

**THE NATIONAL EXAMINATIONS COUNCIL OF TANZANIA**



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

**134 AGRICULTURE**

**THE NATIONAL EXAMINATIONS COUNCIL OF TANZANIA**



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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.



Dr. Charles E. Msonde  
**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

<b>Grades</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>S</b>	<b>F</b>	<b>Total</b>
<b>Female</b>	0	0	34	96	66	9	5	210
<b>Male</b>	0	10	72	196	153	18	5	454
<b>Total</b>	0	10	106	292	219	27	10	664

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.

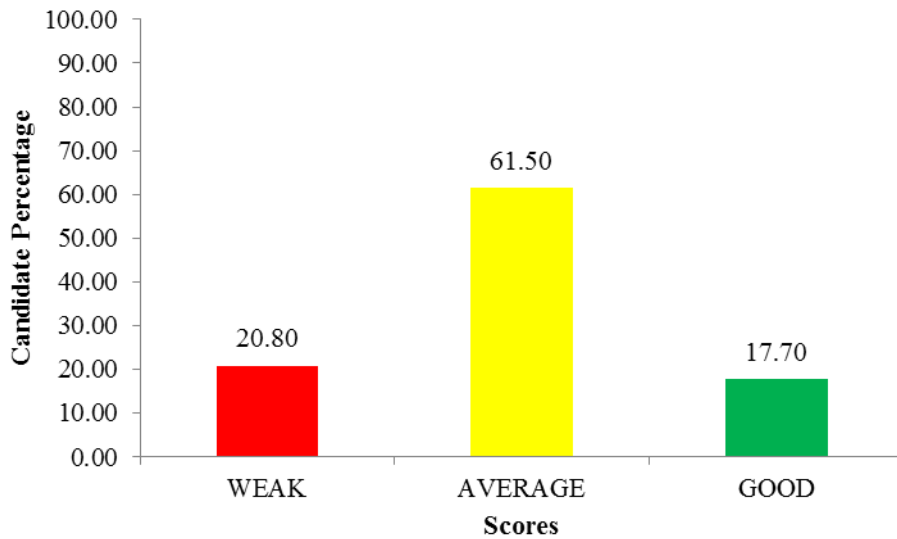
## **2.0 ANALYSIS OF THE CANDIDATES' PERFORMANCE IN EACH QUESTION**

### **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.



**Figure 1.1:** *Candidates' Performance on Question 1*

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.



Q1.	(a) The component is <del>connecting rod</del> . CRANK SHAFT.
	(b) <u>Eight systems.</u>
	(i) <u>Fuel system</u> : Is a system in the tractor which deal with the provision of correct amount of fuel to the engine for ignition.
	(ii) <u>Lubrication system</u> : It deal with lubricating different moving parts of the engine and bearings.
	(iii) <u>Electrical system</u> : It provide a means of light, starting tractor and operating indicators in the tractor.
	(iv) <u>Valve system</u> : A system containing devices which control opening and closing of valves like camshaft to allow fuel to enter in cylinder.
	(v) <u>Hydraulic system</u> : Is a system which is used for attachment of other implements trailers and other at Power take off.
	(vi) <u>Cooling system</u> : It is a system which ensure that tractor is operating at correct temperature.
	(vii) <u>Ignition system</u> : Is a system which deal with fuel ignition to produce power.
	(viii) <u>Transmission system</u> : Is a system which deal with power transmission from engine to rear wheel.

4. (c) Operation of petrol and diesel engines.

(i) Petrol engine.

- It uses petrol fuel to produce power. Operation begins when:

→ Fuel from tank passes through system of filters to be filtered, then clean fuel enters the carburetor, where it mixes with air to form fuel-air mixture. Then the fuel-air mixture is injected to the combustion chamber where it is compressed and ignited to produce power.

→ (ii) Diesel engine.

- It uses diesel fuel to produce power. Operation begins when:

→ Clean air alone is taken to the combustion chamber and compressed to high temperature,

- The clean fuel enters the injector pump and is pumped at high pressure then injected through a system of injector nozzles to make fine droplets.

- The fine droplets are taken into the combustion chamber where they meet with hot compressed air. Then ignition occurs and power is produced.

(d) (i) coil: This is made of system of coiled wires which step up or increase the current produced from the battery so that it can be distributed to the spark plug.

4(d)(ii) Distributor: It transmit the current of electricity equally to the spark plug so that it can produce spark during ignition.
(iii) Condenser: This is used to store electric currents before ignition.
(iv) Spark plug: This receives currents so that it produce sparks during spark ignition in petrol engine.
(v) Battery: This stores produced current by the engine for ignition, starting tractor, lighting and other roles.

### 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.

1	d) Connecting rod	
	ii) cylinder - Place of combustion chamber.	
	iii) cylinder head - Have combustion chamber for mixing air-fuel	
	iv) Connecting rod - linear motion in a crankshaft to rotary motion	
	v) piston - Opening one side and closing the other	
	vi) Crankshaft - Used to transmit power into the connecting rod	
	vii) Crankcase - Connecting and enlarge crankshaft	
	viii) Camshaft - Controlling valves.	
	ix) Inlet and exhaust valve - for passage of fuel-air	
	d) petrol engine	fuel engine
	ii) Uses petrol	ii) Uses diesel
	iii) Have spark plug	iii) Have no spark plug
	iv) Have carburetor for mixing air and fuel	iv) Have no carburetor for mixing air and fuel
	v) Need supply of power in order to operate	v) Does not need supply of power to operate
	vi) Have injector nozzle	vi) Have injector pump
	vii) Have cylinder for combustion chamber	vii) Have no cylinder chamber
	d) ii) Coil - Increase the chance of ionization	
	iii) Distributor - Cool the water from carburetor	
	iv) Condenser - prevent leakage	
	v) spark plug - Used for ignition system.	
	vi) Battery - Used to connect the ignition system	

### Extract 1.1.2

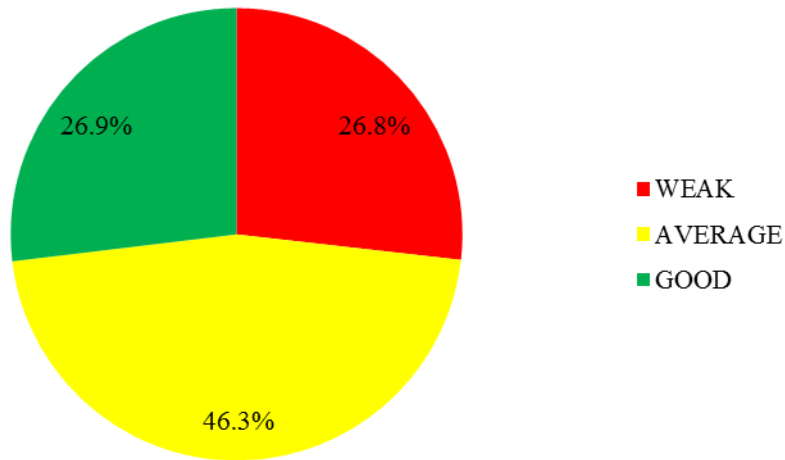
This is an extract from one of the candidates who failed to provide correct responses in all parts of the question.

### 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.



**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.

2.	(a) (i)	
		(i) Goggles.
		- Are used by the farmer during welding to - prevent eye damages.
		(ii) Overall cloth.
		- This help the farmer to prevent the clean - clothes worn inside from getting dirty.
		- Also prevent injuries in the farm workshop if the - farmer would wear loose clothes.
	(b) (i)	
		@ Precaution Safety, precaution against working place.
		(i) The benches 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 pointed <del>tools</del> 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 its found.
		(ii) Direct heat sources should not brought near - inflammable liquids.
		(iii) Flammable liquids should be stored in approved -

2.	(b) Containers.	
	(iv) You are advised to draw just enough fuels and not more supplies.	
2.	(b) (ii) Fire extinguisher is used to stop small fires if started in the workshop.	
	- If the fire start in the workshop the fire extinguisher is taken and then the safety pin is removed and powder is applied to stop the fire in farm-workshop.	
2.	(c)	
	(i) It should be near desirable communication.	
	- The workshop should be located near communication like roads.	
	(ii) It should be near important facilities.	
	- The facilities like water and electricity must be near the workshop.	
	(iii) It should be located away from residential areas. Farm workshop should be located 500-400-600 metres away from residential areas to prevent noise pollution to the people.	
	(iv) It should be sited near the farm.	
	- The farm workshop should be located at the place near the farm to reduce the time required to repair the machines and equipments away.	

### 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 work shop, 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.



201	<p>gear box is used to stop the machine during farm operation.</p> <ul style="list-style-type: none"> <li>- Goggles</li> <li>- Apron</li> <li>- Tractor gear.</li> <li>- Planter gear</li> </ul>	
b)	<p>Three main surface precautions to be considered in farm workshop are:</p> <p>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.</p> <p>Do not sit in the workshop, this is because injury may occur when some tools are not well arranged hence it can cut or cause accident.</p> <p>Do not smoke near the tools and equipment and other properties which catch fire, this is because fire outbreak may occur in the workshop, hence may cause destruction of farm workshop and other properties.</p>	
	<p>Use of fire extinguisher in the farm workshop is to prevent destruction of properties when fire outbreak occurs. Fire extinguisher is used to prevent fire hazards.</p>	
c)	<p>To account for six factors to consider when setting a farm workshop:</p> <p>(i) Availability of materials, these are materials used</p>	

2c). to build farm workshop.	
(ii) Capital, There must be enough capital in order to sit good farm workshop.	
(iii) Amount of tools and equipment farm workshop size depend on the amount of tools and equipment to be kept there.	
(iv) Type of the soil, for example clay soil is not much suitable since it has very high moisture content.	
(v). Design of the workshop also should be considered.	
(vi) Cost of materials should also be considered in order to have a good farm workshop.	

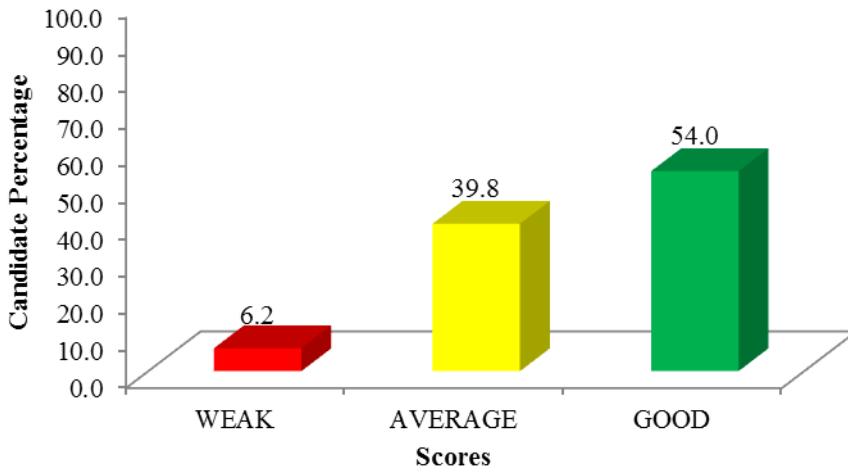
**Extract 1.2.2**

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.



**Figure 1.3:** *Candidates' Performance on Question 3*

The analysis shows 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.

36. (i) Concrete block is the hard block material which is made by using concrete which contains aggregates and cement.

WHILE

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

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

WHILE

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

(iii) Foundation is the part which supports super structure buildings.

WHILE

Footings are the lowest part of the foundation.

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

(i) The intended use of the structure, the farmer should build a certain structure according to his/her needs of the designed structure.

(ii) The prevailing of natural conditions like precipitation, temperature and sun. The farmer should look at the natural conditions when constructing the farm structures which later can help for the farm business.

		use only
3(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 able protect pests and other organism which can cause damage to the farm products.	
	(iii) A good storage structure should be able to protect direct contact of sun to the machines like tractor and fuel tank and flammable liquids.	
	(iv) It must be able protect from theft and loss of tools in the farm	
	(v) It must be able to protect from the dust and other wastes produce	
	(vi) It must be constructed with a hard wall especially concrete wall.	
(d)	(i) <u>Spray race structure</u> → Help in controlling external parasites like ticks	
	(ii) <u>Fish pond structure</u> → Help the farmer to keep the fishes hence provide food to the farmer and increase the farmer income when selling them.	
	(iii) <u>Fence structure</u> → This help to minimize the chance of	

3	disputes (conflicts) in boundaries between two or more neighbours.	
	(iv) <u>Crashes structures</u>	
	→ This help the farmer to obtain the blood sample, artificial insemination and controlling the parasites to the animals.	
	(v) <u>Bee hives structure</u>	
	→ Help the farmer to obtain honey and other products produced by bees.	

### 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.

2a)	To differentiate between the following	
i)	Concrete block and mud brick. Concrete block is the block that is made up by the component 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.	
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.	
b)	Three factors influencing design of farm 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 in order 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.	

B. (c)	Features of good storage structures includes
i/	Must be have ventilation that is well and good ventilation.
ii/	Must be at the center of the farm.
iii/	Must have good strength and durability.
iv/	Must stay for long period of time after reconstruction.
v/	Must avoid destruction of pest and diseases.
vi/	Must allow circulation of air.
(d)	Five farm structures includes
i/	Thatch grasses; Importance - Its cheap. - Simple to apply.
ii/	Corrugated iron sheets Importance - Its strong - Can not allow outbreak of fire and pest.
iii/	Tiles; imp Importance - Its strong. - Can not be destructed by pest and fire.
iv/	Asbestos - Its hard and can not be destructed.
v/	Canvas - Its cheap and simple to apply

#### Extract 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).

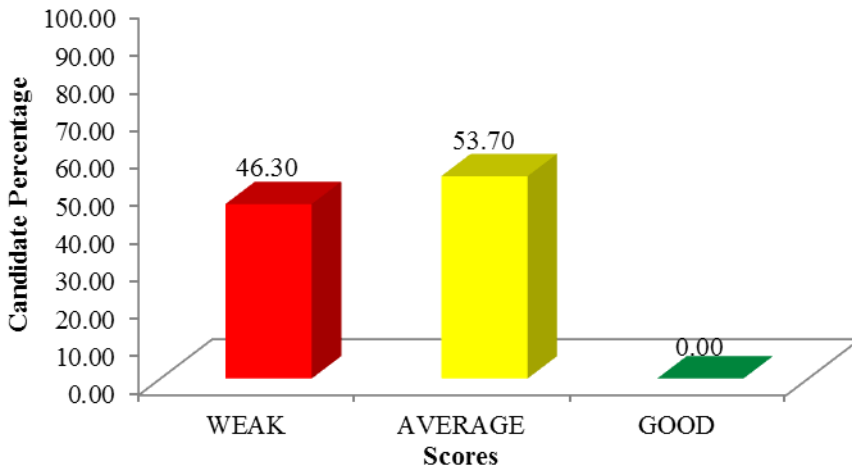
#### 2.1.4 Question 4: Farm Mechanization and Machinery

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



**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.

4a	Seed drill used for sowing small size seed and have to fertilizer hopper while a planter carry large sized seed and have fertilizer hopper.
4 b)	<ul style="list-style-type: none"> <li>i/ Metering device - for metering seeds</li> <li>ii/ Delivery tube - for placing seed into the ground soil and fertilizer.</li> <li>iii/ Furrow opener - for opening furrow into the ground.</li> <li>iv/ Pressing device - for pressing the seed into the soil.</li> <li>v/ Hopper/tank - for carrying seed and fertilizer</li> <li>vi/</li> </ul>
4c	<ul style="list-style-type: none"> <li>i/ Moldboard plough make the complete burial of plant residue</li> <li>ii/ Mollification of land into proper condition for plant to grow</li> <li>iii/ <del>intermixing</del> <sup>mixing</sup> of fertilizer with the soil</li> <li>iv/ <del>intermixing</del> <sup>mixing</sup></li> <li>v/ <del>intermixing</del> <sup>mixing</sup></li> </ul>
4d	<p>Combining harvester perform many operation at once</p> <ul style="list-style-type: none"> <li>- i/ Cutting of crop plant from the field this is done by knife with moving by representing motion.</li> <li>ii/ Sorting of grain from the straw</li> <li>iii/ Farm cleaning by removing the unwanted crop plant during harvesting.</li> <li>iv/ Allow wing of grain crop to remove dust weed from it.</li> <li>v/ bagging the grain - and remaining the straw</li> </ul>

#### 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.

4 a)	Compare a seed drill with a planter. A seed drill is the small hole where seed can be placed into it.	
	while planter It is used for planting row crops.	
4 b)	function of seed drill - To meter the seed - To place the seed into uniform depth. - To carry the seed. - To place the seed into a furrow.	

4	c) Elaborate four functions of double mouldboard plough.
	Standard double mouldboard plough it has disc which can turn, cut and invert furrow slice.
	- Double Mouldboard plough it rides along the dead furrow while moving in opposite direction.
	- Double mouldboard plough does not require higher amount of labour.
	- Double mouldboard plough does not require in each skilled skills/knowledge.
4	d) Briefly describe the mode of operation performed by a combine harvester.
	Combine harvester this is the method used by farmer to plant & harvest various land of crop within the field. During harvest this instrument can harvest more than two kind of crop at a time this is how mode of operation performed by the combine harvester.

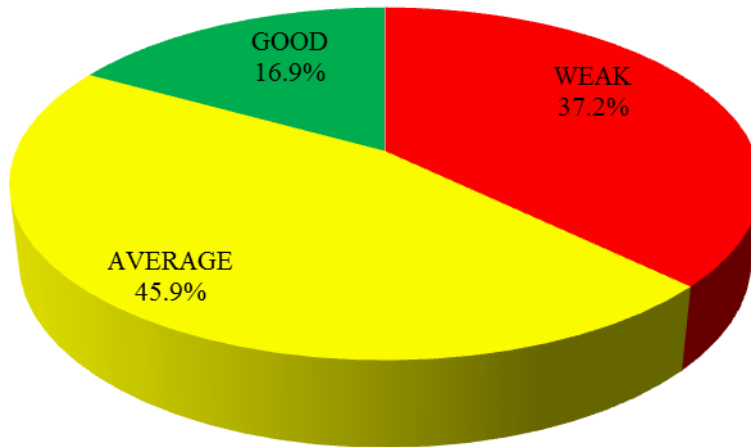
#### Extract 1.4.2

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) borders (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:** *Candidates' Performance on Question 5*

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.

5(a)	<p>(i) Watering cans; These are containers having a handle with a small sized perforations which are used to water plants in small scale, such as garden and trees surrounding the home. Watering is done at the top of plants as water flows from the watering cans facing downward through the perforations.</p>
	<p>(ii) Sprinklers (small sized sprinklers), unlike in large scale where large amount is required, since at home little amount is required for irrigation. Therefore small sized sprinklers are used for overhead irrigation.</p>
	<p>(iii) Perforated containers; sometimes perforated containers made up of plastic and metals are placed above the plants and water is placed on them so that once flow downward through the holes it is in form of drops like rainfall.</p>
(b) (i)	<p>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 in paddy and rice fields. The level of water on a farm is controlled by opening and closing flow of water from the source by creating barriers.</p>
	<p>(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 unrequered land. The checks may be made of concrete, stones or bricks.</p>
	<p>(iii) Boarders; These are demarcation which separate between one irrigation pathway and another. These are normally applied to surface irrigation, especially in</p>

5(b)(iii)	basin and furrow irrigation. Borders are created between one farm and another to facilitate the use of water by many people.
(iv)	Basin; 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 dykes. After a certain level of water has been supplied, the source may be closed. Water is confined only in certain part of the farm by the dykes.
(v)	Furrow irrigation; This is the irrigation method in which channel for directing 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 rotation 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.

### 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, borders- this is the irrigation which take place between the row of the plant and*

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.

50	equipment used to carry out overhead irrigation at the home garden.	
	i/ Source of water (dam)	
	ii/ Lateral	
	iii/ pump	
(b)	i/ Free flooding;	
	⇒ Is the type of irrigation which apply for allowing water from the water source and leaves free above the soil on the soil.	
	ii/ Checks;	
	⇒	
	iii/ Borders	
	⇒ Is the methods of surface irrigation which apply for making large leaching around the farm and make for applying irrigation on the surface.	
	iv/ Basin	
	⇒ Is the method of surface irrigation which allow water on the soil from the water source such as dam.	
	v/ Furrow	
	⇒ Is the method of surface irrigation which make leaching on the ground around the leaves of the crops and allow water to pass through.	



5C) Factors to be considered when operating sprinkl	
e irrigation system.	
- Source of water	
- power	
- water pump	
- Pipe	
- Tank	
- main body	
- lateral	

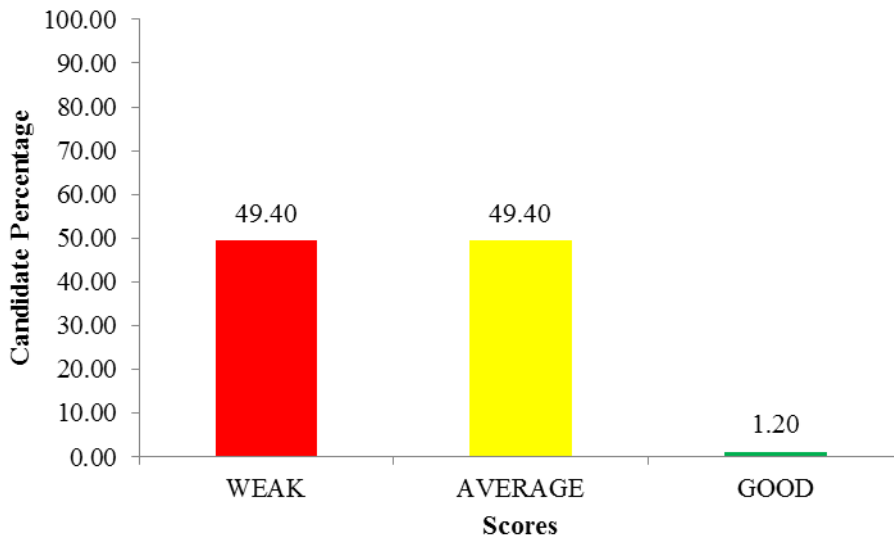
**Extract 1.5.2**

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

**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.



**Figure 1.6:** *Candidates' Performance on Question 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.

6	<p>(a) Weathering</p> <p>- Is the process of breaking down and transformation of rocks and minerals under natural conditions.</p>	
	<p>(b) • Chemical weathering</p> <p>- This is a type of weathering where by the rock particle is broken down as a result of chemical reaction.</p> <p>- Example some roots produce carbon dioxide which reacts with water forming carbonic acid solution of acid, this disintegrates the soil particles held together.</p> <p>- Also carbonic acid / humic acid rain may reach the rock surface and disintegrate.</p>	
	<p>• Mechanical weathering</p> <p>- This is a physical disintegration of the rock particles.</p> <p>- It may be caused by vibrations, movement of <sup>water</sup> <del>air</del> or Mass wasting <sup>wind</sup> and also alternate drying and wetting.</p> <p>- It involves abrasion, exfoliation (peeling off the rock particle due to expansion and contraction during the day and night), attrition.</p>	
	<p>Relationship Between Mechanical and chemical weathering</p> <p>- Chemical weathering weakens the rock particles by corroding or reacting with the rocks forming weak aggregates hence exposing the rock easily to mechanical weathering.</p> <p>- Chemically weakened rock, therefore is easily broken down by water, wind, Mass wasting and other mechanical agents.</p>	

6c)	<ul style="list-style-type: none"> <li>• Living organisms.</li> </ul>	
	<ul style="list-style-type: none"> <li>- The activities of burrowing animals, like earthworm results to breaking down of soil (weathering).</li> </ul>	
	<ul style="list-style-type: none"> <li>- The movement of large herd of animals, people as well as heavy vehicles influences weathering of the soil mechanically.</li> </ul>	
	<ul style="list-style-type: none"> <li>- Plant roots penetrate down the soil thereby breaking rock particles, and also they produce carbon dioxide from root respiration which dissolve in soil forming acidic solution which exposes soil to chemically weathering.</li> </ul>	
	<ul style="list-style-type: none"> <li>• Water</li> </ul>	
	<ul style="list-style-type: none"> <li>- Moving water causes mechanical breakdown of rock particles of the soil</li> </ul>	
	<ul style="list-style-type: none"> <li>- Acid rain forms the acidic solution of weak carbonic acid which reaches the rock and weakens it by making it unstable and vulnerable to mechanical weathering.</li> </ul>	
	<ul style="list-style-type: none"> <li>- Water is also involved in processes like solution, hydration and hydrolysis of a rock particle.</li> </ul>	
	<ul style="list-style-type: none"> <li>• Wind</li> </ul>	
	<ul style="list-style-type: none"> <li>- 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.</li> </ul>	
	<ul style="list-style-type: none"> <li>• Temperature</li> </ul>	
	<ul style="list-style-type: none"> <li>- Rise and fall of temperature, that is alternate heating and drying of the soil causes the rock particle to become unstable and vulnerable to</li> </ul>	

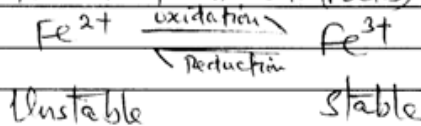
### 6c) Mechanical weathering.

- Alternate drying & contraction and expansion also cause exfoliation (peeling off the rock particles due to contraction and expansion of rock during day and night)

### 6d) <1> Redox process.

- The process involves oxidation and reduction processes on the rock particles. Alternate changing in oxidation states of an element forming rock causes a rock to become unstable and exposed to mechanical weathering.

- It is common in soil (rocks) formed by iron, example

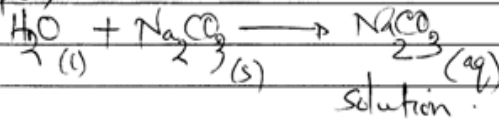


### <2> Solution processes

- 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;

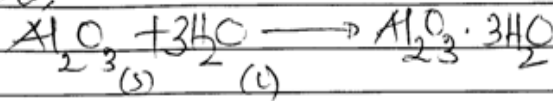


### <3> Hydration process

- In this process water reacts with a rock particle thereby forming a hydrated compound. Some rocks

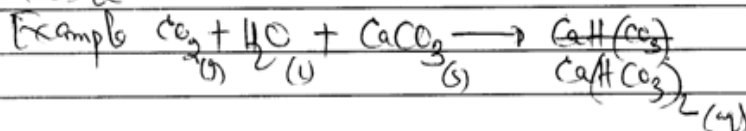
60) becomes weak when hydrated and therefore easily eroded or weathered by wind, living organisms or water.

Example:



#### <4> Carbonation process

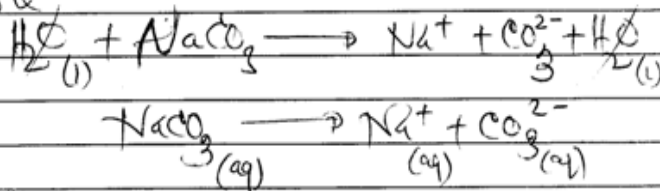
- In this process, the carbon dioxide dissolves in soil water forming weak carbonic acid which reacts with rock particles and making it unstable.



#### <5> Hydrolysis process

- In this process water acts as a reagent where it chemically breaks down the rock mineral by hydrolysis process, hence weathering.

Example



#### 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.  $CaCO_3 + H_2O \longrightarrow H_2CO_3 + Ca(OH)_2$  exfoliation refers to the process in which large particle disintegrate into smaller particles to form soil.  $Fe_2SO_{(4)3} + H_2O \longrightarrow Fe^{3+} + SO_4^{2-}$  Abrasion refers to the process of weathering to form a soil under reduction process.  $2 CuS_2 \longrightarrow Cu_2O$*

*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.

a) Weathering is the action of physical and chemical breakdowns down of large particles into small particles which can be caused by wind, mineral salt, rock.

b) i) primary weathering - this involves physical breakdowns down of particles from large particle to small particles examples of these physical weathering are crystal growth, and thermoexpansion.

ii) secondary weathering  
this involves the chemical breakdowns down of large particles into small particles  
examples of chemical weathering are:

- Oxidation
- hydration
- hydrolysis.



6 c) strength of the soil aggregates.

This is among of the main agent of weathering work on rock. The stronger the strength of the soil aggregates the larger the surface area of break down into smaller particles but when the strength of the soil aggregates is weak it could be very difficult also in breaking down of larger particles into small particles due to the weakness of the strength of the soil aggregates may take time of this rock to be broken down into small particles.

i) Temperature:

Temperature is the coldness or hotness of an object. when there is higher temperature the soil aggregates disintegrate into small particles compare to the time where there is low temperature it will take time for the soil aggregates to breakdown into small particles. although the temperature the higher the higher breakdown of large particles into small particles and vice versa.

Bacterial excrete: Bacterial excrete is among of the main agents of weathering work on rock. Bacterial excrete may lead to breakdown of large particles into small particles this is where the bacteria starts to excrete the soil aggregates breakdown then the surface which may lead to breakdown of large particles into small particles.

	<p>(iv) Root activity • Root activity which can be done within the soil surface may lead to breaking down of large particles into small particles. Root activity when trees are taking place within the soil may lead to soil surface to start loosening the space or cracks from one place to another which can lead to breakdown of these large particles into small particles.</p>
6°	<p>6. Explain one chemical equation in each case, explain any two processes involved in chemical weathering of rocks if hydration.</p> <p>Hydration this is the chemical weathering of rock where water is lost in form of water vapour within the surface which may lead to breakdown of large rock into small rock particles.</p> <p>(i) Dissolution. Dissolution this is the chemical weathering of rock where material / rock may undergo dissolution process so as the larger particles can break down into small particles.</p> <p>Hydrolysis - is the loss of water in form of droplets. Due to this hydrolysis can make large particles to break down into small particles in various ways.</p>

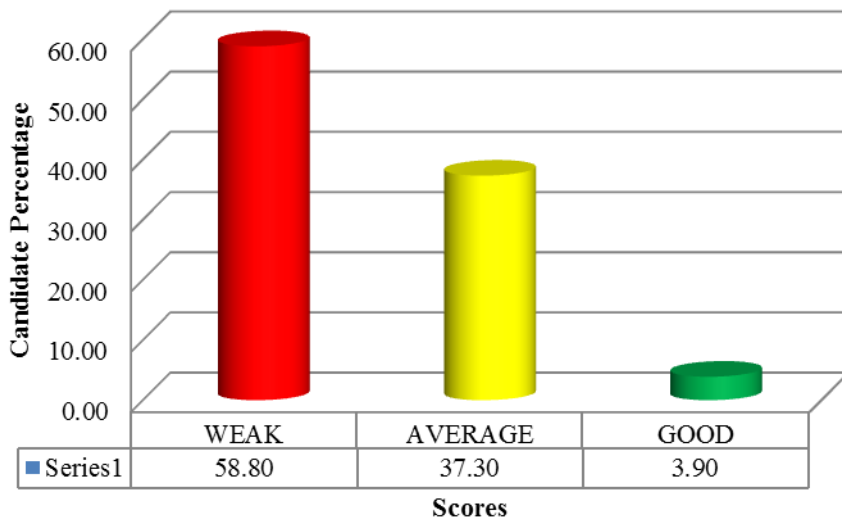
### Extract 1.6.2

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.



**Figure 1.7:** Candidates' Performance on Question 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.

7. (a) Five factors affecting composition of farm yard manure.

Farmyard Manure: It is type of manure from farm animal and its wastes like litter and feed remains.

(i) Type of Animal.

- Composition of farm yard manure depend on type of animal resulting to it, poultry manure is very nutritive 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 complexity in the rumen the feed is much acted by bacteria hence contains some extra nutrients but calf has not well developed rumen. but also adult has high digestibility.

(iii) Litter material used.

- Also composition of farmyard depend on litter materials that are used in preparation and the way used to be. Some litters contain nutrients and have high absorbent and highly decomposed hence farmyard will contain high composition of nutrients.

(iv) Feed Eaten by an animal.

- Also feed determine / influence <sup>composition</sup> ~~part of~~ of farmyard manure. If the animal eat nutritious feeds like concentrates, legumes its manure will have 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 unused wastes that come out will contain large composition of nutrient rather than that with low digestibility.

(b) (i) Fertilizer: This is an inorganic substance (manure) made from industries which contains various nutrients in correct proportion and ratio for proper growth of plants like UREA, CAN, DAP, SSP, MAP, JA.

(ii) Fertilizer analysis: Is a process of analysis composition of a fertilizer, by involving ratio of nutrients it contains.

(iii) Fertilizer grade: Is a rating of fertilizer in grades according to quantity and quality of components it contains.

(iv) Fertilizer ratio: Is a ratio of nutrient element it contains and other materials.

### (c) Function of essential plant nutrients.

(i) They aid in translocation of food within the plant from one cell to another or tissue to tissue.

7.	(i) assist in oxidation and reduction process in the plant like zinc and cobalt
	(ii) They serve enzymatic roles within the plant like magnesium, copper help various reactions involving enzymes.
	(iii) They provide plant resistant to disease - plant immunity is improved so that they are not easily attacked by pathogens.
	(iv) They improve stem stability and strength of a plant, calcium plays this great role so that plant become stable even to action of strong wind.
	(v) They hasten maturity of plants especially vegetative crop like
	(vi) They enable plant to thrive in harsh condition like high salt concentration.
	(vii) Aid in chlorophyll formation like Magnesium.

#### Extract 1.7.1

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.

7.	(a) The following are the five factors which affect the composition of any farmyard manure.	
	pH of the soil; the soil pH is the one which can affect the composition of the farmyard manure which can be acidic or be alkalinity	
	Moisture content; through the presence of moisture content the manure also it can be affect the composition of the farmyard manure	
	Micro-organisms; living organisms also can affect the composition of the farmyard manure due to	

7	<p>(a) Another factor which can affect the composition of farmyard manure.</p> <p>Temperature of the soil; the soil temperature also can affect the composition of the farmyard manure &amp; this can make farmyard manure to be affected.</p> <p>Types of crops; the crop type also can affect the composition of the farmyard manure because some crop need application of inorganic manure so crop types also can affect the composition of farmyard manure.</p>
	<p>(b) (i) Fertilizer - those are the manure which hold plant nutrient</p> <p>(ii) Fertilizer analysis this is the application of the fertilizer which is required to the plant.</p> <p>(iii) Fertilizer grade this is the minimum fertilizer required to the plant.</p> <p>(iv) Fertilizer ratio - is the amount of the fertilizer applied to the</p>
7.	<p>plant.</p> <p>(c). The following are the six functions of essential plant nutrient</p> <ul style="list-style-type: none"> <li>- It give medium growth to the plant.</li> <li>- It provide the soil fertility.</li> <li>- It provide crop with</li> <li>- It provide product with high quantity and quality.</li> <li>- They increase yield.</li> <li>- It increase water holding capacity.</li> <li>- It modify soil temperature</li> </ul>

#### Extract 1.7.2

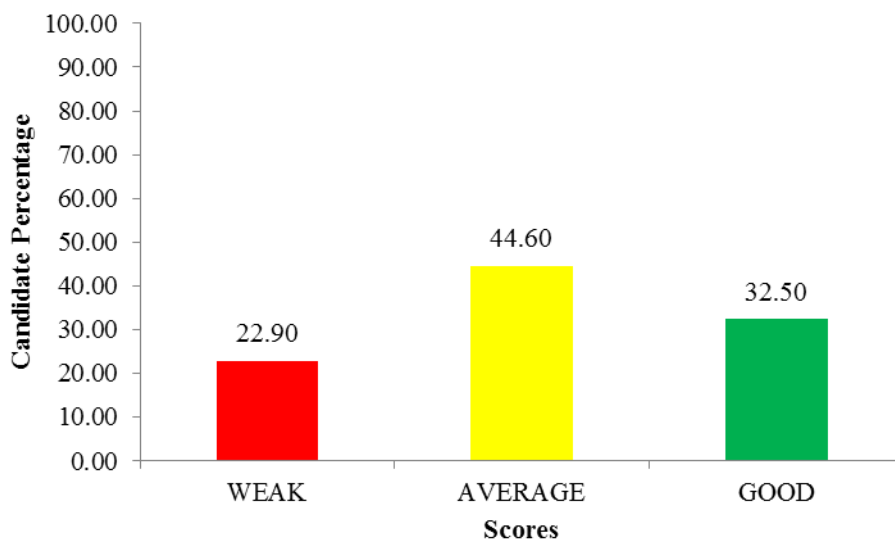
This is an example of poor responses from the candidate who failed to give correct responses to all parts of the question. The candidate showed the lack of knowledge on plant nutrition.



### 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.



*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 exhaustive. 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.

8.1	(a)	
	(i) $Y_1$ and $Y_2$ , the relationship is Complementary relationship this is the relationship between two products in the case A product as $Y_1$ and $Y_2$ where by the increase of one product cause the increase of another product	
	(ii) $Y_1$ and $Y_2$ the relationship is called Joint relationship where by when one product ( $Y_1$ ) increase the other product ( $Y_2$ ) - remain fixed in nature.	
	(iii) $Y_3$ and $Y_4$ these are competitive products where by the increase of one product ( $Y_4$ ) cause the decrease of another product ( $Y_3$ ).	
	(iv) $Y_5$ 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	
	(v) $Y_7$ and $Y_8$ these are supplementary products this is where by when the production of one product increase ( $Y_7$ ) does not affect the production of another product ( $Y_8$ ).	
	(b) (i) production function is the physical relationship between the input used in production and the output produced	
	(ii) Total products refers to the total or sum of all products in the farm.	

8. (b) (iii)	Average product is the ratio of the total output to the inputs used $= \frac{\text{output}}{\text{input}}$ .
(iv)	Marginal product is the change in the total product over change in the variable inputs $MP = \frac{\Delta P}{\Delta \text{inputs}}$
(c)	Characteristics of the three regions of production function
(i)	Region I
(i)	there is increase in production due to increase in the inputs
(ii)	Marginal product is high.
(ii)	Region II.
(i)	there is constant production (no increase in product) as the inputs are added.
(ii)	Marginal product is low.
(iii)	Region III.
(i)	additional unit of inputs cause decrease in the total products.
(ii)	Marginal product is negative.

**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.

8. a)	i) $x_1$ and $x_2$ .	
	This is the types of product relation ship in which the increase in the total of input without change in the value of an out put	
	ii) $x_3$ and $x_4$	
	is the types of product relation ship in which the increase in the value of input cause the decrease in the value of an out put	
	iii) $x_5$ and $x_6$ .	
	is the types of product relation ship in which the increase in the value of $x_5$ without <del>in</del> decrease in the value of $x_6$ .	
	iv) $x_7$ and $x_8$	
	is the types of product relation in which the value of <del><math>x_7</math></del> $x_7$ is keep on decrease or increasing without decrease in <del>in</del> value of decrease or increase the value of $x_8$ .	
8. b)	i) production function - it is the types is the price which <del>more</del> in value	

8(b)	i) Production function - is the process which involves the production of product in the farm.
	ii) Total product - This is all product that are produced in an area.
	iii) Average product - is the total types of product produced per unit area of land.
	iv) Marginal product - is the product that decreases after a certain amount of time.
8(c)	(Characteristics of each of the three regions of production function)
	i) Supply function -
	- Transportation of goods from one place to another place.
	- Merchandizing
	ii) Marketing function - characteristics.
	- presence of buyers and sellers
	- processing the product
	iii) Storage functions
	characteristics
	> Packaging
	> processing the goods product.

### Extract 1.8.2

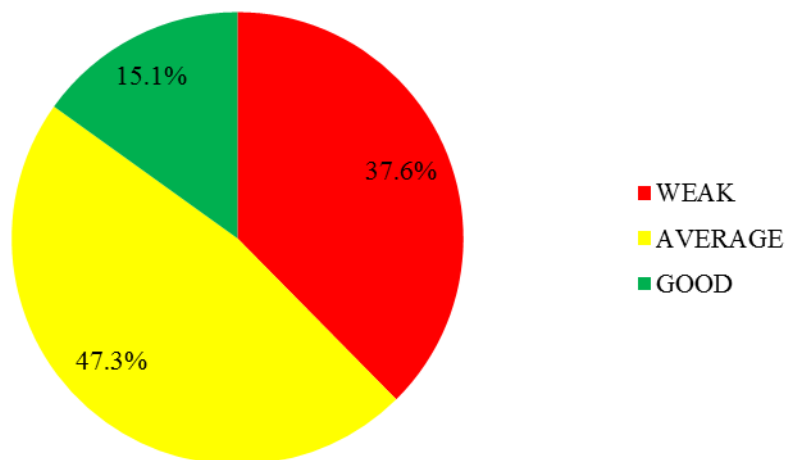
The extract is a sample of poor responses from one of the candidate who provided incorrect responses in all parts of the question due to lack of knowledge on production economics.

### 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.



**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.

0900 (i) Oligopoly - This is the type of market for agricultural product 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 seller charges; all of his product will be bought but he is likely to incur losses.

(ii) Characteristics of Oligopoly market conditions  
→ 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 outputs, he 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 products after studying carefully the price and output levels of other producers.

9(b) (i) Standardization → This is the process of producing crops at quality required by in the market  
→ It means demands of ~~requ~~ good quality produce  
processed by manufacturers and processors.  
Standardization involves preservation of the  
(ii) Financing → product which is constantly available to consumers throughout the year.

(ii) Financing.

→ The marketing involves many operation. These includes buying and selling, transportation and storage. The marketing institutions must has to bear the costs of running these operations.  
→ The institutions must has to keep financial accounts of the business transaction involved in the marketing process and has to organized market process in order to ensure a smooth flow of goods from the producers to consumers.

(iii) Risk bearing:

→ The handling of agricultural goods is risky; they may be stolen, they may catch fire, or they may be destroyed by rodents or water. This means that handling of agricultural crop goods is risky. The marketing institutions must has ensure the goods in order to minimize of risks.

(iv) Marketing intelligence

→ This means ~~multi~~ human skills to operate, grading, improving products quality, and price and customer handling and management.



Q9(b)	(v) Price setting. → In the process of merchandising, the sellers usually set the price at which to sell the products. In doing this they normally usually take into consideration market conditions such as supply and demand of the goods they are selling, price policies and competitions.	
(c)	Black market	Open market.
(i)	Price of the products sold on the black market is high and is determined by the scarcity of product in question.	→ Price of goods sold on the open market is determined by the force of supply and demand.
(ii)	Not all potential buyers are willing to buy <del>on</del> products on the black market.	→ Potential buyers are able to buy goods because price is determined by force of supply and demand.

#### Extract 1.9.1

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.

<p>9 (a) Oligopoly like supply and demand in the agricultural marketing for financial institutions.</p> <p>(b)</p> <ul style="list-style-type: none"> <li>-&gt; Change in price price to the market</li> <li>-&gt; Price of consumer and producers.</li> <li>-&gt; Change of science and technology.</li> <li>-&gt; presence of market stability</li> </ul> <p>(c)</p> <p>(i) standardization It is important of the market which help to the <del>produce</del> <sup>producers</sup> how products should produce and supported to the market.</p> <p>(ii) Financing: This help to the <del>cost</del> <sup>cost</sup> customer to understand profit and loss to the market produces</p> <p>(iii) Risk bearing This means that helps supply and demand to understand market price and how much to produce it.</p> <p>(iv) Market intelligence It is market <del>fund</del> <sup>function</sup> which used to control supply and demand between price of production according to the <del>and</del> <sup>and</sup> income of a nation.</p> <p>(v) price setting like value of buying and selling of goods. It help a farmer to understand price of products with the market for provision of goods and services</p>							
<p>9 (c)</p> <table border="1"> <thead> <tr> <th>black market</th> <th>Open market.</th> </tr> </thead> <tbody> <tr> <td>This is market which is not involves international trade</td> <td>This is market which is involves international trade.</td> </tr> <tr> <td>This is the market in which involves smaller customer for <del>buying</del> <sup>buying</sup> goods.</td> <td>This market involves international customer for buying goods</td> </tr> </tbody> </table>	black market	Open market.	This is market which is not involves international trade	This is market which is involves international trade.	This is the market in which involves smaller customer for <del>buying</del> <sup>buying</sup> goods.	This market involves international customer for buying goods	
black market	Open market.						
This is market which is not involves international trade	This is market which is involves international trade.						
This is the market in which involves smaller customer for <del>buying</del> <sup>buying</sup> goods.	This market involves international customer for buying goods						

**Extract 1.9.2**

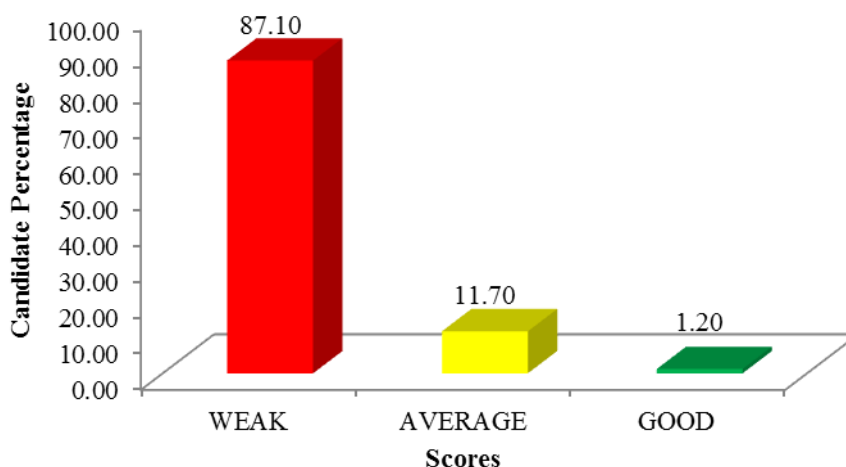
This is a sample of responses from a candidate who performed poorly in question. The candidate only managed to provide one correct response in part (b) (v).

## 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

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.

1	<p>a) Pedigree method - 11/11</p> <p>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.</p> <p>i) Advantages of using pedigree method of plant breeding.</p> <ul style="list-style-type: none"> <li>→ It helps in producing production of high quantity and quality since its selection is based on the performance of common ancestors with good performance.</li> <li>→ It helps to produce products with desirable characteristics, since through considering the past performance the products also will have same characteristics.</li> <li>⇒ 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.</li> <li>⇒ It helps to produce a new variety that performs better than a standard variety during production.</li> <li>⇒ It helps to produce varieties that are resistant to <del>parasite</del><sup>pest</sup> and diseases.</li> <li>⇒ It helps to improve the genetic information of the plants crossed over.</li> <li>⇒ It helps to produce products with good resistant to harsh environmental conditions example drought.</li> </ul>	
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1	<p>a) i) → It helps to increase variation between the plants crossed.</p> <p>ii) Disadvantages of using pedigree method of Plant Breeding.</p> <ul style="list-style-type: none"> <li>→ It increases production cost since it needs time and money for research.</li> <li>→ Pedigree method is difficult since it needs skills and knowledge to apply.</li> <li>→ Under pedigree method the products may have genetic disorders</li> <li>→ Pedigree method is not most accurately to local farmers hence difficult to apply especially in urban areas.</li> </ul>
	<p>b) PROCEDURES IN DEVELOPING CROP VARIETIES BY MASS SELECTION.</p> <p>→ Mass selection - is the type of selection in the individual plants are selected phenotypically to produce a new variety. Procedures</p> <ol style="list-style-type: none"> <li>i) Select about <del>ten</del> twenty plants (20).</li> <li>ii) Plant the seed of selected plants.</li> <li>iii) Harvest the seed of the selected plants planted and mix them.</li> <li>iv) Plant the seed mixed</li> <li>v) Harvest the seed of planted seeds that were mixed.</li> <li>vi) Compare the performance of the selected seeds to obtain a new variety.</li> </ol>

### Extract 2.1.1

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.

↑ (a)	pedigree method - the method of plant breeding used for self pollinated plants in which the plants are chosen by looking the performance and records of their ancestors.
	<u>Advantages of using pedigree method in plant breeding;</u>
	(i). It is the method in which the inferior - genotypes are eliminated; through pedigree selection as plant breeders select individuals according the records of their ancestors hence the desirable and superior genotypes are retained in the population.
	(ii). It provide the genetic information that cannot be obtained from other breeding system.
	(iii) provide the plant individuals that give high yield since the superior genotypes are retained and hence improves the mass production.
	(iv). The plant individuals obtained by pedigree selection are highly adaptable to the environmental conditions such as salt concentration and drought.
	(v). It provide plant individuals that are highly resistant to the crop pests, infections and diseases.
	(vi). The plant individuals obtained by this method give a high quality product and yield.
	(vii). plant individuals obtained by pedigree method grow and mature easily and faster.

9(a).	(viii). The desirable characteristics from ancestors are retained in the population.
	<u>Dis-advantages of using pedigree method of plant breeding,</u>
	(i). It requires a more experienced plant breeder; The plant breeders who are not well trained and experienced cannot work to better in pedigree selection method.
	(ii). It requires more labour.
	(iii). It requires more and enough land to carry out pedigree method.
	(iv). It is time consuming method since it involves carefully taking of information.
(b)	<u>Mass selection</u> ; is the method of plant breeding in which the individual plants are selected by looking phenotypic make up. Therefore the individuals are phenotypically chosen the best are harvested and composited to obtain the superior plant individuals.
	— General procedure which are used in developing crop varieties by mass selection.
	<u>first year</u> ; select few to hundreds plants, harvest the seeds and composite together.
	<u>second year</u> ; grow the harvested seeds in a preliminary yield trial and compare with a standard variety as a check.
	<u>Third year to sixth year (3rd to 6th)</u> ; continue with preliminary yield trial and allow adaptability to the environment.
I(b)	<u>seventh year</u> ; Release variety to the farmer
	— The seventh year is the last year whereby the crop varieties are multiplied in number and released to the farmers.

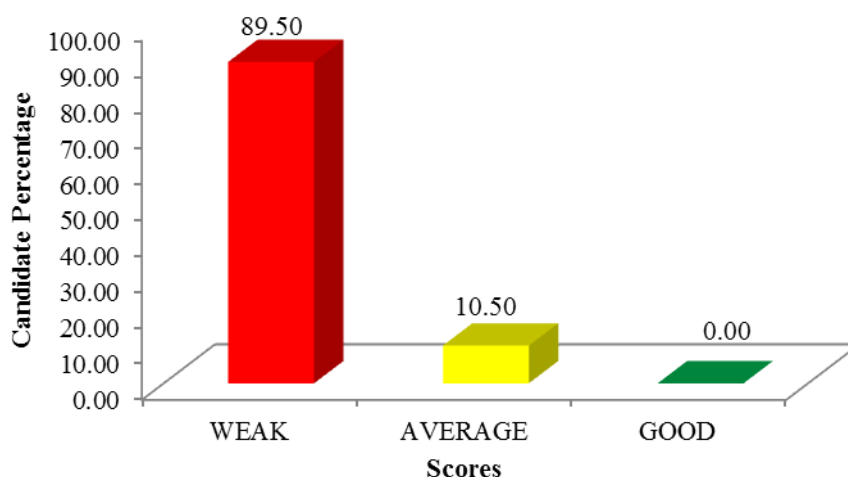
### Extract 2.1.2

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.



**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.

2.	@ (i) Coffee berry disease.	
	(ii) Scientific name; <u>Colletotrichum kahawae</u>	
	(iii) - Crop rotation	
	This is done by planting different type or families of crops in different area of land. Each year with different plant grown.	
	- 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 coffee should be removed from the field and burn all the remains.	
	- Tillage.	
	The field should be done with tillage to convert the upper soil to be down in order to break the life cycle of the pathogen.	

	(b) - To evaluate the effects of the pathogens on the crop and how to control.	
	- To determine the management practices that can be established to control the pathogens.	
	- To know the causes and causative agents of different plant diseases. i.e virus, bacteria, fungi.	
	- To know the types of causative agents in order to formulate the chemicals that can be used to kill them.	
	- To perform the scientific studies on the causes, transmission and effects, symptoms and control measures for the disease.	
	- To investigate the damages that are caused by the pathogens on crop plants and the way of taking care of the crops.	
	- It help in formulation of pesticides, insecticides and all vectors that carry the pathogens that causes diseases.	
	(c) - Water content and type of irrigation.	
	Water content favours the presence of fungal diseases. Splashing of irrigation water causes increase in fungal diseases.	
	- Plant factor.	
	The plant species are susceptible to the diseases. They have no mechanism to deal with infections hence	

2(c)	they are easily attacked.	
	- Type of crops	
	Many types of crops grown in the field are attacked by the pathogens. Some crops are not susceptible but the pathogens are easily attack the crops.	
	- Pathogenic effects and transmission.	
	Pathogens are transmitted by many ways that every where can reach. Many diseases pathogen are transmitted by vectors which are insects. Hence they travel all the way	

### Extract 2.2.1

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.

2	(i) coffee berry disease	
	(ii) common name: coffee berry borer ( <i>Geothromus b.</i> )	
	Scientific name: <i>Colletotrichum kahawae</i>	
	(iii) Cultural control measures for the disease	
	(a) crop rotation	
	(ii) Growing of coffee resistant varieties	
	(iii) Good field sanitation	
	(iv) observe dead leaves	
	(v) Application of manure and fertilizer	
	(vi) Growing early at the season	
	b) Importance of study plant disease	
	i) Study of plant disease provide employment opportunity from the different company and industries	
	ii) Study of plant disease give us effective way of controlling different pest and disease	
	iii) Study of plant disease enable the farmer to improve high quality production of crops	

2	<p>b) due to better method of controlling disease and pest</p> <p>iv) Study of plant disease help people to discover different pest and disease and the way of how to control them</p> <p>v) Study of plant disease help people to reduce the production cost due to - absence of crop pest and disease</p> <p>vi) Study of plant disease enable us to produce high quality product due to - effective method of controlling disease and pest</p> <p>vii) Study of crop pest and disease enable the farmer to produce high yield of product due to effective method of controlling pest and disease</p>	
	<p>c) Factors influencing the occurrence of epiphytic disease</p> <p>i) presence of virulent pathogen • when there is virulent pathogen it cause the disease to the host plant</p> <p>ii) presence of susceptible plant host • when there is susceptible plant host enable the occurrence of the disease</p> <p>iii) conducive environment • Also conducive environment for pathogen to cause disease enable development of disease</p> <p>iv) Human influence • Also human influencing the occurrence of disease due to different activities like tillage, weeding.</p>	

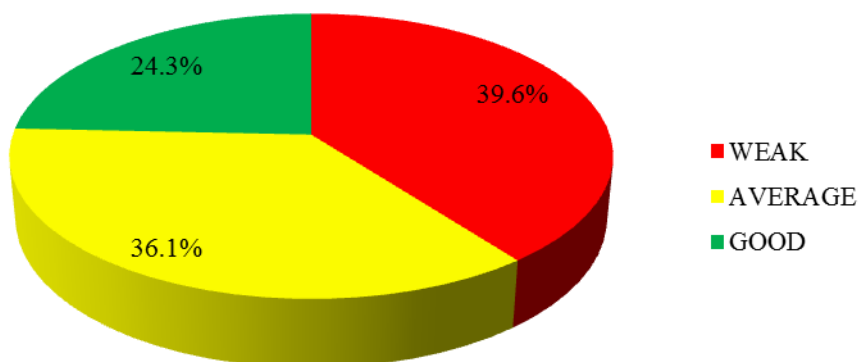
#### Extract 2.2.2

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) Zebrotres 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.



**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.

3(a)	<p>(i) Exclusion; Exclusion is the removal of the all factors which may cause harmful effects to crops. It is done before they have not been yet established.</p>	
	<p>Exclusion is done by removing all pests and disease causing organisms before crops have been affected.</p>	
	<p>(ii) Avoidance; This is a technique in which the causative agents of disease are get rid off (avoided). This is done by creating unfavourable condition for the disease causing organism to establish.</p>	
	<p>Forexample early planting may be done to avoid the attack of pests such as maize stalk borer and American bollworm.</p>	
	<p>(iii) Immunization; This is a principle of crop protection which involves creating immunity to the plants so that once disease causing organisms affect them, they cannot be affected, instead can resist the effects. This is done by application of engineering (genetic engineering) principles or by injection of immune.</p>	
	<p>(iv) Protection; This involves the use of good methods of crop production to keep the plants free from attack of pathogens. Protection can involve the use of chemicals or mechanical equipments before the infection has occurred to obscure the plants. Forexample, the use of copper based fungicides to protect the coffee plants from Coffee berry disease at the season prior to each season.</p>	
	<p>(v) 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. Forexample uprooting and burning or burying of affected plants.</p>	

3(b)	Harmful effects of crop pests.
	(i) The crop pest bore into young seeds and stored seeds; This lead to poor quality of products and hence become unmarketable. Example cotton stainer.
	(ii) They bore into fruits causing rotting of fruits. For example cotton stainer.
	(iii) They bore into stem tissue thus disrupting water and mineral and food conduction in plants leading to death of plants and stunted growth. For example maize stalk borer.
	(iv) Some of pest are vector of disease causing organisms, therefore they transmit disease from one plant to another. Example Whitefly transmit cassava mosaic virus, which cause cassava mosaic disease in cotton and tobacco.
	(v) Crop pest increase the cost of production and may sometimes lead to total loss to a farmer by killing the plants; some of pests such as armyworm are very difficult to control. Also cutworms can cause severe economic loss to a farmer as they can cause total loss of the farmer by eating the seedlings.
(c)	(i) <u>Rhizopertha dominica</u> .
	(ii) <u>Rattus rattus</u> .
	(iii) <u>Ephestia cautella</u> .
	(iv) <u>Callasobranchus ferrugineus</u> .
	(v) <u>Zabrotes fasciatus</u> .

### 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.

3.	a)	i) Chemical Control methods,	
		ii) Biological Control methods,	
		iii) Physical Control methods,	
		iv) Cultural Control methods,	
		v) Legislative Control methods.	
	b)	i) Increase cost of production to the farmer.	
		ii) Lower yield production,	
		iii) Some of the pest are vector of disease.	
		iv) Lower the viabilities of produce of the farmer.	
		v) Reduction profit returns to the farmer.	
	c)	i) Lesser grain borer - <i>Busseola fusca</i> .	
		ii) Common rat - <i>Rattus rattus</i> ,	
		iii) Warehouse moth - <i>Sphelocophyes luteiventris</i> ,	
		iv) Red flour beetle - <i>Salmonella gallinarum</i>	
		v) Zebrales bruchid - <i>Zebrales spp.</i>	

#### Extract 2.3.2

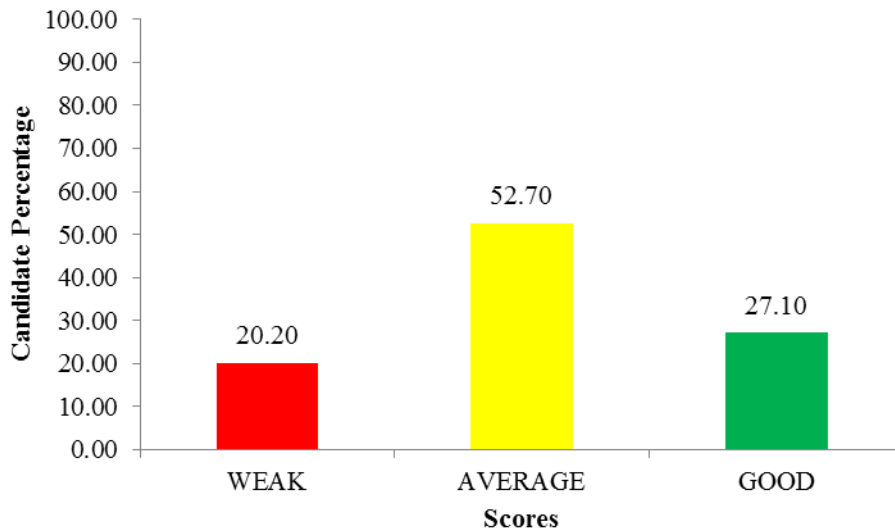
This is a sample of poor response from the candidate who provided incorrect responses to all parts of the question.

### 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.





**Figure 2.4:** Candidates' Performance on Question 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.

4. @ (i) Sign: These are physical evidences that indicate the presence of disease on plants; example of sign include the presence of pest or pathogens, on the plant or presence of sooty powder or white powder on plant surface which indicate powdery mildew. also presence of vegetative and reproductive structures 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, gall formation and cankers, these symbolize the presence of certain disease on plant body.

(iii) Animated plant diseases: these are plant diseases caused by biotic factors, these biotic 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

4@ availability of nutrients either in excess or deficient can cause abiotic plant diseases, example of these diseases can be wilting and Blossom end rot in tomatoes.

(b) (i) Cotton blight

Causative agent: Xanthomonas spp

Symptoms.

- Necrotic lesions on leaves as a result of death of tissues
- Wilt of the leaves and reduced lamina.

Control measures.

- Use chemicals to kill the fungi.
- Crop rotation

(ii) 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.

4(b)	(iii) Black stem rust of wheat.	
	Causative agent: <u>Puccinia spp</u>	
	Typical symptoms.	
	→ Black spots on the stem.	
	→ Wilting of the plant.	
	Control Measures	
	→ Use of fungicides to control the fungi.	
	→ Sanitation of the land before planting	
	(iv) Groundnut rosette.	
	Causative agent: <u>Groundnut rosette virus</u>	
	Typical symptoms	
	→ Leaf curling and malformation.	
	→ Wilting occurs and chlorosis also occurs.	
	→ Very reduced nuts or sometime nuts may not be produced	
	Control Measures	
	→ Roguing, the affected plant should be removed and burned.	
	→ proper spacing to prevent quick transmission during planting	

#### Extract 2.4.1

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: *phytosphore spp*, the symptoms; *appearance of spores, white powder and black sports*, control measures: *early planting, timely harvesting* (ii) Tobacco mosaic; causative agent: *phytosphora 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 rosette; causative agent: *fungi* symptoms; *fomation 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.

#### 4. (a) Signs

- This are internal features that shows and explains the condition of the plant.
- Signs in plants diseases can not be observed by naked eyes.

#### (i) Symptoms

- These are external features that explains and shows the outside condition of the plant.
- These condition can be observed by eyes.

#### (ii) Animated plant diseases.

- These 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.

#### (iii) Abiotic plant diseases.

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

#### (b) Causative agent, typical symptoms and control measure

##### By Cotton blight

Causative agent is cotton strainer.

Symptoms are

- Withering of the leaves
- Yellowing of the leaves.

control measures are

- Crop rotation.
- Application of pesticides

4. (b) i, Tobacco mosaic	
causative agent is <u>Weevils</u> .	
Symptoms are -	
- The leaves are torned at lamina.	
- Yellowing of leaves	
Control measures are -	
- Use of pesticides.	
- crop rotation.	
iii, Black stem rust of wheat	
causative agent is <u>Aphids</u> .	
Symptoms are -	
- Leaves have black spot.	
- drop off of leaves.	
Control measures are-	
- Crop rotation	
- Handpicking of aphids.	
iv, Groundnut rosette	
causative agent is <u>aphids</u> .	
Symptoms are -	
- Weather withering of leaves	
- Dropping of some leaves.	
control measures are -	
- Practice early planting.	
- Use of pesticides.	

#### Extract 2.4.2

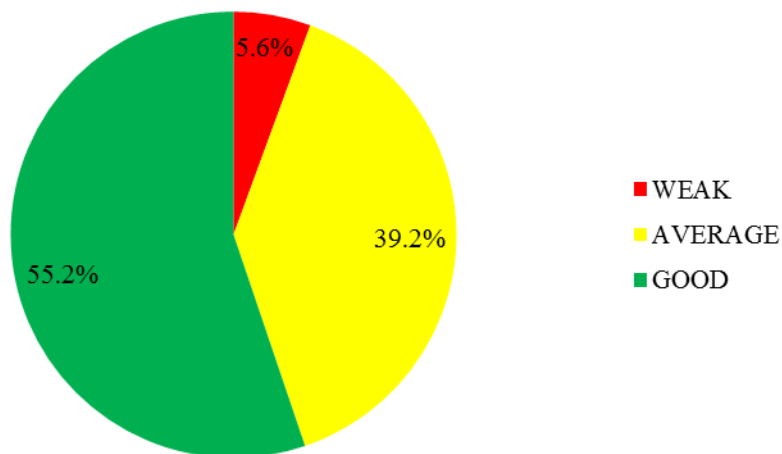
This extract is a candidate's poor responses in which he/she did not do well in all parts of the question.

#### 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.



*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.	
	(vi) Drought.	
	In drought condition, weeds are characterized by low water content in which this low water content will not facilitate efficient reaction between the targeted weeds and herbicides applied.	
5(b)	Reasons to formulate pesticides.	
	(i) To simplify the application process.	
	(ii) To increase effectiveness of pesticides on pests and this is when the pesticides are formulated to a required concentration.	
	(iii) To simplify handling of pesticides.	
	(iv) For easy storage.	
	(v) For easy transport since when they are well formulated their concentration will be lowered facilitating easy transport by farmers.	
	(vi) If they are well formulated they can remain active for long time and be applied again.	
5(c)	Non-insecticidal pest control measures.	
	(i) Biological measures which involve introduction of living organisms in controlling pests for example cats are introduced in houses to feed on rats.	
	(ii) Mechanical measures which involve physical removal of pests from an area.	
	(iii) Legislative measures through inspection, certification and quarantine.	

5(d)	Features that make weeds to have competitive edge.
	(i) Production of a lot of seeds. Many of weeds have ability to produce a lot of seeds in the end of their cycle in which these seeds in favourable condition will grow into new weeds increasing their survival chance.
	(ii) Ability to withstand harsh condition. Weeds have <del>ate</del> high ability to withstand harsh condition than crop plants. This ability gives them chance of existing continuously in a certain area and dominate it.
	(iii) High competitiveness. Weeds have high competitive ability for nutrients, light and water than crop plants in which through this their survival chance is increased.
	(iv) Mimicry or camouflage. Some weeds looks similar with corresponding crop plants. This creates difficult in controlling them mainly through mechanical measures.
	(v) They have short life span. Most of weeds have short life span means they grow faster and produce viable seeds which will grow to the next generation there after they die.

### Extract 2.5.1

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.

5(a)	The environmental factors that affect the performance of the herbicides.
1.	The area with low nutritive value.
2.	The area which have occurred with erosion of the soil.
3.	Weeds.
4.	Low fertility.
5.	They are bulky.
	Explanation
1.	Low fertility these are the environmental factor which affect the performance of the herbicide even be applied while the area it's nature can produce in its factors.
2.	Weeds these are other environmental factor which affect the the performance of the herbicide while other weed it is difficult to remove from the soil.
3.	Bulky this are bad odour that may occurs to the environment and its environmental factors which may cause the <del>er</del> performance of the herbicide even be applied.
4.	Eroded of the soil due to the performance of the herbicides to the area there will not digest while to the soil the organic matter from the soil has removed so this by the other can cause the the performance of herbicides.

5(a)	low nutritive value there are the other environmental factors that affect the performance of the herbicide while its nature the area have nutritive value so even the herbicide can be applied not no improvement.
5(b)	<p>It is necessary to formulate pesticides</p> <ol style="list-style-type: none"> <li>1. To control the damage to both living and non-living things</li> <li>2. To prevent disinfection occur to the environment</li> <li>3. To produce area to have good quality production.</li> <li>4. To produce disease resistant to both living things and non-living things.</li> <li>5. To produce the quantity produced to the area.</li> <li>6. To produce the yield of crops when formulated to the specific area.</li> </ol>
5(c)	<p>three non-insecticidal pest control measures available to farmers.</p> <ol style="list-style-type: none"> <li>1. Cultural control</li> <li>2. Biological control</li> <li>3. Chemical control</li> </ol> <p>1. The <del>cultural</del> <sup>mechanical</sup> control mean the farmer may control the insecticidal pest to the area by using or applying a good establishment of cover crops also weeding and plant early resistant</p>
5(d)	<p>The area to have good quality of production may make the competitive of edge.</p> <p>Ⓐ The area to have high composition of production due its organic matter has <sup>high</sup> production to produce.</p> <p>Ⓑ The soil to have high production these can make the area that weed to competitive edge.</p> <p>(a) later cultivation these also in the field can make the competitive weed edge while maybe the weed was poison to control to the field and it is poison.</p> <p>(5) Weeding these are process of weeding the area or uprooting the area by mechanical that is slashing but the weed has still competitive edge due to its nature such nut grass - <i>setaria</i> name is <i>Cyperus rotundus</i>.</p>

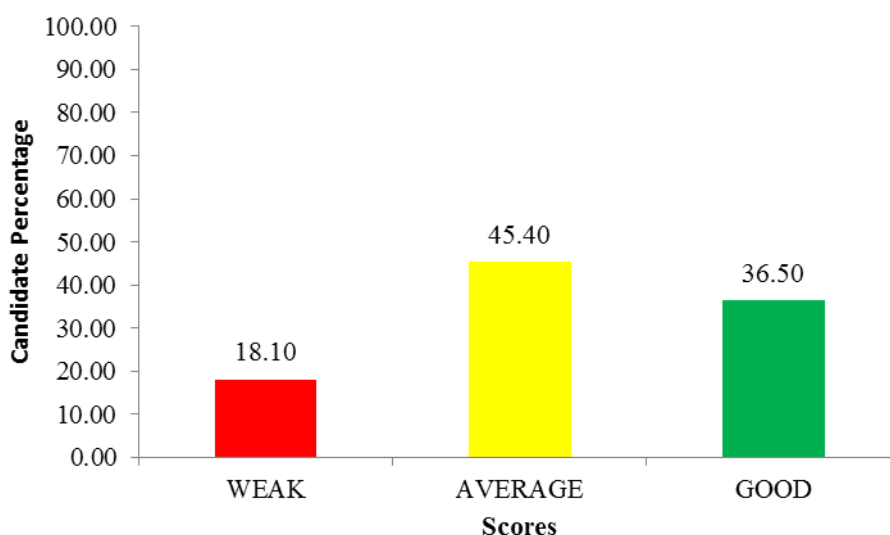
### Extract 2.5.2

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.

### 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.



**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 engorged 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 engorged then fall to the ground and moult to pupa
	iv) Pupa find the same host suck blood then engorged and fall into the ground and moult to adult.
	v) The adult find the same host suck blood engorged 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 predisposed factors to the disease of animals like foot and disease
	v) Ticks can cause lameness 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 lowered

- c) ways of controlling ticks in pasture,
- i) Land cleaning - to insure that pasture is well cleaned and all deposits are removed
  - ii) Burning so that to kill all ticks which are present in the field.
  - iii) Spray pasture by using pesticide (acaricide) to kill ticks.
  - iv) Fencing of the pasture to prevent ticks from entering in the farm by any means
  - v) Picking and killing by hand
- d) Effective characteristics of acaricides:
- i) Should have ability to kill pest
  - ii) Should be easy to formulate
  - iii) Should have effectiveness in low concentration
  - iv) Should not have effect to animal skin and health.

#### 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, exception 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 repellent 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.

6a)	The give stages of the life cycles of one host ticks.	
1.	tick lay the egg to the field for the aim of surviving.	
2.	climbing to the host as it's life to be go with.	
3.	sucking to the host then after sucking fall again to the field for the other generation.	
4.	After fall to the field under complete metamorphosis to the satisfied area as it's life.	



- Qa) 5. Lastly climbing again to the host as it is like where it's living.
- Qb) The damage caused by the ticks of the feeding to an animal:
1. Irritation this means that the tick can cause the body of the organism to have an infection the removal of skin or hair to their body.
  2. Nymph node these are the other damage cause - by the ticks to the other body of an organism - due to their feeding.
  3. Skin coat these are the other damage that cause animal. It's skin show pale to compare during animal to be in ~~was~~ good health while its skin is such showing like body affected when animal are feeling cold.
  4. Animal become docile to compare during animal was good good health to its physical appearances.
  5. Lose of 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 caused by the ticks to an body of animal.

6(b)	while animal become in low body weight after the ticks damaged their body of an animal.
6(c)	Ways of controlling ticks in pasture.
(1)	Application of herbicides to the area to control ticks in the pastures.
(2)	Fenced the area <sup>or pasture</sup> to avoid the grazing animal such for those are continuous grazing, that may either cause the pasture to have a ticks.
(3)	Crop rotation - planting the different legumes and other shrubs that by the other way the may control the tick that affected the pasture.
(4)	Don't allow the to graze the animal to gather with the animal which are not affected with ticks to the area where the person are available to treated after days that may cause the area to have a ticks.
(5)	Early application of spraying the animals and application of the chemical to the field that can avoid the ticks to the pasture.
6(d)	It has character of living inside the host to its life or living organisms.
1.	Sucking the due to its body shape and structure.
2.	Piercing the host of the body of an organism.
3.	Produce both sexually and asexually reproduction.

#### Extract 2.6.2

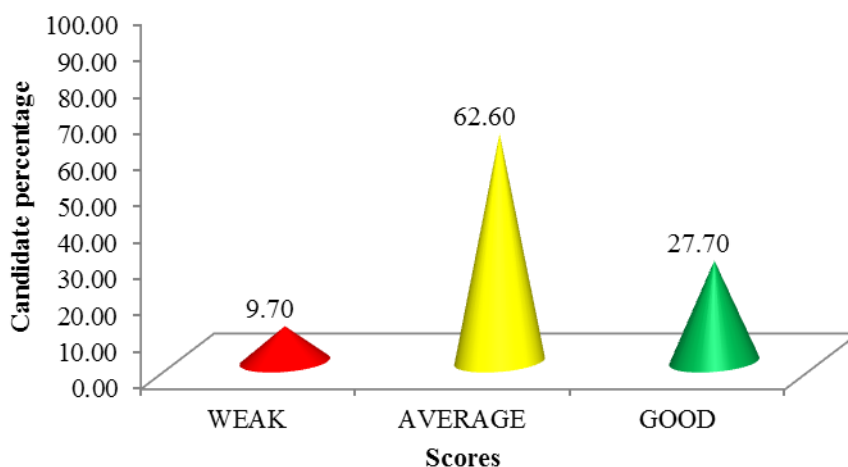
This extract is a sample of candidate's poor responses. The candidate provided incorrect responses in almost all parts of the question, but in part (c), he/she had two points correct.

#### 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

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.

17(a)	<u>Reasons for the lack of Legumes in Pasture</u>	
	(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	
		use only
7(a)	(iii) Low <del>regener</del> regeneration after being eaten; Legumes have low regeneration ability after being eaten by animals	
	(iv) Competition from shrubs and trees; shrubs and big trees suppress legumes in pasture in search of nutrients	
	(v) Legume reproduce by means of seeds unlike grasses which reproduce vegetatively using rhizomes, roots the use of seeds is not more effective as when compared to vegetative growth of grasses which is more efficient and rapid	
	(vi) Legumes produce little number of seeds as compared to grasses which produces large number of seeds and including vegetative growth	
	(vii) Legumes have broad leaves which are easily seen by animals as compared to grasses which most of them have narrow leaves hence animals opt to eat the Legumes hence lack of them in pasture	
7(b)	<u>Factors affecting yield potential of pasture species</u>	
	(i) Soil fertility - The fertile soil determine the yield of pasture that could be produced, so when the soil is more fertile hence yield increase and if it is of low fertility hence low yields result	
	(ii) Pest and Disease; when there is occurrence of pest and disease on the pasture farm hence the yield potential decrease	

7(c)	(iv) High palatability; Good pasture should have high palatability hence making the animal to eat it well and animal prefer to eat it hence proper utilization of pasture as an animal can eat it all without leaving many remains uneaten.
7(d)	<u>Strengths of zero grazing as compared to other systems of grazing</u>
	(i) The Energy which could be used by an animal moving from one area to pasture land could be used for production purposes and growth of an animal example production of milk
	(ii) It do not cause erosion of soil as it done by continuous grazing as animals always remain underdoors eating pastures which are brought to them by farmers
	(iii) Proper utilization of pasture as the farmers bring <del>forage</del> feed which are liked by animals to and also they are do processing practices to that feed like chopping and grinding, hence no feed remains
	(iv) The farmer can keep farm records easily and <sup>accurately</sup> also it is easy to detect the attacks of diseases and ticks hence controlling them easily this is unlike other system which is hard to do so.

### 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.

7a)	The lack of legumes in pastures caused by:	
	- Legumes it have acid.	
	- It have large amount of water.	
	- It have contains large amount of ions.	
	- It have contains large amount of nutrients.	
	- It have can cause over seeding for animals.	
	- It have contain more carbohydrates.	
	- It <del>increase</del> <sup>cause</sup> photosynthesis to take place because of presence amount of water.	
7b)	Factors that affects yield potential of pasture species:	
	i/ Types of grasses	
	ii/ Lack of nutrients available	
	iii/ Irritability.	
	iv/ Amount of water which can cause photosynthesis take place.	
7c)	Qualities of a good pasture.	
	i/ It contain all necessary nutrients	
	ii/ Pasture have dry do not have water.	
	iii/ Accountability	
	iv/ Irritability	
	v/	
7d)	Strengths of zero grazing	
	i/ It increase rate of milk more than rotation grazing	
	ii/ It need more labour to cutting grass more than strip grazing.	
	iii/ Is the grazing of cutting grass animal and	
7e)	gives in their room compared with strip grazing	
	iv/ it is easy to control animals more than rotation grazing.	

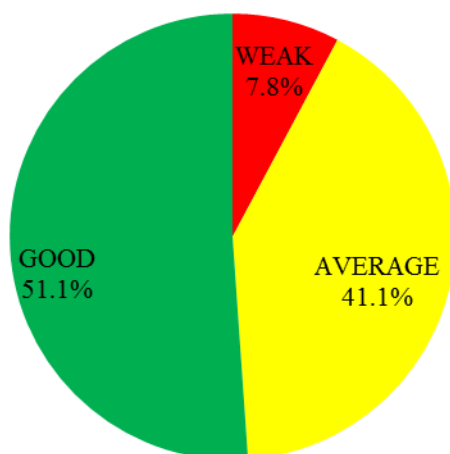
### Extract 2.7.2

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*

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.

8	(a) Feed processing!:- Intake of processed feed in animal is higher than unprocessed feed this is because processed feed increases the surface for them 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 low the intake of food will be low but if rumen has capacity of storing large amount of food the intake of food in animal will be highly large.
	(ii) Fatness of animal!:- Fatty animal has ability to take in small amount of feed and so that intake of food 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 they eat large volume of feed while others eat small amount of feed. eg (exotic and indigenous)
	(v) Health of animal!:- Healthy animal has ability to eat large amount of feed and so that feed intake in healthy animal is highly largely.
	(vi) Disease!:- Animal that is affected by disease has ability to eat small amount of feed and so that diseased animal has low feed intake.
	(vii) Genetic potential of animal!:- Most of animal are made of genes of different characteristics where by there are some of genes resulting to the eating of large amount of feed while others eat small amount of feed naturally.



8	<p>b) (vii) Physiological status of animal:- Animals vary greatly in physiological status and so that this causes animal to have ability of take in large volume of feed while others take in small amount of feed. So that feed intake will be large though to the animal that have ability of take in large amount of food <del>intake</del> but low feed intake to the animal that have ability of take in small amount of feed.</p>
	<p>c) Food associated factor.</p>
	<p>(i) Palatability</p>
	<p>The feed intake in animal is highly if the feed is palatable when by animal can eat large volume of feed.</p>
	<p>(ii) <del>Different nutrients</del></p>
	<p>(i) Deficient of nutrition / nutrients -</p>
	<p>If the feed is of low nutrients the feed intake in animal will be very low while if the feed is nutrition enough the feed intake will be more large.</p>
	<p>(ii) Physical form of feed.</p>
	<p>This is based much on size of material for example (Collage and hay); The feed intake in silage is highly than hay this is because silage is of small size and so that facilitate the performance of it to be taken by animal.</p>
	<p>(iii) Digestibility of feed.</p>
	<p>The high digestible feed has a greater chance to be taken by animal than that which has low digestibility and so that the amount of feed intake in animal is highly than in digestible feed.</p>

### Extract 2.8.1

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.

	<p>Q8 Feed processing: is the amount of feed prepared and ingredient required to feed animals example molasses and hormones and antibiotics</p>	
	<p>(b) Animal associated factors:</p>	
	<p>(i) Amount of feed eaten: the animal should eat the equal amount of feed and ingredient required or suitable for animal health</p>	
	<p>(ii) grass species: the animal should be eaten the grass species which are responsible to increase the productivity of the animal species and good health</p>	
	<p>(iii) Feed consumption: the ratio of consumption given to the animal should be in the right proportion and equal amount during the feeding of animals.</p>	

3.6 (iv) Animal factors: the consideration of the species of an animal to be given the type of feed whether is male or female animals.

(v) Feed Composition: the component to be mixed with feed. Example molasses, hormone and antibiotics is responsible.

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

(vii) Feed Ingredient: is the amount of feed composition eaten by the animal to acquire the individual with good health.

(viii) Metabolisable energy: the energy produced by the young animal is different from the adult. So, the feed given to the young should high amount to that of the adult.

\$ (c)	Food associated factors
(i)	Amount of feed eaten; the ratio of feed is equal to the ratio of ingredient required in the feed.
(ii)	grass species; the animal should acquire the good health they prefer types of grass to be eaten.
(iii)	Sex of the animal; Biological difference between male and female animal due to the feeding of feed eaten
(iv)	Age of the animal; the animal with metabolic rate should be different to that of low metabolic rate
(v)	Feed Consumption; the ratio of feed given to the animal is very high nutrients and should be sustainable
(vi)	Preparation of feed; Food associated factors should be prepared and before allowed the animal to eat that composition of food materials
\$ (c) (vii)	Animal factors; the ratio of the sick animal should be prepared in different area or equipment to that of the healthy one.

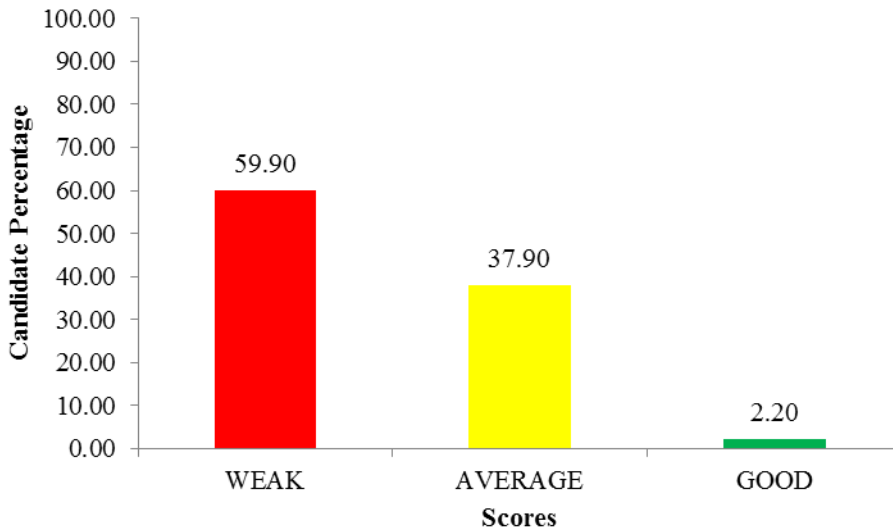
#### Extract 2.8.2

The extract is a sample of responses from one of the candidate. The candidate provided incorrect responses in almost all parts of the question, but in part (c) he/she provided only one correct point.

### 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.

9(a)	<p>(i) &gt; Help to produce animals which have ability to produce products of better quality: Through the principles of genetics to animals it may results to the production of products of better quality such as meat and milk.</p> <p>&gt; Help to produce animal which are more resistant to pest and disease: Through the genetic principles which results to the combination of gene from different animals we may produce animal which have better resistant to pests and diseases.</p>
(b)	<p>It is used to get the pure breed</p>
(c)	<p>(i)</p> <ul style="list-style-type: none"> <li>&gt; It increase the genetic uniformity in the herd</li> <li>&gt; It increase the phenotypic uniformity in the herd</li> <li>&gt; It is used to fix the certain character in the herd</li> <li>&gt; It is used when you want to propagate imported species</li> <li>&gt; It is used to spread new breed</li> </ul>
(ii)	<ul style="list-style-type: none"> <li>&gt; It increase the mortality rate</li> <li>&gt; Produce animals which have less resistant to disease</li> <li>&gt; Produce animals which have low fertility</li> <li>&gt; Produce animals which have less resistant to environmental condition.</li> </ul>
(c)	<p>It is used in <sup>selecti</sup> animals</p>
(c)	<p>&gt; It is used in selection of animals whose record of performance are not yet known.</p> <p>&gt; It avoid inbreeding</p>
9(c)	<p>&gt; Help to improve the production of animal in the herd</p> <ul style="list-style-type: none"> <li>&gt; It produce animals which have better resistant to disease</li> <li>&gt; It help to decrease mortality rate.</li> </ul>

### 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.

9 (a) Animal breeding : Is the process of how to improve the production of animal in term of milk, meat, and other.

(i) 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 help animal in order to improve the rate of reproduction that means they reproduce fast
- They provide the animal which are resistant to harsh environmental condition.
- They provide animal which are very stronger and healthier which are essential for farm operation

(b) 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

→



9 (b) (ii)	Negative effect of inbreeding in improvement of - animal production
	→ It can cause the inheritance bad characteristics to the animal
	-p Transmission of the vulnerable diseases to the animals.
	-p The animal has bad quality like poor - production, and are not resistant.
	-p The animal has poor in the production rate like milk, meat, skin.
(e)	Ways in which pedigree is important
(i)	By considering the performance record of - their common ancestor
(ii)	The body conformation of the animal,
(iii)	The physiology of the animal either - its sick or healthier
(iv)	The breed of the animal which is highly productive.
(v)	The age of the animal - by considering its the age which suitable for production is 3-4 years.

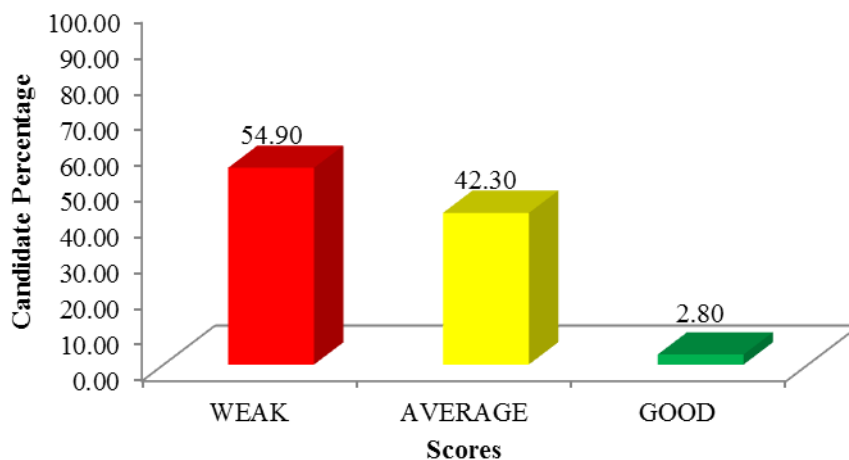
### Extract 2.9.2

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

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.

<p>(i) Biotechnology: This is the technology which involve the use of synthetic materials to produce like plastic to produce usable substances example plastic rice.</p>
<p>(ii) Modern technology: It's the technology which is more advanced which 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.</p>
<p>(iii) Conventional technology: This is the technology which involve the use of synthetic/industrial materials in agriculture and other activities example the use of</p>

So ~~to~~ pesticides, insecticides, herbicides, fertilizers and others to improve yield.

(b) (i) Loss of biodiversity: due to genetic modified organisms, local and advantageous species tend to disappear as people prefer much species with high yield like those generated from (GMO) genetic modified organisms hence pure species don't being planted hence tend to disappear.

(b) (ii) 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.

(b) (iii) Development/introduction of allergen (Allergic gene): due to genetic modified organisms there is introduction of allele which cause allergies (Allergy) to both animals and plants which future may cause death.

(c) (i) Bring about drought:

(c) (i) climatic change

(c) (i) floods

(c) (i) Plants wilting.

10	(c) (i) Genetic modified organisms are more tolerant and adaptable to local environmental condition and stress example drought.
	(ii) Are more resistant to pest and diseases hence little money is used for management.
	(iii) Genetic modified organisms have high yield/production hence farmers get more profit and food security.
	(iv) Have early maturity and fast growth rate hence yields produced early before pest and disease invasion.
	(v) Better quality products/yields are produced as a result of genetic recombination of better quality product producing species.
	(vi) Products with improved better taste are produced which are more required by most farmers.

#### Extract 2.10.1

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 <del>technology</del> technology
iii)	Conventional technology, is the technology where by the new technology adapted from local technology that means to improve the local technology by adding something

10 b) → Land pollution, the use of chemicals in the area for a long time can cause land pollution of that area

→ Reduce yield of production, the use of genetic modified organism can lead to reduce yield of production because of lowering nutrients in the soil

~~→ lead to soil erosion, the use of genetic~~

→ lead to reduce soil fertility, when genetic modified organism applied for a long time can lead to loosen the soil fertility.

c) Effects of global warming

→ lead to reduce yield of production

→ lead to soil erosion

→ lead to unfertile soil

→ lead to hunger.

→ Increase the yield of production, when using genetic modified organisms the yield of product increases.

10	d) → Increase quality of products, the use of genetic modified organism increase quality of products.	
	→ Increase quantity of product, as the use of genetic modified organism increase quantity of products	
	→ Increase market, the use of genetic modified organism in production increase market of buying and selling products from one place to another.	
	→ It reduce risk to a farmer, when a farmer use genetic modified organism. the occurrence of risk is very low.	
	→ It increase resistance of crops, when	
	→ Increase profit to a farmer, when a farmer use genetic modified organism the profit will increase due to high quality and quantity of crops.	

### 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

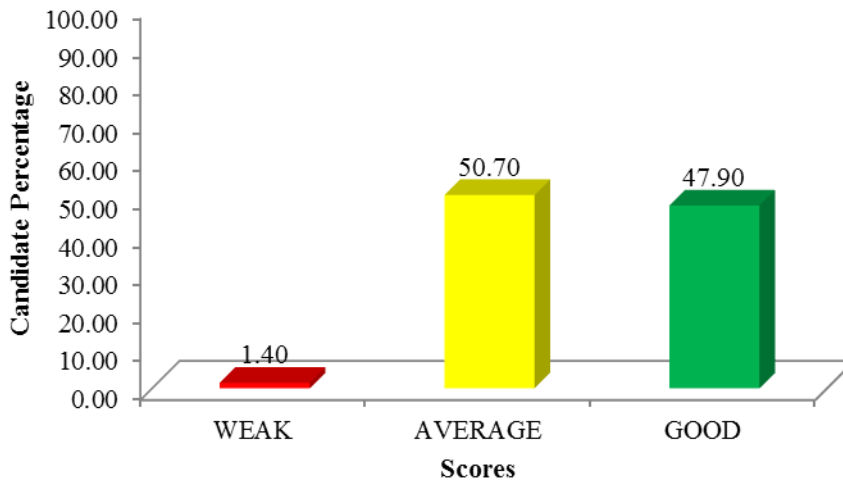
The candidates were provided with specimens: E<sub>1</sub>-piston rings, E<sub>2</sub>-oil filter, E<sub>3</sub>-clutch plate, F<sub>1</sub>-jack plane, F<sub>2</sub>-smoothing plane, F<sub>3</sub>-sash clamp, F<sub>4</sub>-G-clamp, F<sub>5</sub>-cross pein hammer, G<sub>1</sub>-union, G<sub>2</sub>-Bushing, G<sub>3</sub>-Tee, G<sub>4</sub>-Coupling, and G<sub>5</sub>- 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 E<sub>1</sub>, E<sub>2</sub>, and E<sub>3</sub> (ii) suggest the two types of specimen E<sub>1</sub> and their functions, (iii) outline three indicators that would alert the tractor operator that specimen E<sub>1</sub> is worn out (iv) give the name of the unit in transmission system in which specimen E<sub>3</sub> belong and describe its operating principle (b) (i) identify each of the specimen F<sub>3</sub>, F<sub>4</sub> and F<sub>5</sub> (ii) describe the use of specimen F<sub>1</sub>, F<sub>2</sub> and F<sub>5</sub> (iii) differentiate the use of



specimen F<sub>3</sub> and F<sub>4</sub> (c) (i) identify specimen G<sub>1</sub>, G<sub>2</sub>, G<sub>3</sub> and G<sub>4</sub> (ii) indicate the arrangement of specimens and name the fitting they are going to use when they want to join specimen G<sub>5</sub>

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

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<sub>2</sub> 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<sub>1</sub> 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<sub>3</sub> 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.

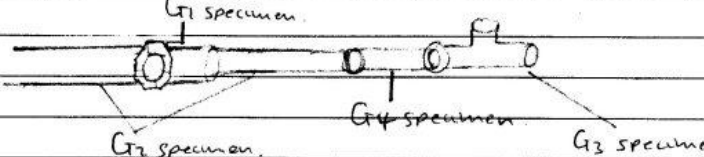
In part (b), most of the candidates were able to identify the specimen given in part (b) (i), and correctly described the use of the named specimens in part (b) (ii). In addition, the candidates also correctly differentiated the use of the named

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 G<sub>5</sub>. 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.

01	a) Identify each of specimens E <sub>1</sub> and their functions.	
	Specimens	Name of specimens
	E <sub>1</sub>	Piston ring
	E <sub>2</sub>	Oil Filter
	E <sub>3</sub>	Clutch plate
	ii) Suggest the two types of specimen E <sub>1</sub> and their functions.	
	<u>Compression ring</u>	
	- Used to prevent the leakage of compressed heat energy between the cylinder wall.	
	<u>Oil control ring</u>	
	- Prevent the leakage of compressed heat energy.	
	- Used to prevent leakage of oil from the crankcase to the combustion chamber.	
	iii) Outline three indicators that would alert the farm tractor operator that specimen E <sub>1</sub> is worn out.	
	i) Leakage of fuel or oil from the tractor engine	
	ii) Burning air in the exhaust consist of oil fuel due to leakage of oil control ring.	
	iii) The efficiency of power tractor engine is reduced due to uncontrolled compression ratio in the cylinder.	
	iv) To give the name of the unit in transmission system in which specimen E <sub>3</sub> belong and describe its operating principle.	
	Name of the unit is <u>Clutch</u>	
	Operation - Used to connect and disconnect power from the engine or engine drive.	

Q1	b) Identify each of specimens F <sub>3</sub> , F <sub>4</sub> and F <sub>5</sub> .	
	Specimens	Name of specimens.
	F <sub>3</sub>	Sash clamp
	F <sub>4</sub>	G-clamp
	F <sub>5</sub>	Cross-pane hammer
	a) Describe the use of specimens F <sub>1</sub> , F <sub>2</sub> and F <sub>3</sub> .	
	<u>Specimen F<sub>1</sub></u>	
	- It is a general purpose plane used for both smooth and rough the plane or wood surface on wood work.	
	<u>Specimen F<sub>2</sub></u>	
	- It is used for smoothing the surface or plane after a jack or try plane has been used.	
	<u>Specimen F<sub>3</sub></u>	
	- Used for driving in nails, swaging and reworking.	
	c) Differentiate the use of specimen F <sub>3</sub> and F <sub>4</sub>	
	<u>Specimen F<sub>3</sub></u>	<u>Specimen F<sub>4</sub></u>
	if Specimen F <sub>3</sub> is used for holding wood work in set position when glue hardens.	if Specimen F <sub>4</sub> used for holding objects securely during cutting and lay out operation.
Q4	c) Identify specimens G <sub>1</sub> , G <sub>2</sub> , G <sub>3</sub> and G <sub>4</sub> .	
	Specimen	Name of specimens.
	G <sub>1</sub>	Union
	G <sub>2</sub>	Bushing
	G <sub>3</sub>	Tee
	G <sub>4</sub>	Coupling

01	of it clearly to indicate the arrangement of specimens.	
	Answer	
	In order to join specimen G <sub>5</sub> , the fittings to be used among provided specimens are:	
	G <sub>2</sub> → G <sub>1</sub> → G <sub>2</sub> → G <sub>4</sub> → G <sub>3</sub>	
		

### 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 E<sub>1</sub> 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 E<sub>1</sub> 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 E<sub>3</sub> 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 G<sub>5</sub>. 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.

i) To identify specimens:

Specimen	Common names
E <sub>1</sub>	Piston ring
E <sub>2</sub>	oil filter
E <sub>3</sub>	clutch plate

ii) Two type of specimen E<sub>1</sub>

iii) Indicator that would alert the farm tractor operator that specimen E<sub>1</sub> is worn out.

» When specimen E<sub>1</sub> is worn out it cause the oil or fuel it will leakage and cause small power which form by compression.

iv) Specimen E<sub>3</sub> it have on the unit in lubrication system.

» It is operating for engage gear.

(b) i/	Specimen	Common name.
	F <sub>3</sub>	Sash clamp
	F <sub>4</sub>	C <sub>2</sub> clamp
	F <sub>5</sub>	
	ii/ Uses of specimen F <sub>1</sub> , F <sub>2</sub> and F <sub>3</sub>	
	Specimen F <sub>1</sub>	
	→ used to make <sup>smooth</sup> soft surface of wood.	
	Specimen F <sub>2</sub>	
	→ used to make <del>raw</del> of the surface of wood.	
	Specimen F <sub>5</sub>	
(c) i/	Specimen	Common name
	C <sub>1</sub>	<sup>no</sup> Coupling coupling
	C <sub>2</sub>	Bushing
	C <sub>3</sub>	Tee
	C <sub>4</sub>	Union
	ii/ If you want to join specimen C <sub>5</sub> which sitting among the specimen.	
	→ We use specimen C <sub>1</sub> to join specimen C <sub>5</sub> and sitting.	

### 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.

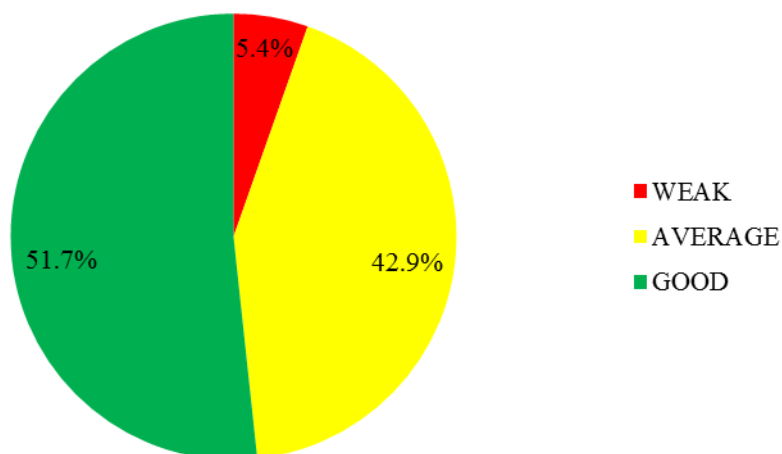
### 2.3.2 Question 2: Crop Science and Production and Soil Science

The candidates were provided with specimens: H<sub>1</sub>-Triple superphosphate (TSP) fertilizer, H<sub>2</sub>-Sulphate of Ammonia fertilizer, I<sub>1</sub>-Tomato plant suffering from bacterial wilt, I<sub>2</sub>-Cassava leaves affected by mosaic virus and I<sub>3</sub>-Maize weevil.

This question had two parts, (a) and (b) carrying 15 marks. In part (a), the candidates were required to (i) identify specimen H<sub>1</sub> and H<sub>2</sub>, (ii) outline four characteristics of specimen H<sub>2</sub>, (iii) give the use of specimens H<sub>1</sub> and H<sub>2</sub>, (iv) state the stage of crop development in which specimen H<sub>2</sub> is recommended for application, (b) (i) identify specimen I<sub>1</sub> by its botanical name, (ii) mention the disease in specimen I<sub>1</sub> and its causative agent, (iii) identify the disease in specimen I<sub>2</sub>, (iv) list two methods in which the disease in specimen I<sub>2</sub> is

transmitted, (v) write scientific name of specimen I<sub>3</sub>, (vi) mention three crops that are the main host of specimen I<sub>3</sub> and (vii) suggest whether I<sub>3</sub> 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*

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 H<sub>2</sub>. 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 H<sub>2</sub> 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 I<sub>1</sub> and I<sub>2</sub> in parts (b) (ii) and (iii), respectively. The candidates listed correctly the methods in which the disease in specimen I<sub>2</sub> is transmitted in part (b) (iv), as well as mentioning correctly crops that are the main host of specimen I<sub>3</sub> 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 I<sub>3</sub> but failed to give reasons to support their answer. An example of incorrect response was I<sub>3</sub> 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.

2a) H <sub>1</sub> - Triple super phosphate (TSP) H <sub>2</sub> - Sulphate of ammonia (SA)
ii) Characteristics of specimen H <sub>2</sub> . i) It contain about 20.5% <del>to</del> 21 to 21% nitrogen ii) It is hygroscopic and deliquescent iii) It has small white crystals iv) It is soluble.
iii) Use of specimens H <sub>1</sub> and H <sub>2</sub> . Specimen H <sub>1</sub> - It is applied into the field in order to encourage the development of seed <del>see</del> and roots. Specimen H <sub>2</sub> - It is applied in the field in order to encourage the development and growth of the vegetative parts of the plant.
iv) The stage of crop development is specimen H <sub>2</sub> recommended for application is after seed have been germinated (post-emergence) from two or four weeks after germination to encourage vegetative growth.
bi). Botanical name of specimen I <sub>1</sub> is <i>Lycopersicon</i> <i>Lycopersicon esculentum</i> .
ii) The disease in specimen I <sub>1</sub> is Bacterial wilt and the causative agent is bacteria called <i>Pseudomonas</i> spp.
iii) The disease in specimen I <sub>2</sub> is <del>Cassava mosaic</del> disease. Cassava mosaic disease.

2b)iv	Methods in which <del>specimen</del> disease in specimen I <sub>2</sub> is transmitted.
i)	It is transmitted by white fly ( <i>Bemisia</i> spp).
ii)	Use of contaminated or infected planting material (stem).
v)	Scientific name of specimen I <sub>3</sub> is <i>Sitophilus zeamays</i> .
vi)	Crops that are main host of specimen I <sub>3</sub> .
i)	Maize.
ii)	Paddy.
iii)	Sorghum.
vid)	The specimen I <sub>3</sub> is both a field field pest and storage pest.
	Reasons
i)	It affect the crop seeds in the field.
ii)	It affect the crop seeds when in the store.
	Reasons:
i)	It cause damage to the crop when in the field.
ii)	It cause damage to the crop when in the store.

### 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<sub>2</sub> 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<sub>3</sub> in part (b) (vi), and failed to suggest whether specimen I<sub>3</sub> 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.

2. (i)	FSP H <sub>1</sub> _____ TSP
	H <sub>2</sub> _____ SA
(ii)	Characteristics of H <sub>2</sub> ⇒ Are white crystalline ⇒ They are hygroscopic ⇒ They are deliquescent ⇒ They are acidic in nature
(iii)	H <sub>1</sub> ⇒ H <sub>1</sub> are used for increasing the root growth of the plant
(ii)	H <sub>1</sub> They are used as fertilizer which facilitate or increase root growth of the plant and also promote cell division H <sub>2</sub> They are used as fertilizer which facilitate vegetative growth of the plant
(iv)	Before planting of the seed the specimen H <sub>2</sub> recommended to be used
(b)	
(i)	<del>Rhizomania</del> <del>manis</del> <del>paedummanis</del> <del>blackmus</del>
(ii)	Bacteria wilt caused by <del>Xanthomonas</del> <del>Sonaceum</del>
(iii)	Mosaic virus caused by bacteria <del>Xanthomonas</del> <del>Sonaceum</del>
(iv)	⇒ From the affected soil

**Extract 3.2.2**

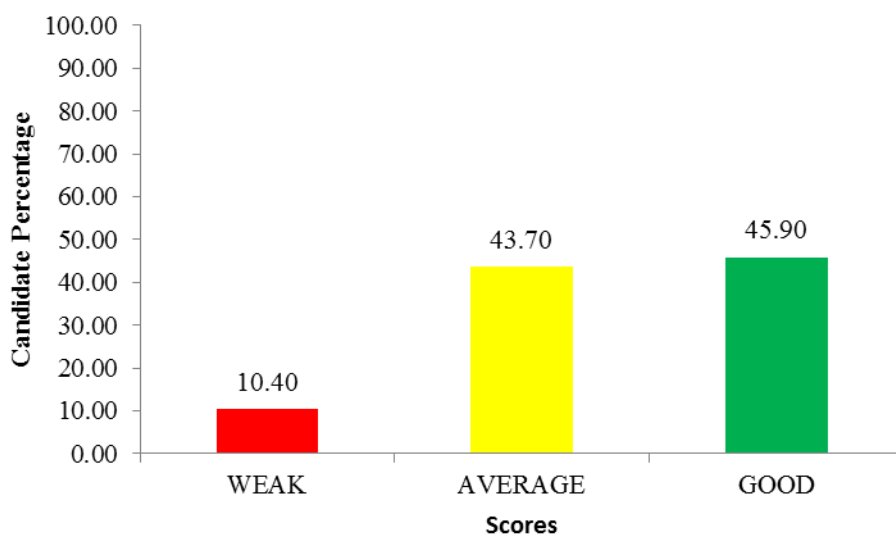
The extract illustrates a sample of a candidate's poor responses. The candidate responded incorrectly in all parts of the question, but failed in part (a) (iii) and (b) (ii).

### 2.3.3 Question 3: Livestock Science and Production

The candidates were provided with specimens J<sub>1</sub>-Rhodes grass, J<sub>2</sub>-Elephant/Napier grass, J<sub>3</sub>-Water snail and J<sub>4</sub>-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<sub>1</sub>, J<sub>2</sub>, J<sub>3</sub> and J<sub>4</sub> by their scientific names (ii) explain briefly how best can specimen J<sub>1</sub> and J<sub>2</sub> be preserved (iii) give three reasons why farmers conserve specimens J<sub>1</sub> and J<sub>2</sub> (b) (i) briefly describe how farm animals could be infested by specimen J<sub>4</sub>, (ii) name two farm animals which are common host of specimen J<sub>4</sub>, (iii) briefly explain the relationship between J<sub>3</sub> and J<sub>4</sub>, and (iv) outline three ways by which specimen J<sub>4</sub> 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*

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<sub>1</sub> and J<sub>2</sub>. 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 J<sub>4</sub> as well as naming correctly farm animals which are common host of specimen J<sub>4</sub>, in parts (b) (i) and (ii), respectively. The candidates also managed to explain the relationship between specimens J<sub>3</sub> and J<sub>4</sub> in part (b) (iii), and outlined correctly ways by which specimen J<sub>4</sub> 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 purpurium* and Liver fluke-*Fusiola species*. The candidates also failed to give the best way on how specimens J<sub>1</sub> and J<sub>2</sub> 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.

3(a) (i)	Specimen	Scientific name
	J <sub>1</sub>	<i>Chloris gayana</i>
	J <sub>2</sub>	<i>Penisetum purpurium</i>
	J <sub>3</sub>	
	J <sub>4</sub>	<i>Fasciola gigantica</i>
(ii) Specimens J <sub>1</sub> and J <sub>2</sub> can be preserved as hay and strage.		
(iii) farm animal could be infested by specimen J <sub>4</sub> as cercaria of specimen J <sub>4</sub> live on the grass where the animal was pastured on that grass. The matured cercaria is taken with feed by a farm animal, specimen J <sub>4</sub> develop in to adult when enter in to the body of animal, and was infested in the liver.		
(iv) We conserve specimen J <sub>1</sub> and J <sub>2</sub> because:		
(a) Used to feed animals during the time of shortage of grass or during time of famine.		
(b) Can be the source of income for the farmer when a farmer have large stock of conserved specimen J <sub>1</sub> and J <sub>2</sub> .		
(c) To ensure availability of animal feed throughout the year.		
b(i) The cercaria of specimen J <sub>4</sub> live on the grasses near water areas, where the farmer animal feed or graze on these grasses it can take		

2(b)	The cercaria of Specimen J <sub>4</sub> , when specimen enter in to a body of its host get matured and was mostly infected in the liver of farm animals.
(ii)	Farm animal which are common host of Specimen J <sub>4</sub> are: (a) Cattle. (b) Sheep.
(iii)	The relationship that exist between Specimen J <sub>3</sub> and J <sub>4</sub> was that, Specimen J <sub>3</sub> act as intermediate host of Specimen J <sub>4</sub> . → Because the eggs of Specimen J <sub>4</sub> drops on the ground or water enter the water snail and develop in to miracidium inside a body of Specimen J <sub>3</sub> . Therefore Specimen J <sub>3</sub> had a Specimen J <sub>4</sub> at some stage of life cycle before maturity.
(iv)	Ways of controlling Specimen J <sub>4</sub> from infecting farm animal. (a) To avoid grazing of farm animals in swampy area which is suspected to have water snail. (b) Treatment of swampy or water areas suspected to have water snail by copper sulphate to reduce the population of water snail. (c) Deworming, that is treatment of inter-

### 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 J<sub>3</sub>.

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- *Penisetum perperiam* instead of *Pennisetum purpureum*. In part (b) (iii), the candidates also were unable to explain the relationship between specimens J<sub>3</sub> and J<sub>4</sub>. They provided incorrect responses such as *specimen J<sub>3</sub> and J<sub>4</sub> 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<sub>4</sub> 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<sub>1</sub> and J<sub>2</sub> in part (a) (iii). Additionally, the candidates managed to describe how farm animals could be infested by specimen J<sub>4</sub> and name farm animals which are common hosts of specimen J<sub>4</sub> in part (b) (i) and (ii), respectively. Poor responses from one of the candidates are indicated in Extract 3.3.2 in question 3.

3.	g) i) specimen J <sub>1</sub> - <u>Chloris Gayana</u>	
	•	
	specimen J <sub>2</sub> - <u>Pennisetum purpureum</u>	
	specimen J <sub>3</sub> - <u>Water snail</u>	
	specimen J <sub>4</sub> - <u>Fasciola Hepatica</u>	

i) Specimen $J_1$ and $J_2$ they can be preserved by because they provide coarse fodder to livestock and used as a ornamental purposes.
ii) Because
i) Used as a coarse fodder to livestock, here
ii) If specimen $J_1$ and $J_2$ are used as a coarse feed fodder to animals hence increase milk production
i) Used as a pollination, specimen $J_1$ and $J_2$ used as pollination because transfer pollen grain from one plant to another plant.
ii) Used for ornamental, where by specimen $J_1$ and $J_2$ are used for ornamental purpose.
b) i) Whole by farm animal, can be infested by specimen $J_4$ by liver fluke attack can cause, eat udder blood, setting liver tissue, laying eggs which can cause severe liver disease and there is liver fluke attack to animal can cause chronic wasting, poor production and death of the animals so the farm animal can be infested by specimen $J_4$ .
i) i) Cattle
ii) Sheep



<p>iii) The relation ship between specimen J<sub>3</sub> and J<sub>4</sub> is that specimen J<sub>4</sub> can be caused with specimen J<sub>3</sub> which can attack grazed animal or man in most animals such as cattle and sheep so just way specimen J<sub>3</sub> related with specimen J<sub>4</sub> hence cause diseases to the liver when being attacked.</p>
<p>iv) Lower the stocking density and fertilizer, where by by lowering the stocking density and fertilizer is the way of controlling the infesting farm animal by specimen J<sub>4</sub>.</p>
<p>ii) Provide Vitamin A, D and B complex, where by by providing vitamins A, D and B complex bring the infested farm animal to be controlled from specimen J<sub>4</sub>.</p>
<p>iv) Very good treatment available from fluke, where by specimen J<sub>4</sub> can be controlled by providing a very good treatment available from fluke hence all infested in farm animal can be controlled.</p>

### 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 experienxes 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.

## Candidates' Performance in Different Topics in ACSEE 2019

S/N	Topic/Subtopic	2019	
		Percentage of Candidates who scored the average of 35% and above	Comments
1.	Agricultural Engineering and Land Planning (Paper three)	98.6	Good
2.	Crop Science and Production and Soil Science (Paper three)	94.6	Good
3.	Introduction to Weed Science	94.4	Good
4.	Farm Structure	93.8	Good
5.	Introduction to Animal Nutrition	92.2	Good
6.	Pasture Agronomy	90.3	Good
7.	Livestock Science and Production (Paper three)	89.6	Good
8.	Introduction to Animal Health	81.9	Good
9.	Farm Power	79.2	Good
10.	Agricultural Production Economics	77.1	Good
11.	Farm Workshop	73.2	Good
12.	Introduction to Irrigation	62.8	Good
13.	Introduction to Agricultural Prices	62.4	Good
14.	Crop Pests	60.4	Good
15.	Farm Mechanization and Machinery	53.7	Average
16.	Introduction to Soil Science	50.6	Average
17.	Plant Diseases	45.2	Average

S/N	Topic/Subtopic	2019	
		Percentage of Candidates who scored the average of 35% and above	Comments
18.	Environmental and Technological Challenges in Agricultural Development	45.1	Average
19.	Introduction to Soil Chemistry	41.2	Average
20.	Livestock Reproduction, Breeding and Improvement	40.1	Average
21.	Plant Breeding	12.9	Weak

