (ii), the candidates also managed to outline the characteristics of specimen H₂. In part (a) (iii) they were able to give the use of the named specimens, and in part (a) (iv) of the question, the candidates correctly give the stage of crop development where specimen H₂ is recommended for application. In this part, the candidates showed good mastery of fertilizers’ use and application. Moreover, the candidates managed to identify diseases in specimens I₁ and I₂ in parts (b) (ii) and (iii), respectively. The candidates listed correctly the methods in which the disease in specimen I₂ is transmitted in part (b) (iv), as well as mentioning correctly crops that are the main host of specimen I₃ in part (b) (vi). However, the candidates failed to write the
scientific names of the specimens in part (b) (i) and (v). Most of the candidates misspelled the scientific names required.

In part (b) (vii), the candidates suggested correctly area of attack for specimen I3 but failed to give reasons to support their answer. An example of incorrect response was I3 is a storage pest because it attack dry crops. Generally, the candidates had good mastery on plant diseases and crop pests. Extract 3.2.1 is a representative sample of good responses in question 2.
Extract 3.2.1
The extract illustrates responses from a candidate who performed well in all parts, but failed in part (b) (ii) and (v).

The analysis indicates further that the candidates who performed poorly provided incorrect responses in most parts of the question with exception of part (a), most of the candidates provided incorrect responses in all other parts. In part (b), the candidates failed to identify the diseases in part (b) (ii) and (iii), whereas in part (b) (iv), the candidates did not manage to list methods in which the disease in specimen $I_2$ is transmitted. In part (b) (i) and (v), the candidates were unable to write the scientific names of the given specimens. In these parts, most of the candidates either misspelled the names or failed to follow the rules in naming organisms. Similarly, the candidates failed to mention crops that are the main host of specimen $I_3$ in part (b) (vi), and failed to suggest whether specimen $I_3$ is a field or storage pests with reasons to support their answers. The responses given by the candidates in these parts suggest that the candidates lacked knowledge and practical skills on plant diseases and crop pests.
Nevertheless, most of the candidates in this group responded correctly to part (a) (i) and (iii) of the question that generally required them to identify fertilizers together with their use and application. Extract 3.2.2 is one of the responses from a candidate who had poor performance in question 2.

Extract 3.2.2
The extract illustrates a sample of a candidate’s poor responses. The candidate responded incorrectly in all parts of the question, but failed in part (a) (iii) and (b) (ii).
2.3.3 **Question 3: Livestock Science and Production**

The candidates were provided with specimens $J_1$-Rhodes grass, $J_2$-Elephant/Napier grass, $J_3$-Water snail and $J_4$-Liver fluke.

The question consisted of two parts, namely (a) and (b) carrying 15 marks. The candidates were required to: (a) (i) identify the specimens $J_1$, $J_2$, $J_3$ and $J_4$ by their scientific names (ii) explain briefly how best can specimen $J_1$ and $J_2$ be preserved (iii) give three reasons why farmers conserve specimens $J_1$ and $J_2$ (b) (i) briefly describe how farm animals could be infested by specimen $J_4$, (ii) name two farm animals which are common host of specimen $J_4$, (iii) briefly explain the relationship between $J_3$ and $J_4$ and (iv) outline three ways by which specimen $J_4$ may be controlled from infesting farm animals.

The question was attempted by 664 (100%) candidates. Among them, 69 (10.4%) scored from 1 to 5 marks, 290 (43.7%) scored from 5.5 to 8.5 marks and 305 (45.9%) scored from 9 to 14.5 marks. The analysis indicates that the general performance was good because 595 (89.6%) of the candidates scored from 5.5 to 14.5 marks. The candidates’ scores are summarized in Figure 3.3.

![Figure 3.3: Candidates’ Performance on Question 3](image)

It was noted that the candidates with good performance did well in most parts of the question, except part (a) (i) and (ii). In part (a) (iii), most of them were able to give reasons why farmers conserve specimens $J_1$ and $J_2$. Their responses suggest that the candidates had knowledge on fodder crops. In part (b), the candidates
correctly described how farm animals could be infested by specimen J₄ as well as naming correctly farm animals which are common host of specimen J₄, in parts (b) (i) and (ii), respectively. The candidates also managed to explain the relationship between specimens J₃ and J₄ in part (b) (iii), and outlined correctly ways by which specimen J₄ may be controlled from infesting farm animals in part (b) (iv). However, most of the candidates in this group failed to identify the given specimens in part (a) (i) by misspelling their scientific names. Some of incorrect responses for scientific names of specimens were Elephant grass/Napier grass- *Penisetum purpureum* and Liver fluke-*Fusiola species*. The candidates also failed to give the best way on how specimens J₁ and J₂ can be preserved in part (b) (ii). A sample of responses from a candidate who performed well in question 3 is shown in Extract 3.3.1.
### Extract 3.3.1

The extract is a sample of responses from the candidate who managed to provide correct responses to most parts of the question, except in part (a) (i) for specimen J₃.

Further analysis shows that, the candidates who performed poorly in this question were unable to provide correct responses to parts (a) (i), (iii), (b) (iii) and (iv). Most of the candidates responded correctly to parts (a) (ii), (b) (i) and (ii). In part (a) (i), the candidates failed to identify the given specimens by their scientific names. Examples of incorrect responses provided were Rhodes grass- *Tripsacum laxum* instead of *Chloris gayana* and Elephant grass/Napier grass- *Pennisetum purperian* instead of *Pennisetum purpureum*. In part (b) (iii), the candidates also were unable to explain the relationship between specimens J₃ and J₄. They provided incorrect responses such as *specimen J₃ and J₄ can be obtained from grass of animal or water, all can cause disease to animals when entered to the animal body, animals such as cattle lose appetite during eating*. Examples of
incorrect responses provided by the candidates for ways in which specimen J\textsubscript{4} may be controlled from infesting farm animals in part (b) (iv) were to ensure clean and fresh food are provided to the animals, provision of medicine to animals, prevent mixing of animals for example pig and goat. Their incorrect responses in most parts of the question imply lack of good understanding of livestock parasites.

It was also noted that, some candidates managed to identify the specimens provided in part (a) (i) and correctly gave reasons for farmers to conserve specimens J\textsubscript{1} and J\textsubscript{2} in part (a) (iii). Additionally, the candidates managed to describe how farm animals could be infested by specimen J\textsubscript{4} and name farm animals which are common hosts of specimen J\textsubscript{4} in part (b) (i) and (ii), respectively. Poor responses from one of the candidates are indicated in Extract 3.3.2 in question 3.

<table>
<thead>
<tr>
<th>Specimen</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>J\textsubscript{1} - Chloris</td>
<td>Bloodworm</td>
</tr>
<tr>
<td>J\textsubscript{2} - Panmodium</td>
<td>Cutworm</td>
</tr>
<tr>
<td>J\textsubscript{3} - Water</td>
<td>Unail</td>
</tr>
<tr>
<td>J\textsubscript{4} - Fasciola</td>
<td>Hepatic</td>
</tr>
</tbody>
</table>
ID Specimen J and J2, they can be preserved by because they provide coarse fodder to livestock and used as ornamental purposes.

Because used as coarse fodder to livestock, hence Specimen J and J2 are used as coarse feed for animals hence increase milk production.

ID Used as a pollination, Specimen J and J2 used as pollination because transfer pollen grain from one plant to another plant.

ID Used for ornamental, where by Specimen J and J2 are used for ornamental purpose.

ID When by farm animals can be injected by specimen J4 by liver fluke attack can cause, eat duck blood, eating liver tissue, laying eggs which can cause severe liver disease and there is liver fluke attack to animal can cause chronic, chronic wasting, poor production and death of the animals so to farmland animal can be injected by specimen J4.

ID Cattle
ID Sheep
Extract 3.3.2
The extract is a sample of the response from the candidate who performed poorly in all parts of the question, except part (b) (ii).
3.0 PERFORMANCE OF CANDIDATES IN EACH TOPIC/FIELD

The analysis of the candidates’ items responses in different topics and field in 2019 examination indicates that the candidates had good performance in most of the topics/field examined. Performance was considered as good if percentage of the candidates who scored an average of 35 marks and above falls in the range of 60-100, if the percentage of the candidates who scored an average of 35 marks and above falls in the range of 35-59, the performance is average and if the percentage is less than 35, the performance is poor.

Considering that criterion, the topics/field which had good performance were; Agricultural Engineering and Land Planning (98.6%), Crop Science and Production and Soil Science (94.6%), Introduction to Weed Science (94.4%), Farm Structures (93.8%), Introduction to Animal Nutrition (92.2%), Pasture Agronomy (90.3%), Livestock Science and Production (89.6%), Introduction to Animal Health (81.9%), Farm Power (79.2%), Agricultural Production Economics (77.1%), Farm Workshop (73.2%), Introduction to Irrigation (62.8%), Introduction to Agricultural Prices (62.4%) and Crop Pests (60.4%).

On the one hand, topics on Farm Mechanization and Machinery (53.7%), Introduction to Soil Science (50.6%), Plant Diseases (45.2%), Environmental and Technological Challenges in Agricultural Development (45.1%), Introduction to Soil Chemistry (41.2%) and Livestock Reproduction, Breeding and Improvement (40.1%) had average performance. On the other hand, candidates performed poorly in the topic on Plant Breeding (12.9%).

In both years 2019 and 2018, the topics and fields examined in ACSEE were 21. In 2019 ACSEE results, topics and fields with good performance were 15, 5 topics had average performance and 1 topic had poor performance compared to 2018 ACSEE results in which 17 topics/ fields had good performance, 3 topics had average performance and 1 topic had poor performance.

The performance rate of the candidates in 2019 has increased compared to 2018 results because more candidates passed in 2019 than in 2018. Performance of the candidates in each topics/fields is shown in Appendix I. Green colour denotes topics/fields with good performance, yellow colour indicates topics with average performance whereas red colour shows topic with poor performance.
4.0 CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

The analysis shows an increase of 0.28 percent pass rate in ACSEE 2019 compared to 2018 results. In this year’s examination, 98.49 percent of the candidates who sat for the examination passed compared to 98.21 percent who passed in 2018 examination.

The general performance of the candidates’ shows that majority passed, but their scores were low. Among the candidates who passed the examination 538 (82.26%) attained the lower pass grades D, E, and S while 116 (17.74%) of the candidates attained the upper pass grades B and C. None of them attained grade A in this year’s examination.

Analysis of candidates items response revealed several factors that have contributed to the majority to score low pass marks. This include candidates not having good understanding of the topics. It was observed that the majority of the candidates had inadequate knowledge in different topics that were examined. This was evidenced from candidates responses provided either incorrect or insufficient. Additionally, other candidates skipped some of the questions.

Candidates’ inadequate knowledge in various topics was also associated with inadequate field practical experiences. Practicals translate theory into actual practice and students learn better by doing. There were questions in the theory examination which needed practical skills in addition to classroom knowledge for candidates to have attempted them well. Hence insufficient practical experiences resulted into their failure.

In some cases, in different items in the questions, candidates did not fulfill the requirements of the questions. Candidates, failed to identify the tasks in the questions properly, hence they provided responses that were not related to the demands of the questions.

On the other hand, responses from few candidates who scored high marks in the examination indicated that the candidates possessed adequate knowledge and practical skills that enabled them to meet the demands of the questions.

4.2 Recommendations

Performance rate of the candidates in this year’s examination has increased compared to the year 2018 results. However, majority of the candidates passed with lower pass grades. Collective effort from education stakeholders particularly
teachers and students is needed in order to improve performance of the candidates. The following are recommended so as to increase the performance in future examinations.

(a) Teachers should make effective use of enabling infrastructure in the subject such as school farms, garden and farm workshop which translate theory into practice because students learn better by doing.

(b) Teachers should effect appropriate teaching/learning strategies as per demand of the topics.

(c) Subject teachers should use team teaching technique to teach various topics.

(d) Teachers should orient their students with key terms used in examination questions by using them in continuous assessment exercises.

(e) Teachers and students should spend extra hours to enhance students’ understanding, especially to those topics which are more demanding than others.

(f) Students should be encouraged to be inquisitive and look for various sources of materials and references that suit the demand of the syllabus.
<table>
<thead>
<tr>
<th>S/N</th>
<th>Topic/Subtopic</th>
<th>2019 Percentage of Candidates who scored the average of 35% and above</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Agricultural Engineering and Land Planning (Paper three)</td>
<td>98.6</td>
<td>Good</td>
</tr>
<tr>
<td>2.</td>
<td>Crop Science and Production and Soil Science (Paper three)</td>
<td>94.6</td>
<td>Good</td>
</tr>
<tr>
<td>3.</td>
<td>Introduction to Weed Science</td>
<td>94.4</td>
<td>Good</td>
</tr>
<tr>
<td>4.</td>
<td>Farm Structure</td>
<td>93.8</td>
<td>Good</td>
</tr>
<tr>
<td>5.</td>
<td>Introduction to Animal Nutrition</td>
<td>92.2</td>
<td>Good</td>
</tr>
<tr>
<td>6.</td>
<td>Pasture Agronomy</td>
<td>90.3</td>
<td>Good</td>
</tr>
<tr>
<td>7.</td>
<td>Livestock Science and Production (Paper three)</td>
<td>89.6</td>
<td>Good</td>
</tr>
<tr>
<td>8.</td>
<td>Introduction to Animal Health</td>
<td>81.9</td>
<td>Good</td>
</tr>
<tr>
<td>9.</td>
<td>Farm Power</td>
<td>79.2</td>
<td>Good</td>
</tr>
<tr>
<td>10.</td>
<td>Agricultural Production Economics</td>
<td>77.1</td>
<td>Good</td>
</tr>
<tr>
<td>11.</td>
<td>Farm Workshop</td>
<td>73.2</td>
<td>Good</td>
</tr>
<tr>
<td>12.</td>
<td>Introduction to Irrigation</td>
<td>62.8</td>
<td>Good</td>
</tr>
<tr>
<td>13.</td>
<td>Introduction to Agricultural Prices</td>
<td>62.4</td>
<td>Good</td>
</tr>
<tr>
<td>14.</td>
<td>Crop Pests</td>
<td>60.4</td>
<td>Good</td>
</tr>
<tr>
<td>15.</td>
<td>Farm Mechanization and Machinery</td>
<td>53.7</td>
<td>Average</td>
</tr>
<tr>
<td>16.</td>
<td>Introduction to Soil Science</td>
<td>50.6</td>
<td>Average</td>
</tr>
<tr>
<td>17.</td>
<td>Plant Diseases</td>
<td>45.2</td>
<td>Average</td>
</tr>
<tr>
<td>S/N</td>
<td>Topic/Subtopic</td>
<td>2019 Percentage of Candidates who scored the average of 35% and above</td>
<td>Comments</td>
</tr>
<tr>
<td>-----</td>
<td>---------------------------------------------------------</td>
<td>---------------------------------------------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>18.</td>
<td>Environmental and Technological Challenges in Agricultural Development</td>
<td>45.1</td>
<td>Average</td>
</tr>
<tr>
<td>19.</td>
<td>Introduction to Soil Chemistry</td>
<td>41.2</td>
<td>Average</td>
</tr>
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<td>20.</td>
<td>Livestock Reproduction, Breeding and Improvement</td>
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<tr>
<td>21.</td>
<td>Plant Breeding</td>
<td>12.9</td>
<td>Weak</td>
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