

THE NATIONAL EXAMINATIONS COUNCIL OF TANZANIA



**CANDIDATES' ITEM RESPONSE ANALYSIS REPORT
FOR THE ADVANCED CERTIFICATE OF SECONDARY
EDUCATION EXAMINATION (ACSEE) 2018**

134 AGRICULTURE

THE NATIONAL EXAMINATIONS COUNCIL OF TANZANIA



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134 AGRICULTURE

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FOREWORD

The Agriculture Candidates' Items Response Analysis Report on the Advanced Certificate of Secondary Education Examination (ACSEE) 2018 was written to provide feedback to students, teachers, parents, policy makers and other educational stakeholders on the candidates' performance in the Agriculture subject.

The Advanced Certificate of Secondary Education Examination marks the end of two years of advanced level secondary education. This summative evaluation shows, among other things, the effectiveness of the education system in general and education delivery system in particular. Essentially, the candidates' responses to the examination questions 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 statistics show good performance of the candidates in this year's examination with majority of the candidates having scored average marks. The analysis presented in this report is intended to contribute towards understanding the reasons that contributed to average performance by most of the candidates. These reasons include; inadequate knowledge of the topics and practical skills, inadequate English language proficiency and failure to meet requirements of questions. The report also highlights factors that caused few candidates to perform well in the examination. These include; adequate knowledge and practical skills and adequate English language proficiency that made the candidates to meet demands of the questions.

The feedback will enable educational administrators, school managers, teachers, and students to identify proper measures for improving candidates' performance in future examinations administered by the Council.

The National Examinations Council of Tanzania will highly appreciate constructive comments and suggestions from teachers, students and the public to improve future Items Response Analysis Reports.

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 is an analysis of responses of the candidates who sat for the Advanced Certificate of Secondary Education Examination in the Agriculture subject in 2018. The 2018 Agriculture Examination was set according to the examination format issued in 2011 which was derived from the 2009 Agriculture syllabus.

The examination comprised three papers, namely 134/1 Agriculture 1 and 134/2 Agriculture 2 (both being theory papers) and 134/3 Agriculture 3 (a practical paper). All papers consisted of short answer questions.

Paper 1 consisted of three (3) sections: A, B and C. Section A consisted of five questions from which the candidates were required to answer three. Sections B and C had two questions each; the candidates were required to answer one question from each section. Each question carried 20 marks. Paper 2 consisted of two sections, namely A and B. Each section contained five questions. 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; the candidates were required to answer all questions. Question 1 carried 20 marks, while questions 2 and 3 carried 15 marks each.

The statistical data show that a total of 615 candidates sat for the examination this year. The candidates who passed the examination were 604 (98.21%); they scored from B to S grades and 11 (1.79%) failed the examination, have scored the F grade as it is shown in Table 1. The general performance of the candidates in this year's examination was good with 1.6% fall in pass compared to 2017 results.

Table 1: Candidates' Performance by Grades

Grades	A	B	C	D	E	S	F	Total
Male	0	9	76	164	75	15	4	343
Female	0	0	26	110	109	20	7	272
Total	0	9	102	274	184	35	11	615

Source: NECTA Statistics Book, pg 6, ACSEE, 2018

Key:

A (80 – 100), B (70 -79), C (60 – 69), D (50 -59), E (40 – 49, S (35 – 39), F (0 – 34)

The following section of the report analyses performance on each question. The analysis involves giving an overview of what the candidates were required to do, the way they responded, and the reasons for their good/poor performance. In the analysis, a question/topic is categorised as having poor performance, average performance or good performance by considering the percentage of the candidates who scored an average of 35 percent and above of the marks allocated to the individual question. If the percentage lies in the interval of 0-34, 35-59 and 60-100, the performance is described as poor, average and good respectively. Some extracts of such good and poor responses to the questions have been included.

2.0 ANALYSIS OF THE CANDIDATES' PERFORMANCE ON EACH QUESTION

2.1 134/1 AGRICULTURE 1

2.1.1 Question 1: Farm Power

The question consisted of four parts: (a), (b), (c), and (d). The candidates were required to (a) identify the following types of oils based on US Society of Automotive Engineers (i) four engine oils, (ii) four gear and transmission oils, and (iii) two multigrade oils; (b) briefly explain five functions of the lubrication system; (c) briefly describe three types of lubrication systems; and (d) differentiate between detergent oils and grease.

The question was attempted by 173 (28.1%) candidates; among them, 75 (43.4%) scored from 1.5 to 6.5 marks, and 98 (56.6%) scored from 7 to 11.5 out of 20 marks. These data show that their general performance on this question was average, since 98 (56.6%) candidates scored from 7 to 11.5 marks. The distribution of the candidates' scores is shown in the following pie chart.

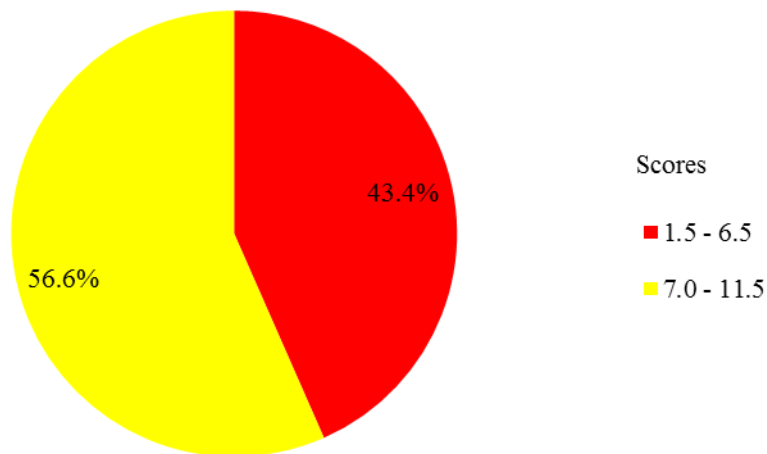


Figure 1: *Candidates' Performance on Question 1*

Figure 1 portrays average performance on the question. Apparently, the candidates did not fully understand the topic. Accordingly most candidates performed averagely. Most of these candidates gave correct responses in parts (b), (c), and (d) but failed to identify different types of oils in part (a).

In part (b), the candidates correctly explained the functions of the lubrication system and, hence, managed to describe types of lubrication systems in part (c). Similarly, the differences between detergent oil and grease were clearly given by the majority of these candidates in part (d).

However, most candidates who performed averagely in this question failed to identify different types of oils in part (a). Examples of incorrect responses were (i) engine oils - *viscosity of A40, SAE 50 and grease*. (ii) gear and transmission oils - *viscosity of A20, SAE 40 and detergent oils*. (iii) multigrade oils - *viscosity of A40, SAE 30 and multiple grade oils*. Evidently, the candidates lacked practical exposure to different types of oils. Extract 1.1.1 represents such average responses to the question.

Extract 1.1.1

1	(a) (i)	30/40 SAE.	
	(ii)	90/150 SAE or 90/140 SAE	
	(iii)	SAE 70 - 90.	
1	(b) (i)	It reduce friction for all moving parts example in reciprocating parts.	
	(ii)	It reduce noise of engine parts.	
	(iii)	It clean the engine parts example ^{grease} and oil.	
	(iv)	It reduce wearing of engine parts.	
	(v)	It reduce leakage of moving parts	
1	(c) (i)	Forced Lubrication system, by applying a pressure ^{outside.} inside	
	(ii)	Induced Lubrication system, pressure applied inside the moving parts	
	(iii)	Application of ^{grease} grease and oil.	
1	(d)	Detergent oils Grease.	
	(i)	Applied outside of the engine	(i) Applied inside the engine.
	(ii)	The oil is dirty Sometimes	(ii) The grease is always clean

Extract 1.1.1 is a sample of answers from a candidate who performed averagely in the question. The candidate attempted well all parts of the question except in part (a) (ii) and (a) (iii), in which he/she failed to identify gear and transmission oils and multigrade oils.

The poor performance of the candidates on this question was caused by their inadequate knowledge and practical skill on the topic. The majority of the candidates who performed poorly on this question provided incorrect responses to part (a), (c), and (d). Some of these candidates, however, provided correct responses to part (b).

Examples of the incorrect responses provided by the candidates in identifying different types of oils in part (a) were (i) engine oils - *intake, compression, power, and exhaust*; (ii) gear and transmission oils- *valve system, SAE 40, and viscosity of water*; (iii) multigrade oils – *petrol, diesel, SAE 30 and viscosity of A40*.

Likewise, in part (c), most of these candidates could not describe the types of lubrication systems. They gave incorrect responses such as *fuel system*, *cooling system* and *oil system*.

In addition, in part (d), the candidates failed to differentiate between detergent oils and grease. They gave incorrect responses such as *detergent oil applied outside the engine* and *detergent is always dirty while grease is always clean*.

However, some of these candidates could explain correctly few functions of the lubrication system in part (b). Apparently, the candidates were knowledgeable about the functions of lubricants. Extract 1.1.2 is a sample of the poor responses to the question.

Extract 1.1.2

1.	(a) (i) - SAE 10	
	- SAE 20	
	- SAE 30	
	- SAE 40	
	(ii) - Detergent oil	
	- Multi-grade oil	
	- Grease oil	
	(iii) Multi grade oil are	
	- These prevent thin oil from thickening when cold	
	- These prevent thick oil from thinning when hot	
1.	(b) Functions of Lubricant.	
	- Aid to seal the compression between the cylinder and piston so as to give a proper ignition of fuel in the cylinder.	
	- Oil with detergent help to keep dirty and smoke in the engine hence maintain the proper function of the engine.	
	- Oil help to reduce friction in the moving part hence prevent the wearing of the engine parts.	
	- Oil aid in a cooling purpose particularly in two stroke engine.	
	- Oil help to control the Engine temperature by absorbing the heat produced within the engine.	

1	<p>① Types of Lubrication system.</p> <p>① Splash Method</p> <p>- In this system Oil is splashed by the crankshaft bearing cap to the moving part. When the crankshaft rotate it splash the oil from the crankcase to the moving parts by cap.</p> <p>② Oil Mist Method.</p> <p>- This is the process of lubrication where by the oil is mixed with fuel. This system is more applicable to the two stroke engine.</p> <p>③ Force feed Method.</p> <p>- This is the type of lubrication in which the oil passes from the crankcase to the moving parts by using various structure like oil strainers, oil pump, pressure pump. These parts can carry the oil from the crankcase to the moving part of the engine.</p> <p>④ Detergent oil are those oil which contain additive that can act to trap dust and smoke in the engine while grease there are the oil which is made by petroleum materials and soap that can be used in the engine to reduce friction.</p>	
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In Extract 1.1.2, the candidate provided only some few correct responses to part (b). This justifies the incompetence of the candidate in the subject matter.

2.1.2 Question 2: Farm Workshop

The question consisted of three parts: (a), (b) and (c). The candidates were required to (a) give the functions of each of the following workshop tools (i) wood float, (ii) bolster, (iii) rasps, (iv) bastard file, and (v) hand drill; (b) (i) suggest four measures to be taken to increase life span of files and (ii) outline ten safety rules to be adhered to when working in a farm workshop and; (c) write the functions of four types of saws used in the farm workshop.

The question was attempted by 543 (81.1%) candidates. In this question, 14 (2.6%) candidates scored from 4.5 to 6.5 marks; 117 (21.5%) candidates scored from 7 to 11.5 marks; and 412 (75.9%) candidates scored from 12 to

19 out of 20 marks. These statistics show good performance in the question on the question in which 447 (97.4%) candidates scored from 7 to 19 marks. Table 2 presents the scores of the candidates on the question.

Table 2: Candidates' Performance on Question 2

Scores	Percentage of Candidates
1.5 - 6.5	2.6
7.0 - 11.5	21.5
12.0 - 19.0	75.9

Table 2 depicts candidates' good performance on the question. This was a result of good knowledge and practical skills in the subject matter. Those who demonstrated good performance on this question did well in almost all parts of the question, except in part (a). In this part, some candidates did not know the function of bolster in part (a) (ii).

In part (a), the majority of the candidates who did well in the question managed to give correct functions of the given tools; a few of them failed to give the function of bolster. An example of the incorrect response from one candidate was *bolster used for sharpening of wood and metal*.

Measures to be taken in order to increase the life span of files in part (b) (i) were correctly suggested by the candidates. They also outlined properly the safety rules to be adhered to when working in a farm workshop in part (b) (ii).

Moreover, in part (c), the candidates showed competence in writing correctly the functions of different saws used in a farm workshop. This part required the candidates to identify the saws and then give their functions. The candidates managed to identify the saws and their respective functions, indicating that they had adequate knowledge and practical skills in farm workshop tools. Extract 1.2.1 illustrates one of the candidates' good responses to the question.

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Extract 1.2.1

2(a)	Function of the workshop tools are as follows.	
	(i) <u>Wood float</u>	
	There is a masonry tool that is used for placing or laying mortar before it is placed on the surface (wall).	
	(ii) <u>Bolster</u>	
	There is a masonry tool that is used in cutting bricks or blocks for construction.	
	(iii) <u>Rasper</u>	
	There is a workshop tool that is used for smoothing rough surface and reducing the diameter of a wood metal and sharpening of metal.	
	(iv) <u>Bastard file</u>	
	There is a workshop tool that is used for sharpening metals and also reducing diam	
	(v) <u>Bastard file</u>	
	There is a workshop tool that is used for smoothing surfaces and provide suitable surface and removing of diameter of a metal or wood.	
	(vi) <u>Hand drill</u>	
	There is a workshop tool that is used for drilling wood and metal to make holes where different bolts or nuts are inserted. There are hand drill and multi-purpose where it work on both wood and metal while hand drill bore holes on wood.	

2b)	4) Measures to be taken to increase life span of files.	
	(a) <u>Proper storage of files</u>	
	Files should be stored in a dry and place away from moisture content to prevent rusting and other corrosion.	
	(b) <u>Files should be cleaned by using a file card.</u>	
	Files should be cleaned using a file card to avoid breakage of teeth and make it to work blunt when operating the process. So it is advised to clean it using file card.	
	(c) <u>Avoiding spilling of oil to the file card.</u>	
	There is a measure to increase life span of files in a workshop by avoiding spilling of oil to the files as these may block the teeth and make it to operate worse.	
	(d) <u>Files should be kept in a cabinet and arranged in a manner to prevent knocking to one another to increase efficiency and also they should be protected against moisture to prevent rusting and corrosion to take place.</u>	

Q6)	iii) The following are the rules adhered in a farm workshop.	
	① Floor should be kept clean from obstruction and avoid spilling of oil to the floor to avoid accident in a workshop.	
	② Machine should be operated by one person to avoid accident.	
	③ Do not smoke cigarette in a workshop to avoid fire hazards.	
	④ Wear safety clothes such as overall and avoid wearing loose clothes to prevent injury and reduce as them as possible.	
	⑤ Wear goggles and shields when welding and forging to avoid personal injury and eye problems in a workshop.	
	⑥ Use proper tool for a particular and proper tasks to be performed.	
	⑦ Do not run in the workshop to avoid personal accidents.	
	⑧ Do not operate a machine or a power saw till instructed by a supervisor and make sure the drive belt is in proper tension.	

	(i) Wear gumboot when operating with a power saw to avoid injury and accidents in a workshop.	
	(ii) After working with a workshop tool clean it and arrange it to the cabinet store nice well and arranged manner for the prolonged life span..	
	(iii) Do not run and make noisy in the workshop	
28c).	The four types of saws used in a farm workshop are.	
	(i) <u>Rip saw</u> There is used to cut wood along the grain	
	(ii) <u>Cross cut saw</u> There is used to cut wood across the grain	
	(iii) <u>Tenon saw and dove tail saw</u> Tenon saw is used for sawing small works for making tenon joint and dove tail saw is used for making tenon dove tail joints.	
	(iv) <u>Coupling saw and Bore saw</u> Coupling saw is used for making curves or cutting tight works and bore saw is used for cutting logs along the grains.	

Extract 1.2.1 is an example of good responses to the question. The candidate provided correct responses to all parts of the question but missed only some few points in part (b) (ii).

Conversely, the candidates who performed poorly demonstrated inadequate knowledge and practical skills in the farm workshop. The majority of these provided incorrect responses to part (a) and (c) but tried to attempt part (b) correctly.

Such candidates failed to give the functions of different tools in part (a). Some of the incorrect responses to this part were (i) wood float - *is used for floating materials before placing in its position*; (ii) bolster - *used for bolting nuts and screws*; (iii) rasps - *used for cleaning nuts*; (iv) bastard file- *is used for sharpening wood surface*; and (v) hand drill - *is used to drill on wall surfaces*.

In part (c), the candidates did not manage to write the functions of the types of the saws used in the farm workshop. Consequently, they failed to give their functions. Few candidates managed to identify the correct saws but failed to give their proper functions. Examples of incorrect responses provided for the functions of the saws were (i) hacksaw -used for sawing wood along the grain; (ii) dovetail saw- used for general bench working; (iii) Rip saw- for cutting wood across the grain; and (iv) cross-cut saw- for cutting metal.

On the other hand, these candidates managed to suggest measures to be taken to increase the life span of files in part (b) (i) and correctly provided some few correct points on the safety rules to be adhered to when working in the farm workshop in part (b) (ii). This indicates that the candidates possessed partial knowledge of safety rules in the farm workshop. Extract 1.2.2 indicates responses from a candidate who responded poorly to the question.

Extract: 1.2.2

2.	a, i	To measure diameter of wood along the grain.	
	ii	Used to strengthen or lowering the nail.	
	iii	Used to fix the wood. Used to drive strengthen the nail.	
	iv	It makes square angles of the wood. / measure square angles	
	v	To create holes to the wood.	
	b, i	cleaning of files after use.	
	ii	lubrication on it.	
		- should be stored in a cool and dry place.	
		- should be prevented from rusting.	
	ii	All flammable liquids should be labelled and kept on their safety container to avoid contamination.	
		- A person should wear goggles wear to avoid direct light during welding activities.	
		- A person should wear nose mask wear to avoid dusts during the work.	

	- A person should wear overall and gloves so as to prevent him or her during the work.	
	- A person should be carefully when using sharp tools, equipments, implements and machines.	
	- All benches and other goods should be well arranged.	
	- Clean all workshop tools used and arrange them properly.	
	- Fire extinguisher should be available for emergency of fire.	
	- The floor should be clean all the time (out of rubbish) so as to avoid accident.	
	- Do not spill any flammable liquid to the floor because it may lead to fire outbreak.	

In Extract 1.2.2, the candidate only gave the correct function of the bastard file in part (a) (iv), suggested correctly measures to increase life span of files in part (b) (i), and gave few safety measures to be adhered to in a farm workshop in part (b) (ii). This shows that, to a great extent, the candidate lacked knowledge and practical skills on workshop and workshop tools.

2.1.3 Question 3: Farm Structures

This question comprised four parts: (a), (b), (c) and (d). The candidates were required to (a) classify two types of wood, (b) account for four uses of timber as a building material, (c) give four merits and five demerits of timber as a building material, and (d) identify five advantages of using concrete in farm building.

The question was attempted by 530 (86%) candidates. Among them, 83 (15.7%) scored from 1 to 6.5 marks; 387 (73%) scored from 7 to 11.5 marks; and 60 (11.3%) scored from 12 to 14.5 of the 20 marks set for the question. These data signify good performance on the question, some 447 (84.3%) scored from 7 to 14.5 marks. The candidates' scores are shown in Figure 2.

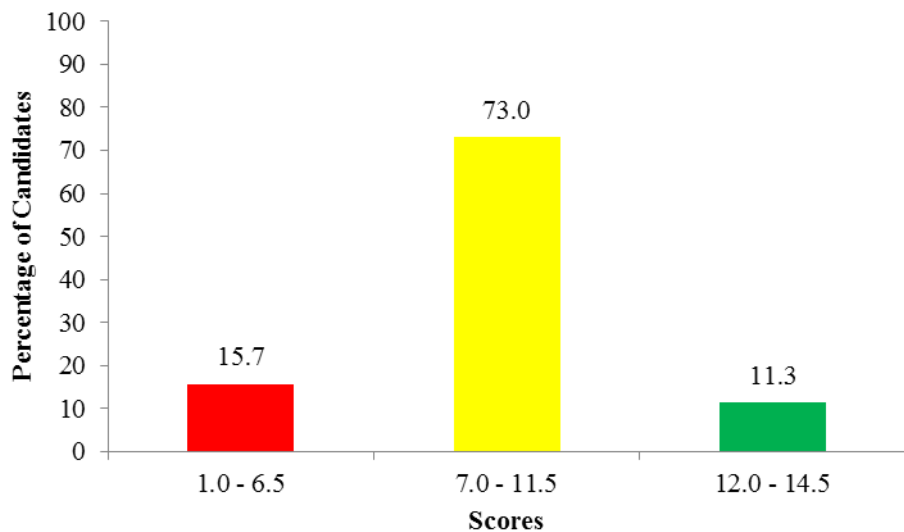


Figure 2: *Candidates' Performance on Question 3*

On one hand, the data presented in Figure 2 indicate good performance. The performance was due to their adequate knowledge of farm structures. The candidates who performed well on this question showed good mastery of the topic. Most of them did well in part (a), (b), and (c) but poorly in part (d).

Part (a) required the candidates to classify two types of wood. This part was correctly attempted by most of the candidates. In part (b), these candidates also correctly indicated uses of timber as building material.

Moreover, in part (c), the majority of these candidates managed to give the merits and demerits of timber as building material but failed to give all points needed on the advantages of using concrete in farm building in part (d). Some candidates provided incorrect responses such as *do not catch fire* and *produce no heat* as advantages of using concrete in farm building. This revealed that the candidates had poor knowledge of and field experience on masonry work. Extract 1.3.1 represents a sample of average responses to the question.

Extract 1.3.1

3(a)	Two types of woods.	
	i) Soft woods, used in making papers and some soft kind of books.	
	ii) Hard/rough wood- used in building some materials example chairs, tables, and doors.	
3(b)	Four uses of timber as a building material.	
	i) Used in building of chairs, tables and doors as the building material.	
	ii) Timber is used in building form crushes structures.	
	iii) Timber is used as roofing material. in the house.	
	iv) Timber is used in floor and wall construction for some building hence are strong when treated well.	
3(c)	Four merits of timber as building material.	
	i) It is not cost full, The timber is not cost full compare to metal when buying it and using.	
	ii) No need of high skill and knowledge when using it during building compare to the metal used during building are complicated.	
	iii) It is available easily, The timber it is available easily compare to metal hence depend on far area to obtain but timber it is tree which are available naturally.	
	iv) It is strength, when the timber is treated well by chemical it is very strength and durable for long lasting to be affected by the different agent like insects.	

3(c)	Demerits of timber as a building material!	
	i) Timber can be rotten by fungus/fungi, The timber does not longer living compare to metal hence it take short period of time to decay.	
	ii) Can eaten by insects such as termites and hence have low quality to be take short time to living.	
	iii) Affected by weather condition (rainfall and hence decay) Also timber are affected by weather condition hence may be decay after rained by rainfall.	
	iv) It is Cost full in transportation from the point where it is produced up to the point of use.	
	v) It is not more Durable, The timber it is not take longer time compare to other type of building such metal when used in building.	
3(d)	Five advantages of using concrete in farm building	
	i) It is very durable, the concrete when used there is durability of house for long time ago to live of house.	
	ii) It is easy to mix the mixture are used hence depend in water, gravel and cement only in ratio of the 1:3:4.	
	iii) When used improve strength of both foundation and looking of the house.	
	iv) It does not rotten when used and hold house security not easy to be cracked during earthquake.	
	v) May not be attacked by termites, insects and fungi, hence may live long last of time with out be broken by any organism.	

Extract 1.3.1 is a sample of good responses to the question. The candidate attempted well nearly all parts of the question in exception of part (c) in which he/she missed some points on the demerits of timber as building material. Likewise, in part (d), the candidate missed few points on the advantages of concrete in farm building.

On the other hand, some candidates performed poorly in this question by responding incorrectly in almost all parts of the question due to their inadequate knowledge of farm structures.

In part (a), an example of incorrect responses on the classification of wood were *treated timber* and *untreated timber*. While some of the incorrect

responses on the uses of timber as building material in part (b) were *source of firewood* and *marking feed trough of livestock*.

In part (c), the majority of the candidates also provided incorrect responses such as *used to build strong wall of a store* and *it increases durability to the house* as merits of timber as building material. Examples of incorrect responses for the demerits of timber as building material were *it lead to shortage of rainfall* and *cause desertification*.

In part (d), incorrect responses such as *it can protect livestock from strong winds* and *protect livestock* were also given as advantages of using concrete in farm building. Extract 1.3.2 exemplifies poor responses to the question.

Extract 1.3.2

3	<u>TYPES OF WOOD</u>	
i	SOFT wood	
ii	Hard wood.	
3b	<u>uses of timber</u>	
i	It prevent movement of livestock hence it minimize spread of disease to animal	
ii	It protect the farm building like animal crop from rain fall and sunlight.	
iii	It help in storage of agricultural product.	
iv	It used in improvement of the farm building hence facilitate crop rotation in field.	

3C	<u>MERITS OF TIMBER</u>	
I	It help in protection of the farm properties such as animal and tools from rainfall and sunlight.	
II	It help in storage of agricultural products such as crop and feed.	
III	It help to prevent the movement of wild animal from one place to another.	
	- It help to minimize the spread of the disease and help to reduce rate of theft.	
3C	<u>DIMERITIES OF TIMBER</u>	
I	It is expensive to buy the timber for construction.	
II	It required more skilled during the building farm structure by using timber.	
III	It need	
III	It require more time during farm building.	
IV	It need more labour during farm building.	
V	There transportation of timber is difficult this lead to increase cost to the farmer.	

	<u>ADVANTAGE OF CONCRETE IN FARM BUILDING</u>	
3d1	It used in fencing so it help in prevent wind.	
II	It used to prevent the intrusive movement of animal from one place to another hence it minimize direct transmission.	
III	It demarcate the boundaries of the farm hence the chance of dispute with the neighboring. It minimize.	
IV	It improve crop rotation.	
V	It help protect the animal from the sun and rainfall.	

In Extract 1.3.2, the candidate provided correct responses to part (a) only but failed to respond to the rest of the question. The candidate showed inadequate knowledge of building materials on farm structures.

2.1.4 Question 4: Farm Mechanisation and Machinery

The question was divided into four parts: (a), (b), (c) and (d). The candidates were required to (a) give the meaning of land clearing, (b) elaborate four principles of chaining as a land clearing method, (c) propose three methods that can be used to dispose the vegetation removed from land clearing, and (d) give the eight important questions to be considered when selecting the machine model to be purchased.

The question was attempted by 39 (6.3%) candidates, whereby 14 (35.9%) candidates scored from 3 to 6 marks and 25 (64.1%) candidates scored from 7 to 10 out of the 20 marks set for the question. The data suggest that the performance of the candidates on this question was good since 25 (64.1%) candidates scored from 7 to 10 marks. Figure 3 indicates the candidates' scores in the question.

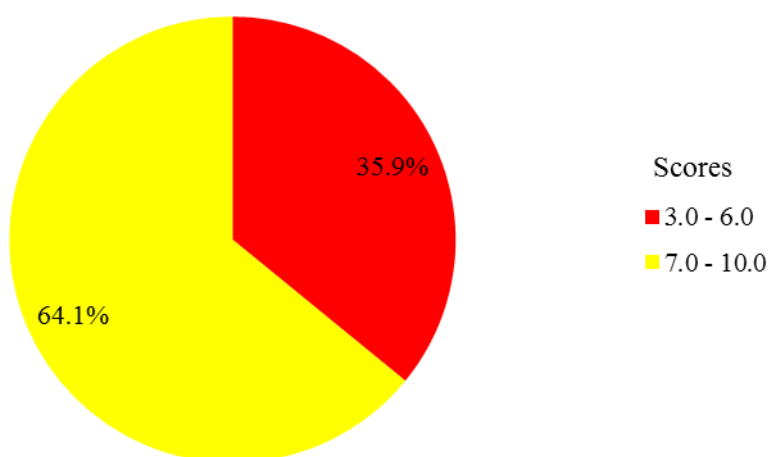


Figure 3: *Candidates' Performance on Question 4*

Figure 3 shows good performance on the question. The majority of the candidates performed averagely on this question; most of them lacked adequately knowledge about the topic. These candidates provided correct responses in part (a) and (c). In part (d), they managed to provide correct responses but failed to elaborate principles of chaining as a land clearing method in part (b).

In part (c), the candidates also managed to propose methods that can be used to dispose the vegetation removed from land clearing and responded well on the questions to be considered when selecting the machine model to be purchased by giving most of the points correctly in part (d). However, the majority of these candidates failed to elaborate the principles of chaining as a land clearing method. Instead, they elaborated procedures used in survey chaining. In this part, the candidates failed to meet the demand of the question and seemed to lack adequate knowledge of the methods of land clearing. Extract 1.4.1 shows one of the candidates' good responses to the question.

Extract 1.4.1

4	(a) Land clearing is the process where by land is kept free from several obstacles such as vegetation, stones, thorns to provide area for agriculture production such as crops cultivation.	
	(b)	
	(i) Eradication and uprooting all vegetation.	
	(ii) Conducing away all wastes in the farm.	
	(iii) Harrowing the land by incorporate soil with organic matter.	
	(iv) Mixing manures throughout the land.	
	(c)	
	(i) Burning	
	all vegetation from or removed from land clearing can be burned in order to remove all wastes which are present in clearing land, burning can be done outside in specific area or where land clearing conducted.	

	(ii) Use as animal feeds.	
	also if vegetation are grass such as nut grass or couch	
	grass can be used as animal fodder instead of being damaged	
	because it is useful to animal	
	(iii) Used to manufacturing compost manure	
	also vegetation removed from land clearing can be	
	use to manufacturing of compost manure when is buried	
	and incorporated with soil	
Q	(d)	
	(i) low operational cost	
	(ii) machine should be easily adjusted and serviced	
	(iii) machine should be manufactured by reliable firm	
	(iv) machine should be purchased at reasonable cost;	
	(v) Spares parts and services of that machine should be	
	available	
	(vi) machine should be able to work even in poor local	
	environment	
	(vii) can be able to conduct more than one works or function	
	example tractor for cultivating and harvesting	
	(viii) portable and easily shifted from place to another.	

Extract 1.4.1 shows a sample of responses from a candidate who performed averagely in the question. The candidate provided the correct responses in part (a) and gave partially correct responses in parts (c) and (d). In part (b), the candidate failed to elaborate principles of chaining as the land clearing method.

The analysis of the responses from the candidates who performed poorly in the question indicated poor mastery of the topic. Most of these candidates gave incorrect responses in the whole question.

In part (a), these candidates failed to give the meaning of land clearing. Consequently, they failed to give the principles of chaining as a land clearing method in part (b). An example of an incorrect response on the meaning of land clearing from one of the candidates was *land clearing is the process of removing waste product which are not wanted in the soil*. Some incorrect responses provided on the principles of chaining as a land clearing method were such as *avoid overcutting tree* and *replacement of vegetation after clearing*.

In addition, the majority of these candidates did not manage to propose methods that can be used to dispose vegetation removed from land clearing

in part (c). The candidates gave incorrect responses like *by using chemicals* and *by uprooting method*. Likewise in part (d), the candidates failed to give important questions to be considered when selecting the machine model to be purchased and gave responses such as *type of crop pattern* and *availability of material*. Extract 1.4.2 portrays responses from a candidate who did poorly in the question.

Extract 1.4.2

4.	(a) Land clearing	
	Is the measure taken to the land and also putting the marks to the land for different work to be done.	
	(b) Principles of chaining as a land clearing method.	
	(i) Look slope of the area. When using chain method we also look the slope of the area by using chain.	
	(ii) Take the measure of the area and put the mark to the area by using chain method.	
	(iii) Put the mark to the area which you have measure clear without mistake.	
	(iv) Write the measure you have taken to the note book for the record.	
	(c) methods of land clearing-	
	(i) Chain method This is the method which is taken by using chain. It disposes the vegetation and removes from land.	
	(ii) Culperter Square method This is the method taken by using Culperter. It disposes the vegetation and removes from land.	
	(iii) Triangular Triangular method. This is the method taken by using Triangular. It disposes the vegetation and removes from land.	
4.	(d) Important question to be considered when selecting machine model to be purchased.	
	i) How is it cost?	
	ii) How is it work?	
	iii) Is the repairment of parts available?	
	iv) Is it good to use to my farm?	
4.	(e) In which condition is the machine works?	
	(vi)	
	(vii)	
	(viii)	

Extract 1.4.2 are poor responses to the question. The candidate only provided few correct responses in part (d). The other parts of the question were poorly attempted by the candidate. Apparently, the candidate lacked adequate knowledge of land clearing methods.

2.1.5 Question 5: Introduction to Irrigation

The question had four parts: (a), (b), (c), and (d). The candidates were demanded to (a) briefly describe the furrow irrigation system, (b) outline three advantages and four disadvantages of the furrow irrigation system (c) suggest four necessary conditions for surface irrigation system to take place, and (d) briefly explain in six points the importance of drainage in the irrigated farm.

The question was attempted by 564 (91.6%) candidates. In this question, 176 (31.2%) candidates scored from 2.5 to 6.5 marks; 350 (62.1%) candidates scored from 7 to 11.5 marks; and 38 (6.7%) candidates scored from 12 to 16 out of the 20 marks set for the question. In this question, the candidates demonstrated good performance; 388 (68.8%) candidates scored from 7 to 16 marks. Figure 4 illustrates the candidates' scores on the question.

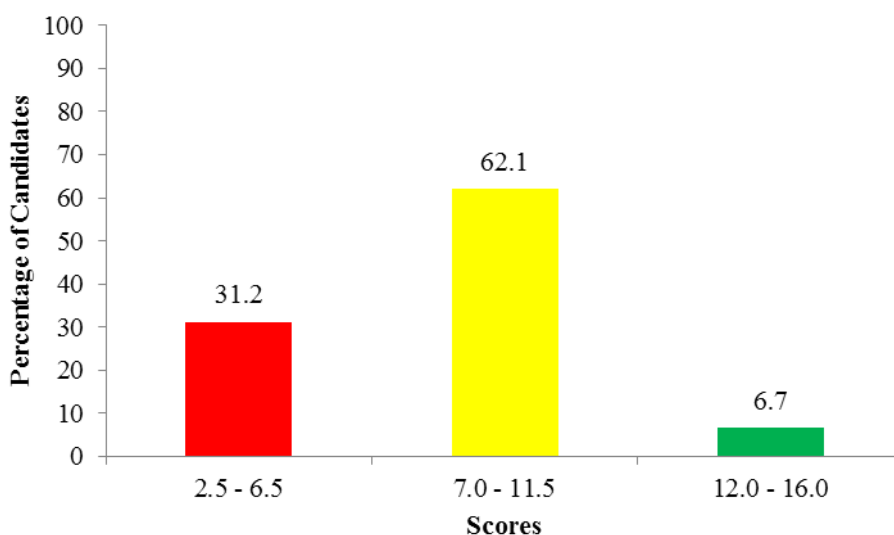


Figure 4: *Candidates' Performance on Question 5*

Figure 4 presents general good performance of the candidates. The majority of the candidates had sufficient subject matter knowledge and field exposure. The candidates who did well in this question demonstrated a good mastery of the topic. Accordingly, they gave correct responses to almost all parts of the question.

In part (a), most of these candidates managed to describe the furrow irrigation system, except that some few candidates did not fully describe the system. In this part, the candidates were supposed to describe the furrow irrigation system by explaining the whole make up of the system. However, few candidates missed some points in their description. Nevertheless, the majority of the candidates in this group managed to outline the advantages and disadvantages of the furrow irrigation system in part (b).

In part (c), the candidates correctly suggested necessary conditions for surface irrigation to take place. They also managed to explain most points on to the importance of drainage in the irrigated farm in part (d). Extract 1.5.1 illustrates good responses to the question from one of the candidates.

Extract 1.5.1

5	a) furrow Irrigation: Is the type of surface Irrigation whereby water flows in Canals following the Contour-line. It is mostly applied in crops such as sugar Canes whereby water flows in streams which are made of dykes to Control water movement within a system.	
5	b) i) three advantages of furrow Irrigation	
	i) It reduce the incidence of fungal diseases spread to plants.	
	ii) It does not require high skilled Labour during operation.	
	iii) It is a cheap method to establish and maintain.	
5	b) four disadvantages of furrow irrigation.	
	i) It needs high amount of water.	
	ii) It may cause soil erosion.	
	iii) It encourages development of weeds.	
	iv) Large amount of water is wasted through evaporation and infiltration.	
5	c) four conditions necessary for surface irrigation to occur:	
	i) The soil should be clay to reduce infiltration of water.	
	ii) There should be large amount of water.	
	iii) There should be minimum evaporation rate.	
	iv) The slope should be gentle.	

5	d) six importance of drainage in the irrigated farm.	
	i) It improves soil Aeration simply because good drainage opens the pores facilitating free movement of air within the soil particles.	
	ii) It improves microbial activities because good drainage facilitates an increase in decomposition of micro-organisms in the soil facilitating soil fertility.	
	iii) It reclaims the soil: drainage system reclaims the soil by changing the unproductive soil which was poorly drained to a productive one hence increase amount of crop growth.	
	iv) It improves soil temperature: good drainage system in the farm improves soil temperature hence results to decomposition of organic matter in the soil.	
	v) It reduces the incidence of spread of diseases such as fungal diseases which tend to multiply in a wet environment such as high moisture is favoured.	
	vi) It removes toxins from the irrigated farms by not allowing accumulation of minerals and salts which may cause increase in soil acidity which affects different properties of the soil for plant growth.	

Extract 1.5.1 indicates good responses to the question. The candidate gave all correct responses to part (c) and missed only a few correct points to parts (a), (b), and (d), demonstrating adequate knowledge of and field practical exposure to irrigation.

Many of the responses given by the candidates who performed poorly in this question suggest inadequate knowledge and experience in field training. The candidates largely provided incorrect responses to most parts of the question.

In part (a), the majority of these candidates gave incorrect responses on the description of the furrow irrigation system. Examples of such incorrect responses were *Furrow irrigation involve use of water through*

surface of soil by providing water to the plant growth and Irrigation is irrigated water are applied to the crop land.

The candidates similarly failed to outline the advantages and disadvantages of the furrow irrigation system in part (b). Instead, they provided responses such as *furrow irrigation cannot be affected by water condition* and *furrow irrigation stimulate growth* as advantages of the furrow irrigation system and *encourage accumulation of toxic substances* and *easy to transport pests and diseases* as its disadvantages.

In part (c), the majority of candidates gave incorrect responses in respect to the conditions that are necessary for the surface irrigation system to take place. Examples of responses given were *arrangement of good drainage is required* and *it is applied in wet soils*.

Part (d), which required the candidates to explain the importance of drainage in the irrigated farm, was also poorly attempted by the majority of the candidates. Few candidates in this group managed to outline few points on the importance of drainage in the irrigated farm without giving their explanation. Examples of incorrect responses were *drainage help in controlling weeds* and *drainage help to maintain soil moisture*. Extract 1.5.2 represents poor responses to the question.

Extract 1.5.2

5(a)	Furrow irrigation, There is the form of surface irrigation where by irrigated water are pump are applied to the land cropland, it's important since it can lead to proper growth of crop plant hence increase yield of crops.	
(b)	The following are advantage of furrow irrigation system.	
i/	It supply water to the crop plant hence stimulate growth.	

5b) growth of the plant:

- i) It facilitates growth of root to crop plant since water is supplied to the crop land. Water is useful for root growth and absorption of plant nutrients.
- ii) Water supplied to crop land is useful since it has cooling effect to crop plant and also maintains moisture of the soil that is necessary for plant growth.

The following are disadvantages of -
Furrow irrigation

- i) It can't be used where there is a low quantity of water.
- ii) The system also can't be used in the soil that is impermeable to water, that is, soil that does not allow passage of water.
- iii) This system can't be applied in an area where the land is not near flat.
- iv) Proper drainage arrangement will be required to prevent ponding.

c) The following are necessary conditions for surface irrigation

- i) The land should be relatively flat.
- ii) There should be presence of large quantity of water.
- iii) The soil should be permeable, that is, the one that allows water to pass through it.
- iv) Arrangement of good drainage is required to prevent ponding.

5(d)	The following are drainage in the irrigated farm.	
i/	It help to maintain maintain soil moisture, soil moist ure is very assential for the seed to be germinated, since excess water from the field are removed, hence the crop plant will grow well and increase crops yield.	
ii/	Drainage help in maintaining aeration in the soil, whe n excess water are removed from the soil hence oxygen obta that found in the soil will be used by plant roots which will ensure good growth of crop plant - hence increase in quantity of production.	
iii/	Also help in controlling weed. There are some weed that grow well in a place with high quantity of water example duck weed, These can interfere with normal growth of crop plant example paddy, hence dr ainage help in removing such p difficulties.	
iv/	Help in maintaing suitable Bable of water, This hel p in good growth of plant growth which facilitate increase in yield of crops.	
v/	Drainage help in maintaining soil temperature - This is very importance since enzymatic activities work under optimal temperature and hence if its lower than that optimal will not work good, This drainage help in maintaining temperature that enzyme will work better to increase high yield of crops.	
vi/	Drainage help in preventing flooding / leaching of soil nutrients that will cause loss of soil fertilit y and have poor quantity of yield of crops.	

In Extract 1.5.2, the candidates attempted parts (a) and (b) poorly. However he/she managed to provide just few correct responses in parts (c) and (d) which resulted into scoring low marks. The candidate lacked knowledge and field training exposure on irrigation.

2.1.6 Question 6: Introduction to Soil Science

The question constituted four parts: (a), (b), (c) and (d). The candidates were required to (a) give five ways employed in soil air management; (b) briefly explain four factors affecting the composition of soil air; (c) analyse the effects of the following physical properties of soil on soil temperature:

(i) soil colour and (ii) soil moisture; and (d) describe the following terminologies as used in soil science: (i) infiltration, (ii) percolation, and (iii) permeability.

The question was attempted by 372 (60.4%) candidates; among them, 153 (41.1%) scored from 0 to 6.5 marks; 158 (42.5%) scored from 7 to 11.5 marks; and 61 (16.4%) scored from 12 to 18.5 out of the 20 marks set for the question. The data show average performance on the question; 219 (58.9%) candidates scored from 7 to 15.5 marks. The candidates' scores are shown in Figure 5.

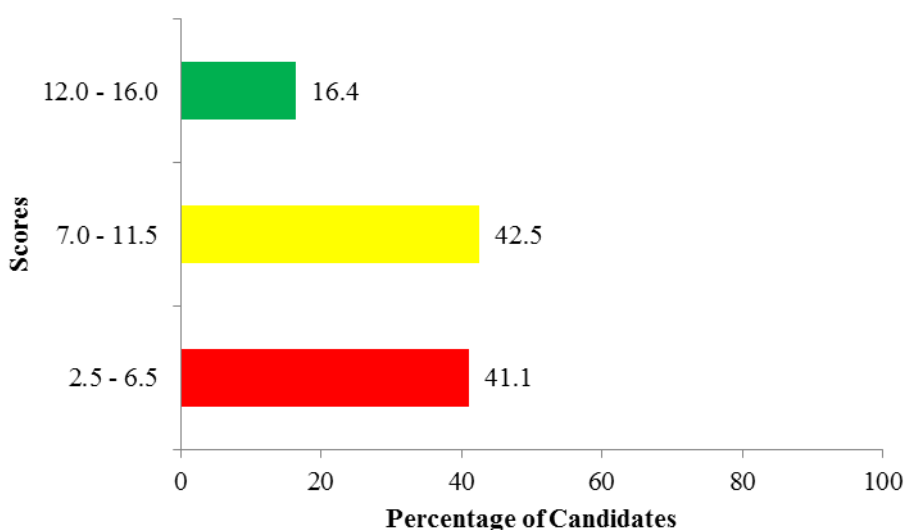


Figure 5: *Candidates' Performance on Question 6*

Drawing on Figure 5, the candidates' performance on the question was average, because the majority of the candidates had partial knowledge of the content. Those who demonstrated good performance on this question did well in part (a), (b), and (c); however, most of them failed to provide correct responses to part (d).

Most candidates in this group responded correctly on the ways employed in soil air management in part (a) and explained well the factors affecting the composition of soil air in part (b). Similarly, these candidates correctly analysed the effect of soil color and soil moisture on soil temperature in part (c), signifying sufficient mastery of the topic.

However, in part (d), most of these candidates could not describe the named terminologies. Some of them provided incorrect responses such as (i) Infiltration is the condition in which water is reabsorbed by the soil due to the physical properties of soil (ii) Percolation is the movement of water across the soil. (iii) Permeability as the ability of the soil to allow the movement of water in the soil in any direction in the soil. Extract 1.6.1 is an example of good responses to this question.

Extract: 1.6.1

6.	④ five ways employed in soil air management are	
	1. Tillage practice, when the tillage is practised it increases the aeration of the soil since the soil has been loosely	
	2. Drainage, involve removing of water to the soil surface this could increase the soil air	
	3. Addition of organic matter this when employed to the soil it increase the soil air by increase the pore space in the soil	
	4. mulching when the soil is covered by using dry material such as dry grasses tend to increase soil air	

- 6 @ 5. growing crops such as leguminous crop. this crop increase the uptake of air (oxygen) since it has high ability of fixing oxygen from atmosphere

b) few factor affecting the composition of soil air are

1. Physical properties of soil

- This affect is the way when soil structure, soil texture have large compaction it reduce the aeration of the soil since small pore existed by large particle and block structure of the soil

2. Agronomic activities

- This is involve cultivation such as tillage of the soil for growing crops crop plant tend to use air (oxygen) for the growth and hence affect the soil air

3. Microbial activities

- microbial activities within the soil tend to consume the (oxygen) air for their activities of decomposition of materials and to release Carbon dioxide (CO_2) this affect the soil air

4. Seasonal variation

- The variation exerted by temperature and moisture contents in the soil, it result to reduce the air required by the soil hence affect it

6	(c) The effect of the following physical properties of the soil on soil temperature
	(i) soil colour
	- In soil there is different colour existed on it hence for example black colour absorb heat from atmosphere and to increase soil temperature while white colour (white soil colour) tend to reflect heat and reduce the soil temperature.
	(ii) soil moisture
	- When the moisture presence in the soil it tend to cool the soil and hence reduce the soil temperature required by the plant for proper growth.
	(d) (i) infiltration
	- Refer to passage or infiltration filtration of the water down the soil through the small channels (capillaries).
	(ii) percolation
	- Refer to the movement of material down ward the bedrock through vertical column.
	(iii) permeability
	- Refer to the ability of material that able to pass through membrane of one layer of soil to another down the soil.

In Extract 1.6.1, the candidate, having knowledge and practical skills on the physical properties in the soil, provided correct responses in nearly all parts of the question. However, the candidate provided a partially correct response to the effect of soil moisture in soil temperature in part (c) (ii) and failed to describe the term permeability in part (d) (iii).

Inadequate mastery of the topic was the major cause of poor performance on the question. These candidates performed poorly in part (a), (c) and (d). In part (b), most of these candidates failed to address properly the task in the question. They just named some few factors affecting the composition of soil air, instead of explaining them.

In part (a), most candidates responded incorrectly. Examples of such incorrect responses were *avoid overgrazing, encourage overgrazing, encourage good farming method, reduce the compactness and reduce the application of artificial fertilizer.*

In part (c), in which the candidates were required to analyse the effect of soil color and soil moisture on soil temperature, most of them also responded incorrectly. Examples of incorrect responses by one of the candidates were (i) Soil colour: *red soil contain high amount of iron (haematirte), help in absorption and restriction of air into the soil* (ii) Soil Moisture: *increases plant growth, facilitate process of photosynthesis, increases microbial activities in the soil.*

Likewise, in part (d), these candidates failed to describe the terminologies given, and they did not provide correct responses. Some responses were (i) *Infiltration is the ability of water to provide a space for water to accumulate in the soil sample;* (ii) *Percolation is the entering of water into the soil for plant growth;* (iii) *Permeability is the ability of the soil to allow the movement of water in the soil in any direction in the soil.* Extract 1.6.2 represents poor responses to the question.

Extract 1.6.2

(a)	The soil should be well aerated.	
(i)	Maintain the soil profile.	
(ii)	Infiltration of the air in the soil.	
(ii)	Maintaining the moisture in the soil.	
(b)	Four factors affecting the composition of soil air	
(i)	Low of High temperature, the increase of the hottest in the soil will affect the composition of soil air.	
(ii)	Density of the soil.	
(iii)	The moisture content of the soil.	
(iv)	The bulk of the soil.	
(v)	The availability microbial activities.	
	The presence of the microbial in the soil affects the composition of the soil air.	

(c)(i)	Soil colour.	
	The colour of the soil determines the nutrients and fertility of the soil so when the colour changed from the normal colour to the other colour it means there are important mineral which improves the soil nutrients or fertility have been destroyed appeared so the soil colour will affect the growth of the plant not to grow in a good way and also it can cause the wilting of the plants also it will cause the disappearance of the microorganism which are found in that soil.	
ii	Soil moisture	
	When the temperature in the soil is too high the moisture content of that soil will decrease so the soil will remain dry without any availability of the water so due to the loss of the moisture which is caused by the temperature the soil will have the following effects:	
	(i) It causes the wilting or drying of the plants.	
	(ii) Disappearance of the important mineral which are brought to the availability of the moisture in the soil.	
	(iii) Death of the Microorganism found in the soil because these are microorganisms which they can survive in a dry soil they depend on the soil water moisture.	
(d)(i)	Infiltration - is the process of entrance of the mineral in the soil.	
ii)	Percolation - is the process where by the moisture or downward moved into the soil.	
iii)	Permeability - is the process where by the soil is permeable to allow the entrance of the nutrients.	

Extract 1.6.2 represents poor responses to the question. The candidate provided incorrect responses to all parts of the question. This signifies that the candidate lacked knowledge and practical experience in the physical properties of soil.

2.1.7 Question 7: Introduction to Soil Chemistry

The question consisted three parts: (a), (b) and (c). The candidates were required to (a) (i) justify the following statement by using well-balanced equations “presence of high aluminium ions (Al^{3+}) in soils is known to contribute to soil acidity and (ii) differentiate between active and potential acidity; (b) (i) give the meaning of liming as used in management of acid soils and (ii) examine four liming materials commonly used in agriculture by using at least one chemical equation in each case; (c) make a clear distinction between the following pairs: (i) organic fertilizers and inorganic fertilizer, (ii) complex compound fertilizers and straight fertilizers.

The question was attempted by 241 (39.1%) candidates. Among them, 37 (15.4%) scored from 0 to 6.5 marks; 123 (51%) scored from 7 to 11.5 marks; and 81 (33.6%) scored from 12 to 20 marks out of the 20 marks set for the question. The general performance on the question was good, since 204 (84.6%) candidates scored from 7 to 20 marks. The candidates’ scores are summarized in Figure 6.

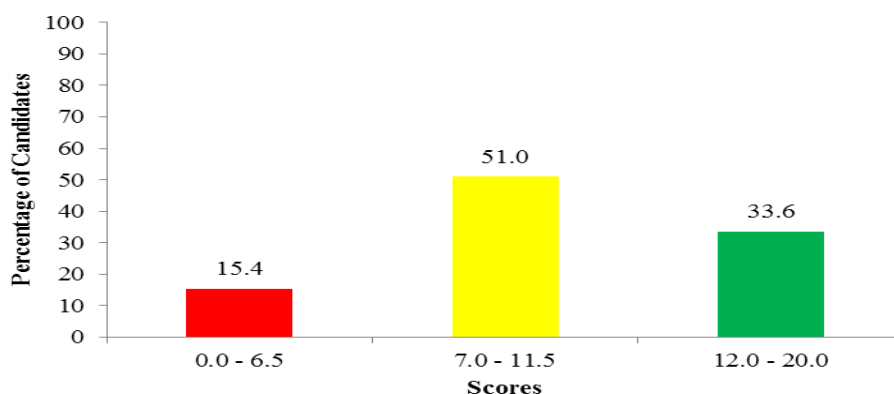


Figure 6: *Candidates’ Performance on Question 7*

Figure 6 illustrates good performance by candidates on the question. This is attributed to good mastery of the subject matter. Most of the candidates who performed well in this question provided correct responses to almost all parts of the question, except in part (a) (i) and (b) (ii). In these parts, the candidates had problem in writing and balancing the chemical equations. For example, in part (a) (i), the candidate failed to write balanced chemical equations associated with the presence of high aluminium ions that causes soil acidity, but, in part (b) (ii), most of these candidates managed to

identify the correct liming materials used in agriculture. However, they failed to write the respective chemical equations for the liming processes.

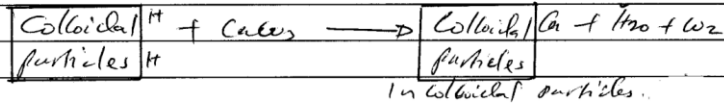
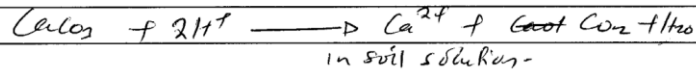
In part (a) (ii), the candidates were required to give the differences existing between active and potential acidity. The majority of the candidates responded correctly in this part by providing clear differences between active and potential acidity. These candidates also managed to give the meaning of liming as used in management of acid soils in part (b) (i). Furthermore the candidates managed to give clear distinctions between the named fertilizers in part (c). Extract 1.7.1 represents good responses to the question.

Extract 1.7.1

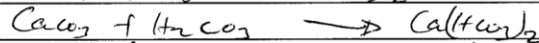
7	<p>② Al^{3+} contributes to soil acidity because when it hydrolyses, it releases three molecules of hydrogen ions. The presence of aluminium ions decrease the pH of the soil when it is hydrolysed. The reaction is shown as follows</p> $Al^{3+} + H_2O \longrightarrow Al(OH)^{2+} + H^+$ $Al(OH)^{2+} + H_2O \longrightarrow Al(OH)_2^+ + H^+$ $Al(OH)_2^+ + H_2O \longrightarrow Al(OH)_3 + H^+$ <p>One molecule of Al^{3+} in the soil contributes three molecules of hydrogen ions.</p> <p>(i) Active acidity - is the type of acid which is found in the soil solution. While -</p> <p>potential acidity - is the type of acid which is found in the colloidal particles.</p> <p>(b) (i) Liming is the practice of adding material</p> <p>(b) (i) Liming is the practice of adding alkaline material to the soil for the purpose of neutralizing the acid found in the soil and provide suitable conditions for growth of crops.</p>
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7) (ii) ① Calco. (Calcium carbonate)

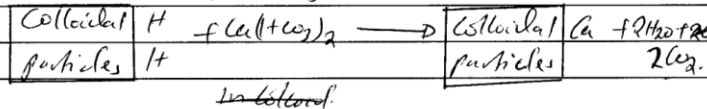
- This is also called limestone. It react with acidic soil as follow.



- Calco also react with carbonic acid found in the soil to form $\text{Ca}(\text{HCO}_3)_2$ in soil solution

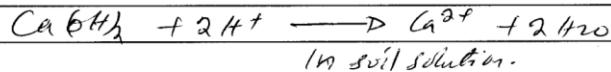


- in colloidal particles it react as follow.

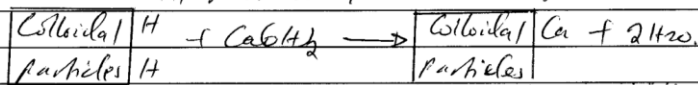


② Calcium hydroxide ($\text{Ca}(\text{OH})_2$)

- It is also called hydrated lime and it react with acidic soil as follow.



- in colloidal particles it react as follow.



③ Calcium oxide (CaO)

- This is also called burned lime. It firstly react with water to form $\text{Ca}(\text{OH})_2$.

7	(b)(i)	It react with acidic soil as follow $\text{Ca(OH)}_2 + 2\text{H}^+ \longrightarrow \text{Ca}^{2+} + 2\text{H}_2\text{O}$ <p style="text-align: center;">in soil solution.</p> <p>- In the ^{acidic} colloidal particles it react as follow.</p> <table style="margin-left: auto; margin-right: auto;"><tr><td>Colloidal particle</td><td>H^+</td><td>$+ \text{Ca(OH)}_2$</td><td>\longrightarrow</td><td>Colloidal particle</td><td>$\text{Ca} + 2\text{H}_2\text{O}$</td></tr></table> <p>- Also Ca(OH)_2 react with carbonic acid in the soil. $\text{Ca(OH)}_2 + \text{H}_2\text{CO}_3 \longrightarrow \text{Ca(HCO}_3)_2$<p>It react with acid in the colloidal particle as follow.</p><table style="margin-left: auto; margin-right: auto;"><tr><td>Colloidal particle</td><td>H^+</td><td>$+ \text{Ca(HCO}_3)_2$</td><td>\longrightarrow</td><td>Colloidal particle</td><td>$\text{Ca} + 2\text{H}_2\text{O} + 2\text{CO}_2$</td></tr></table></p>	Colloidal particle	H^+	$+ \text{Ca(OH)}_2$	\longrightarrow	Colloidal particle	$\text{Ca} + 2\text{H}_2\text{O}$	Colloidal particle	H^+	$+ \text{Ca(HCO}_3)_2$	\longrightarrow	Colloidal particle	$\text{Ca} + 2\text{H}_2\text{O} + 2\text{CO}_2$	
Colloidal particle	H^+	$+ \text{Ca(OH)}_2$	\longrightarrow	Colloidal particle	$\text{Ca} + 2\text{H}_2\text{O}$										
Colloidal particle	H^+	$+ \text{Ca(HCO}_3)_2$	\longrightarrow	Colloidal particle	$\text{Ca} + 2\text{H}_2\text{O} + 2\text{CO}_2$										
	(ii)	Calcium silicate (Casilon) - This react with acid in the soil as follow. $\text{Casilon} + 2\text{H}^+ \longrightarrow \text{Ca}^{2+} + \text{H}_2\text{SiO}_3$ <p style="text-align: center;">in the soil solution.</p> <p>- In the colloidal particles it react as follow</p> <table style="margin-left: auto; margin-right: auto;"><tr><td>Colloidal particle</td><td>H^+</td><td>$+ \text{Casilon}$</td><td>\longrightarrow</td><td>Colloidal particle</td><td>$\text{Ca} + \text{H}_2\text{SiO}_3$</td></tr></table>	Colloidal particle	H^+	$+ \text{Casilon}$	\longrightarrow	Colloidal particle	$\text{Ca} + \text{H}_2\text{SiO}_3$							
Colloidal particle	H^+	$+ \text{Casilon}$	\longrightarrow	Colloidal particle	$\text{Ca} + \text{H}_2\text{SiO}_3$										
	(c)(i)	Organic fertilizers, These are fertilizer, that are obtained from the animal waste products and also plant. Also it is obtained from the decomposed plant materials while													
7	(c)(ii)	Inorganic fertilizer - is the fertilizer that made from the industries for example Ammonium Sulphate (SA).													
	(ii)	Complex/compound fertilizers, These are fertilizer that contain all three major nutrients which are Nitrogen, phosphorous and potassium (N.P.K) while straight fertilizers are the fertilizer that contain one of the major nut- rients													

Extract 1.7.1 represents one of the good responses to the question. The candidate provided correct responses in all parts of the question, thus demonstrating adequate knowledge and practical skills to the subject matter.

The analysis of the candidates' responses to this question revealed that those who performed poorly in this question provided incorrect responses in almost all parts of the question, signifying their inadequate knowledge of the subject matter.

For example, in part (a) (i), these candidates provided incorrect responses in justifying the statement that the “presence of high aluminium ions in soils is known to contribute to soil acidity”. Responses from one of the candidates were *higher Aluminium ions (Al^{3+}) in soil contribute to soil acidity due to the following reasons: the presence of high aluminum it increase the hydrogen ions in the soil hence increase the soil acidity* $\text{Al}(\text{OH})_3 + \text{H}_2\text{O} \rightarrow 2\text{Al}^{3+} + 3\text{OH}^- + 2\text{H}^+$. *presence of high aluminum ions also increase the carbonic acid to the soil, for example: $\text{Al}_2(\text{CO}_3)_2 \rightarrow 2\text{Al}^{3+} + 3\text{CO}_3^{2-} + \text{CO}_2$, hence increase the acidity of the soil.* In part (a) (ii), these candidates also failed to differentiate between active acidity and potential acidity. Examples of incorrect responses provided by the candidates were *Active acidity this is the type of acid in which the hydrogen ions in the soil increased while potential acidity is the types of acid in which the presence of aluminium ions present on the soil.*

In addition, the candidates failed to give the proper meaning of liming in part (b) (ii). They gave responses such as *liming is the presence of adding basic materials in order to neutralize the acid which are present on the soil, for example: Calcium Carbonate (CaCO_3), Sodium nitrate (NaCO_3) and Potassium Nitrate (KNO_3).* In part (b) (ii), most of these candidates failed to identify the common liming materials used in agriculture. Consequently, they also failed to write chemical equations for the respective liming processes. Some of the incorrect responses provided by the candidates were *four liming materials used in agriculture: Calcium carbonate: this are the material used to neutralize the acid in the soil, for example when calcium react with water it reduce the acid in the soil* $\text{CaCO}_3 + \text{H}_2\text{O} \rightarrow \text{CaO} + \text{HCO}_3^-$, *Sodium nitrate \rightarrow when sodium nitrate react with water it give the sodium hydroxide hence number of hydrogen ions is reduced* $\text{NaNO}_3 + \text{H}_2\text{O} \rightarrow \text{NaOH} + \text{NO}_3^-$ (iii): *Addition of potassium nitrate this is due to potassium nitrate react with water to give potassium oxide and nitrate* $\text{KNO}_3 + \text{H}_2\text{O} \rightarrow \text{KOH} + \text{NO}_3^-$ (iv) *Addition of potassium carbonate it reduce the acid in the soil when react with water to give potassium hydroxide and calcium oxide* $\text{KNO}_3 + \text{H}_2\text{O} \rightarrow$

KOH + CO₃. The question on distinction between different groups of fertilizers in part (c) was also incorrectly responded to by the candidates. Examples of responses from one of the candidates were (i) Organic fertilizer *is the types of fertilizer in which is obtain naturally from animals, plants remains for example composite manure, kraal manure, farm yard manure are the organic manure* while inorganic fertilizer *is the types of fertilizer in which is made by human being in the industry, for example urea, ammonium sulphate and nitrogen, phosphorus and potassium*. (ii) Complex or compound fertilizer: *this are types of inorganic fertilizer in which is made by human being, for example sulphate of ammonia*, while straight fertilizer *is the kind of fertilizer in which is made in industry hence increase the crop production, for example nitrogen, potassium and phosphorus*. Extract 1.7.2 represents poor responses to the question.

7. a) i) $Al^{3+} + 3Cl^- \rightarrow AlCl_3$
 (i) The difference between active and Potential activity is that
 Active activity - is the activity of the soil which is due to easily soluble or soluble
 Potential activity is the activity of the soil which is due to less soluble substances.

ii) i) is the application of lining materials to control the ^{acid} affected soil.
 ii) 1. $CaCO_3 + H_2CO_3 \rightarrow Ca(HCO_3)_2$ (limestone)
 2. $Ca(OH)_2 + H_2CO_3 \rightarrow CaO + CO_2 + H_2O$
 3. $CaSO_4 + Na_2CO_3 \rightarrow CaCl + Na_2SO_4$

c) By the difference between organic manure and inorganic fertilizer is that organic manure are obtained from remains of plants and animals while inorganic fertilizers are obtained from inorganic materials.
 Organic fertilizers can be decomposed by microorganisms.

2.1.8 Question 8: Fundamentals of International Trade

The question had three parts: (a), (b) and (c). The candidates were required to (a) give the meaning of international trade, (b) briefly explain the significance of international trade by giving five points and (c) carefully study the table showing the production of two crops by two countries and then answer the questions that follow.

Country	Crop	
	Maize (bags/Ha)	Paddy (Bags/Ha)
A	8	60
B	30	12

(i) Use the law of comparative advantage to describe the production of crops in both countries, (ii) justify how the principle of opportunity cost works in both countries, (iii) use the law of comparative advantage and principle of opportunity cost to briefly explain the possible trade between the two countries.

The question was attempted by 205 (33.3%) candidates; among them, 53 (25.9%) scored from 1 to 6.5 marks; 80 (39%) scored from 7 to 11.5 marks; and 72 (35.1%) scored from 12 to 18 out of 20 marks. These statistics indicate good performance, because 152 (74.1%) candidates scored from 7 to 18 marks. Figure 7 shows the distribution of the candidates' scores.

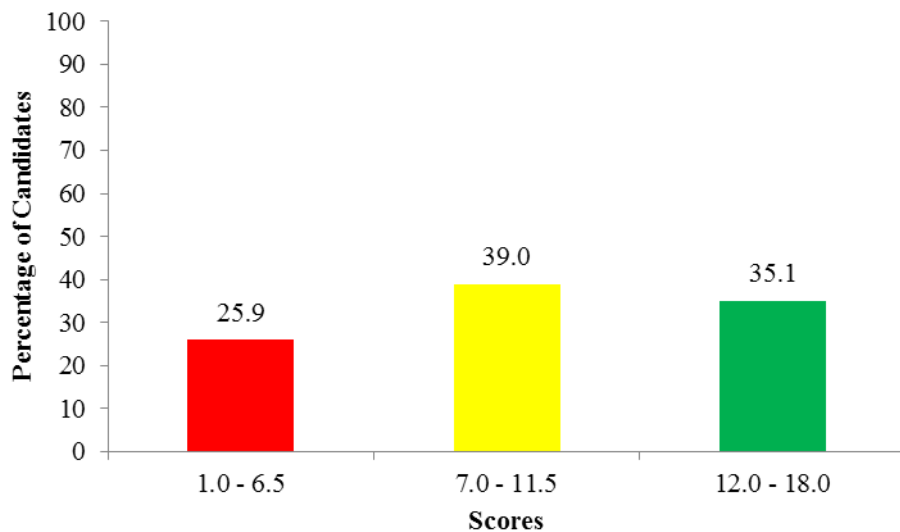


Figure 7: *Candidates' Performance on Question 8*

With respect to Figure 7, the performance of the candidates on this question was good. The majority of the candidates possessed adequate knowledge of the content. Such candidates performed well in part (a) and (c). In part (b), the majority of the candidates did not exhaust all the points needed to justify the importance of international trade.

In part (a), the candidates correctly gave the meaning of international trade. In addition, by knowing clearly the concept of comparative advantage and opportunity cost, they correctly interpreted the given table and responded well to the questions that followed in part (c). This indicates that the candidates possessed adequate knowledge of the concept of *international trade* and the *law of comparative advantage*. Extract 1.8.1 is a sample of the candidates' good responses to the question.

Extract 1.8.1

8	<p>International trade: Is the exchange of goods and service between one country and another country in the borders of two different countries.</p> <p>For example the exchange of Beans from Kenya. Can exchange the goods with Maize from Tanzania.</p>	
	<p>Significance of International trade</p>	
	<p>(i) It allows or facilitates of specialization in production of a particular products where by a particular country is known to be produces a certain primary product.</p>	
	<p>(ii) It helps to reduce risk in production, since sometimes overproduction may occur by the help of International trade goods can be sold to other countries or exchanged to other countries.</p>	
	<p>(iii).</p>	
	<p>Significance of International trade</p>	
	<p>(i) It provide protection to the country which is the major primary producer of a particular product or commodity from competition of other countries</p>	

	(iii) It provide protection to the countries from excessive over overproduction since it is risky it may lead to devaluation of agricultural product due to overproduction	
	(iv) International trade helps to stabilize the world price of commodity.	
	(v) Used to allocate quota shares to each member of the international trade.	
	(vi) facilitate specialization in production where by a particular country produce a particular product.	
	(c) from the table	
	(i) Country A and B are all producing maize but in country B, there is high production of maize than country A, hence we can conclude by saying that the Country B has a high comparative advantage in production of maize due to low opportunity cost than Country A which has a high opportunity cost in production of maize	
	- Country A and B also are producing paddy but the Country A has comparative advantage in producing paddy due to low opportunity cost than country B which produce small amount of paddy.	

	(II) According to the law of Comp principle of opportunity cost which states that "the country with low opportunity cost has a comparative advantage in producing a particular product. Between the two countries	
	From the two countries Country B has a lower opportunity cost in production of Maize than in Country A hence Country B has comparative advantage in producing maize than Country A while in production of paddy (Rice) the Country A has a low opportunity cost in production of paddy than Country B hence Country A has a comparative advantage than Country B in production of paddy (Rice). due to different in opportunity cost.	
	(III) By Considering the law of Comparative advantage and Principle of opportunity cost the trade between the two countries are as follows.	
	Country A which have comparative advantage in paddy due to low opportunity cost may trade with the Country B which are less in comparative advantage in production of paddy to high cost of producing it due soil difference and water availability which make them to have a high opportunity cost in producing paddy. hence they need to are trade with country A for paddy. Also the cost.	
	Country B has a comparative advantage in production of maize than Country A due to low opportunity cost in production of maize. the country B must have to trade with Country A which are less likely to produce maize	
	Hence the two countries must have to trade of the Agricultural products. Country A should supply paddy to Country B while Country B should supply maize to Country A.	

In Extract 1.8.1, the candidate displayed a good understanding of the concept of international trade and the law of comparative advantage. The candidate provided correct responses to almost all parts of the question, except to part (c) (iii) for which he/she missed few points on using the law of comparative advantage and principle of opportunity cost to explain the possible trade between the two countries.

Such inadequate knowledge and failure to meet the demands of the question led some candidates to perform poorly in this question. These candidates responded incorrectly to almost all parts of the question.

For example, the meaning of international trade in part (a) was wrongly given by the majority of these candidates. Some of such responses were *international trade is the trade within the country that is region to region, international trade is the transportation of goods from one country to another, international trade is the selling of goods in the country.*

In part (b), the majority of these candidates failed to understand the demand of the question regarding the importance of international trade. Consequently, they provided incorrect responses such as *international trade is the source of employment, it enable the country to get loans, international trade increase the number of international trade, international trade brings interaction among people, international trade enable easy transport of products.*

In part (c), the candidates did not understand the concept of *comparative advantage* and *opportunity cost*; hence, they provided incorrect responses to this part. For example, they failed to use the *law of comparative advantage* to describe the production of crops in both countries in part (c) (i). An example of the responses from such candidates were *the comparative advantage is when one country trade with another country and Comparative advantage is when one product decreases the product of another product.* Likewise, in part (c) (ii), the candidates also failed to justify how the principle of opportunity cost works in both countries. Incorrect responses given by one of the candidates were: *the cost of crop in both country A and B differ but closely levels of cost since the cost of paddy and maize does not equal. Country A should sale their paddy to the B at high cost and country B will sale their maize products to the country A at higher price.* In part (c) (iii), the law of comparative advantage and principle of opportunity cost were wrongly interpreted by these candidates. They thus failed to explain the possible trade between the two countries. Such incorrect responses given were the *possible trade between countries is jobber trade, broker trade, blacker market trade, wholesale trade, country A will sale maize to country B because of high opportunity cost.* Generally, these candidates were seen to

lack knowledge of international trade and the law of comparative advantage. Extract 1.8.2 presents poor responses from one of the candidates.

Extract 1.8.2

8.	(a) International trade is the system in which in which there is exchange of good and money International.	
	(b) Significance of International trade.	
	(i) International trade helps the world with	
	(i) International trade Unite different people from different parts of the world.	
	(ii) International trade determine the value of money.	
	(iii) International trade enhance love and peace and Communication from different part of the world.	
	(iv) International trade helps or bring Competition between different parts of the world; Competition on their goods selling to people.	
	(v) International trade Uphold the economic status of different Country.	
	(c) The law of Comparative state that "The increase of one product tend to decrease the production of another product", and hence when the Maize of product A decrease tend to increase in Maize product of A also when the Paddy of A increase tends to decrease the paddy of product B.	
8.	(c) (ii) The principle of Opportunity Cost work in both Countries because when the Crop of product A increase tends to the decrease of product B.	
	(iii) The possible trade between the two Countries A and B is Continuous since the increase of one product tends to decrease the other product and therefore each Country they will benefit and sometimes get loss.	

Extract 1.8.2 is a sample of the candidates' poor responses to the question. The candidate only provided a partially correct response on the meaning of international trade in part (a). The candidate attempted poorly in the remaining parts of the question. This signifies that the candidate had inadequate knowledge of international trade and the law of comparative advantage.

2.1.9 Question 9: Farm Planning

The question constituted four parts: (a), (b), (c), and (d). The candidates were required to (a) explain why it is necessary to plan farming activities; (b) (i) differentiate between gross margin and partial budget as used in farm planning and (ii) site two situations where partial budget can be applied in a farm; (c) suggest four main ways in which profit on the farm can be raised using Gross Margin planning; (d) use given information to prepare a partial budget and advise the farmer whether the change is worthwhile.

The question was attempted by 407 (66.1%) candidates. Among them, 87 (21.4%) candidates scored from 0.5 to 6.5 marks; 125 (30.7%) candidates scored from 7 to 11.5 marks; and 195 (47.9%) candidates scored from 12 to 19.5 out of 20 marks. The general performance on the question was good; 300 (78.6%) candidates scored from 7 to 19.5 marks. The distribution of the candidates' scores is summarized in Figure 8.

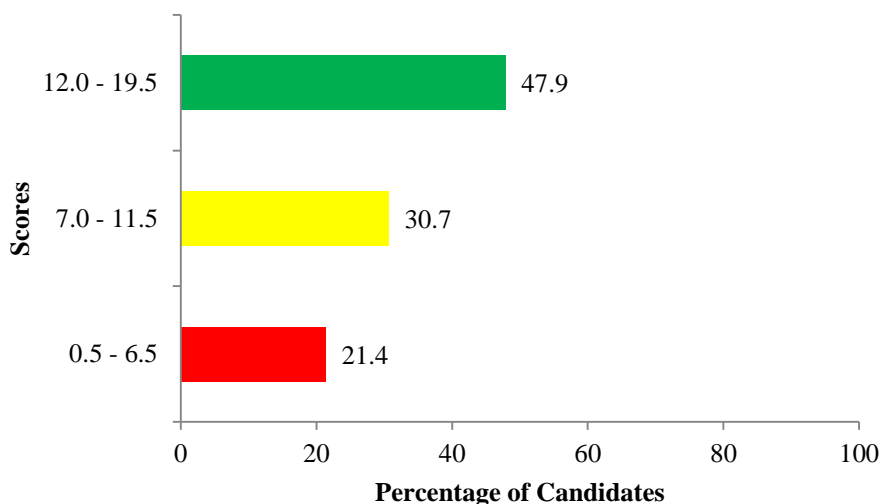


Figure 8: Candidates' Performance on Question 9

Figure 8 presents good performance of the candidates in the question. The candidates demonstrated good understanding of the topic. Those with good performance did well in part (a), (b), and (d). Most of them did not perform well in part (c), which required them to suggest ways in which profit on the farm can be raised using gross margin planning. Some of the incorrect responses given were *increase quality of the product*, *reduce extra costs* and *plan the farm properly*. These candidates demonstrated inadequate knowledge of gross margin as a farm planning technique.

On part (a) of this question, the majority of the candidates who performed well provided correct responses as to why it is necessary to plan farming activities. These candidates also correctly differentiated gross margin and partial budget as tools in farm planning in (b) (i) and cited well two situations in which partial budget can be applied in part (b) (ii). In part (d), the candidates used the information given and correctly prepared a partial budget. The candidates properly arranged the layout for the partial budget and demonstrated good mathematical ability. The candidates also correctly used the results of the computation to positively advise the farmer. Extract 1.9.1 represents good responses to the question.

Extract 1.9.1

09.(a).	- In order to ensure that the allocation of scarce resources on the farm gives optimum and satisfactory return to the farmer.	
(b). (i).	Gross Margin	Partial budget.
	- Is the difference between output and variable costs. Helpfull in allocation of resources by considering their return (whether profitable or loss).	- Its the technique used to determine the effect of partial change of farm business.
(c).	Ways of raising profit by using Gross Margin.	
	(i). By reducing amount of Fixed costs	
	(ii). By expanding one enterprise without reducing the other enterprise.	
	(iii). By substituting one enterprise with another.	
	(iv). By improving gross Margin of enterprises that are already present in the farm through better husbandry.	
(d).	Given.	
	Previous farm business = Maize farming.	
	Introduced new business = Haricot bean farming.	
	Area of the farm = 20 hectares.	
	Revenue lost.	
	Yield = 400 kg per ha X 20 ha = 8000 kg.	
	Price = 400 per kg. X 8000 kg = 3,200,000 Tsh.	
	= Maize yield (Revenue lost) = 3,200,000 Tsh.	

9. (d). Costs saved (Maize costs).	
Seed 10 kg/ha - 4,000/= kg	
Fertilizer 4 tonnes - 1,000,000/= ton	
Harvesting 20 ha - 10,000 /= ha	
Tractor 5 hrs - 50,000 /= hour.	
Extra Revenue.	
Yield = 1800 kg per ha x 20 ha = 36 000 kg.	
Price = 1,200/= per kg x 36,000 kg = 43,200,000	
Extra costs.	
Seeds 4 kg per ha - 2,000 /= per kg.	
Fertilizer 3 tonnes - 1,000,000/= per ton.	
Harvesting 20 ha - 9,000 /= per ha	
Tractor 4 hrs - 50,000 /= per hour.	
PARTIAL BUDGET.	
LOSSES	GAINS.
Extra costs. Tsh	COST SAVED Tsh.
Seeds 160,000	Seeds 800,000
Fertilizer 3,000,000	Fertilizer 4,000,000
Harvesting 180,000	Harvesting 200,000
Tractor 200,000	Tractor 250,000
REVENUE LOST	EXTRA REVENUE
Yield 3,200,000	Yield 43,200,000
6,740,000	48,450,000
Net gain 41,710,000	
48,450,000	48,450,000

09. (c). A farmer can make change from growing Maize to growing haricot beans since the change will be worthwhile with a profit of 41,710,000 Tsh.	
9 (b)(ii). - When replacing one enterprise with another	
- Introduction of supplementary enterprises.	

Extract 1.9.1 represents good responses to the question. The candidate provided correct responses in almost all parts of the question. The candidate demonstrated adequate knowledge of farm planning techniques.

The candidates who responded to this question poorly demonstrated a poor understanding of the topic and skills in mathematical manipulation.

In part (a), these candidates failed to give reasons as to why it is necessary to plan for farming activities. Examples of the incorrect responses given were *planning enable farmers to get loans, planning helps to know future objectives, planning provides records which give information to the farmers.*

Most of these candidates failed to differentiate between gross margin and partial budget in part (b) (i). Accordingly, they gave incorrect responses such as *Gross margin have limited with labour due to presence of permanent labour and causal labour while partial budget does not show real planning, Gross margin is the differences between variable output and variable input while partial budget is the budget made by person when plan on agricultural farming in order to improve the agriculture* and in part (b) (ii), the candidates also incorrectly cited two situations in which partial budget can be applied on the farm. Examples of the incorrect responses given were *applied in farm planning, when there is fire, when there is profit, in gross margin.* Likewise, in part (c), due to their inadequate knowledge of the topic, the candidates failed to suggest ways in which profit can be raised on the farm using Gross Margin planning. Some incorrect responses given in this part were *estimate the total variable inputs, determine the total output, determine the differences between total output and total input to estimate gross margin, divide the gross margin per given project.*

In part (d), it was observed that the candidates failed to use the given information to prepare the required partial budget because of poor mathematical manipulation skills and inadequate knowledge of how to arrange the layout of the partial budget. Accordingly, the candidates failed to advise the farmer whether the change is worthwhile or not. In this question, the candidates demonstrated poor understanding of the farm planning techniques. Extract 1.9.2 represents poor responses from the candidates.

Extract 1.9.2

9. a)	⇒ in order to improve the agricultural activities in the farm economy/production process.	
b)	Gross margin; is the difference between variable input and variable cost.	
	WHILE: Partial budget; Mean the budget made by person when plan on agricultural farming in order to improve the agriculture	
c)	⇒ The use of subsidy. ⇒ Diversification of production. ⇒ The use of buffer stock fund funds. ⇒ The use of international agreement	
d)	Variable cost for Maize 20 hectares 400g/kg selling price. $10\text{kg} \times 4000 = 40000$ Fertilizer $4 \times 1000000 = 4000000$ harvesting & picking <u>10,000</u> $5\text{tr} \times 50,000 = 250000$ <u>4,300,400</u>	Variable input haricot bean 20 hectares 400 cost price. $1800\text{kg} \times 1200 = 2160000$ $4\text{kg} \times 2000 = 8000$ $3\text{tonnes} \times 1600000 = 3000000$ harv = <u>9000</u> $4\text{tractor} \times 50,000$ <u>5,377,400</u>
	$G-M = \frac{5,377,400 - 4,300,400}{20}$ $\therefore G-M = 53,850 \text{ Tsh}$	

In Extract 1.9.2, the candidate lacked knowledge of farm planning techniques. Accordingly, he/she provided incorrect responses to almost all parts of the question.

2.2 134/2 AGRICULTURE 2

2.2.1 Question 1: Crop Pests

This question was comprised of four parts: (a), (b), (c) and (d). The candidates were asked to (a) give the meaning of crop pests; (b) briefly explain five cultural methods that are used to control insects; (c) (i) account for the four common formulations of insecticides and (ii) elaborate five different ways through which pest can arise; (d) (i) name two crops which are attacked by *Busseola fusca* and (ii) outline two symptoms of the plant attacked by the pest in (d) (i), and (iii) state two cultural methods of minimizing the pest.

The question was attempted by 369 (59.9%) candidates; among them, 41 (11.1%) scored from 1 to 6.5 marks; 248 (67.2%) scored from 7 to 11.5 marks; and 80 (21.7%) scored from 12 to 19.5 out of 20 marks. These data signify good performance of the candidates; 328 (88.9%) candidates scored from 7 to 19.5 marks. Figure 9 shows the distribution of the candidates' scores.

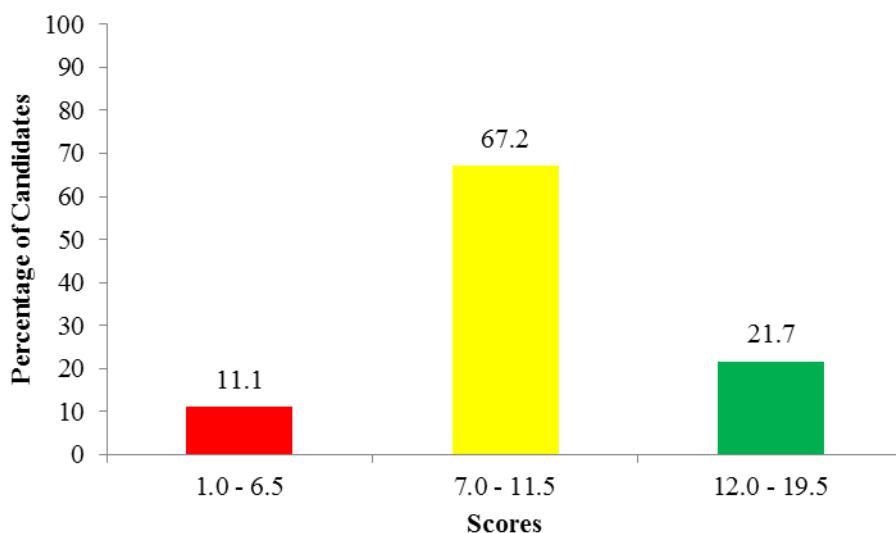


Figure 9: Candidates' Performance on Question 1

Considering Figure 9, the general performance of the candidates is good. This signifies that most of the candidates had adequate knowledge of the topic. The candidates with good performance on this question did well in

part (a), (b) and (d), showing good mastery of the content and adequate practical skills. These candidates did not do well in part (c) in which the majority failed to account for the common four formulations of insecticides in part (c) (i) and did not provide all the correct responses needed for part (c) (ii); those are, five ways through which pests can arise.

In part (a), the candidates correctly gave the meaning of crop pests and explained five cultural methods that are used to control insects in part (b). Two crops which are attacked by *Busseola fusca* were correctly named by most of these candidates in part (d) (i). The candidates also correctly outlined the symptoms of the plant attacked by *Busseola fusca* and stated the cultural methods used to minimize the pest in (d) (ii) and (d) (iii) respectively. Therefore, they demonstrated adequate knowledge and relevant skills in the subject matter.

In part (c) (i), the majority of the candidates in this group failed to understand the demand of the question. They thus named the types of insecticides instead of accounting for formulations of insecticides. Extract 2.1.1 is an example of good responses to the question.

Extract 2.1.1

1	<p>(a) Crop pest is an organism that causes injury to crop and inflicts damage to cultivated crop. For example Aphids and cutworms.</p>	
	<p>(b) Cultural methods to control pest are</p> <ul style="list-style-type: none"> - Crop rotation, the alternation of field crops season after season reduces the chances of pest since pests are specific to their host. eg: alternating legumes and higher plants - Field sanitation, ensure that the field is clean before farming operations, removing crop debris and crop remains that might carry pests. - Irrigation, as water is flooded on the farm pest on soil are eradicated especially in the stage of growth between egg and larvae. - The use of clean approved seeds, sometimes the seeds contain pest inoculum eg: spores and eggs hence proper sanitation of seeds is essential - Practising dead season and closed season, where a season passes without cultivation reduces the survival of crop pest on the field. 	
	<p>(c) (i) Formulation of insecticides</p> <ul style="list-style-type: none"> - <u>Wettable powder</u>, - are insecticides that are insoluble in water and forms a suspension on mixing with water. - <u>Water soluble insecticides</u>, - these are soluble in water and forms a homogeneous mixture - <u>Emulsifiable concentrates</u>, - insecticides that are insoluble in water but soluble in organic solvent - <u>Granules and powdered insecticides</u> do not require water 	

1	(c) (ii) Ways through which pest/crises can arise.	
	- From unsanitized and improperly cleaned land in crop debris of the last infected harvested plants hence proper land cleaning is essential.	
	- Production in maximum of the susceptible host can attract the occurrence of pest and inflict damage to the planted crops.	
	- From unsafe seeds and plant cultivars to be established in the farm, hence the seeds and vegetative propagated parts should be thoroughly checked.	
	- Pest can arise when there is absence of the pest control management on the farm, this creates favourable environment for pest arise.	
	- Pest arise when favourable climatic condition is present to support pest growth, for example humidity, temperature and weather in general.	
	(d) Crops attacked by <i>Busseola fusca</i> are	
	(i) Maize	
	(ii) Sorghum	
	(iii) Millet	
	(ii) Symptoms on the plant affected are	
	- Bored stem margins and eaten xylem vessels of the plant.	
	- Wilting of the attacked crop	
	- Yield reduction on the affected crop.	
	(iii) Cultural methods of minimizing pest are	
	- Crop rotation practice	
	- Efficient field and seed sanitation	

Extract 2.1.1 represents good responses to the question. The candidate managed to provide correct responses to all parts of the question, except to part (d) (ii), in which he/she missed one symptom of the plant attacked by *Busseola fusca*. The candidate exhibited a better mastery of the content.

Such inadequate knowledge and practical skills on the content as well as failure to meet the requirements of the question resulted into some candidates performing poorly in this question. Such candidates provided incorrect responses in part (c) and (d). Most of them gave the correct meaning of crop pest in part (a) and managed to name few cultural methods

that are used to control insects in part (b); however, they could not explain them.

In part (c) (i), these candidates incorrectly gave the formulation of insecticides. They generally named and mixed up the types of insecticides and herbicides instead of giving the formulations of insecticides. In part (c) (ii), the candidates provided incorrect responses on the ways in which pests can arise. The candidates gave responses such as *during heavy rain* and *high temperatures*.

Their inadequate knowledge and practical skills in knowing the pest *Busseola fusca* and its details caused the majority of the candidates fail to respond correctly to part (d) of the question. The candidates failed to name correctly two crops attacked by the pest in part (d) (i). The candidates also failed to outline the associated symptoms of the plant attacked by the pest in part (d) (ii). In part (d) (iii), the candidates incorrectly stated the cultural methods that can be used to minimize the pest. Examples of incorrect responses given were *killing the pest* and *use of insecticide* which is a chemical method. Extract 2.1.2 illustrates one of the candidates' poor responses to the question.

Extract 2.1.2

1	a) Crop pest - Is the process of crop attached pest in the farm.
	b) i) Use of vector:- in order to avoid pest in the farm except by using overhead irrigation
	ii) Stick band:- is the method which help to avoid pest insects.
	iii) Using Mosquitoes net:- It method using to control insects.
	iv) Using by trap insects:- This is method used to control insects on the farm.
	v) Using by hand:- if it found to touch
	d) i) To reduce pest and disease.
	ii) To reduce quality of products
	iii) It is very expensive
	iv) It need knowledge and skill to applied.
	ii) i) Necrosis
	ii) Chlorosis
	iii) Stunted growth.
	iv) Mosaic mottling
	v) Leaf curl.
	d) i) Weevil <i>fusca</i> spp
1	d) ii) High germination rate
	iii) Stunted growth.
	iii) i) Early planting
	ii) spraying by using chemicals example insecticide

Extract 2.1.2 is a sample response from a candidate who performed poorly. The candidate only managed to provide one correct point on the symptoms of the plant attacked by *Busseola fusca* in part (d) (iii). Conversely, the candidate poorly attempted other parts. He/she lacked adequate knowledge and field exposure to crop pests and their control.

2.2.2 Question 2: Plant Breeding

In this question, there were four parts: (a), (b), (c) and (d). The candidates were required to (a) identify six roles of plant breeding in crop production, (b) (i) give the meaning of heterosis (ii) describe five steps used in production of hybrid seed, (c) account for three purposes of plant introductions, (d) (i) give the meaning of pedigree selection (ii) give three disadvantages of pedigree selection.

The question was attempted by 244 (39.6%) candidates. Among them, 30 (12.3%) scored from 4 to 6.5 marks; 160 (65.6%) scored from 7 to 11.5 marks; and 54 (22.1%) scored from 12 to 16.5 out of 20 marks. The general performance on this question was good; 214 (87.7%) candidates scored from 7 to 16.5 marks. The candidates' scores are shown in Figure 10.

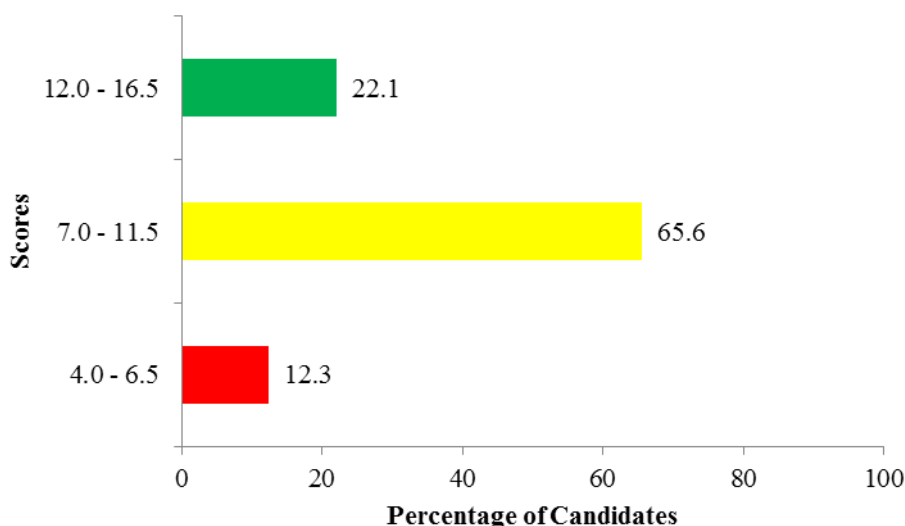


Figure 10: Candidates' Performance on Question 2

Figure 10 shows good performance. These candidates provided correct responses to almost all parts of the question, except to part (b) (ii) and (d) (ii). Such good performance shows that the candidates possessed adequate knowledge of the content.

Most of those who performed well correctly identified the roles of plant breeding in crop production in part (a). These candidates also managed to give the meaning of heterosis in part (b) (i) and accounted well for the purposes of plant introductions in part (c). The candidates showed familiarity

with different terms used in plant breeding by giving the correct meaning of pedigree selection in part (d) (i).

Contrary, in part (b) (ii), the majority of these candidates failed to describe all the five steps used in the production of hybrid seeds. Neither did the candidates arrange the steps in the sequential order nor presented all the steps. Some of the incorrect steps given by the candidates were *selection of superior parents* and *interbreeding of other superior parents*.

In part (d) (ii), most of those who performed well in this question failed to give the advantages of pedigree selection and to provide correct responses. Some incorrect responses were *transmits undesirable traits* and *reduce high breed vigour*. Generally, these candidates lacked adequate knowledge of producing hybrid seeds and breeding methods. Extract 2.2.1 is a sample of good responses to the question.

Extract 2.2.1

2	the roles of plant breeding in crop production	
(i)	It's help to increase the high yield in which when the plant breed is improved	
(ii)	It increase the plant varieties which are resistance to pest and disease	
(iii)	Help to increase the adaptability of the plant in to the local environment condition	
(iv)	It produce the pure varieties of the crops which are useable for the mechanical harvesting	
(v)	produce the plant which leave good quality	
(vi)	produce the plant varieties which have fast rate of growth.	
(b)(i)	Heterosis	
	⇒ Is the superior performance of the hybrids compared to the average parent performance of its parents.	
(ii)	Steps used in production of hybrids seed.	
	• Selection of the base population from which the superior parents can be selected.	

2	<ul style="list-style-type: none"> • Selection of the superior parents in the population • Interbreeding of the superior parents to produce the hybrids • Evaluation of the field trial • Release of hybrids as the variety.
(C)	Purpose of plant introduction:
(i)	For economic uses example vegetables
(ii)	For the study of origin and evolution of crops plant
(iii)	For beautification in the garden.
(iv)	For hybridization of the new variety
(D)	Pedigree Selection
(i)	This is the method of improvement of self pollinated plant in which the superior genotype plant was selected from the records of ancestors
(ii)	Disadvantage of pedigree
	<ul style="list-style-type: none"> • It's consume time hence it's requires more time for collecting the data of the long past generations. • It's expensive hence stored data must be down documented and preserved
	<ul style="list-style-type: none"> • It's may can spread the undesirable traits from one generation to another generation because it's use the crossing of very closed individuals.

Extract 2.2.1 is a sample of good responses to the question. The candidate managed to give correct responses to many parts of the question, except to part (b) (ii) and (d) (ii). In part (b) (ii), the candidate did not exhaust all the steps involved in the production of hybrid seeds and missed one disadvantage of pedigree in part (d) (ii).

Most of those who performed poorly in this question showed incompetence in almost all parts of the question. In part (a), they failed to identify six roles of plant breeding in crop production. Examples of the incorrect responses provided by the candidates in this question include *producing toxic substances*, and *to use cultural practices*.

In part (b) (i), most of the candidates also failed to give the meaning of heterosis. One of the candidates stated it is a *type of plant breeding which include cross breeding*. In part (b) (ii), these candidates provided incorrect responses such as *emasculation*, *bagging* and *tagging* as steps used in the production of hybrid seeds.

In part (c), most of them failed to provide correct responses in giving three purposes of plant introductions. Some incorrect responses provided include *mass selection*, *pedigree methods* and *progeny testing*. Moreover, the meaning of pedigree selection in part (d) (i) was incorrectly given by these candidates. An example of such incorrect responses was *pedigree selection means cross breed between superior family*. Failure to know the meaning of pedigree selection also led these candidates to fail giving its disadvantages in part (d)(ii). Examples of incorrect responses on the disadvantages of pedigree selection were *pedigree selection results into poisonous substances*, *disturbances of breeds*, and *poor farmers*. Extract 2.2.2 exemplifies poor responses to the question.

Extract 2.2.2

Q1	<p>(a) i) Improve high yield.</p> <p>ii) Provide crop of highly resistant varieties</p> <p>iii) Improvement of high offspring of desirable character.</p> <p>iv) Provide synchronous maturity to plant species.</p> <p>v) Improvement of hybrid vigour</p>	
Q2	<p>(b) i) Heterosis \Rightarrow is the breeding between hybrid offspring and their parents</p>	
Q3	<p>ii) a) Selection</p> <p>b) evaluation</p> <p>c) choosing of progeny</p> <p>d) Progeny testing</p> <p>e) Hybridisation</p>	
Q4	<p>(c) i) To improve yield.</p> <p>ii) To provide necessary condition for their growth.</p> <p>iii) Genetic improvement of plant species.</p>	
Q5	<p>(d) Pedigree selection \Rightarrow is the selection of the mating between offspring and their closely related individuals.</p>	
Q6	<p>ii) i) It may lead to selection of offspring with unhybrid vigour</p> <p>ii) lower the cost of production</p> <p>iii) Increase the disease rate.</p>	

In Extract 2.2.2, the candidate provided few correct responses to part (a) only and incorrect responses to all other parts, showing poor understanding of the topic.

2.2.3 Question 3: Introduction to Weed Science

This question consisted of three parts: (a), (b) and (c). The candidates were required to (a) explain why a volunteer plant is classified as a weed by giving two reasons (b) suggest nine agronomic ways of reducing the effects of weeds to crops (c) (i) outline five merits of chemical application in combating weeds (ii) assess four factors affecting the efficiency of chemical application in combating weeds.

The question was attempted by 567 (92%) candidates. Among them, 28 (4.9%) scored from 0 to 6.5 marks; 202 (35.7%) scored from 7 to 11.5; and 337 (59.4%) scored from 12 to 19 out of 20 marks. These data show good performance on the question; 539 (95.1) candidates scored from 7 to 19 marks. Figure 11 shows the distribution of the candidates' scores.

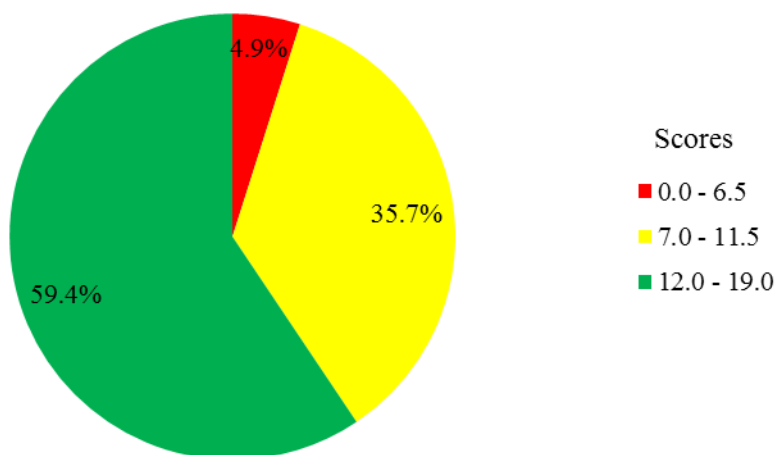


Figure 11: Candidates' Performance on Question 3.

Figure 11 shows good performance of the candidates. The majority of the candidates mastered the topic. The candidates performed well in part (a), (b), and (c) (i).

Most of the candidates who performed well in this question gave correct reasons as to why a volunteer plant is classified as a weed in part (a). In part (b), the candidates also correctly suggested the agronomic ways of reducing the effects of weeds to crops. Likewise, in part (c) (i), these candidates correctly outlined the merits of chemical application in combating weeds.

Apparently, the candidates had adequate knowledge and practical experience in weeds. Extract 2.3.1 presents responses from a candidate who did well in the question.

Extract 2.3.1

3(a)	i) Because they compete with crop plants for nutrients and water with in the crop field.	
	ii) It lower the quality and quantity of the plant yield because dominate the crop plants.	
3(b)	i) Use of cover crops - This use to minimize the effects of weeds because fill the space where the weeds can grow.	
	ii) Mulching Practices - Covering of the soil with the dry grasses material help to reduce weed effects because it suppress and inhibit the grown up weed for light.	
	iii) Crop rotation - The process of alternating the crop with in the field help to destruct the habits of the weeds.	
	iv) Deep Tillage - Tillage practice control the weed where it exposing the weed roots to be removed by racks.	
	v) Weeding - This is the process of removing the weeds from the farm either by cultivation.	
	vi) Application of the herbicides - chemical application help to reduce the effects of the weed because it inhibit their growth.	
	vii) Slashing and uprooting - weed in the farm are controlled by uprooting completely from the crop field.	
	viii) Bush-burning and flooding - burning of the weed help to destruct the seeds of the weed which clammored in the soil.	
	ix) Allowing fallow period - is the agronomy practice which the farm kept with out growing the crop this help to control or reduce the dependant weed which always require plants for their survival.	

3c)	i/ Chemical method are more effective to control the weeds.	
	→ It is used in the area where other methods are insufficient since its specific to the weeds.	
	→ It does not require laborous like mechanical method of controlling weeds.	
	→ It does not destructs the soil structure.	
	→ It save time and reduce the cost of production.	
	→ Applicable to the mud soil where other method are difficult.	
	ii/ → Rate of chemical formulation. the lower concentration of the herbicides affects its efficiency. It should be formulated to appropriate rate.	
	→ Climatic condition application of the chemical method affected by the climatic condition such as rain fall where it may be washed out.	
	→ Resistance of the weeds. Some of the weed develop the resistance to the chemical method application example Stiga spp.	
	→ Growth stage of the weed. Chemical method is more suitable to early stage of the weed growth because when become mature are difficult to control.	
	→ Time of application. herbicides are more effective to applied during the evening to avoid evaporation of the weed during the day and	

Extract 2.3.1 represents the candidates' good responses to the question. In the question, the candidate missed only one point on the agronomic ways to be used to reduce effects of weeds to crops in part (b). The candidate possessed adequate knowledge and practical skills in weeds and their control.

Although most of the candidate responded to part (c) (ii) of the question correctly, a few of them responded incorrectly. They just mentioned the factors affecting the efficiency of chemical methods in combating weeds. Others even failed to understand the demand of the question. Accordingly,

they gave the disadvantages of the method instead of the factors affecting the efficiency of the method.

Those who performed poorly in this question demonstrated inadequate knowledge of the subject matter and failed to meet the requirements of the question. These led to their poor performance. They responded to almost all parts of the question incorrectly.

In part (a), the majority of the candidates mixed up the characteristics of weeds, which were needed as reasons for a volunteer plant to be classified as a weed, with effects of weeds. They also gave the positive effects of weeds as reasons for volunteer plant to be classified as a weed. Moreover, instead of suggesting agronomic ways to reduce the effects of weeds to crops, the candidates mentioned chemical and mechanical methods of controlling weeds in part (b).

In part (c) (i), the majority of the candidates provided incorrect responses on the merits of chemical application in combating weeds. Examples of incorrect responses provided were *quick in action* and *not poisonous*, while, in part (c) (ii), a number of these candidates responded by giving the disadvantages of chemical methods in controlling weeds instead of assessing the factors affecting the efficiency of chemical application in combating weeds. Conclusively, these candidates lacked adequate knowledge in weeds. Extract 2.3.2 presents responses from a candidate who performed poorly.

Extract 2.3.2

3.	a)	because i) It act as a source of food example pig weed. ii) It produce poisonous to livestock and human being example thorn apple.
	b)	- High productivity - Palatability of product - low cost to the farmer. - quality of products - decrease pest and disease - quality on the farm. - Improvement of soil fertility - Nutritive value. Propagation
	g)	Merits - decreases pest and disease. - High productivity - Nutritive value. - quality of products - Palatability of products.
3	gii)	It is very expensive. - Reduce quality of products - It encourage microbial activities - Low production - Reduce palatability of products

In Extract 2.3.2, having inadequate knowledge and practical skills on weeds and their control, the candidate provided incorrect responses to the whole question.

2.2.4 Question 4: Plant Diseases

The question constituted three parts: (a), (b) and (c). The candidates were required to (a) (i) give four characteristics which make fungi to be important disease causing agent and (ii) give other three economic importance of fungi apart from causing diseases to plants; (b) describe the following: (i) localized symptoms, (ii) growth distortion, (iii) witches brooms, (iv) galls and knots,

and (v) etiolation; (c) (i) give the causative agent of the damage in root knot (ii) list two symptoms of the attack and two control measures of root knot nematodes.

The question was attempted by 120 (19.5%) candidates; among them, 25 (20.8%) scored from 2.5 to 6.5 marks; 78 (65%) scored from 7 to 11.5 marks; and 17 (14.2%) scored from 12 to 20 marks out of the 20 marks set for the question. These data indicate good performance on the question since, 95 (79.2%) candidates scored from 7 to 20 marks. Figure 12 shows the distribution of the candidates' scores.

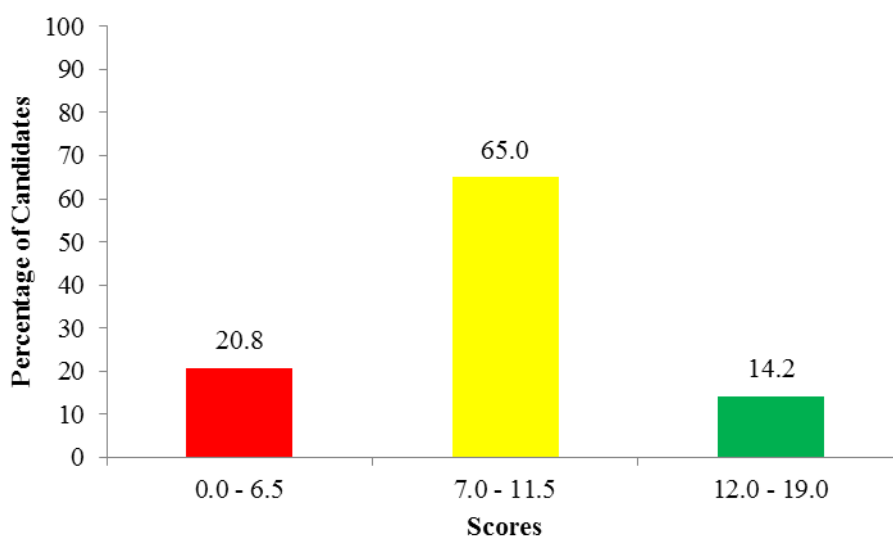


Figure 12: Candidates' Performance on Question 4.

Figure 12 shows the performance of the candidates. Apparently, most of them had adequate knowledge and enough practical skills in the topic. The majority of those who performed well did so in almost all parts of the question except in some items in parts (b) and (c) (i). In part (a)(i), the majority of the candidates correctly gave characteristics which make fungi to be important disease causing agents in plants. They also correctly gave other economic importance of fungi, apart from causing diseases to plant in part (a) (ii).

In part (b), most of the candidates managed to describe the terms given although some of the candidates incorrectly described one or two of the given terms; for example, one candidate described etiolation as *the condition in*

which the plant forms more leaves than normal. In part (c)(i), the majority of the candidates provided correct responses in relation to the causative agent of the damage in root knot. However, some few candidates either misspelled the name or failed to follow the scientific rules in naming the organisms, especially the rule that is concerned with underlining the name. In part (c)(ii), these candidates managed to list the symptoms of the attack and control measures for the root knot nematodes. Therefore, they possessed adequate knowledge and practical skills in plant diseases. Extract 2.4.1 is a sample of the candidates' good responses to the question.

Extract 2.4.1

<p>4</p> <p>(a)</p>	<p>Four characteristics of fungi which make it to be important pathogen are;</p> <ul style="list-style-type: none"> > Fungi can remain dormant even when the environmental conditions are not favourable. > Fungi have good dispersal of their inoculum such as mycelium and spore, example by wind. > Fungi use alternate hosts to attack their hosts. They have many hosts which provide them with food for their survival. > They have high reproductive rate, they produce many spores to increase their survival thus attacking many hosts on a short time. <p>(ii) • Fungi are used in manufacture of antibiotics such as penicillin from penicillium, which is used in treatment of many animal diseases.</p> <p>• Fungi spoil food, example bread moulds spoils bread, thus making it poisonous for human use.</p> <p>• Fungi such as mushroom can be used as human food.</p>
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4(b)	(i) Localized symptoms Localized symptoms are those disease symptoms which affects only one part of plant. Example leaf spot appear only on the surface of leaf and not otherwise.
	(ii) Growth distortion This is the abnormal development of the plant part or tissues example overgrowth, gall formation and malformation of leaves. Leaves become twisted or rolled affecting their growth.
	(iii) Witches brooms It is the symptom of plant disease in banana where leaves break off due to the effect of wind.
	(iv) Galls and knots These are swellings overgrown from the plant tissues. Galls are formed on leaves where leaves tissues swells and forms rounded, or irregular structures. Knots are the root swellings which may be due to infection. Example root knots in leguminous plants
	(v) Etiolation. This is the yellowing of leaves due to lack of low light. Etiolation is due to insufficient light.

In part (c) (i), besides failing to follow the rules of nomenclature, the majority of the candidates failed to give the causative agent of damage in root knot. Some incorrect responses provided were *fussarium wilt*, *Almiillaria mellea* and *melodgyine spp.* In part (c) (ii), these candidates consequently failed to list the symptoms of the attack and control measures for the root knot nematodes. Examples of the incorrect responses given were *leaf chlorosis* and *water soaking* as symptoms. As regards the control measures, some incorrect responses were *use of insecticides* and *mixed farming*. These candidates lacked knowledge and field training in plant diseases. Extract 2.4.2 represents poor responses to the question.

Extract 2.4.2

4	(i) Characteristics of fungi	
	—D Their Camouflage easy to hide them self	
	—D Their small in size easy to affect crop and easy to	
	hide them self.	
	—D Flagellum They have flagellum for locomotion.	
	—D Their difficult to be seen by eyes. Some of them	
	(ii) Economic Importance of fungi	
	—D Cause diseases to crops - which affect the large	
	number of crops.	
	—D They used in the industries for manufacturing of Alcohol	
	—D They used use the source of food to man for example	
	Mushroom.	
	(b)	
	(i) Localized symptoms is the symptom to the crop which	
	is very local to the crop.	
	(ii) Growth Distortion is the process whereby the part	
	of plant is not well growing	

4(b)	iii) Witches brooms is the process where by the crop has been affected and form the witches brooms to the plant.	
	(iv) Galls and knots is the process where plant form the galls and knots shows that it is affected.	
	And (v) Etiolation is the process where the crop form Etiola	
	(c)	
	(i) Causative agent of root knot nematode is Virus	
	At the	
	(ii) The can symptoms of root knot	
	→ yellowing of the crop	
	→ Poor growth of the crop.	
	Control measures of root knot	
	→ Applying Insect Substace Chemical so that to avoid the disease	
	→ Early plant of the crop to the area so that to employ the destruction of the disease.	

In Extract 2.4.2, the candidate only managed to provide few correct responses to part (a) (ii) and (c) (ii). The candidate largely showed insufficient knowledge and practical skills in disease causing agents and poor understanding of different terms used in plant diseases.

2.2.5 Question 5: Plant Diseases

The question had three parts (a), (b), and (c). The candidates were required to (a) explain the meaning of the following terms as they are used in plant diseases: (i) inoculation, (ii) signs, (iii) toxicity, (iv) epidemiology, and (v) pellet; (b) describe damping off in tomatoes under the following headline: (i) causative agent, (ii) two symptoms of the disease, and (iii) two control measures; (c) explain how can the disease be controlled by using the following methods: (i) avoidance, (ii) exclusion, (iii) eradication, (iv) immunization, and (v) protection.

The question was attempted by 256 (40.2%) candidates. Among them, 103 (40.2%) candidates scored from 0.5 to 6.5 marks; 133 (52%) candidates scored from 7 to 11.5 marks; and 20 (7.8%) candidates scored from 12 to 16 out of 20 marks. These data display average performance of the candidates. The statistics show that 153 (59.8%) candidates scored from 7 to 16 marks. A summary of the candidates scores is presented in Figure 13.

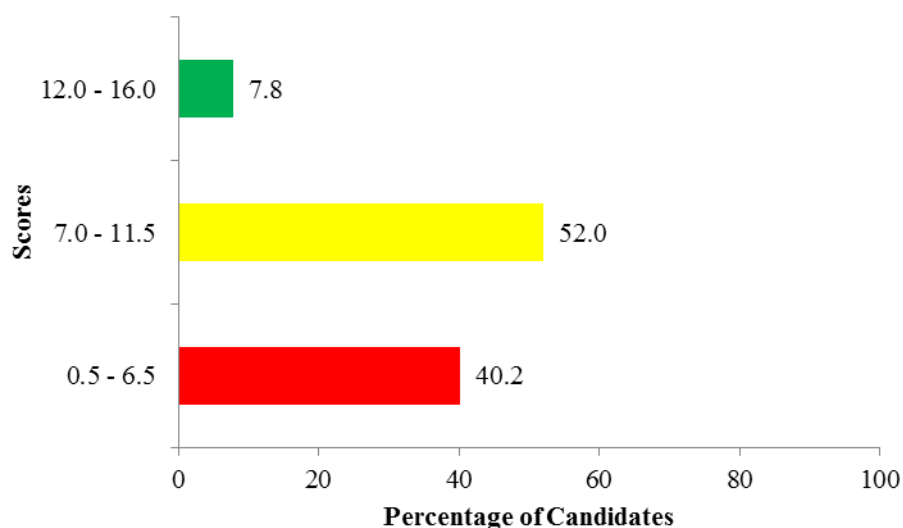


Figure 13: *Candidates' Performance on Question 5.*

Figure 13 underscores the average performance on the question. Such performance is attributed to most of the candidates' partial knowledge and practical skills in plant diseases. However, the candidates who performed well, in this question, provided correct responses to many parts of the question, except to parts (a) (v), (c) (i) and (c) (ii).

In part (a), the candidates gave the correct meaning of the terms given except in part (a) (v), in which most of them provided incorrect responses. Some incorrect responses provided were *pellet is the formation of black spot on the leaves*, *pellet means presence of soot on the leaves* and *pellet are yellow streaks found on the leaves*.

In part (b), they adequately described the dumping off disease regarding its causative agent in part (b) (i), its symptoms, and control measures in part (b) (ii), and (b) (iii) respectively. The candidates also explained well how the disease can be controlled by eradication, immunization, and protection in part (c) (iii), (c) (iv) and (c) (v). However, it was seen that most of these candidates mixed up the explanations on how diseases can be controlled via avoidance and exclusion in part (c) (i) and (c) (ii) respectively. Extract 2.5.1 shows one of the candidates' good responses to the question.

Extract 2.5.1

5.	(a) (i) <u>Inoculation</u> - Is the attachment of the disease causing organism to the surface of the host ready to cause infection and disease.
	(ii) <u>Signs</u> - there are visible indication of the emergence of infection in the plant.
	(iii) <u>Toxicity</u> - This refers to the ability of the chemical used in control of plant disease to bring about effect or change.
	(iv) <u>Epidemiology</u> - This refers to the study of disease causing micro-organism and in relation to the disease they cause to plants.

5.	(a) <u>Pellet</u> These are small particles in solid form on which form on which chemicals can exist for disease control in plants.
	(b) <u>Damping off in tomatoes</u> (i) <u>Causative agent</u> It is caused by <u>Fungi</u>
	(ii) <u>Two symptoms of the disease</u> - <u>Wilt of the plant</u> is one of the symptom of damping off in tomatoes - <u>Tomato fruit appear black or with black patches instead of green when not ripe and red when ripe</u>
	(iii) <u>Two control measures</u> - <u>Avoid excessive watering of tomato plants</u> this will stimulate the emergence of fungi which will caused damping off. - <u>Avoid application of excessive nitrogenous fertilizers</u> which stimulate damping off and also the fungi causing damping off in the field of tomato.
	(c) <u>Methods of controlling diseases</u> (i) <u>Avoidance</u> as principle of disease control in plants involve measures example cultural methods on planting to prevent the emergence of disease causing agents in plants.

5.	(c) (i) <u>Exclusion</u> as the principle of disease control ensures that the <u>multiplication</u> and <u>spread</u> of the disease causing organism is inhibited by example maintenance of field hygiene and the use of clean planting material	
	(ii) <u>Eradication</u> as the principle of disease control in the plants involves physical destruction of disease causing organism or removal of the affected plant from an area to prevent further spread	
	(iv) <u>Immunization</u> as the principle of disease control involves the use of resistant variety in planting this ensures that the disease rate is of low chance to plants.	
	(v) <u>Protection</u> as the principle of disease control in the plants, the use of chemicals to the crop plant and the soil is employed used in order to minimize the effect of disease to plants.	

Extract 2.5.1 indicates good responses to the question from one of the candidates. The candidate succeeded to provide correct responses to almost all parts of the question. Nevertheless, the candidate failed to give the causative agent and symptoms of damping off in tomatoes in part (b) (i) and part (b) (ii) respectively. In addition, he/she failed to explain how diseases can be controlled by the avoidance method in part (c)(i).

Few candidates performed poorly in this question. Inadequate knowledge of the subject matter is the major cause of such poor performance. The candidates provided incorrect responses to nearly all parts of the question, except to parts (c) (iii) and (c) (iv).

Most of them failed to give the correct meaning of the given terms in part (a). Examples of incorrect responses were (i) Inoculation is the introduction of insecticides into the plant. (ii) Signs means symptoms of the disease (iii) Toxicity is the ability of the plant to fight toxic substances (iv) epidemiology is the science of plant diseases (v) Pellet means granule substances on the leaves.

Inadequate knowledge and practical skills in plant diseases led the candidates fail to describe the damping off disease in tomatoes in part (b). In part (b) (i),

the candidates failed to identify the causative agent of the disease. They gave incorrect responses such as *bacteria, fungi and virus*. The candidates also failed to give the symptoms of the disease. They mentioned *leaf curl, yellow spot* and *stunted growth* as responses to part (b) (ii). In addition, the candidates incorrectly mentioned *crop rotation* and *burning vegetation* in part (b) (iii) as control measures for the disease.

These candidates also failed to explain how the disease can be controlled by using the named methods in part (c). For example, in part (c) (i) the candidates failed to explain that the disease can be controlled by avoidance. One candidate incorrectly responded by writing *the disease can be controlled by avoiding contact with the organisms*. Another candidate also incorrectly responded that *the disease can be controlled by exclusion which involves excluding the plants from the factors which favor occurrence of the disease* in part (c) (ii). Likewise, in part (c) (v), the candidates failed to explain how the disease can be controlled by protection. Accordingly, they provided responses such as *protect the plant from bacteria, fungi and virus*.

However, few candidates managed to explain how the disease can be controlled by eradication and immunization in parts (c) (iii) and (c) (iv) respectively. In these parts, the named methods seemed to be familiar to the candidates since they are common practices done on the farm. Extract 2.5.2 illustrates one of the candidates' poor responses to the question.

Extract 2.5.2

5	(i) Inoculation :- Is the process where by pathogen enter in the plant and grow do not show symptoms.	
	(ii) Signs :- The signs is the symptoms shows by plant when enter in the plant eg- Cassava mosaic virus show chlorosis in the leaves.	
	(iii) Toxicity :- Is the chemical produce by plant pathogen when enter in the plant and harm the plant by producing of toxicity chemical.	

v) Protection :- To control plant disease by use of herbicide to protect plant from plant disease	
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5	iv) Epidemiology :- The disease which occur in the plant and show visible symptoms	
	v) Pellet :- Is the colour appear in the plant due to pathogen infection	
	b) Damping off	
	i) Causative agent :- <u>Fusarium spp</u> <u>Fusarium spp</u>	
	Symptoms	
	i) The plant Spices head to dry	
	ii) The leaves of come near to the soil	
	Control measure	
	- Use proper decomposed manure	
	- Avoid over head irrigation in the nursery	
	c) i) Avoidance :- Avoiding enter of plant disease in the field	
	ii) Exclusion :- To use inspection of seed which enter in the country to reduce the spread spread of plant disease	
	iii) Eradication :- Burning of all affected plant	
	iv) Immunization :- To make suspension in crops in order to avoid enter of new plant disease in the countries	

Extract 2.5.2 is an example of poor responses to the question. The candidate provided incorrect responses to almost all parts of the question, showing lack of adequate knowledge and practical skills in plant diseases.

2.2.6 Question 6: Introduction to Animal Health

The question comprised three parts: (a), (b), and (c). The candidates were required to (a) (i) define the term *animal disease* as used in animal health (ii) mention three causes of diseases in livestock, (b) briefly describe six groups of micro-organisms which cause diseases in livestock, and (c) name three means of classifying animal diseases.

The question was attempted by 307 (49.8%) candidates, 46 (15%) candidates scored from 0 to 6.5 marks; 147 (47.9%) candidates scored from 7 to 11.5 marks; and 114 (37.1%) candidates scored from 12 to 18 out of 20 marks. The candidates' performance on this question was good in the sense that 261 (85%) candidates scored from 7 to 18 marks. The distribution of the candidates' scores is illustrated in Figure 14.

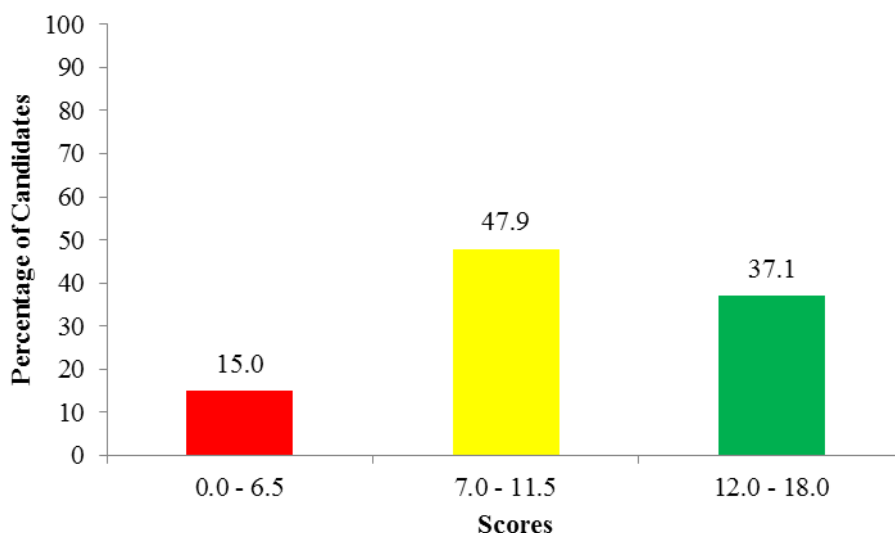


Figure 14: Candidates' Performance on Question 6.

Figure 14, shows that the general performance of the candidates was good. The majority of the candidates had sufficient knowledge of the content. Those who performed well in the question did so in almost all parts of the question, except part (c).

In part (a) (i), most of them precisely defined the term *animal disease* as used in animal health and correctly mentioned the causes of diseases in livestock in part (a) (ii). Moreover, the candidates correctly described six groups of

organisms which cause diseases in livestock in part (b). Extract 2.6.1 represents good responses to the question.

Extract 2.6.1

6. (a) (i) Animal disease - Is the abnormal condition that occurs in the body of an animal compared to the normal function of the body.	
(ii) Causes of disease	
(1) Nutritional factor. There are many diseases caused by lacking some important nutrient to the farm animals. for example for example Milk fever	
(ii) parasite There can either be endoparasite like amoeba Ascaris and tape worm and ectoparasite for example • Tsetse fly - Anaplasmosis • Brown ear tick - East coast fever.	
(iii) Mechanical damage. Some wounds and injury present in many animals are source of disease because they create a conducive environment for the parasite to enter.	
(b) Groups of Micro-organism causing disease. (1) Bacteria, these organisms cause disease like Anthrax, Mastitis and ringerspest , and pneumonia.	

6.	<p>(i) Virus, the disease caused by virus include:</p> <ul style="list-style-type: none"> Newcastle disease Foot and mouth disease <p>(ii) parasites, these are the organism which cause disease by affecting an animal either internal or external.</p> <p>for example.</p> <p>Brown ear tick - East coast fever</p> <p>transmitting fly - Anaplasmosis</p> <p>Liver fluke - Damage Liver</p> <p>(iii) protozoa, the organism cause disease are include ticks which the disease are like</p> <ul style="list-style-type: none"> coccidiosis East coast fever Heart Water. <p>(iv) Fungi, also are causative agent of disease.</p>
6.	<p>(i) Means of classifying disease.</p> <p>(i) Classifying in terms of disease causing organism, for example we have disease caused by parasites, fungi, virus, and bacteria.</p>
6.	<p>(i) Classifying in terms of contamination.</p> <p>There are contaminated disease transmitted by contamination and non-contaminated disease are do not transmitted by contamination method.</p> <p>for example</p> <p>Coccidiosis - Contaminated disease</p> <p>Bloat - Non-contaminated disease.</p> <p>(ii) Classifying in terms of Nutrient deficient.</p> <p>for example:</p> <p>(i) Milk fever - caused by lack of Ca^{2+} ions found in some nutrient.</p> <p>(ii) East coast fever - is not caused by lack of Nutrients.</p>

Extract 2.6.1 represent good responses to the question. The candidate correctly attempted all parts of the question; however, he/she failed to classify animal diseases in part (c).

However, this group of candidates failed to name means of classifying animal diseases in part (c). Examples of incorrect responses were *bacterial diseases*, *fungi diseases* and *viral diseases*. In this part, the candidates mixed up means of classifying animal diseases with types of animal diseases.

Moreover, other candidates failed to provide correct responses to nearly all parts of the question except to part (a) (i). In this part, the majority of these candidates tried to define the term *animal disease* as used in animal health. In part (a) (ii), most of the candidates in this group failed to mention the causes of diseases in livestock. Some of the incorrect responses provided were *vector*, *contaminated water/food*, *poor hygiene* and *poor rearing of livestock*.

In part (b), which demanded candidates to describe groups of micro-organisms causing diseases in livestock, they poorly attempted by mentioning few groups of organisms, without describing them. In part (c), the candidates failed to name means of classifying animal diseases. Some incorrect responses provided to this part were *color of urine*, *through body temperature* and *through animal appetite*. Extract 2.6.2 is a poor response to the question.

Extract 2.6.2

6	Q. i. Answer	
	a) i. Animal disease	
	Is the process of animal attachment of disease or affected by disease.	
	ii - loss of appetite	
	- low production example milk	
	- High fever in the body of animals	
	b) i. Mastitis	
	ii Anthrax	
	iii Knot rot	
	iv Peclatylsis	
	v Castle fever	
	vi	
	c) i. Mastitis	
	ii Anthrac	
	iii Castle fever	

In Extract 2.6.2, the candidate provided incorrect responses to the whole question.

2.2.7 Question 7: Introduction to Animal Nutrition

The question had three parts: (a), (b), and (c). The candidates were required to (a) (i) differentiate between a feedstuff and a feed, (ii) give the meaning of the term *maintenance ration*, and (iii) account for four factors that affect maintenance requirement of farm animals; (b) (i) briefly explain two roles played by reticulum in ruminant animals, (ii) analyse four microbial activities that take place in the rumen of ruminant animals, and (iii) elaborate the functions of gizzard and caecum in the poultry digestive system; (c) (i) give two categories of vitamins basing on their solubility and give two examples for each and (ii) identify two sources of vitamin E and one problem associated with its deficiency in animals.

The question was attempted by 242 (39.3%) candidates. In this question, 173 (71.5%) candidates scored from 0.5 to 6.5 marks; 65 (26.8%) candidates scored from 7 to 11.5 marks; and 4 (1.7%) candidates scored from 12 to 15.5 out of 20 marks. The data portray poor performance on the question because only 69 (28.5%) candidates scored from 7 to 15.5 marks. Table 3 shows the distribution of the candidates' scores.

Table 3: Candidates' Performance on Question 7

Scores	Percentage of Candidates
0.0 - 6.5	71.5
7.0 - 11.5	26.8
12.0 - 15.5	1.7

Table 3 shows that the candidates' performance on the question was poor. Such poor performance to them is attributed to their inadequate knowledge of animal feeds and failure to meet the demand of the question. Most of these candidates provided incorrect responses to almost all parts of the question, as described below.

They failed to differentiate feedstuff from feed in part (a) (i). Some incorrect responses from one candidate were *feedstuff is the ration for animal prepared within twenty four hours* while *feed is the ration for animal given in daily basis*. In part (a) (ii) these candidates also failed to give the meaning of maintenance ration. For example, one candidate wrote that *maintenance ration*

is amount of food which has added to animal in order to give nutrients to that animal. In part (a) (iii), the majority of the candidates provided factors affecting digestibility of feed in animals instead of accounting for the factors that affect maintenance requirement of farm animals.

In part (b) (i), these candidates failed to explain the roles of reticulum in ruminant animals. Most of them gave roles of the rectum instead of roles of the reticulum. In part (b) (ii), most of the candidates mixed up microbial activities, which take place in the rumen of ruminant animals as required in the question, with the roles of abomasum. In addition, in part (b) (iii), the candidates failed to state the functions of gizzard and caecum in the digestive system of poultry. Examples of the incorrect responses given by one of the candidates were *gizzard is used for digestion* and *ceacum as one of the organ that is used for reproduction in chicken*.

In part (c) (i), most of the candidates demonstrated inadequate knowledge of the content. They provided incorrect responses in relation to the categories of vitamins based on their solubility. Example responses from one of the candidates were *solid* and *non-solid*. In part (c) (ii), consequently the candidates failed to give the sources of vitamin E. They thus provided incorrect responses like *roughage*, *concentrates* and *succulents*. Extract 2.7.1 is a sample of poor responses to the question.

Extract 2.7.1

7.	(a) Feed stuff	Is the feed which given to the animal which contain high nutritive value like concentrate be either protein and roughes or succulent which given to animal at 24 hours per day. while
	Feed	Is the feed of Animal which contain nutrition which does not balancing the nutrients content given to Animal.
	(a) (i) Maintenance ration:	
		Is the ration of feed given to animal in order to balance or adding the weight of Animal.
7	(a) (ii) Factor that affect maintenance requirement of farm animal,	
	(a) Type of crop or feed:	
		These are factor that affect the maintenance of animal for instance roughes for increase wh. energy to animal and succulent to water purpose so if taken to Animal does not increase maintenance to animal but concentrate must be taken.

7	(b) feed preparation: many concentrated must be mixing with water to provide solution and also proper grinding distance seed cake from sunflower to allow proper feed to Animal.	
	(c) Species of plant taken to Animal The grass are not provide maintenance maintenance to Animal when compare to forage (labeled). which have high nutritive value to Animal.	
	(d) A quality of plant and Animal factor including age: Animal factor must be included when prepare the maintenance feed small animal must provide feed which help for growth and Aged animal are more eat concentrate feed	
	(b) i) To store food at temporarily which later 'chewing' for further digestion and breaking to small part in the mouth parts.	
	ii) To mixing with microorganism which help increase surface area of food in the rumen track for increase fermentation of food.	
	(ii) (a) To provide fermentation process to the feed taken by Animal in the.	
	(b) Increase the surface area of food to become easy digested by enzymes.	
	(c) Initiate reg chewing process for further digestion to mouth parts.	
	(d) Provide basic medium for food being digested	

7	ted and absorption, by enzymes.	
	(ii) (a) Gizzard help to provide surface area for food to be absorbed in alimentary canal by grind seed particles.	
	(b) Tend to disintegrate the food against a small particle of stone by some stone used to functioning at gizzard for grinding.	
	(c) Feed Function to moisture the food	
7.	(C) i) micro-Vitamin eg Vitamin D and potter sium.	
	ii) macro element (vitamin) for instance calci um and Vitamin B	
	i) Source of Vitamin E	
	(a) Eggs	
	(b) meat	
	One problem associated with its deficiency in animal, is breeding of blood.	

In Extract 2.7.1, the candidate gave the correct response to part (b) (iii) only partially by giving the function of gizzard. The candidate responded incorrectly to all the remaining parts. This indicates lack of knowledge on the content by the candidate.

Few candidates performed well in this question. The analysis shows that the candidates had ample knowledge of the subject matter. Candidates who responded well to this question did so to part (a) (ii), (a) (iii), (b) and (c) (i) but responded incorrectly to part (a) (i) and (c) (ii).

In part (a) (ii), the candidates who performed well in the question gave the correct meaning of *maintenance ration*. Similarly, they correctly accounted for the factors that affect maintenance requirement of animals in part (a) (iii). They also correctly explained the roles of the reticulum in ruminant animals in part (b) (i). Microbial activities that take place in the rumen of ruminant animals and functions of gizzard and caecum in the poultry digestive system were correctly described by the majority of these candidates in part (b) (ii) and (b) (iii) respectively. The candidates also answered correctly about the categories of vitamins basing on their solubility in part (c) (i), therefore, they

showed a high degree of understanding of animal feeds. Extract 2.7.1 is an example of responses from a candidate who performed well in the question

Extract 2.7.1

7.	(a) (iii) <u>Factors that affect maintenance requirements of farm animals.</u>	
	(i) <u>Body size and weight</u>	
	- Animals with large body sizes and weights have greater value of energy used for metabolic activities hence these require more amount of maintenance ration than smaller animals.	
	(ii) <u>Age of the animals</u>	
	- Older animals have greater metabolic activity hence they require greater amount of maintenance energy hence than younger animals.	
	(iii) <u>Species of the animals</u>	
	- Different species among farm animals have different metabolic activity and hence their maintenance requirements also vary from species to species. For For example, Cows and donkeys do not have similar requirements.	
	(iv) <u>Activity of the animal among farm animals.</u>	
	- The animal with greater activity usually has greater maintenance requirements than the one with low activity. For example Draught animals produce power to pull ox-equipments thus require greater amount of maintenance requirements than dairy cows.	
	(b) <u>Roles of reticulum</u>	
	(i) To sieve the fine textured food materials from coarse textured food materials. Reticulum performs a major function of separating the fine textured food to coarse roughage. This is necessary to ensure that the coarse roughages are separated and efficiently digested.	
	(ii) To thoroughly mix the food materials with water which thereby providing a greater surface area for	

7(b)	the cellulase enzymes from bacteria to digest more cellulose that might have escaped in the rumen.	
(iii)	Microbial activities that take place in the rumen.	
	(i) Production of vitamin B Complex together with B_1 , B_2 and B_{12} Vitamins.	
	- Inside the rumen the microorganisms also perform a microbial activity of manufacturing Vitamins B Complex with other B vitamins which play an important role as a source of Vitamin B for the animal.	
	(ii) Conversion of Nitrates to ammonia	
	- All the nitrates present in the plant tissues are converted to ammonia through microbial activity.	
	(iii) Digestion of Cellulose by cellulase enzyme	
	- Another microbial activity in the rumen is that the bacteria and protozoans produce cellulase enzyme which in effect it digests the cellulose present in roughage feeds into leaving a form which is readily digested by animal enzymes - By doing this they simplify the digestion of the food by animal enzymes.	
	(iv) Anaerobic fermentation and Production of Methane	
	Also, bacteria present in the rumen some of them are anaerobic which facilitates fermentation of the roughage anaerobically leading to escape of gases as methane (CH_4).	
	(v) Functions of gizzard and Digestive caecae	
	- The function of the gizzard is to perform mechanical digestion of the feed which comes from the proventriculus. It has muscles which enables it to do so	

7.(b)	— Function of Caecae is to enable digestion of cellulose as it contains bacteria similar to those in rumen which aid to digest cellulose by cellulase enzyme secreted by them in case the feed contains roughages.	
(c)	Categories of vitamins based on solubility	
(i)	Water soluble vitamins. These are vitamins which are readily soluble in water and are normally transported with the fluid tissues of the body. For example, Vitamin B ₁ , Vitamin B ₂ and Vitamin B ₁₂ and Vitamin C	
(ii)	Lipid soluble vitamins. These are vitamins that are readily soluble in lipids especially fats and are transported with fats. For example- Vitamin A, Vitamin D, Vitamin E and Vitamin K.	
(ii)	Sources of Vitamin E	
(i)	Fresh green roughage grasses and legumes.	
(ii)	Blood meal and Plant fruits.	
	Deficiency problem	
(i)	It leads to retardation of growth since it acts as activator for metabolic activities.	

In Extract 2.7.2, the candidate attempted well many parts of the question. He/she only failed to analyse microbial activities in the rumen of ruminant animals in part (b) (ii) and in part (c) (ii). He/she also failed to identify the sources and deficiency symptoms of vitamin E in animals.

Nevertheless, most of the candidates who did well in this question failed to differentiate feedstuff from feed in part (a) (i). Examples of incorrect responses by one of the candidates were *feed is edible substance that can be egested and become digested but contain one nutrient only* while *feedstuff refers to component of feed that are more than one nutrient only*. Likewise, in part (c) (ii), most of these candidates failed to identify two sources of vitamins E and one problem associated with its deficiency in animals. Examples of incorrect responses given were *cassava, potato and rice* as the source of vitamin E and *loss of appetite and problems in digestion*. In these parts, the candidates did not understand different terms used in animal nutrition. They also failed to identify sources and deficiency symptoms of feed nutrients.

2.2.8 Question 8: Pasture Agronomy

The question consisted of four parts; (a), (b), (c) and (d). The candidates were required to (a) enumerate four factors affecting yield potential of a given species of pasture; (b) suggest three measures that can be taken in order to improve natural pasture in Tanzania; (c) (i) give the meaning of top-dressing as used in pasture management, and (ii) give four reasons as to why it is important to use top dressing in pasture by giving four reasons; (d) (i) give reason why additives are added in napier grass when making silage, (ii) explain one problem associated with poor forage compaction during silage making, and (iii) list five characteristics of good quality silage.

The question was attempted by 464 (75.3%) candidates; among them, 114 (24.6%) candidates scored from 1.5 to 6.5 marks; 259 (55.8%) candidates scored from 7 to 11.5 marks; and 91 (19.6%) candidates scored from 12 to 18 out of 20 marks. The general performance on the question was good. The statistics indicate that 350 (78.4%) candidates scored from 7 to 18 marks. The candidates' scores are summarised in Figure 15.

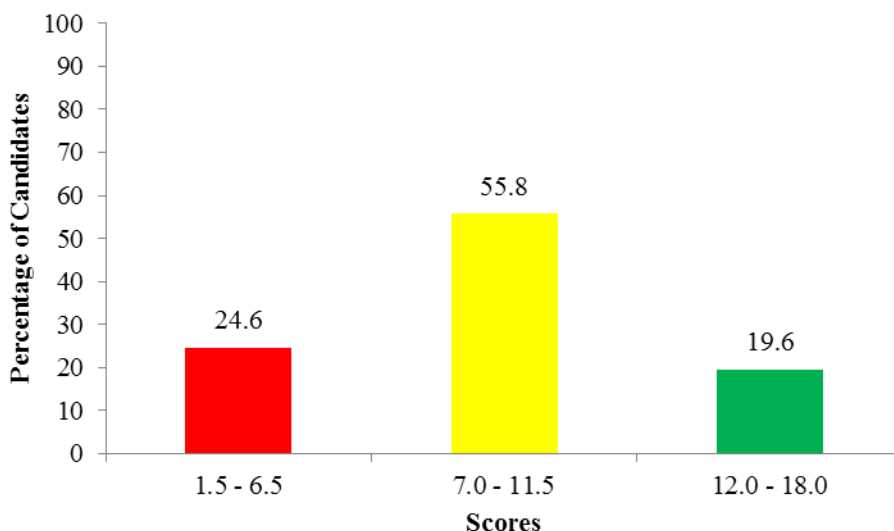


Figure 15: Candidates' Performance on Question 8.

Figure 15 indicates good performance in the question. The majority of the candidates had sufficient knowledge and practical skills in pastures; as an added advantage to these candidates that enabled them to use the experience acquired in the field to respond well to some question parts. Part

(a), (b), (c) and (d) (i) were responded correctly by most of the candidates. However, these candidates did not do well in part (d) (ii) and (d) (iii).

Most candidates who responded well to this question enumerated factors affecting yield in a given species of pasture in part (a). They also correctly suggest measures to improve natural pasture in Tanzania in part (b). Likewise, in part (c), the candidates gave the correct meaning of top dressing and reasons as to why it is important to use top dressing in pasture. Part (d) (i) of the question was also well attempted by the majority of the candidates; they gave correct reasons for adding additives in napier grass when making silage. Extract 2.8.1 is a sample of good responses to the question.

Extract 2.8.1

<p>§</p>	<p>(i) Soil fertility A fertile soil supports pasture growth thus increasing yield potential of pasture species</p>	
	<p>(ii) Water availability Sufficient rainfall or irrigation increase the yield of pasture species whereby little moisture in the soil reduce yield.</p>	
	<p>(iii) Pest and disease attack Both pest and disease reduce yield and quality of pasture. Thus, pest and disease should be controlled to increase pasture yield.</p>	
	<p>(iv) Method of utilization of pasture Paddocking improves pasture utilization. This method allow regrowth of the pasture after being grazed thus increasing yield...</p>	
	<p>(v) Manure and fertilizer application This provide nutrients for pasture growth</p>	
	<p>(vi) Paddocking This allow regrowth of the pasture after grazing</p>	
	<p>(vii) Pest and disease control Natural pasture should be free from pest and diseases attack.</p>	

<p>§ (i)</p>	<p>Top dressing is the application of chemicals to the pasture ^{top} plants so as to improve its nutritive value. It is aimed to supply essential nutrients for pasture growth.</p>
	<p>(ii) Reasons for top dressing in pasture</p>
	<ul style="list-style-type: none"> • To supply nutrient elements necessary for growth of pasture species.
	<ul style="list-style-type: none"> • To improve the nutritive value of the pasture species
	<ul style="list-style-type: none"> • To increase the yield of pasture, top dressed pastures produces more than pastures where there is insufficient of nutrient supply.
	<ul style="list-style-type: none"> • Top dressing is aimed to support microbial activities in the soil to improve soil fertility.
(d)	<p>(i) The aim of additives is to allow microbial decomposition of sugar and prevent napier grass from being decomposed by microbes.</p>
(ii)	<p>Poor forage compaction during silage making allow oxygen, aerobic condition into the silage. Aerobic condition allow aerobic respiration of silage which reduce the quality of silage.</p>
§ (iii)	<p>Characteristics of good quality silage.</p>
	<ul style="list-style-type: none"> > Should be at pH of 4.2
	<ul style="list-style-type: none"> > Should have 5% to 9% lactic acid
	<ul style="list-style-type: none"> > Good quality silage should be fine textured and not slimy producing good odour
	<ul style="list-style-type: none"> > Should be free from moulds and other material which reduce its quality
	<ul style="list-style-type: none"> > Should be light yellow in colour and not brown or black

Extract 2.8.1 is a sample of good responses to the question. The candidate scored all marks in almost all parts of the question but failed to give the correct meaning of top dressing in part (c) (i).

However, most of the candidates who performed well in this question did not do well in part (d) (ii) and (d) (iii). In part (d) (ii), the majority of them failed

to explain the problem associated with poor forage compaction during silage making. Examples of incorrect responses provided were *cause silage not to ferment* and *silage do not change color*. In part (d) (iii), the candidates provided incorrect characteristic of good quality silage such as *soft, succulent* and *contain fibres*. In these parts, the candidates lacked knowledge and field exposure to fodder crops.

On the other side, the majority of the candidate who performed poorly, in this question, provided incorrect responses to many parts of the question, except to part (c) (i) and (d) (i). Such poor performance results from their inadequate knowledge of and practical skills in the topic.

In part (a), the majority of the candidates who poorly responded to the question failed to enumerate factors affecting yield of a given species of pasture. Accordingly, they provided incorrect responses such as *management of pasture, overgrazing* and *plugging*. Part (b), which required candidates to suggest measures to be taken to improve natural pasture in Tanzania, was also poorly attempted. Examples of incorrect responses to this part were *protecting weed in order to reduce competition, to increase growth of the pastures, to control weed in pasture field and to encourage vegetative growth*.

Similarly, in part (d)(ii), most of these candidates failed to give the problem associated with poor forage compaction during silage making. The candidates provided incorrect responses such as *breeching of the green colour, results to production of bad smell* and *loss of nutritive value of the silage*. Examples of incorrect responses provided on the characteristics of good quality silage in part (d) (iii) were *it should contain small amount of water, it should have a good taste for the animal to eat* and *it should be made with plant material*. Extract 2.8.2 is a sample of poor responses to the question.

Extract 2.8.2

8a	by burning	
	by seedling	
	by weeding	
	to control pest and disease.	

- 8 b) i To reduce pest and disease.
 ii ~~Thia~~ knowledge and skill in order to improve natural pasture
 iii Capital is needed in order to buy the chemical to ~~ore~~ improve natural pasture.
- c) i Top dressing:- Is the process of plant or pasture to improved well in the soil without disease or pest
- ii i In order to improve the palatability of pasture.
 ii In order to reduce costful of the farmer.
 iii In order to increase quality of products.
 iv In order to increase nutritive value of pasture.
- d) i In order to improve nutrients on the grass and palatability.
- ii by ~~using~~ by using chemical compounds synthetic is big problem in the making silage.
- iii i Palatability of silage
 ii Nutritive value.
 iii Propagation
 iv Accessibility
 v Productivity

Extract 2.8.2 represents poor responses to the question. The candidate attempted nearly all parts of the question incorrectly, except parts (b) and (c) (ii). In these parts, the candidate provided only a few correct responses on the ways to improve natural pastures in Tanzania and reasons for top dressing in pastures.

In contrast, the majority of these candidates managed to give the meaning of top dressing and gave correct reasons as to why additives are added in napier grass when making silage in parts (c) (i) and (d) (i) respectively. These candidates seemed to possess knowledge of silage making.

2.2.9 Question 9: Livestock Reproduction, Breeding and Improvement

The question was divided into three parts: (a), (b) and (c). The candidates were required to (a) define the following terms as used in livestock breeding and improvement: (i) runt, (ii) libido, (iii) free-martin, and (iv) dystocia; (b) outline four functions of inbreeding in livestock breeding; (c) (i) mention two methods of semen collection from the bull, (ii) examine three semen parameters that have to be evaluated or tested in order to judge its quality before insemination or storages, and (iii) enumerate four limitations of artificial insemination as opposed to natural mating.

The question was attempted by 90 (14.6%) candidates; among them, 35 (39.3%) scored from 2 to 6.5 marks; 48 (54%) scored from 7 to 11.5 marks; and 6 (6.7%) scored from 12 to 13 out of 20 marks. Their performance on the question was good; 54 (60.7%) candidates scored from 7 to 13 marks. The following pie chart shows the distribution of the candidates' scores.

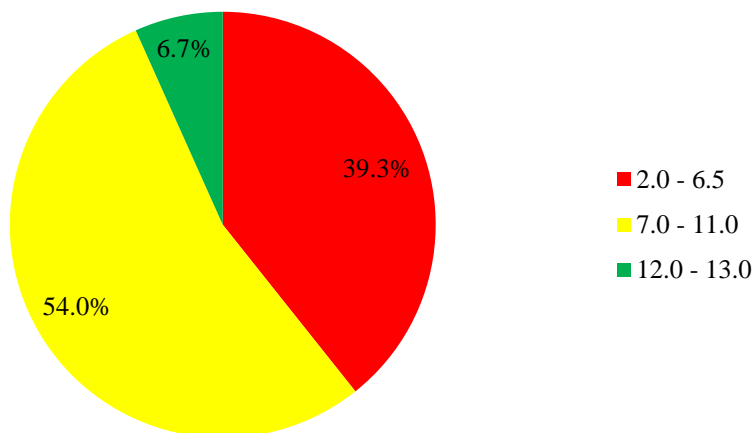


Figure 16: *Candidates' Performance on Question 9.*

Considering to Figure 16, the performance of the candidates was good. They had adequate knowledge and exposure to practicals. Most of the candidates who did well in the question provided correct responses to almost all parts of the question.

In part (a), the majority of these candidates clearly defined the terms given. They also managed to outline the functions of inbreeding in livestock breeding in part (b). Moreover, in part (c) (i), in which the candidates were required to mention methods of semen collection from the bull. They did well by giving the correct methods. In part (c) (iii), the candidates also managed to enumerate limitations of artificial insemination as opposed to natural mating. These candidates proved to possess sufficient knowledge of and field training in breeding methods. Extract 2.9.1 represents good responses to the question.

Extract 2.9.1

9. @	iii/ Free-mating	
	- A Situation by which the animals are allowed to stay together and mate during their life time without being controlled	
	(b) • Functions of inbreeding	
	→ Used to Spread a new breed at a particular area. For example when a new breed is brought at that area, the easy way of getting large number of that particular breed is by the process of inbreeding.	
	→ Production of pure breed. Since it involve the closely related animals. Example brother and sister.	
	→ Maintenance of genetic stability. Through inbreeding, the genetics of particular animals are maintained and hence no variations	
	→ Inbreeding provide a chance of spreading the good characteristics of animals that are desired by the animal keeper in a particular area.	
	(c) i/ Semen collection methods	
	→ Through the use of plastic Vagina that is placed on the penis of a bull during copulation.	
	→ Through electrical stimulation of a male, that will result to the release of Sperm by the male animal	

9. (c)	<p>ii) → Semen Viability</p> <p>→ Semen Visibility</p> <p>→ Semen mobility</p>
	<p>• Semen Viability</p> <p>The collected Semen should be Viable for their normal functioning. The unviable Semen are not required since they are considered functionless. Therefore Semen that are Viable Can be used or Stored for artificial insemination.</p>
	<p>• Semen Visibility</p> <p>A good quality semen should be visible to be used in artificial insemination. Lack of visibility accounts for a poor quality semen</p>
	<p>• Semen mobility</p> <p>A Sperm (Semen) should have the mobility strength in order to form a zygote with an ovum of a female animal. Non mobile Semens are not required in artificial insemination.</p>
	<p>iii) Limitations of artificial insemination.</p>
	<p>→ It requires Skilled labours to perform the artificial insemination hence it requires money for the payment</p>
	<p>→ The heat period must be detected to the female animals, Therefore animal keeper should be active to determine if the animal is at heat period or not at heat period.</p>
9. (d) iii)	<p>→ The bull may be a carrier of undesirable characteristics, hence the collected Semens of that particular bull will results to the Spread of undesirable Characters to other animals</p>
	<p>→ May also lead to the Spread of disease from that particular bull to other healthy animals through artificial insemination.</p>

Extract 2.9.1 reflects good mastery of the content. The candidate managed to respond correctly in most parts of the question. However, the candidate failed to define the named terms in part (a) and provided few correct responses in part (b), which focused on the limitation of inbreeding.

Nevertheless, these candidates incorrectly responded to part (c) (ii) by mixing up semen parameters to be evaluated in order to judge its quality before insemination or storage with good qualities of the semen. They thus failed to meet the demand of the question.

On the other hand, the candidates who responded poorly to this question did so to almost all parts of the question. The majority of the candidates who performed poorly in this question failed to define most of the terms in part (a). In part (a) (i), the candidates provided incorrect responses for the term *runt* such as *runt is the male camel when is not matured enough for mating*, *runt is an animal which is sterile*. Examples of incorrect responses for the term *free-martin* in part (a) (iii) were like *free-martin is the mating system whereby male animal allowed to mate with female at any time*, *free mating is the system whereby animals are allowed to mate freely* and in part (a) (iv), the term *dystocia* was incorrectly defined as *dystocia is the male animal fail to ejaculate*, *dystocia is the process of accumulating semen*.

In part (b), the candidates were required to state the functions of inbreeding in livestock breeding. Most candidates also provided incorrect responses such as *inbreeding increases chance of variation*, *in breeding introduce new gene into the heard*.

In part (c) (i), these candidates gave incorrect responses such as *the use of transmission* and *use of breeder bag* as the methods used to collect semen from the bull. In part (c) (ii), where the candidates were required to examine semen parameters that have to be evaluated or tested in order to judge its quality before insemination or storage, the candidates provided incorrect responses such as *strong*, *live* and *with high temperature*. In part (c) (iii), some of the incorrect responses given by the candidates on limitations of artificial insemination as opposed to natural mating were *it is difficult to transport male animal*, *semen is not natural*. Responses from these candidates revealed their inadequate knowledge of and field exposure to breeding methods. Extract 2.9.2 represents poor responses to the question.

Extract 2.9.2

9	(a) <u>Bunt</u> is the process of separating the female animal and the male when are young.	
	(i) <u>Libido</u> - is the kind of taking the male animal with female animal when are on heat period.	
	(ii) <u>Free-mating</u> this is the mating of the animal naturally between the male and female animal when are on heat or any time.	
	(iii) <u>Systocea</u> - is the ability of the male animal to inseminate the female animal natural.	
	b) <u>Inbreeding</u> it lead to improve the quality of animal which are been as the methods of livestock breeding.	
	(i) it lead to improve the good varieties of the animal either can be male or the female animal.	
	(ii) <u>Inbreeding</u> it's used to reduce the sexual desire of the some animal in livestock breeding.	
	(iv) <u>Inbreeding</u> it's used into the introduction of new varieties of the animal or the new species of the good animal.	

Q8	(c) Two methods of semen collection from the bull.	
	(i) By breeder's bag	
	(ii) By massage methods.	
	(iv) (i) The semen which can be collected by artificial vagina it can be used to be tested and judge on the quality of the semen.	
	(ii) The semen which are been collected on the breeder's bag are been taken and tested in order to judge on its quality before insemination.	
	(iii) Such semen which are been taken by massage methods can also be done in the kind / process of judge the quality of such semen before inseminate the animal.	
	∴ The Such parameters can be judge by using electrical methods and the artificial womb.	
	(iv) Artificial insemination is the kind of inseminating female animal by using artificial methods or introducing the semen to the female animal. The following are the limitation of artificial insemination.	
	It need more equipment when applying the methods of artificial insemination it can be done by using more improved tools in order to complete the work of introducing such semen.	

98	It need skilled person; Such methods of using artificial insemination it can be lead to done by the skilled person which make them to be improved.	
	Transmission of venereal disease is high; The methods of using artificial insemination it can be lead to transmitt the venereal disease from one animal to another animal.	
	It's difficult to know the female animal which are sterile/not fertile; when using the artificial insemination it lead to be more difficult to know the female animal which are fertile or infertile.	

Extract 2.9.2 represents poor responses to the question. The candidate incorrectly responded to many parts of the question. However, he/she managed to provide few correct responses in relation to the limitations of artificial insemination as opposed to natural mating in part (c) (iii).

Part (a) (ii) of the question was observed to be the only part to which the majority of the candidates provided correct responses; that is, defining the term *libido*. The term is also commonly used in other disciplines, the reason that, contributed for these candidates to define the term correctly.

2.2.10 Question 10: Environmental and Technological Challenges in Agricultural Development

The question had four parts: (a), (b), (c), and (d). It required the candidates to (a) outline five sustainable agricultural techniques used by farmers to achieve the key roles in protection of crop plants and soil quality, (b) assess three contributions of cover crops in sustainable agriculture, (c) briefly explain four effects of crop rotation on agricultural production and sustainability, and (d) give three reasons as to why modern farming is not sustainable.

The question was attempted by 420 (68.2%) candidates; among them, 26 (6.2%) candidates scored from 3 to 6.5 marks; 134 (31.8%) candidates scored from 7 to 11.5 marks; and 261 (62%) candidates scored from 12 to 20 out of 20 marks. This signifies that the general performance on the question was good; 395 (93.8%) candidates scored from 7 to 20 marks. Figure 17 shows the distribution of the candidates' scores.

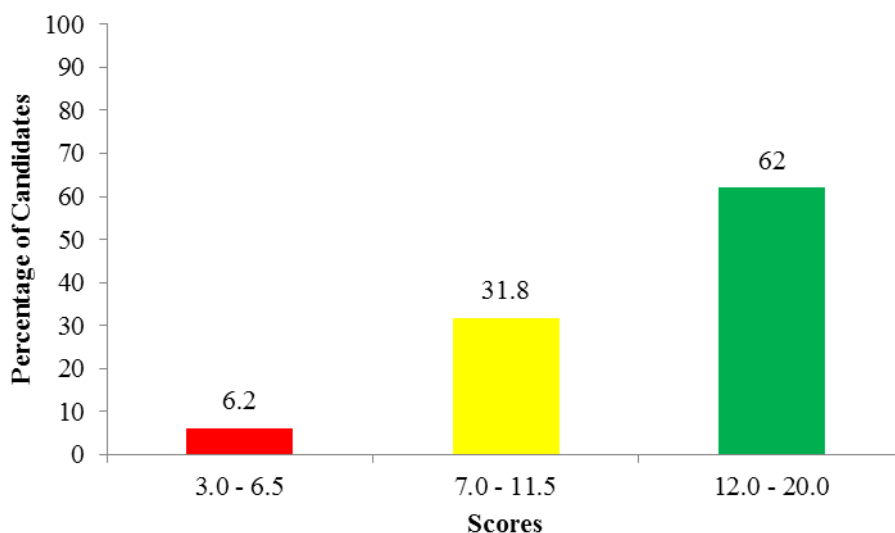


Figure 17: *Candidates' Performance on Question 10.*

Figure 17 presents good performance. This performance shows that the candidates had adequate knowledge of the subject matter. The majority of them responded well to part (a), (b), and (d).

In part (a), the majority of these candidates managed to outline sustainable agricultural techniques used by farmers to achieve the key role in protecting crop plants and soil quality. They also correctly assessed the contribution of cover crops in sustainable agriculture in part (b). Similarly, in part (d), the candidates managed to give reasons as to why modern farming is not sustainable. Their responses indicate that the candidates had sufficient knowledge of the concept of *sustainable agriculture*. Extract 2.10.1 exemplifies good responses to the question.

Extract 2.10.1

10	a) Five Sustainable agricultural techniques used by farmers to achieve key roles in protection of crop plants and soil productivity	
	i) Addition of organic Matter to the soil	

10	(a) (i) Green Manuring	
	(ii) Application of organic herbicides and pesticides	
	(iv) Crop rotation	
	(v) Mulching	
	(b) Three contributions of cover crops in sustainable agriculture	
	(i) It contribute improvement of soil fertility; through using of cover crops help to prevent loss of soil fertility by weeds.	
	(ii) It help to combat weeds; Cover crops are assisting in sustainable agriculture as they prevent growth of weeds in the farm.	
	(iii) Help to reduce soil erosion; As it cover the bare spaces of soil it reduce the erosion which reduce soil fertility hence contributing to sustainable agriculture	
	(c) Crop rotation - is the practice of alternating the different type of crop in field year after year.	
	effects of crop rotation on agricultural production and sustainability	
	(i) Crop rotation control weeds; through alternation of crops helps to control the parasitic weeds.	
	(ii) Crop rotation improves soil fertility; this practice help to avoid use inorganic fertilizers hence ensure sustainability.	
	(iii) Crop rotation control crop pests; practice also reduce the use of pesticides by controlling	

	the pests by breaking their life cycles.	
	(iv) Crop rotation help to controls crop disease; through alternating crops helps to control the diseases.	
10	(d) Morden farming is not sustainable agriculture because:-	
	(i) Envolves use of industrial fertilizer and pesticides; Use of industrial inputs like fertiliser that tend to destruct soil structure is not sustainable agriculture	
	(ii) It does not follow the principles of organic farming; farming system to be sustainable to be it should observe the principle of organic farming which are principle of health, of care, of ecology and principle of fairness.	
	(iii) It does not take into consideration of future generation; Morden farming focuses only today & neglect the next generation as they also need land for farming.	

In Extract 2.10.1, the candidate demonstrated sufficient knowledge of the concept of sustainable agriculture by scoring all marks in the question.

In part (c), a few candidates failed to understand the demand of the question, that is, to explain the effects of crop rotation on agricultural production and sustainability. In this part, the candidates misinterpreted the word *effect* to mean 'negative'. Accordingly, they gave responses such as *it increase the spread of pest and diseases, cause soil erosion, destroy soil structure and cause loss of soil fertility*.

However, those who poorly responded to this question lacked adequate knowledge of the topic. They responded poorly to almost all parts of the question, except to part (a), where most of them outlined a few sustainable agricultural techniques used by farmers to achieve the key role in protecting crop plants and soil quality.

In part (b), the majority of the candidates failed to assess the contribution of cover crops to sustainable agriculture. They thus provided incorrect responses such as *protect crops from rain, help in temperature regulation and increase yield*.

In part (c), most of the candidates incorrectly tried to explain crop rotation by focusing on its negative side. Examples of the incorrect responses given were *decrease production, introduce pest and diseases* and *wash nutrients*. Part (d), which required the candidates to give reasons as to why modern farming is not sustainable, was also poorly attempted by the majority of these candidates. Some incorrect responses given were *use tractors to plough, use manure* and *it is expensive*. Generally, all these responses indicate their inadequate knowledge in part of the candidates on the concept of sustainable agriculture. Extract 2.10.2 illustrates the candidates' poor responses to the question

Extract 2.10.2

<p>ii. crop rotation</p> <p>- crop rotation is the practice where by two or more crops are growing in a piece of land. crop rotation help in add organic matter to the soil where by crop growing are legume as which they have pods which fix nitrogen to the soil when by soil can be qualified and plant can be protected</p>	
<p>iii. Tilling</p> <p>- Tilling is the practice of allowing the land to rest for the period of time so as nutrients to regain. This practice led to the addition of soil nutrients hence can protect the crops and soil quality.</p>	
<p>iv. Mulching</p> <p>This is the practice of using grasses or plastic material such as to cover the soil. This practice can conserve the soil moisture allow permeability, prevent high temperature to the soil which can affect microbial activities, also mulching lead to the addition of organic matter to the soil</p>	
<p>v. Mixed cropping</p> <p>- is the practice where by different crops are growing in the same piece of land. This we can see that these different crops has different nutrient which add organic matter to the soil and hence led to the protection of plant crops and soil quality</p>	

10	<p>(b) The following are the contributions of cover crops in sustainable Agriculture</p> <p>I. cover crops can compete with crops to take nutrient</p> <p>cover crops can compete with crops to take nutrient and remain plant with less nutrient hence can cause the plant to produce little product with low quality</p> <p>II. Cover crops can low the quality of product</p> <p>- cover crops will grow completely with plant then will take all nutrients then will led plant to produce low product</p> <p>III. Cover crops can led to soil infertility</p> <p>cover crops can led into soil infertility by intake all nutrient from the soil</p>
C)	<p>The following are the effects of crop rotation</p> <p>i. crop rotation led to soil infertility</p> <p>- crop rotation as the tendency of growing two or more crop of on the same piece of land will lead to the soil infertility where by soil will not grow well due to the competition of taking up nutrients</p> <p>ii. Some crops will compete for nutrients</p> <p>- As different crops grow on the field the crops will compete for nutrient</p> <p>iii. Crops will not grow well</p> <p>- crops will not grow well because there are many in the same field will be competing for the nutrients</p>

10	c iv. low products	
	due to crop rotation there are low products where by crop will not be able to produce high product due to lack enough nutrient after being absorbed by other crops	
	d) <u>Modern farming</u> - is the practice where by farming activities are conducted by using advanced technology and modern tools like tractor and harvester	
	The following is why modern farming is not sustainable	
	i. <u>Lack of modern capital</u>	
	- Due to lack of capital so as to conducting farming in modern this lead to modern farming is not sustainable.	
	These modern farmer lack capital so as to buy modern tool and modern seed so as to sustain modern farming	
	ii. <u>Lack of technology</u>	
	- Due to the lack of technology like using of modern tools and modern seed the modern farming are not sustain	
	farmers are lacking technology on how to use of chemical so as to control weed or pest	
	iii. <u>Poor government support</u>	
	- Due to poor government support whether on provision on modern seed, good market condition farmer are not	
	Sustain modern farming	

In Extract 2.10.2, the candidate managed to outline correctly just few sustainable agricultural techniques in part (a). The candidate responded incorrectly in the remaining part of the question due to lack of knowledge and practical experience on sustainable agricultural practices.

2.3 134/3 AGRICULTURE 3

2.3.1 Question 1: Agricultural Engineering and Land Planning

The candidates were provided with specimens: E₁ – spirit level, E₂ – plumb bob, E₃ – G-clamp, E₄ – shear, E₅ – hinge, E₆ – centre bit, E₇ – rubber hose pipe, E₈ – engine oil, E₉ – spark plug.

The question consisted of three parts: (a), (b) and (c). The candidates were required to (a) (i) give the functions of specimens E₁, E₂, E₃, E₄, E₅ and E₆ and (ii) explain the importance of the practice done by specimen E₄; (b) (i) account four factors to consider when choosing specimen E₇, and (ii) enumerate six properties of water for good piping in specimen E₇; (c) (i) give any four properties of specimen E₈, and (ii) suggest three possible maintenance which might be needed in specimen E₉ after several hours of its uses.

The question was attempted by 616 (100%) candidates. Among them, 4 (0.6%) scored from 5.5 to 6.5 marks; 260 (42.3%) scored from 7 to 11.5 marks; and 352 (57.1%) scored from 12 to 18.5 out of 20 marks. Their general performance on this question was good, since 612 (99.4%) candidates scored from 7 to 18.5 marks. Table 4 shows the distribution of the candidates' scores.

Table 4: Candidates' Performance on Question 1

Scores	Percentage of Candidates
5.5 - 6.5	0.6
7.0 - 11.5	42.3
12.0 - 18.0	57.1

Table 4 shows good performance. The candidates who performed well in this question managed to provide correct responses to parts (a), (b) (ii) and (c) (ii). Their performance show that they had adequate knowledge and practical skills relevant to the topic.

In part (a) (i), the majority of candidates provided correct responses with regards to the functions of specimens E₁, E₂, E₃, E₄, E₅, and E₆. Likewise, in part (a) (ii), most of these candidates managed to give the importance of the practice done by specimen E₄.

In part (b) (ii), with their adequate knowledge and practical skills in the content, the candidates correctly enumerated properties of water for good piping in specimen E₇ and suggested the possible maintenance which might be needed in specimen E₉ in part (c) (ii). Extract 3.1.1 is a sample of good responses to the question.

Extract 3.1.1

1.	① (i) The functions of specimen E_1, E_2, E_3, E_4, E_5 and E_6 are:	
	i) <u>function of specimen E_1</u>	
	— used to check the vertical and horizontal straightness of the wall or an object.	
	ii) <u>Specimen E_2</u>	
	— used to test the vertical straightness of the wall.	
	iii) <u>specimen E_3</u>	
	— used for holding two pieces of wood together during carpentry work such as planing, sawing and nailing.	
	iv) <u>Specimen E_4</u>	
	— used for prunning of ledges or trimming purposes.	
	v) <u>Specimen E_5</u>	
	— used for holding the two bodies to simplify movement through opening and closing it.	
	vi) <u>Specimen E_6</u>	
	— used for boring or drilling of wood surfaces to making holes.	

1.	(a) (ii) The specimen E_4 , have its importance on its practice of pruning or trimming hedges as it improves the beauty and decorates the form by levelling the hedges to look clear.	
1.	(b) (i) Four factors to consider when choosing specimen E_7 are:	
	a/ Cost of the specimen E_7 on buying and maintaining it.	
	b/ Availability of specimen E_7 in the environment.	
	c/ Suitability of activities performed by the specimen E_7 .	
	d/ Durability of specimen E_7 to its function	
	(b) (ii) Six properties of water used to piping water be piped by specimen E_7 are:	
	1/ water should be clean	
	2/ water should be free from dissolved salts	
	3/ water should be free from chemicals	
	4/ water should be free from dirty and dust which may block the specimen E_7 .	
	5/ water should be treated enough as good water to be passed through specimen E_7 .	

On the other hand, few candidates performed poorly in this question. They provided incorrect responses to many parts of the question, except to part (a) (i) and (c) (ii). These candidates had inadequate knowledge and practical skills on the content of the question.

In part (a) (ii), the majority of the candidates failed to give the importance of the practice done by specimen E₄. Some incorrect responses to this part of the question were *cut branches of trees* and *cut grass for livestock*.

Examples of the incorrect responses to part (b) (i) on factors to consider when choosing specimen E₇ were *country of manufacture*, *purpose* and *length of the pipe*. In part (b) (ii), the candidates also provided incorrect responses on the properties of water for good piping in specimen E₇. Examples of the incorrect responses provided were such as *high pressure* and *treated*.

Furthermore, in part (c) (i), these candidates gave incorrect responses such as *oil stay long time without being destroyed*, *remain unchanged till the end* and *high viscosity on the properties of specimen E₈*. Extract 3.1.2 exemplifies poor responses to the question.

Extract 3.1.2

a	E ₁ - Used for measure straightness line of the angle	
i	E ₂ - for measure perpendicular walls.	
	E ₃ - For drilling hole in a wood	
	E ₄ - For trimming the hedge	
	E ₅ - Is a piece of metal which occur in the door for gate move freely open and closed	
	E ₆ - For drawing scribe in the timber or wood grain	
a	ii Importance of the practice done by specimen E ₄ is to make the trees and grass to be the same level in order to avoid pest which live on trees as well as to avoid spread of disease	
b	i Select the plastic pipe in order to be used when are cross in different area.	
	ii Type of the soil which apply the soil	
	iii Select the pipe which have not have hole between them	
	iv slope of the area	
c	i It is soluble and hygroscopic	
i	ii It contain about 21% of nitrogen	
	iii It cause slight acidity in the soil when applied to the soil.	
	iv It is deliquescent	
c	i Apply grease in order to reduce friction	
ii	iii Put of oil in order to prevent rusting which occur	
	iii Bolts and nuts must be tightened by using spinner	

Extract 3.1.2 represents poor responses to the question. The candidate gave incorrect responses to almost all parts of the question. However, he/she managed to give most of the functions of the named specimen in part (a), except the function of specimen E₃.

These candidates largely managed to give the functions of most of the items in part (a). They also correctly suggested possible maintenance which might be needed in specimen E₉ after several hours of its uses in part (c) (ii). The candidates demonstrated adequate knowledge of different instruments and tools which are commonly used in agro-mechanics.

2.3.2 Question 2: Crop Science and Production and Soil Science

The candidates were provided with specimens: S₁ – CAN fertilizer, S₂ –Farm yard manure, C₁ – Berry affected by Coffee Berry Disease, C₂ – A diseased pod of beans affected by halo blight and C₃ – Thorn apple.

This question consisted of three parts: (a), (b) and (c). The candidates were required to (a) (i) give four reasons why specimen S₁ is top dressed in pasture, and (ii) describe with reference to 2 (a) (i) the importance of top dressing in pasture grazing; (b) account four factors on which the nutrition value and quality of specimen S₂ depends;(c) (i) give a newly and an old scientific name of pathogen causing the disease in specimen C₁, (ii) enumerate two control of the disease in specimen C₁, (iii) name the causative agent of the disease in specimen C₂, (iv) outline three management measures to the disease in specimen C₂, and (v) name four general symptoms which will be shown by the livestock eaten specimen C₃ as it is an important poisonous weed to man and livestock.

This question was attempted by 615 (99.8%) candidates. Among them 119 (19.3%) candidates scored from 2 to 5 marks; 374 (60.9%) candidates scored from 5.5 to 8.5 marks; and 122 (19.8%) candidates scored from 9 to 12.5 out of 15 marks. In this question, the performance of the candidates was generally good; 496 (80.7%) candidates scored from 5.5 to 12.5 marks. Figure 18 indicates candidates' scores in the question.

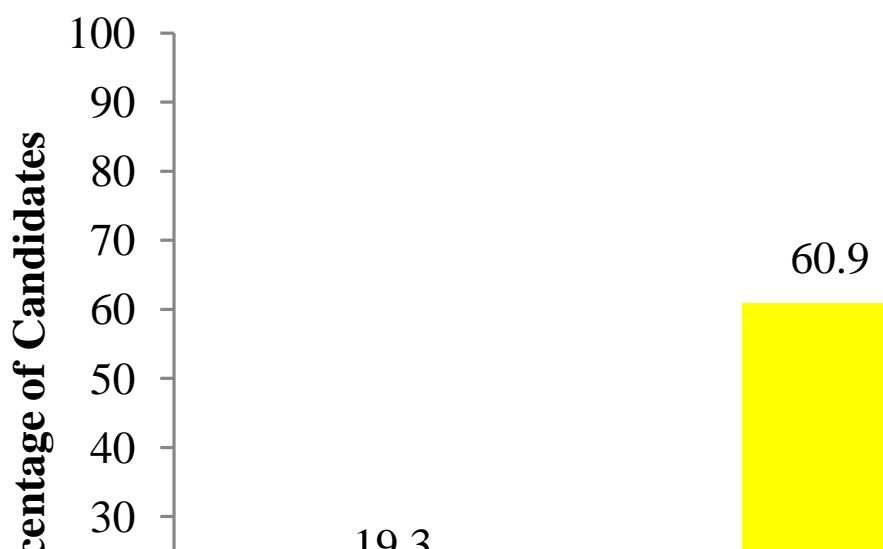


Figure 18: *Candidates' Performance on Question 2.*

Figure 18 presents good performance. Adequate knowledge and practical skills in the topics by most of the candidates contributed to such performance. These candidates provided correct responses to many parts of the question, except to part (c) (v).

In part (a) (i), most of these candidates correctly gave reasons as to why specimen S_1 is top dressed in pasture. They also correctly gave the importance of topping in pasture grazing in part (a) (ii). In addition, most of them managed to account for factors on which the nutritional value and quality of specimen S_2 depend in part (b).

In parts (c) (i) and (c) (iii), a new and an old scientific name for the causative agent of coffee berry disease and the scientific name for the causative agent of halo blight respectively were correctly written by most candidates. These candidates also well enumerated the control of the disease in specimen C_1 in part (c) (ii). Likewise the candidates managed to outline the management measures to the disease in specimen C_2 as asked in part (c) (iv). Extract 3.2.1 are responses from a candidate who responded well to the question.

Extract 3.2.1

2.	(a) (i) Reasons for top dressing specimen S_1 in pasture.	
	(i) To replenish nutrients in the soil	
	(ii) To improve the nutritive value of the pastures.	
	(iii) To improve the soil physical and chemical properties or characteristics.	
	(iv) To promote ^{fast} growth, faster establishment and regrowth of the pasture after grazing.	
2.(a) (ii)	Importance of Topping in pasture grazing.	
	- Topping is the practice of removing the stems of pastures that remain or left by animals after grazing on pasture by using a sickle. This is important so as to promote easy regrowth of pastures and also improves the leaf: stem ratio in pasture crops and finally increasing the palatability of the forage by animals.	
	(b) Factors which govern the nutritional value and quality of specimen S_2	
	(i) Species of the animals.	
	The different species of farm animals produce different types of specimen S_2 with a different quality and nutritional values. For example cattle and goats produce specimen S_2 but these differ in nutrient content and quality.	
	(ii) The Type of feed fed to livestock	
	- Also the type of feed allowed to animals governs the quality of the specimen S_2 produced as well as its nutritional content. For example when an animal is allowed with a greater amount of concentrates the specimen S_2 produced will have high amounts of Nitrogen nutrient than the one who feeds on roughages only.	
	(iii) Level of preparation and its processes of storage.	
	- When specimen S_2 is prepared it is accompanied accompanied with a lot of risks of nutrient loss by evaporation and leaching by rain water. Properly stored and prepared specimen S_2 has higher nutrient content and hence quality than the one one which is poorly prepared.	

2. (b)	(iv) <u>Age of the animal</u>	
	- Normally young animals especially young 'ruminant' animals have produce low quality specimen \therefore because their alimentary canal is yet fully developed than older ones hence older produce \therefore with greater nutrient contents	
	(v) <u>Amount of feed intake.</u>	
	- When animal consumes alot of feed it excretes alot of it in the faeces which in turn leads to production of greater amounts of \therefore with high nutrient content as well as quality.	
	(c) (i) <u>New scientific name: Colletotrichum kahawae</u>	
	<u>Old scientific name: Colletotrichum Coffeanum</u>	
	(ii) <u>Control of the disease in specimen 8 C₁</u>	
	(i) <u>Proper pruning</u> - which involves the removal of overgrown branches which reduces the chances of the disease to spread from one plant to another as the contact between them is limited.	
	(ii) <u>Use of Resistant varieties</u>	
	- Many resistant varieties have been produced in East Africa that can withstand or tolerate the disease for example RUIRU 41 which was produced in KENYA has been effective in controlling the disease	
	- Also the use of Copper fungicides is also effective.	

2.	(c) (iii) The causative agent of disease in specimen C ₂ is Bacteria known as <u>Pseudomonas syringae</u>	
	(iv) The disease in specimen C ₂ can be controlled by the following methods :-	
	(i) Crop rotation	
	(ii) Rogue Roguing Roguing to remove infected plants.	
	(iii) Growing resistant varieties and destruction of crop residues.	
	(v) Symptoms to show that the livestock have eaten specimen C ₃	
	(i) Dullness and Loss of appetit appetite.	
	(ii) Sudden death and before death the animal removes a foam like saliva out through the mouth	
	(iii) When the carcass is opened the liver be may be seen enlarged enlarged with enlarged gall bladder	
	(iv) In an inability to regurgitate food.	
	(iv) Reduced regurgitation of feed eaten by the animal.	

In Extract 3.2.1, the candidate managed to provide correct responses to many parts of the question with the exception of parts (a) (ii) and (c) (v). Accordingly, he/she showed a good mastery of the topics.

Contrary to the performance in other question parts, these candidates failed to name the symptoms which are shown by the livestock who has eaten specimen C₃ in part (c) (v). The candidates provided incorrect responses such as *lose of appetite* and *skin rushes*. In this part, the candidates demonstrated the lack of field experience associated with the symptoms of the animal which has eaten the specimen.

On the other hand, few candidates performed poorly in this question. Such poor performance is attributed to their inadequate knowledge and practical skills. Most of the candidates who poorly responded to this question did so in parts (a), (b), (c) (i), (iii), and (iv) but did well in part (c) (ii) and (v).

In part (a) (i), the majority of the candidates incorrectly wrote the properties of specimen S₁ as *it does not scorch the leaves* and *it add soil acidity*. In part (a) (ii), these candidates also failed to give the importance of topping in pasture grazing; they gave incorrect responses such as *it facilitate microbial decomposition since it does not scorch the leaves* and *prevents soil erosion*.

In part (b), the majority of the candidates failed to give factors on which the nutritional value and quality of specimen S₂ depends. The candidates provided incorrect responses like *improve the soil structure* and *it prevent soil erosion*.

In part (c) (i), the majority of the candidates, likewise, failed to write correctly a new and the old scientific name of the causative agent of the coffee berry disease. Some incorrect responses by one of the candidates were Chollectrotrichium Khawea as a new name and chollectrotrichium coffeanam as the old name instead of Colletotrichum kahawae as a new name and Colletotrichum coffeanum as an old name. In part (c) (iii), most candidates failed to write the scientific name of the causative agent in specimen C₂. Examples of incorrect responses given by the candidates were Pseudomonous phaseliocola and Pseudomonas phaseolicola instead of Pseudomonas phaseolicola or Pseudomonas syringae. Moreover, the candidates failed to outline management measures to the disease in specimen C₂ in part (c) (iv); examples of the incorrect responses provided include *use of herbicide* and *crop rotation*. Extract 3.2.2 presents one of the poor responses to the question.

Extract 3.2.2

2.	(a) (i) Specimen S ₁ is top dressed in pasture because → It is very soluble in water hence can be absorbed by the plants after dissolving in the soil. → Because it is very soluble can be absorbed by the leaves and scratch them. → Specimen S ₁ do not have residue effect to the pasture hence applied by top dressing method. → It is very not hygroscopic do not absorb water.
	(ii) Topping increase the absorption of a certain fertilizer when applied in the pasture, hence quickly absorbed by the plant roots and can be used for plant activities.
2.	(b) (i) <u>Filtration rate</u> - The ratio of passing water for specimen S ₂ is very low that indicate that it contain higher organic matter content. (ii) <u>Texture</u> → The texture of specimen S ₂ is not held together hence many space covered with organic matter. (iii) <u>The pH value</u> - The pH of specimen S ₂ seem to be alkaline to provide a suitable conditions for plant growing in alkaline soil. (iv) <u>Organic matter content</u> → The amount of organic matter in the specimen S ₂ is very high hence this obtain specimen is obtained from the mixture of grasses and livestock remains.
	(c) (i) Newly scientific name is <u>Colletotrichum spp.</u>
	(ii) → Use of resistance varieties - Crop rotation should be considered - Spray the crop with 50% of copper solution to kill the pathogen.
	(iii) Causative agent is Fungus known as <u>Pseudomonas syringae</u> .

2	(c) (iv)	
	→ proper spacing of the plants in the field to avoid contamination with affected one.	
	→ Roguing - remove of all affected crop to avoid further spread of the disease.	
	- Crop rotation, by changing the type of crop in the same piece of land.	
	(v) (i) If an animal eaten specimen C ₃ will show laziness and fail to walk.	
	(ii) The stomach will be too much brown up by accumulation of gas.	
	(iii) Livestock tend to produce white mucous membranes to the mouth and sometime in the nasal passage.	
	(iv) Breathing of the animal become difficult, small amount of air allowed to enter the lungs as eventually livestock die.	

In Extract 3.2.2, with their inadequate knowledge of the content, the candidate responded incorrectly to part (a) and (b). In part (c), the candidate managed to provide only a few correct responses to parts (c) (ii) and (c) (iv). In addition, the candidate attempted parts (c) (i), (c) (iii) and (c) (v) poorly.

However, most of these candidates provided correct responses to part (c) (ii) and (c) (v). As for part (c) (ii), the candidates managed to enumerate control of the disease in specimen S₁ and provided correct responses on the symptoms shown by the livestock that has been eaten specimen C₃ in part (c) (v).

2.3.3 Question 3: Livestock Science and Production

The candidates were provided with specimens L₁- Urea, L₂- Round potatoes, L₃- water, L₄-Knapsack sprayer, L₅-Rhodes grass, and L₆- Lucerne.

The question consisted of three parts: (a), (b) and (c). The candidates were required to (a) (i) explain briefly the role of specimen L₁ in crop residues and (ii) name other two items which can be used with the same purpose as specimen L₁; (b) (i) explain why it is a normal practice to cook specimen L₂ and discard its water when preparing it as feed for pig and poultry, (ii) list three general factors that govern the amount of specimen L₃ intake in animals and (iii) outline the procedures for using specimen L₄ when

applying acaricide to a confined animal in a crush; and (c) suggest seven benefits of having both specimen L₅ and specimen L₆ in a forage.

The question was attempted by 615 (99.8%) candidates; among them, 340 (55.3%) scored from 0 to 5 marks; 264 (42.9%) scored from 5.5 to 8.5 marks; and 11 (1.8%) scored from 9 to 13 out of 15 marks. A total of 275 (44.7%) candidates scored from 5.5 to 11 marks. These results indicate average performance in the question. The candidates' scores are summarised in the following table.

Table 5: Candidates' Performance on Question 3

Scores	Percentage of Candidates
0-5	55.3
5.5 - 8.5	42.9
9 - 11	1.8

Table 5 shows that the performance was average. Most candidates had inadequate knowledge of the subject matter. Consequently, they demonstrated average performance. Having adequate knowledge and practical skills on the topics in the fields made the majority of the candidates who performed well in this question to meet the demands of the question. Thus, they provided correct responses to almost all parts of the question.

Most of the candidates with good performance in this question correctly explained the role of specimen L₁ in crop residues and named items which can be used with the same purpose as specimen L₁ in parts (a) (i) and (a) (ii) respectively.

The reasons as to why it is normal to cook specimen L₂ and discard its water when preparing feed for animals was correctly given by the majority of these candidates in part (b) (i). In part (b) (ii), the candidates largely managed to list general factors that govern the amount of specimen L₃ intake in animals. Similarly, in part (b) (iii), these candidates managed to outline the procedures for using specimen L₄ when applying acaricides to a confined animal in a crush.

Likewise the candidates provided many correct responses with regard to the benefits of having both specimen L₅ and L₆ in a forage as asked in part (c). Extract 3.3.1 is a sample of good responses to the question.

Extract 3.3.1

3(a)	Role of specimen L ₁ in crop residues
	They increase the decomposition of crop residues which increase the organic matter the urea have taken to specimen L ₁ have taken by plant leaves and increase the growth of vegetation so after harvesting the residue decompose early
(ii)	Item which can be used with the specimen some purpose as specimen L ₁
	(i) Calcium Ammonium Nitrogen (CAN)
	(ii) Farm yard manure
	(iii) Sulphate of ammonium
3(b)	It is normal practice to cook specimen L ₂ and discard its water when preparing it as pig feed for pig and poultry because the Irish before cooked have chemical which inhibit the digestion in pig and poultry so after heating the Irish potatoes become free from those chemical.

(ii)	General factor that govern amount of specimen H_2O intake in animal	
(1)	The presence of roughages in the feed; The roughages have low water amount so the when animal eat roughages they lead to high intake of water but for the succulent and concentrate the animal do not need high amount of water	
(ii)	weather weather condition; The water intake also affected by the weather means during - cooling period the animal do not use large amount of water and some times the animal do not take totally this is due to the cool weather but for the period of high temperature the animal take large amount of water for cooling purpose and other functions	

b) (ii)	Type or species of the Animal; The animal they differ in intake of water, the large animal use or take high amount of water compared to the small organisms
(iv)	health of the animal; The animal who has good health take the enough water but the some of the organisms who have not good health have ability of increasing high intake of water or lowering intake of water but this depend on their disease
(v)	
(b) (iii)	Procedure of using specimen Ly when applying acaricide to a confined animal in a crush
(i)	Check that the all parts of specimen Ly are cleaned and no any contamination
(ii)	Check that the nozzle are unblocked and their joints should kept good
(iii)	The filter cap should open and set the filter into the mouth of the specimen Ly
(iv)	Take clean water and put to the specimen Ly then with the presence of filter to avoid the entering of any unrequired material but volume should of the correct required ratio
(v)	Read the all instruction given about the acaricide used to avoid the incorrect diluting of the acaricide

- vi) Measure the acaricide that is which is enough for the volume of water that are already added to specimen ~~to~~ L₄ to avoid incorrect preparation of acaricide concentration
- vii) The measured acaricide should be added to the specimen L₄ and swirl or use stir rod to mix chemical and water
- viii) Wear gloves, correct the nozzle, present then carrying the specimen L₄ and take the bang or boom with the ~~left~~^{right} hand while controlling the handle operating with the left hand
- ix) Start spraying the acaricide to the animal on the crabs and spray chemical all over the body of organism correctly
- x) After applying acaricide wash the specimen 2 with clean water followed by washing sock and unblocked nozzle, if there is blocked nozzle, and also dry the specimen 2 then store in cool place
- xi) After applying the ~~acaricide~~ acaricide the man should clean or wash his/her hand, head and legs to avoid irritation and other effect of acaricide but if there is ~~abnorma~~ abnormal condition see the medical doctor

3(c)	Seven benefit of having both of specimen L ₅ and specimen L ₆ in a forage	*
(i)	They produce high nutritive value	
(ii)	They increase fodder production even at the poor soil	
(iii)	Maintain soil fertility by increasing nitrogen fixation done by specimen L ₆	
(iv)	They lower application of specimen nitrogenous fertilizer due to increase the nitrogen fixation done by specimen L ₆	
(v)	Increase the yield of the fodder	
(vi)	They increase amount of protein in the fodder	
(vii)	Controlling soil erosion, weed due to the ability of specimen L ₆ which are legume	
(viii)	Increase palatability of the feed or fodder	

In Extract 3.3.1, the candidate demonstrated adequate knowledge of the content in the question via providing correct responses to most of the parts. The candidate, however, failed to outline the procedures in knapsack sprayer when applying acaricides in part (b) (iii).

Those who performed poorly in the question demonstrated inadequate knowledge of the subject matter and practical skills. Consequently, the majority of the candidates failed to attempt this question. They provided incorrect responses to all parts of the question, except to part (b) (ii).

In part (a) (i), the majority of the candidates failed to explain the role of specimen L₁ in crop residues. Most of them mixed up the function of the specimen in crop residues and in field crops; thus, many of the responses given were the functions of the specimen in field crops. Consequently, in part (a) (ii), the candidates named different types of fertilizers and manure as other items which can be used with the same purpose as specimen L₁.

In part (b) (i), the majority of the candidates failed to give reason as to why it is normal to cook specimen L₂ and discard its water when preparing it as feed for pig and poultry. Some of the incorrect responses provided were to

improve the palatability of specimen L₂ and to enhance digestibility of specimen L₂. In part (b) (iii), these candidates also failed to outline the procedures for using specimen L₄ when applying acaricides to a confined animal in a crush; instead, the majority of them outlined procedures for mixing and using acaricides.

In part (c), the candidates were asked to suggest the benefits of having both specimens L₅ and L₆ in a forage. This part was incorrectly responded to by the majority of these candidates. Examples of the incorrect responses provided were *avoid parasites, control soil erosion* and *provide energy to the animals*.

The candidates who poorly responded to this question largely provided correct responses on the general factors that govern the amount of specimen L₃ intake in animals in part (b) (ii), since they related the amount of water needed in human body with that in animals. Extract 3.3.2 presents a poor response to the question.

Extract 3.3.2

3biii)	General factors that govern amount of specimen L ₃ intake in animals	
	i/ A lot of solute which have been eaten like salt	
	ii/ To neutralize/neutralize the food eaten.	
	iii/ To make it feel smooth.	
(iii)	Procedure of using specimen L ₄ when applying to acaricide to a confined animal in a crush	
1	Clean the L ₄ with water	
2	After cleaning look the part which has broken it is present pour it out	
3	Take the 10 litre of water put into the L ₄	
4	Take one bottle which contain acaricide put into	
4	Take the amount of acaricide put into L ₄ which contain water	
5	After added acaricide start to mix till the mixture has mixed well.	
6	After mixed pour it start to spray the animal one after another.	
c	Seven benefits of having both specimen L ₅ and specimen L ₆	
	It used as the source of food	
	It used to control soil erosion	
	It used as the mulching when do	
	It used as the ornament	
	It used as the medicine	
	It is use as the scientific experiment	

Extract 3.3.2 is a sample of poor responses to all parts of the question. This response shows inadequate knowledge and practical skills on the part of the candidate.

3.0 PERFORMANCE OF THE CANDIDATES ON EACH TOPIC

This section presents the performance of the candidates on each topic/ field. Depending on the percentage of candidates who scored an average of 35 marks and above, the performance on the topic/field is considered to be good, average or poor. When the percentage of the candidates who scored an average of 35 marks and above falls in the range of 60-100, the performance is termed as good; 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. In view of this criterion, the performance on the topic/ fields in this year's is as follows;

The topics/fields on which the candidates had good performance were Agricultural Engineering and Land Planning (99.4%), Farm Workshop (97.4%), Introduction to Weed Science (95.1%), Environmental and Technological Challenges in Agricultural Development (93.8%), Crop Pests (88.9%), Plant Breeding (87.7%), Introduction to Animal Health (85%), Introduction to Soil Chemistry (84.6%), Farm Structures (84.3%), Crop Science and Production and Soil Science (80.7%), Farm Planning (78.6%), Pasture Agronomy (78.4%), Fundamentals of International Trade (74.1%), Plant Diseases (69.5%), Introduction to Irrigation (68.8%), Farm Mechanization and Machinery (64.1%), and Livestock Reproduction, Breeding and Improvement (60.7%). The candidates had average performance on Introduction to Soil Science (58.9%), Farm Power (56.6%), and Livestock Science and Production (44.7%). However, the candidates performed poorly on Introduction to Animal Nutrition (28.5%).

The candidates' performance on each topic/field in this year's examination is shown in Appendix I. In this year's examination, 18 topics were examined in the theory papers; among them, questions on 15 topics were well performed, questions on 2 topics were averagely performed and questions on 1 topic were poorly performed. In the practical paper, 4 fields were examined. The candidates demonstrated good performance on 3 fields and average performance on 1 field. The green color in the appendix shows topics/fields on which the candidates had good performance; the yellow color indicates average performance; and red color depicts topics/fields on which the candidates performed poorly. The performance of the candidates in ACSEE 2017 and 2018 are compared in Appendix II. There are 6 topics on which the percentage of the candidates who have scored an average of 35 marks and

above has increased; and 6 topics on which the percentage of the candidates who scored an average of 35 marks and above has decreased. The topics on which the percentage of the candidates with good performance has increased are Farm Workshop, Crop Pests, Introduction to Irrigation, Introduction Weed Science, Environmental and Technological Challenges in Agricultural Development and Introduction to Soil Chemistry. This indicates that more candidates performed much better on these topics in this year than in 2017.

The topics on which percentage of candidates with good performance has decreased are Introduction to Animal Health, Livestock Reproduction, Breeding and Improvement, Farm Structures, Plant Diseases, Plant Breeding and Fundamentals of International Trade. This indicates that the number of the candidates who did well on these topics in this year is smaller than in 2017.

Moreover, in 2018, the performance of the candidates on Farm Mechanization and Machinery is relatively better than in 2017. Performances on Farm Power and Introduction to Soil Science have decreased to average; it was good in 2017. However, the performance on Introduction to Animal Nutrition has decreased from being good in 2017 to being poor in 2018.

In the practical papers, the percentage of the candidates with good performance in the field of Agricultural Engineering and Land Planning has increased in this year as compared to the year 2017, indicating that more candidates performed well in this year. In addition, the fields of Crop Science and Production together with Soil Science had good performance in both years. However, more candidates performed relatively better in 2017 than in 2018. Performance of the candidates in the field of Livestock Science and Production has decreased from being good in the year 2017 to being average in the year 2018.

4.0 CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

The candidates' performance in this year's examination generally showed good performance. The statistics indicate that, of the total 615 candidates, 604 (98.21%) passed and 11 (1.79%) candidates failed the examination.

The general scores of the candidates suggest that the majority of the candidates scored average marks in the examination. The analysis of the candidates'

responses revealed several reasons contributing to most of the candidates to perform averagely. These include the following;

The majority of the candidates had inadequate knowledge of various topics. The analysis of the candidates' responses showed this factor to be the major cause for candidates to score average marks in the examination. Accordingly, they provided incorrect responses, partially correct responses and sometimes not being able to attempt in responding to the questions completely. Lack of enough exposure to practical also resulted to the candidates scoring average marks in the examination. These candidates did not do very well in both practical examination and theory examinations. Possession of practical skills by the candidates could also have been an added advantage in responding correctly to some questions in theory papers.

Failure of the candidates to meet the requirements of the question led them to scoring average marks. This also caused them to provide incorrect responses with respect to the demands of the questions. In some cases, the candidates also failed to address properly the tasks in the questions especially when responding to the tasks that required detailed information.

Poor command of the English language caused a number of these candidates to write poor English sentences. Consequently, they lost marks since the sentences were not well understood.

Nevertheless, few candidates who managed to score high marks in the examination proved to possess adequate knowledge and practical skills in different topics/fields in the examination. In addition, these candidates had good command of the English language, which made them to meet the demands of the questions.

4.2 Recommendations

Based on the findings the following are recommended so as to improve performance in future examinations.

- (a) Students should develop the habit of reading books to improve their written and oral English.
- (b) Candidates should carefully read the examination questions to understand what they are supposed to do.

- (c) Students should know the content of the syllabus and look for relevant reading materials.
- (d) Students should go through past examination papers to get acquainted with examination questions and examination format.
- (e) Teachers should conduct extra and remedial classes to enhance students' learning.
- (f) Teachers should give their students enough exercises and tests and provide immediate feedback on their performance.
- (g) Teachers should use a team teaching technique based on their specialisation and interest.
- (h) Teachers should invite and involve various subject matter specialists in teaching different subject fields.
- (i) Teachers should use appropriate teaching methods and techniques depending on the requirements of the topics.
- (j) Teachers should orient students on how to respond to various tasks in the examination.
- (k) Teachers should put more emphasis on the practical aspect of the subject since students learn better by doing.

It is emphasized that, the findings included in this report are solely based on the analysis of the candidates' items response. This leaves a gap for further studies to be conducted in order to determine other factors that might have contributed to most of the candidates' scoring average marks in the examination.

Appendix I

Candidates' Performance on each topic/field in ACSEE 2018

S/N	Topic/Field	2018	
		Percentage of Candidates whose average performance was 35% and above	Comments
1.	Agricultural Engineering and Land Planning	99.4	Good
2.	Farm Workshop	97.4	Good
3.	Introduction to Weed Science	95.1	Good
4.	Environmental and Technological Challenges in Agricultural Development	93.8	Good
5.	Crop Pests	88.9	Good
6.	Plant Breeding	87.7	Good
7.	Introduction to Animal Health	85	Good
8.	Introduction to Soil Chemistry	84.6	Good
9.	Farm Structure	84.3	Good
10	Crop Science and Production and Soil Science	80.7	Good
11	Farm Planning	78.6	Good
12	Pasture Agronomy	78.4	Good
13	Fundamentals of International Trade	74.1	Good
14	Plant Diseases	69.5	Good
15	Introduction to Irrigation	68.8	Good

S/N	Topic/Field	2018	
		Percentage of Candidates whose average performance was 35% and above	Comments
16	Farm Mechanization and Machinery	64.1	Good
17	Livestock Reproduction, Breeding and Improvement	60.7	Good
18	Introduction to Soil Science	58.9	Average
19	Farm Power	56.6	Average
20	Livestock Science and Production	44.7	Average
21	Introduction to Animal Nutrition	28.5	Weak

Appendix II

Comparison of Candidates' Performance on each Topic/Field in ACSEE 2017 and 2018

S/N	Topic/Field	2017		2018	
		Percentage of Candidates who scored the average of 35% and above	Comments	Percentage of Candidates who scored the average of 35% and above	Comments
1.	Agricultural Engineering and Land Planning	94.3	Good	99.4	Good
2.	Livestock Science and Production	82.2	Good	44.7	Average
3.	Crop Science and Production and Soil Science	98.7	Good	80.7	Good
4.	Introduction to Animal Health	99.7	Good	85	Good
5.	Farm Workshop	85.7	Good	97.4	Good
6.	Crop Pests	85.8	Good	88.9	Good
7.	Introduction to Irrigation	67.1	Good	68.8	Good
8.	Livestock Reproduction, Breeding and Improvement	76.8	Good	60.7	Good
9.	Farm Structures	89.9	Good	84.3	Good
10.	Introduction to Soil Science	75.2	Good	58.9	Average
11.	Introduction to Weed Science	93.8	Good	95.1	Good
12.	Plant Diseases	88.05	Good	69.5	Good
13.	Environmental and Technological Challenges in Agricultural Development	86.8	Good	93.8	Good
14.	Plant Breeding	89.4	Good	87.7	Good
15.	Introduction to Agricultural Prices and Fundamentals of International Trade	81.1	Good	74.1	Good
16.	Farm Mechanization and Machinery	25	Weak	64.1	Good
17.	Introduction to Animal Nutrition	98.4	Good	28.5	Weak
18.	Farm Power	70.8	Good	56.6	Average
19.	Introduction to Soil Chemistry	72.9	Good	84.6	Good
20.	Agricultural Marketing	66.7	Good		Good
21.	Farm Planning			78.6	Good

