THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY
NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

CANDIDATES' ITEM RESPONSE ANALYSIS REPORT FOR THE ADVANCED CERTIFICATE OF SECONDARY EDUCATION EXAMINATION (ACSEE) 2020

134 AGRICULTURE

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FOREWORD

The Agriculture Candidates' Item Response Analysis report on the Advanced Certificate of Secondary Education Examination (ACSEE) 2020 was written in order to provide feedback to students, teachers, parents, policy makers and other education stakeholders on the candidates' performance in this subject.

The ACSEE marks the end of a two year Advanced Secondary Education. It is a summative evaluation which, among other things, shows the effectiveness of education system in general and education delivery system in particular. Essentially, candidates' responses in the examination are 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 report points out reasons that led candidates to score poorly based on their responses, which include inadequate knowledge of the subject matter and field practical skills in the topics examined and misconceptions in the demands of the questions. Conversely, scoring of high marks in the examination by some of the candidates was attributed by adequate knowledge and field practical skills in the topics examined which enabled them to address properly the demands of the questions.

Furthermore, the report offers recommendations on how to improve the performance of the candidates in future examination administered by NECTA.

Lastly, the Council would like to thank all the examination officers, examiners and all who participated in the preparation of this report.

Dr. Charles E. Msonde
EXECUTIVE SECRETARY

1.0 INTRODUCTION

This report presents the performance of the candidates who sat for the Advanced Certificate of Secondary Education Examination in Agriculture subject in 2020. The examination was set according to the examination format issued in 2019, which is based on the 2009 Agriculture syllabus.

The examination had three papers, 134/1 Agriculture 1 (theory), 134/2 Agriculture 2 (theory) and 134/3 Agriculture 3 (practical). All papers consisted of short answer questions and the candidates were required to answer all the questions.

Paper 1 and 2 consisted of ten questions each. All questions carried 10 marks making a total of 100 marks in each paper. Paper 3 consisted of three questions. Question one carried 20 marks and the other two carried 15 marks each making a total of 50 marks.

A total of 628 candidates sat for the examination this year and the general performance was good. The majority of the candidates who passed the examination scored lower pass grades. The statistical data show that 620 (98.73%) candidates passed and 8 (1.27%) failed the examination. The results indicate 0.24 percent of performance rise compared to the Year 2019. Table 1 summarizes performance of the candidates who sat for ACSEE 2020 in terms of grades.

Table1: Candidates' Performance by Grades in ACSEE 2020

Year	Grades							% Pass	% Fail	Sat
	A	B	C	D	E	S	F			
2019	0	9	102	274	184	35	11	98.49	1.51	664
2020	0	8	96	258	234	24	8	98.73	1.27	628

Source: NECTA Statistics Book, pg 6 ACSEE, 2020

The next section presents performance analysis in each question. The analysis highlights the requirements of each question, general performance of the candidates in each question, candidates' responses and possible reasons for their performance. Extracts representing samples of candidate's responses in each question have been included to illustrate cases presented. In the analysis, the performance is considered as poor, average or good by considering the candidates' scores in terms of percentage. Scores ranging between 0-34, 35-59 and 60-100 percent are regarded as poor, average and good respectively.

2.0 ANALYSIS OF THE CANDIDATES' PERFORMANCE IN EACH QUESTION

2.1 134/1 Agriculture 1

2.1.1 Question 1: Farm Power

The question had parts (a) and (b) carrying a total of 10 marks. The candidates were required to: (a) state three major roles played by gear box and one role played by clutch in the power transmission system of a tractor and (b) (i) identify two causes for sudden stopping and continuous running as a common fault in the ignition system of a tractor and (ii) suggest two measures that can be taken to correct each fault.

The question was attempted by 620 (98.7%) candidates, of whom 417 (67.3%) scored from 0 to 3 marks, 197 (31.7%) scored from 3.5 to 5. 5 marks and 6 (1%) scored from 6 to 7 marks. Figure 1 summarizes candidates' performance in this question.

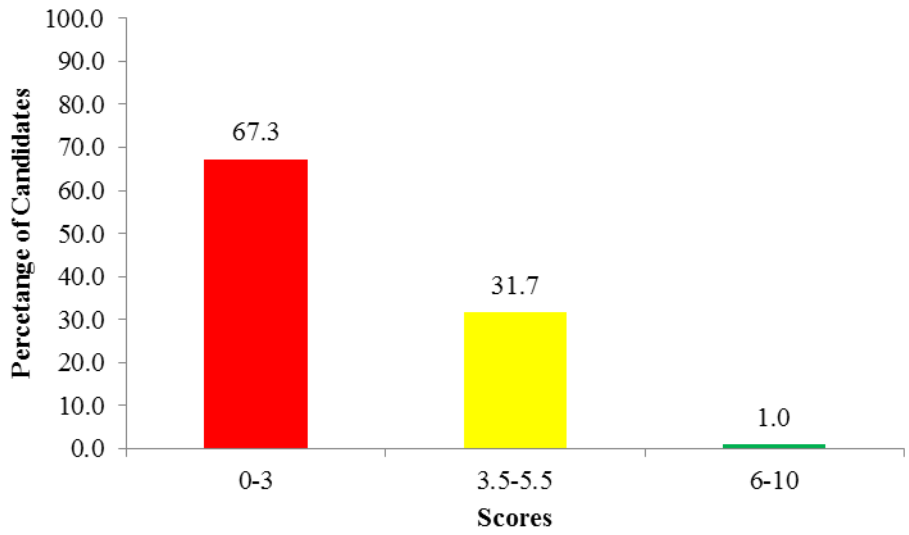
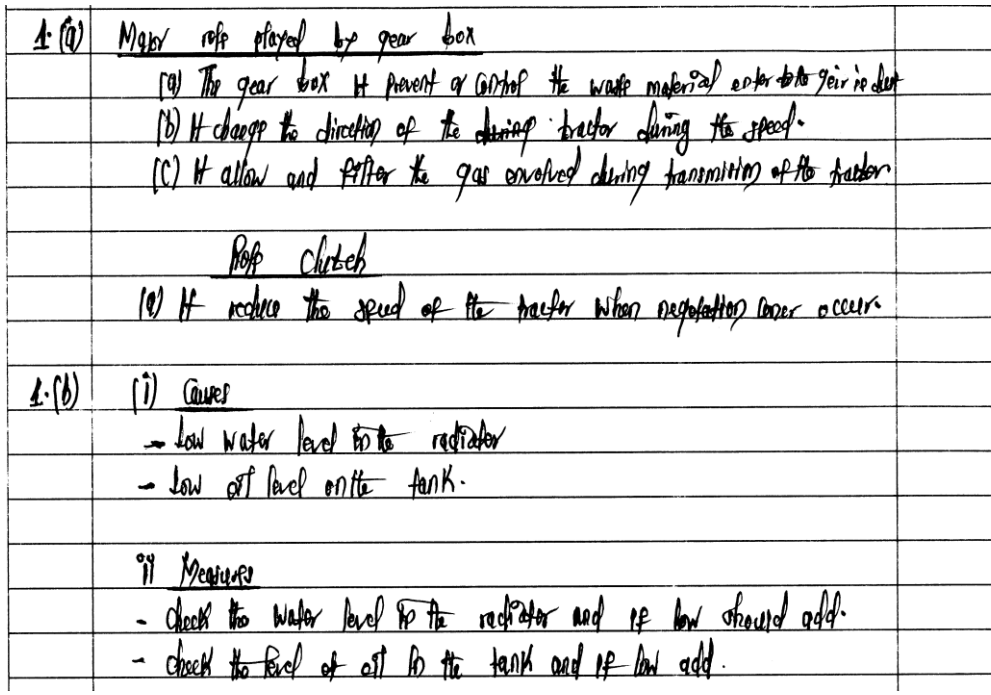


Figure 1: *Distribution of candidates' scores in Question 1*

With respect to Figure 1, a few (1%) candidates scored good (6-10) marks while the majority (67.3) had low (0-3) marks. The analysis shows that the candidates who scored low marks provided incorrect responses to almost all parts of the question. In part (b) (i), the candidates failed to identify causes for sudden stopping and continuous running as common faults in the ignition system of a tractor. Majority of the candidates had their responses focusing on other faults apart from those occurring in the ignition system such as *improper*

cooling system, lack of proper maintenance, lack of repair. The analysis of these responses indicates that the candidates confused faults in the ignition system with routine maintenance practices on the tractor. Inability to respond well in part (b) (i) led to the failure of candidates in suggesting measures to correct fault in part (b) (ii). The incorrect responses such as *to insure good repair*, *to insure good maintenance of the ignition system* and *replacing any broken wire* were provided by some of the candidates in part (b) (ii). This indicates that the candidates had insufficient knowledge and skills on various tractor systems. Nevertheless, a few candidates provided few correct points on major roles played by gear box and a role played by clutch in the power transmission system of a tractor hence scored few marks. Extract 1.1 presents a sample of poor responses from one of the candidates.


1. (a) Major role played by gear box
(a) The gear box it prevent or control the waste material enter to the gear in dust
(b) It change the direction of the driving tractor during the speed.
(c) It allow and filter the gas involved during transmitting of the tractor.

Role Clutch
(a) It reduce the speed of the tractor when negotiation bend occur.

1. (b) (i) Causes
- low water level in the radiator
- low oil level on the tank.

ii Measures
- check the water level in the radiator and if low should add.
- check the level of oil in the tank and if low add.

Extract 1.1: *A sample of poor responses by one of the candidates' in Question 1*

In Extract 1.1, the candidate gave incorrect responses to all parts of the question. The candidate mixed up the ignition system with water cooling system and function of a clutch with those of the gear box.

On the other hand, 32.7 percent of the candidates responded correctly in parts (a) and (b). In part (a), most of the candidates were able to state major roles played by gear box and a role played by clutch in the power transmission system of a tractor. This suggests that the candidates had adequate knowledge

and practical skills on the power transmission system of a tractor. Similarly, in part (b) (ii) the candidates managed to suggest measures that can be taken to correct sudden stopping and continuous running as faults in the ignition system of a tractor. This indicates that, the candidates were knowledgeable enough on ignition system. However, a few of them failed to identify causes of sudden stopping and continuous running as faults in the ignition system of a tractor in part (b) (i) hence could not score full marks. Extract 1.2 presents one of the good responses from one of the candidates.

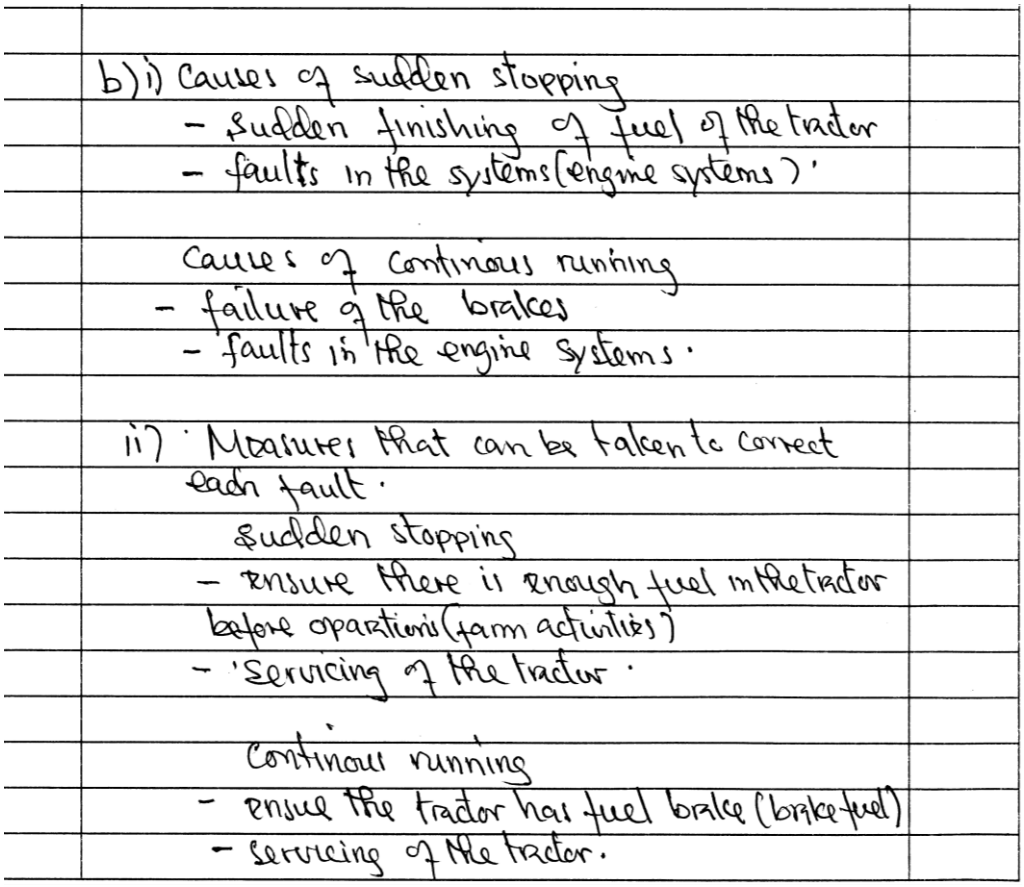
1. @ i) It helps during changing of gear to increase or decrease the acceleration of a moving ~~vehicle~~ or tractor.

ii) It helps in transmission of power.

iii) It helps in moving the tractor to and from driving of the wheels.

The role of clutch

- It helps in separation of gear plates during changing of motion either to enter a higher gear or to move to lower gear.



Extract 1.2: *A sample of good responses by one of the candidates' in Question 1*

In Extract 1.2, the candidate was able to state the role of a gearbox and suggest measures that can be used to correct each fault except in part (b) (i) where he/she failed to identify causes of the faults.

2.1.2 Question 2: Workshop Technology and Farm Structure

The question was divided into parts (a) and (b) carrying a total of 10 marks. The candidates were required to: (a) summarize five important precautions to be taken when using jack plane as a workshop tool used in carpentry work and (b) account for five features of a good calf pen as a part of diary unit.

The question was attempted by 625 (99.5%) candidates, whereby 383 (61.3%) scored from 0 to 3 marks, 217 (34.7%) scored from 3.5 to 5.5 marks and 25 (4%) scored from 6 to 8 marks. The statistics show that the performance of the candidates was average. Figure 2 summarizes candidates' performance in this question.

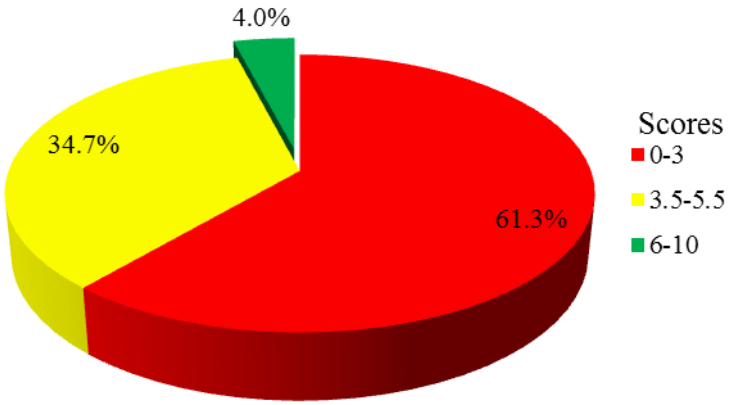
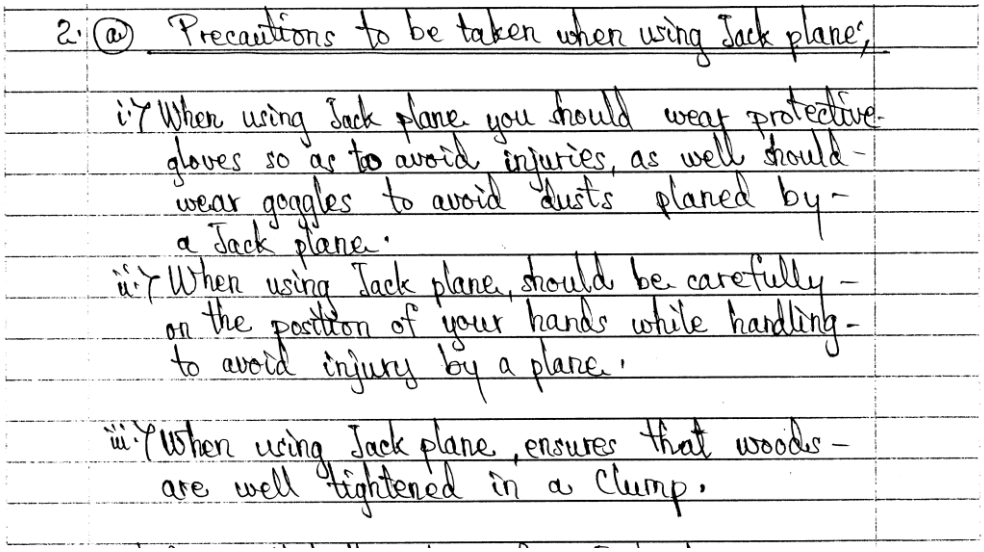


Figure 2: *Distribution of candidates' scores in Question 2*

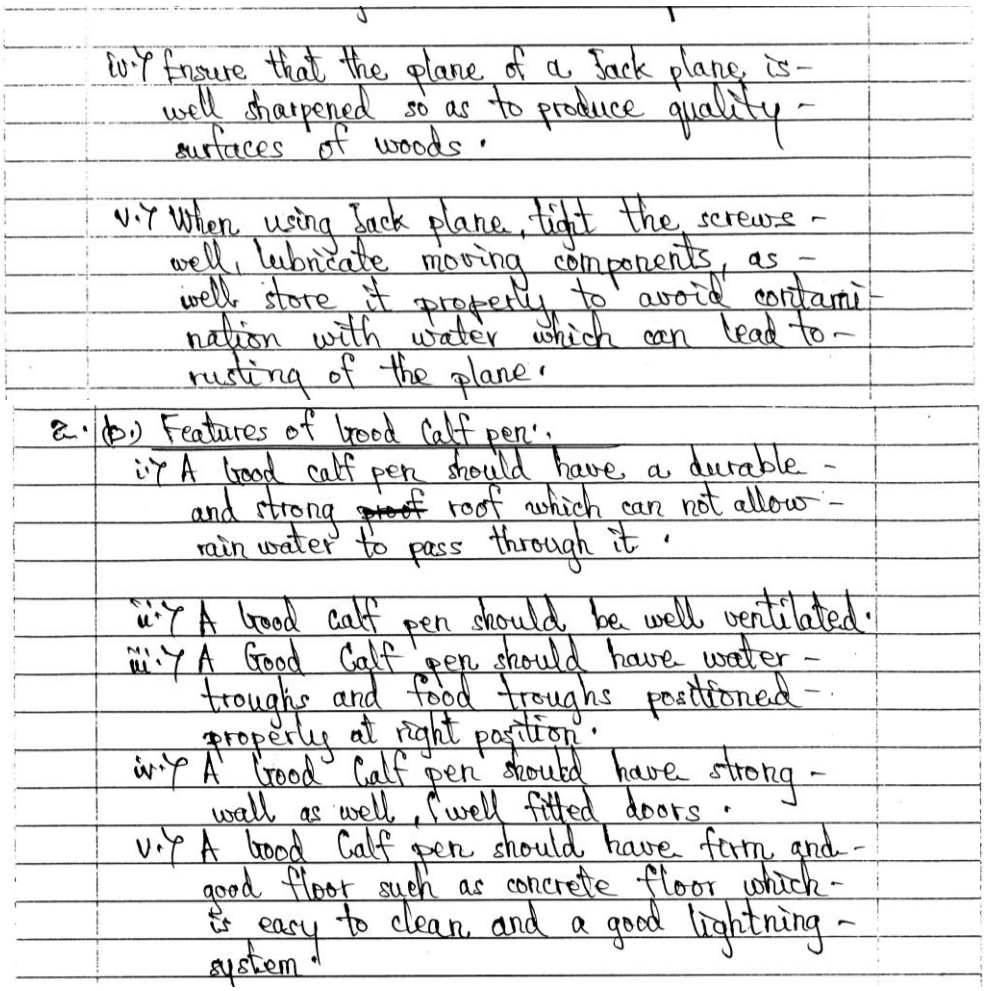
Figure 2 indicates that, the majority (61.3%) of the candidates scored low (0-3) marks while a few (4%) scored high (6-10) marks. The analysis of candidates' responses indicates that 38.7 percent provided correct responses. In part (a), a few candidates managed to summarize the important precautions to be taken when using jack plane. Similarly, they were able to account for the feature of a good calf pen as a part of diary unit. This suggests that the candidates had sufficient knowledge of the asked concepts. However, the candidates who scored average marks (3.5-5.5) missed some points in parts (a) and (b) hence could not score all the marks. Extract 2.1 presents one of the good responses from one of the candidates.


2. (a) Precautions to be taken when using Jack plane,

i.) When using Jack plane you should wear protective gloves so as to avoid injuries, as well should wear goggles to avoid dusts planed by a Jack plane.

ii.) When using Jack plane, should be carefully on the position of your hands while handling to avoid injury by a plane.

iii.) When using Jack plane, ensures that woods are well tightened in a Clump.

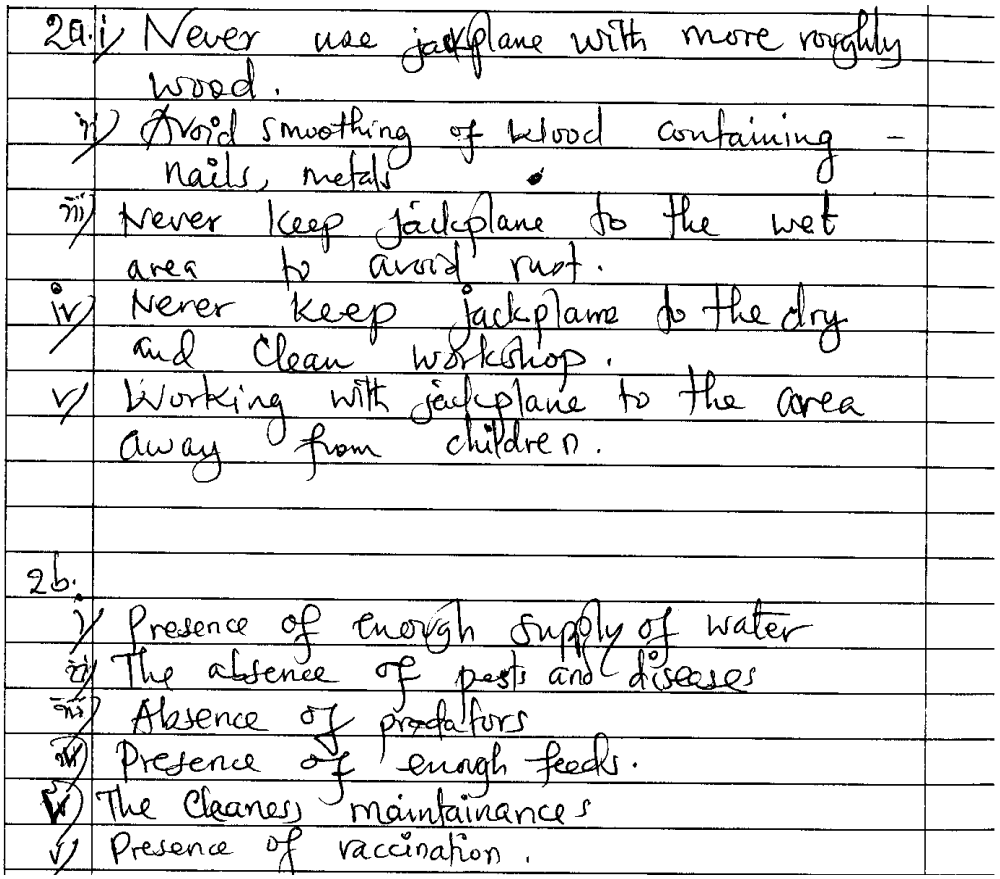


Extract 2.1: *A sample of good responses by one of the candidates' in question 2*

In Extract 2.1, the candidate summarized important precautions to be taken when using the jack plane and features of good calf pen except that he/she missed one point in each part.

On the other hand, 61.3 percent of the candidates provided incorrect responses in almost all parts of the question. Most of these candidates failed to summarize important precautions to be taken when using jack plane in part (a). Irrelevant responses such as: *area* of *work must be clean, all benches must be arranged properly, remove all spilled oil from the floor and remove obstructions* were provided by some of the candidates. This shows that, the candidates' responses focused on the general workshop safety precautions rather than explaining the precaution to be observed when working with jack plane. This suggests that the candidates lacked knowledge and practical skills

on the use of jack plane. Furthermore, the candidates failed to account on features of good calf pen in part (b). Examples of incorrect responses provided in part (b) were: *the calf pen should be well handled and used, calf pen should be* clean. This justifies that the candidates had inadequate knowledge on parts of a diary unit. However, a few of these candidates were able to give few correct points on features of a good calf pen in part (b). Extract 2.2 represents a sample of poor responses from one of the candidates.


2a.
i) Never use jackplane with more roughly wood.
ii) Avoid smoothing of wood containing nails, metals
iii) Never keep jackplane to the wet area to avoid rust.
iv) Never keep jackplane to the dry and clean workshop.
v) Working with jackplane to the area away from children.

2b.
i) Presence of enough supply of water
ii) The absence of pests and diseases
iii) Absence of predators
iv) Presence of enough feeds.
v) The Cleaness maintainances
vi) Presence of vaccination.

Extract 2.2: *A sample of candidates' poor responses in Question 2*

In Extract 2.2, the candidate provided incorrect responses in most parts of the question except in part (a) where he/she provided one precaution correctly.

2.1.3 Question 3: Farm Mechanization and Machinery and Introduction to Irrigation

The question had parts (a) and (b) both carrying a total of 10 marks. The candidates were required to: (a) give a brief description of a spike-tooth harrow as a tillage implement and (b) point out three advantages and three disadvantages of trickle irrigation system.

The question was attempted by 625 (99.5%) candidates, out of which 416 (66.6%) scored from 0 to 3 marks, 170 (27.2%) scored from 3.5 to 5.5 marks and 39 (6.2%) scored from 6 to 10 marks. The general performance in this question was poor as 209 (33.4%) candidates scored from 3.5 to 8 marks. Figure 3 illustrates the candidates' scores in this question.

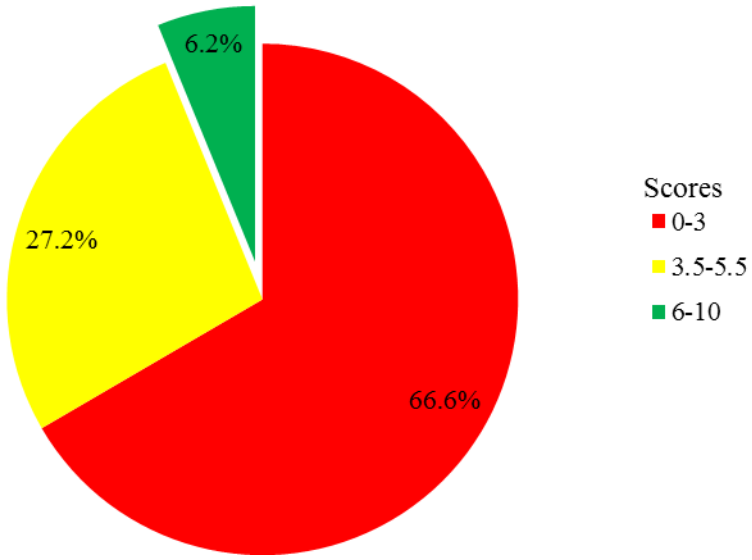
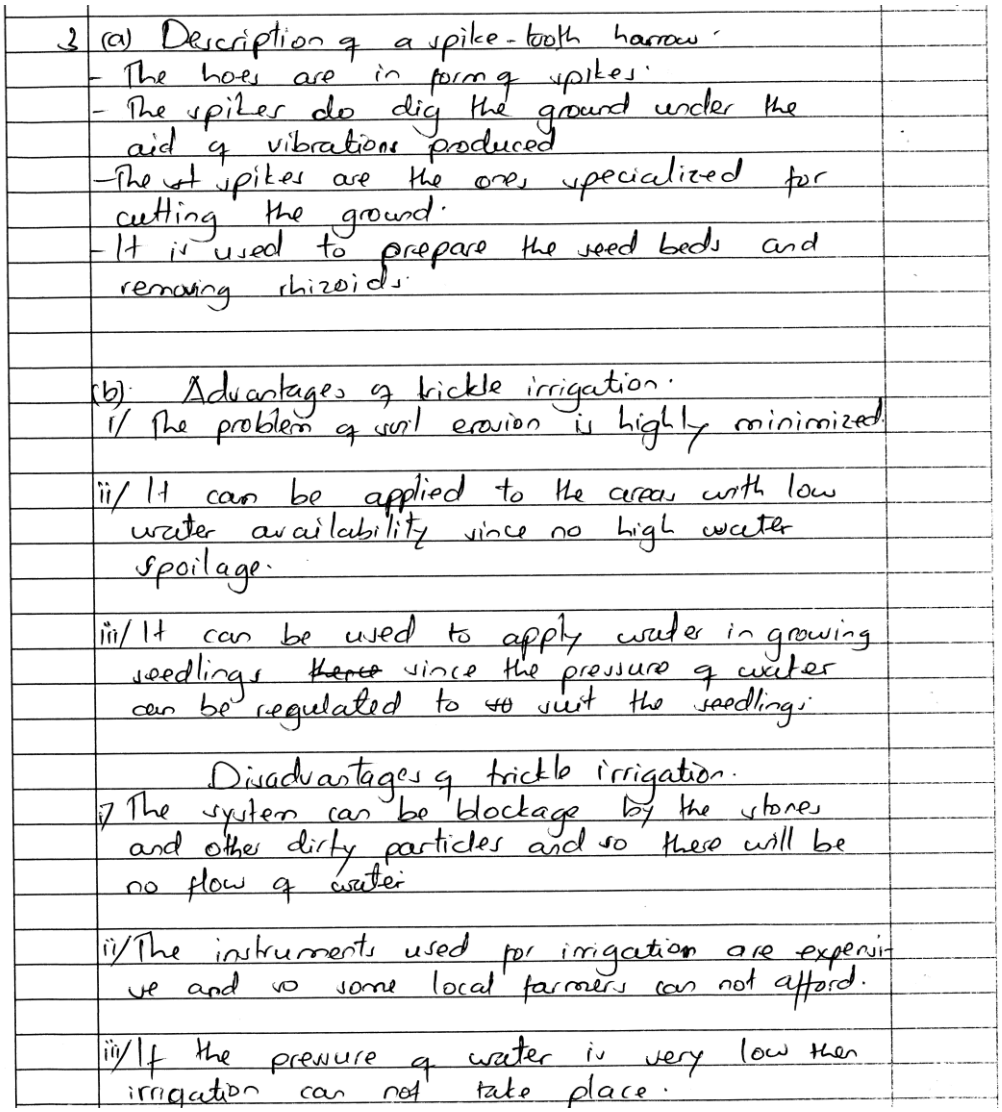


Figure 3: *Distribution of candidates' scores in Question 3*

Figure 3 indicates that, majority of the candidates (66.6%) scored low (0-3) marks and a very few (6.2%) scored high (6-10) marks. The analysis of the responses shows that, in part (a), 66.6 percent of the candidates provided incorrect description of a spike-tooth harrow as tillage implement. The candidates were unable to distinguish it with disc harrow in terms of its body structure. Examples of incorrect responses provided by few candidates from this group were: *the spike-tooth harrow consists of frame on which simple teeth in form of like teeth arranged in a nice pattern closed to each other can be zigzag, used for a land with rough and stony soil*. This justifies that most of these candidates lacked knowledge on farm tillage implement. It was also observed that the candidates were unable to point out the advantages and disadvantage of trickle irrigation system in part (b). The candidates provided incorrect responses such as: *it spread fungi disease, not all parts of plant allow water, and it consumes time*. The analysis of these responses provided indicates that candidates were unable to distinguish trickle irrigation system from sprinkler irrigation system. This shows that the candidates had inadequate knowledge on the types of irrigation methods. Nevertheless, only few candidates in this group managed to point out a few correct advantages and

disadvantages of trickle irrigation system in part (b). Extract 3.1 represents one of the poor responses from one of the candidates.


3 (a) Description of a spike-tooth harrow:
- The hoes are in form of spikes.
- The spikes do dig the ground under the aid of vibrations produced
- The ~~of~~ spikes are the ones specialized for cutting the ground.
- It is used to prepare the seed beds and removing rhizoids.

(b) Advantages of trickle irrigation.
i/ The problem of soil erosion is highly minimized

ii/ It can be applied to the areas with low water availability since no high water spoilage.

iii/ It can be used to apply water in growing seedlings ~~Here~~ since the pressure of water can be regulated to ~~to~~ suit the seedlings.

Disadvantages of trickle irrigation.
i/ The system can be blockage by the stones and other dirty particles and so these will be no flow of water

ii/ The instruments used for irrigation are expensive and so some local farmers can not afford.

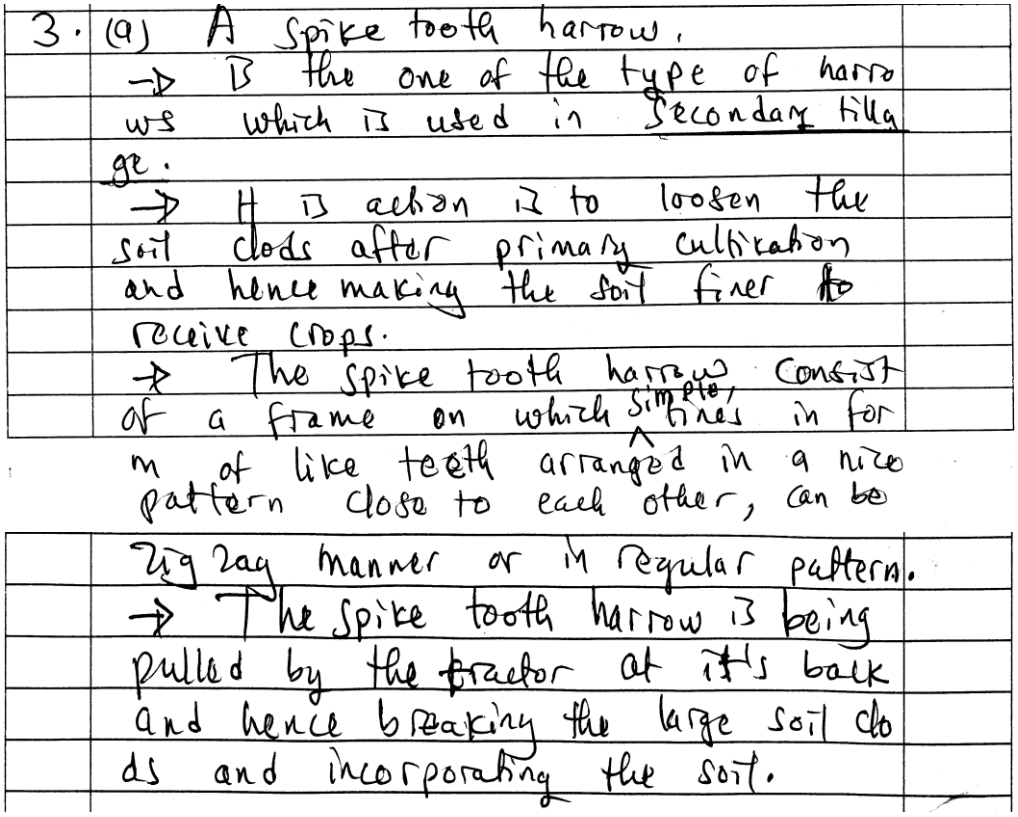
iii/ If the pressure of water is very low then irrigation can not take place.

Extract 3.1: *A sample of candidates' poor responses in Question 3*

In Extract 3.1, the candidate had misconception on the types of harrow and irrigation systems which led to provision of incorrect responses to all parts of the question.

On the other hand, 33.4 percent of the candidates provided correct responses in most parts of the question. In part (a), they managed to give a brief description of a spike–tooth harrow as a tillage implement. Likewise, they provided correct responses on three advantages and three disadvantages of trickle irrigation system. This implies that the candidates were knowledgeable enough

on types of irrigation methods. However, a few candidates failed to give brief description of a spike- tooth harrow as a tillage implement hence could not score full marks. Extract 3.2 represents a sample of good responses from one of the candidates.


3. (a) A Spike tooth harrow.
→ It the one of the type of harrows which is used in Secondary tillage.
→ It is action is to loosen the soil clods after primary cultivation and hence making the soil finer to receive crops.
→ The spike tooth harrow consist of a frame on which simple tines in form of like teeth arranged in a nice pattern close to each other, can be Zig Zag manner or in regular pattern.
→ The spike tooth harrow is being pulled by the tractor at it's back and hence breaking the large soil clods and incorporating the soil.

help to know the phy Chemical composition of the soil and how different reaction in the soil like those biological ones are affected.

→ Knowing the soil reaction will help on improving the soil physical properties through different operations such as liming when it is found as being acidic.

3. (b)

Advantages of trickle irrigation system.

→ It avoids wastage of water as it uses limited supply of water.
→ It helps in controlling weeds as, water are only provided to the plant and not between the rows or in rows.
→ It avoids the formation of fungal diseases to the plant e.g CBD (coffee berry disease).

Disadvantages.

→ It needs high capital to buy and maintain the system, as needs the buying of pipes and other equipment.
→ It needs high technical skills in installing the system and also in maintaining it, as needs experts in installing.

→ ~~The system can not be used~~
→ Nozzles on pipes can be blocked by soil sediments or soil salts or water salts making the system ineffective

Extract 3.2: *A sample of candidates' good responses in Question 3*

In Extract 3.2, the candidate was able to describe spike tooth harrow, advantages and disadvantage of trickle irrigation system although he/she missed one point from part (a) and two points from part (b).

2.1.4 Question 4: Introduction to Soil Science

The question had parts (a) and (b) both carrying a total of 10 marks. The candidates were required to (a) briefly explain how acid soil management can be achieved and (b) briefly explain six points on the significance of knowing the reaction of the soil before growing any crop.

The question was attempted by 625 (99.5%) candidates, whereby 99 (15.8%) scored from 0 to 3 marks, 202 (32.4%) scored from 3.5 to 5.5 marks and 324 (51.8%) scored from 6 to 10 marks. The analysis shows that the general performance was good because 526 (84.2%) candidates scored from 3.5 to 10 marks. Distribution of candidates' scores is shown in Figure 4.

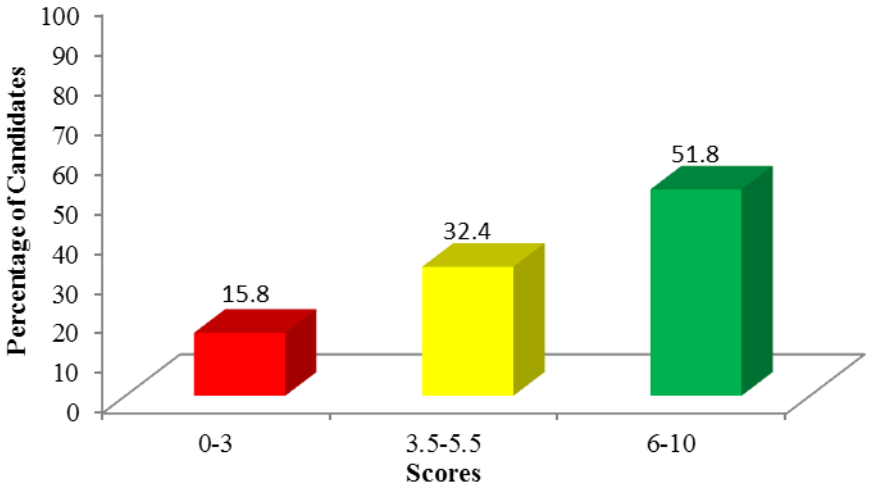


Figure 4*: Distribution of candidates' scores in Question 4*

Figure 4 shows that, majority (51.8%) of the candidates scored high (6-10) marks and a few (15.8%) scored low marks (0-3) marks. The analysis shows that, 84.2 percent of the candidates attempted this question correctly. In part (b), most of the candidates correctly explained the significance of knowing the reaction of the soil before growing any crop. This is evidence that the candidates were knowledgeable enough on soil reaction. In responding to part (a), a few candidates managed to show how neutralization of acid is done through the use of liming as one way of managing acidic soil. However, some candidates were unable to provide correct responses in part (a) hence could not score full marks. Extract 4.1 shows one of the good responses from one of the candidates.

4 a) Acid soil management is achieved by

i) Eradication.

- This involves the com

ii) Neutralization

→ It involves the use of materials which are called limes for neutralizing the soil acid. Example of limes include calcium carbonate, CaO calcium oxide, calcium silicate.

Example; using $CaCO_3$ as liming material

Soil $\boxed{\text{soil particle}}_H^H + CaCO_3 \longrightarrow \boxed{\text{Soil particle}}Ca + CO_2 + H_2O$

That is $H^+ + CaCO_3 \longrightarrow Ca^{2+} + CO_2 + H_2O$.

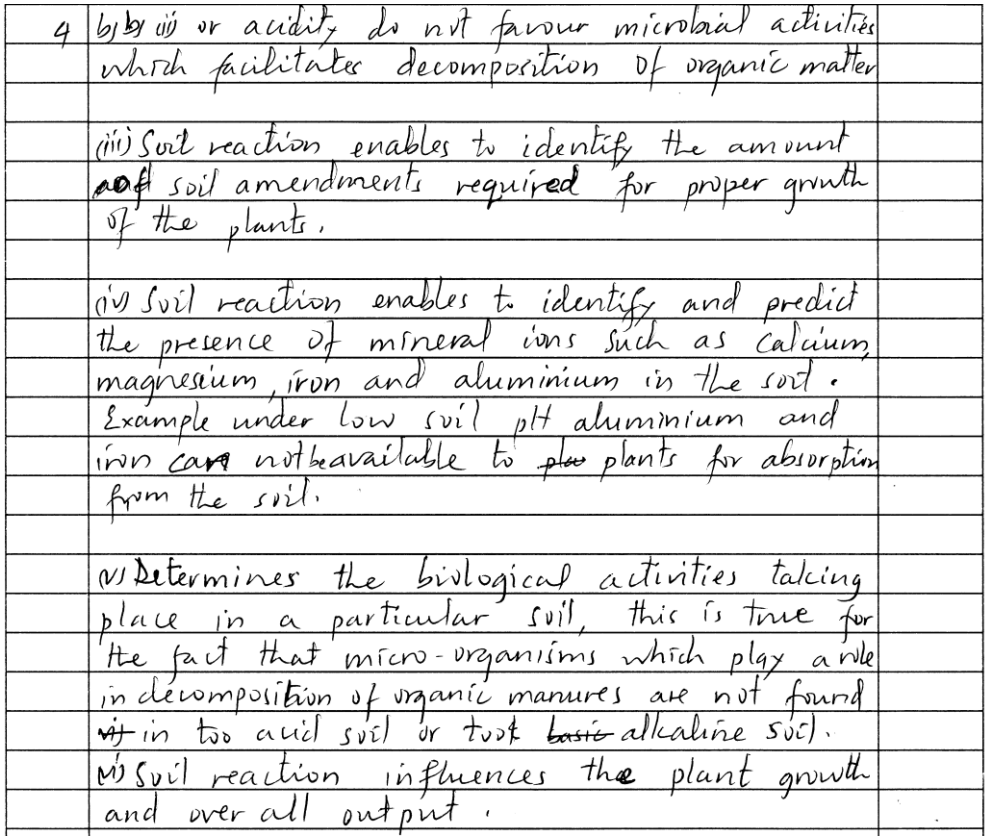
ii) Intensification.

→ This involves the addition of high acid content in the soil inorder to favour the growth of high acid tolerant crops such as tea and treat diseases such potato scab.

→ Materials added examples are sulphur or ~~calcium sulphate~~ sulphuric acid.

b) (i) Soil reaction enables to identify the suitable crops to be grown over the certain area of land. This is because crops differ in their growth medium of either slightly acidic or basic or too acidic or too basic.

(ii) Soil reaction enables to predict the fertility status of the soil as soil with high alkalinity



Extract 4.1: *A sample of candidates' good responses in Question 4*

However, 15.8 percent of the candidates attempted almost all parts of this question incorrectly. In part (a), most of the candidates failed to explain the management of acidic soil. The candidates mixed up the concept of soil fertility management with acidic soil management. This is attributed by the fact that the candidates lacked knowledge and practical skills on the management of acid soil. Examples of incorrect responses provided in this part were: *crop rotation, use of cover crops, use of organic matter* and *mulching.* These candidates also did not manage to explain the significance of knowing the reaction of the soil before growing any crop in part (b). Incorrect responses provided by these candidates were such as: *addition of nutrients in soil, increase flocculation, large sized charged particles of the soil colloids*. This indicates poor knowledge on soil reaction. However, a few candidates in this group managed to point out a few significance of knowing the reaction of the soil hence scored few marks. Extract 4.2 shows a sample of poor responses from one of the candidates.

4. (a) Acidic soil management can be achieved through various ways such as;

(i) Crop rotation of plants

When practising crop rotation means that several of exchangable of crops seasonal will aid at reducing the acidic soil to basic soil hence seasonal and annually practice of this will help in soil management practices.

(ii) Using PH meter at measuring soil

When using the PH meter kit will tend to identify how acidic is the soil and what type of crops are to be grown hence methods such as Colorimetric and electrometric methods are easily used here.

iii) Introduction of basic fertilizers

They are some fertilizers that can work on acidic while basic so they should be applied to neutralize the acidity and hence plant accessible crops on the farm.

4 (b):

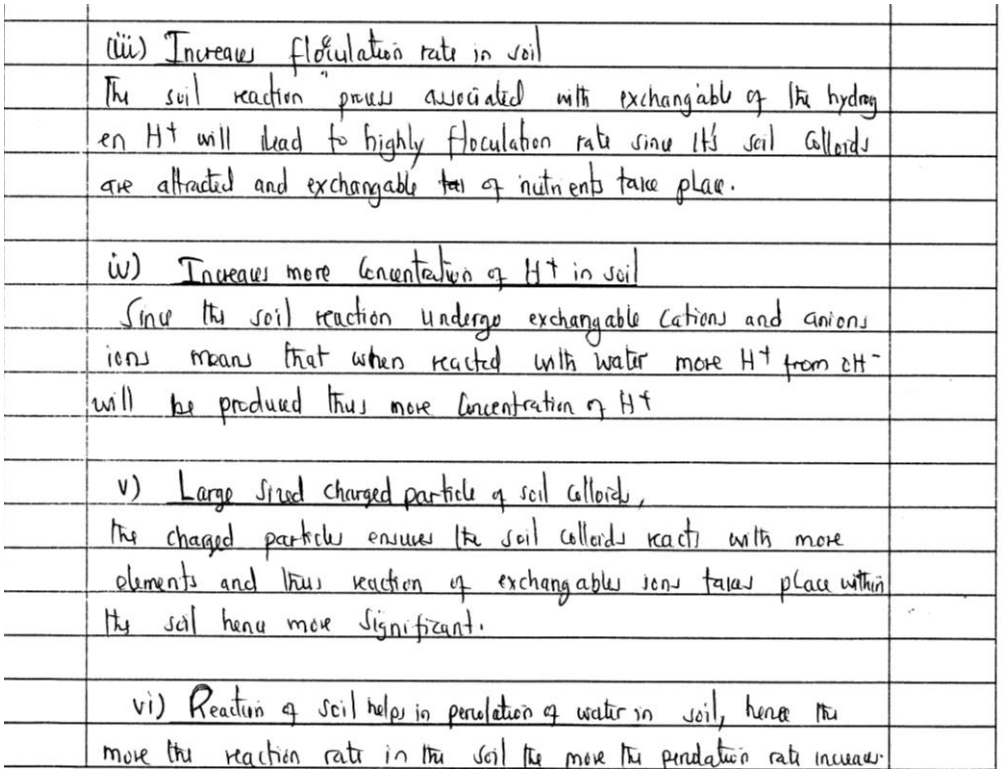
Soil reaction has several significance and importances on the soil thus they have the following significance;

(i) Addition of nutrients in the soil;

Soil reaction since involve the exchange of cations and anions in the soil leads to addition of several nutrients in the soil hence high production.

(ii) Maintains soil PH;

Soil reaction since exchangle soil colloids in the soil do have different soil PH so when exchangable ~~bases and~~ cations and anions are used PH will be maintained


(iii) Increases floculation rate in soil
The soil reaction process associated with exchangable of the hydrogen H^+ will lead to highly floculation rate since the soil colloids are attracted and exchangable of nutrients take place.

(iv) Increases more Concentration of H^+ in soil
Since the soil reaction undergo exchangable cations and anions ions means that when reacted with water more H^+ from OH^- will be produced thus more Concentration of H^+

v) Large Sized charged particle of soil colloids,
The charged particles ensures the soil colloids react with more elements and thus reaction of exchangables ions takes place within the soil hence more significant.

vi) Reaction of soil helps in percolation of water in soil, hence the more the reaction rate in the soil the more the percolation rate increases

Extract 4.2*: A sample of candidates' poor responses in Question 4*

In Extract 4.2, the candidate had misconception about soil reaction and soil acidity which led to giving incorrect responses in all parts of the question.

2.1.5 Question 5: Introduction to Soil Science

The question comprised of parts (a) and (b) both carrying a total of 10 marks. The candidates were required to (a) differentiate infiltration from percolation and (b) explain how one can classify soil water based on (i) the relative degree of retention giving five points (ii) the extent of utility by plant giving three points.

The question was attempted by 617 (98.2%) candidates, out of which 310 (50.2%) scored from 0 to 3 marks, 168 (27.22%) scored from 3.5 to 5.5 marks and 139 (22.5%) scored from 6 to 10 marks. The general performance in this question was average since 307 (49.7%) scored from 3.5 to 10 marks. Figure 5 shows candidates' scores in this question.

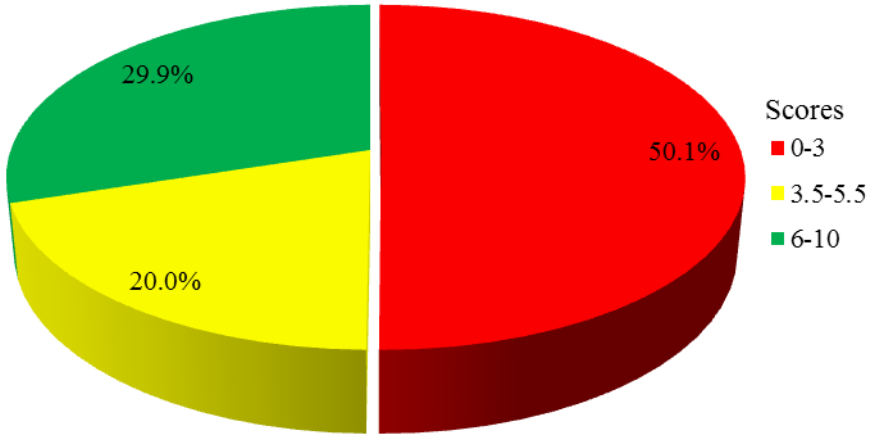


Figure 5: *Distribution of candidates scores in Question 5*

Figure 5 shows that, about half (50.1%) of the candidates scored low (0-3) marks while 29.9 percent scored high (6-10) marks. The analysis shows that, 49.7 percent of the candidates provided the correct responses to this question. In part (a), they managed to differentiated infiltration from percolation. The candidates were conversant with the terms used about soil water movements and retention. The candidates' ability to differentiate these terms shows good understanding of soil water. Similarly, in part (b) (i), the candidates managed to classify soil water based on the relative degree of retention. This implies that the candidates possessed adequate knowledge on soil water relationship based on relative degree of retention. However, some of the candidates had inadequate knowledge on soil water relationship based on the extent of utility by plants in part (b) (ii) since they provided incorrect responses. Extract 5.1 presents a sample of good responses from one of the candidates.

5 a)	Infiltration
	Is the movement of water from the upper layers of the
	soil to the lower layers of the soil
	Double
	Percolation
	Is the downward movement of the water soil through the
	column of the soil.
b)	i) Gravitational / free water.
(i)	↳ Is the water which cover water that was in excess in
	field capacity.

ii) Hydroscopic water
↳ Is the water which is held at hydroscopic coefficient.

iii) Capillarity water
↳ Is the water which is held between the field capacity and hydroscopic coefficient.

iv) Water of crystalization
↳ Is the amount of water which is a part of the solid crystals but are not available for the plants.

v) Water vapour
↳ Is the amount of water in the soil which is present in vapour form and can easily radiated to the Atmosphere.

5(b) (ii) i) Superflous water
↳ Is the water which is in excess to that held in field capacity.

ii) Available water
↳ Is the soil water which is held between the field capacity and wilting coefficient.

iii) Unavailable water.
↳ Is the soil water which is held permanently at the wilting coefficient/point.

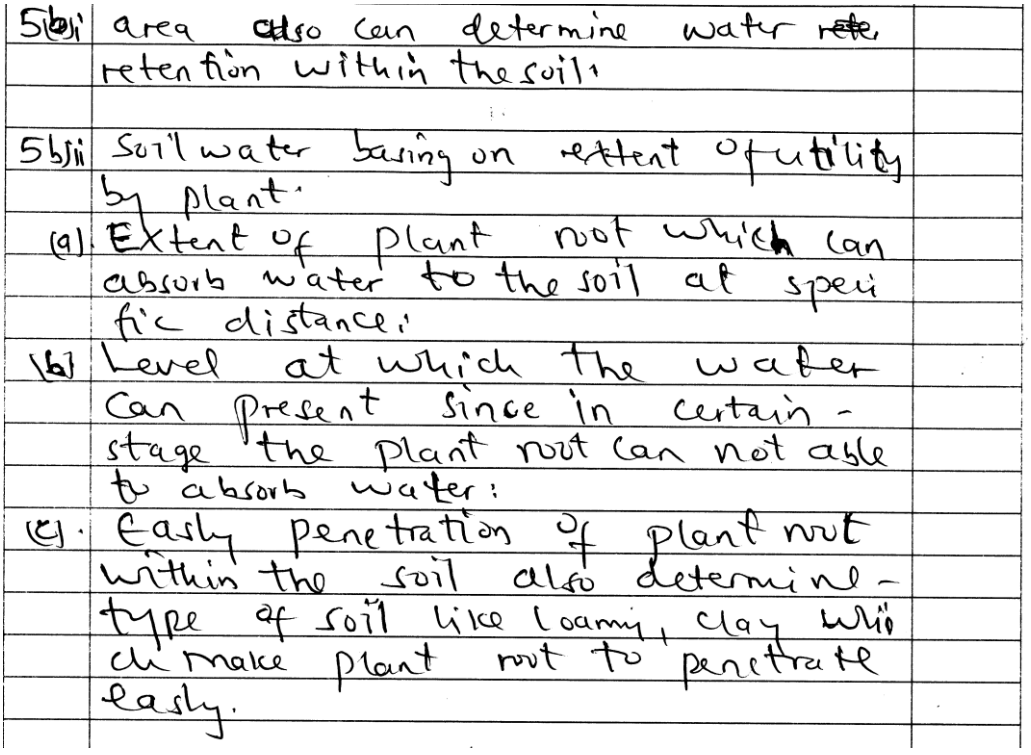
Extract 5.1: *A sample of candidates' good responses in Question 5*

On the other hand, 50.2 percent of the candidates provided incorrect responses in almost all parts of the question. They failed to differentiate infiltration from percolation in part (a). It was observed from candidates' responses that they were not conversant with terms used about soil water movement and retention. This is an example of incorrect responses from one of the candidate: *infiltration is the process whereby the soil high filtered easily to the container or on the land so that the top soil to become dry and water inter the soil in large amount while percolation is the process when by the top soil is eroded with large amount of water on the surface*. This indicates lack of good understanding on the terms used in soil water. Furthermore, in part (b), most of the candidates were unable to classify soil water based on the relative degree of retention and the extent of utility by plants. The candidates seemed to lack

knowledge on water retention and utility as their responses focused on the uses of water. Examples of incorrect responses from some of the candidates were: *water is a universal solvent of organic matter, soil water is used for drinking by the animal, soil water is used for habitat for aquatic living organism, wilting coefficient, crystallization, and used to cool the plant*. All of these incorrect responses suggest inadequate knowledge about soil water relationship. However, only a few candidates were able to differentiate infiltration from percolation in part (a) hence scored few marks. Extract 5.2 presents a sample of poor responses from one of the candidates.

5(a). Infiltration: Is the entry of water to the soil by absorbition ~~of~~ with plant roots., downward filtration of water by plant roots, while ~~Pere~~
Percolation: Is the movement of water to the soil through the small pores, water can-enter through the soil by small pores in order to be filled with the water at maximum

(b)(i) Ways to classify soil water from Relative of retention:
(a). Type of the soil which can-hold the water
(b). Pores Presence within the soil to accumulate the large amount of water.
(c). Easly penetration of water to the soil during rainning.
(d) Moisture remaining in the soil after the surface water removed.
(e) Type of vegetation grown in certain


5(b)i area also can determine water rete. retention within the soil.

5(b)ii Soil water basing on extent of utility by plant.

(a) Extent of plant root which can absorb water to the soil at specific distance.

(b) Level at which the water can present since in certain - stage the plant root can not asle to absorb water.

(c) Easly penetration of plant root within the soil also determine - type of soil like loamy, clay which make plant root to penetrate easly.

Extract 5.2: *A sample of candidates' poor responses in Question 5*

In Extract 5.2, the candidate showed poor understanding on soil water movement and retention, where he/she incorrectly responded to all parts of the question.

2.1.6 Question 6: Introduction to Soil Chemistry

The question carried 10 marks. The candidates were required to account on five agronomic practices that can be used by the farmer to ensure that the fertility of the soil is maintained.

The question was attempted by 627 (99.8%) candidates, of whom 96 (15.3%) scored from 0 to 3 marks, 194 (31%) scored from 3.5 to 5.5 marks and 337 (53.7%) scored from 6 to 10 marks. Thus the general performance of the candidates in the question was good as 531 (84.7%) candidates scored from 3.5 to 10 marks. Candidates' scores are shown in Figure 6.

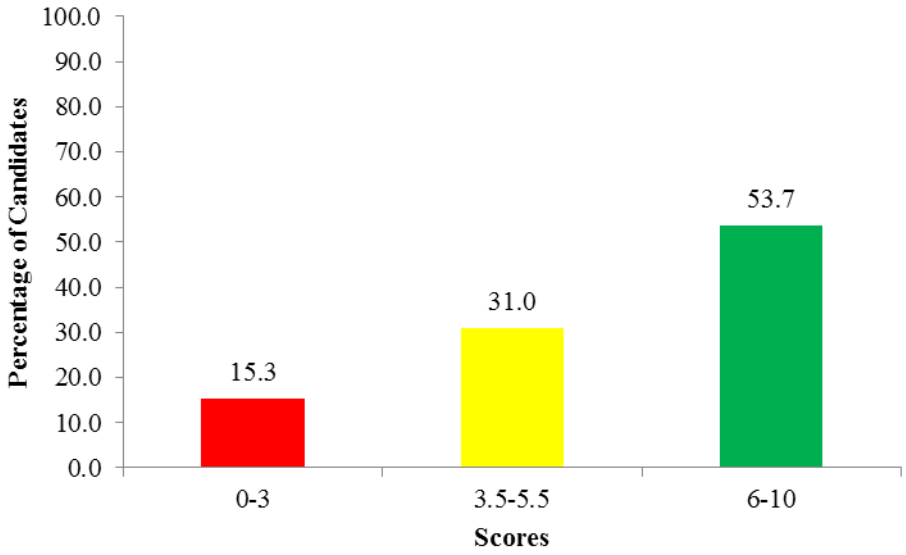


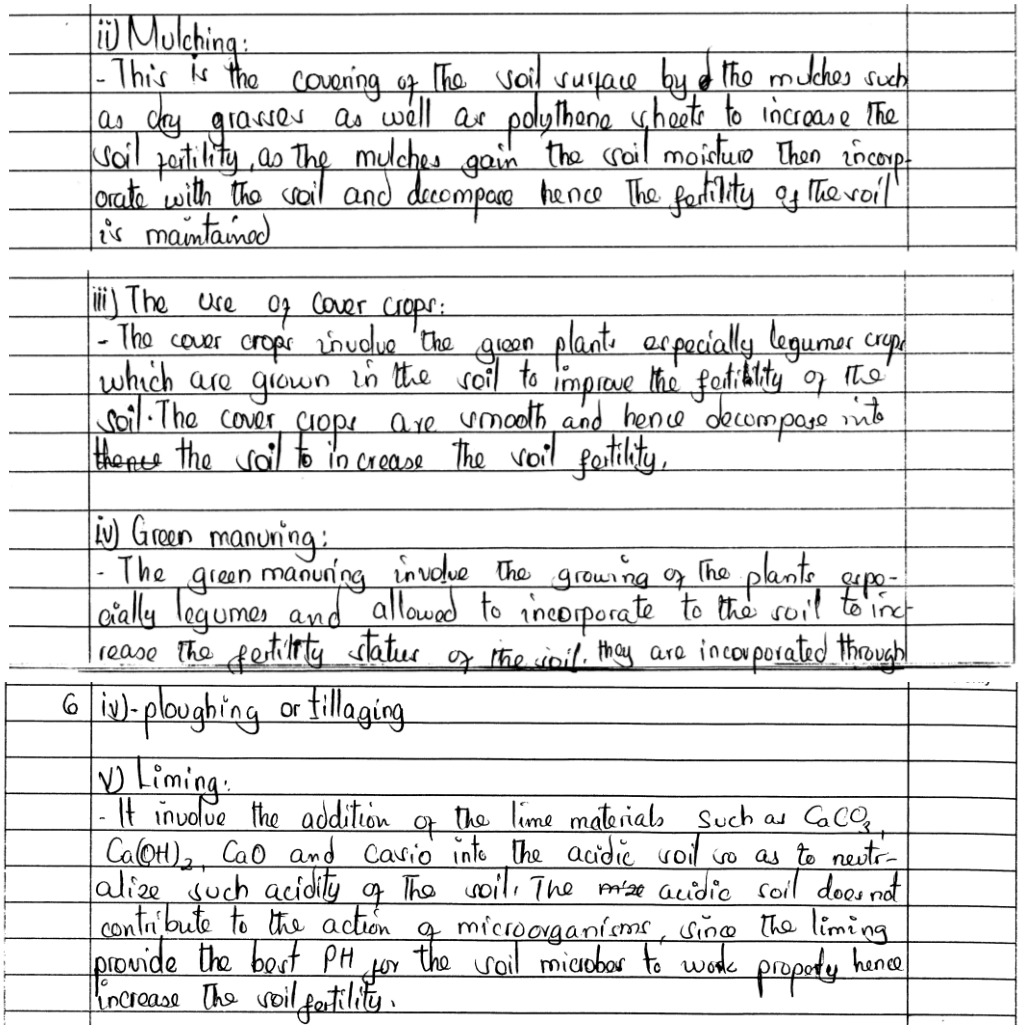
Figure 6: *Distribution of candidates scores in Question 6*

Figure 6 indicates that, more than half (53.7%) of the candidates scored high (6-10). The analysis indicates that, 84.7 percent of the candidates were able to account on the agronomic practices that can be used by the farmer to ensure the fertility of the soil is maintained. The responses provided by the candidates show the possession of adequate knowledge on the ways of maintaining soil fertility. However, a few candidates provided few incorrect responses hence could not score full marks. Extract 6.1 shows a sample of good responses from one of the candidates.

6 Five agronomic practices that can be used by the farmer to ensure that the fertility of the soil maintained

i) Crop rotation

This is the practice of growing different kind of crops season after season. This means that once harvesting of one crop is done in a ~~for~~ particular season, In another season the other crop is planted. In crop rotation crops of different ~~are gro~~ habits are grown on successive seasons, also the legumes and fallowing are included in farming hence they increase soil fertility.


ii) Mulching:
- This is the covering of the soil surface by the mulches such as dry grasses as well as polythene sheets to increase the soil fertility, as the mulches gain the soil moisture then incorporate with the soil and decompose hence the fertility of the soil is maintained

iii) The use of cover crops:
- The cover crops involve the green plants especially legumes crops which are grown in the soil to improve the fertility of the soil. The cover crops are smooth and hence decompose into ~~there~~ the soil to increase the soil fertility.

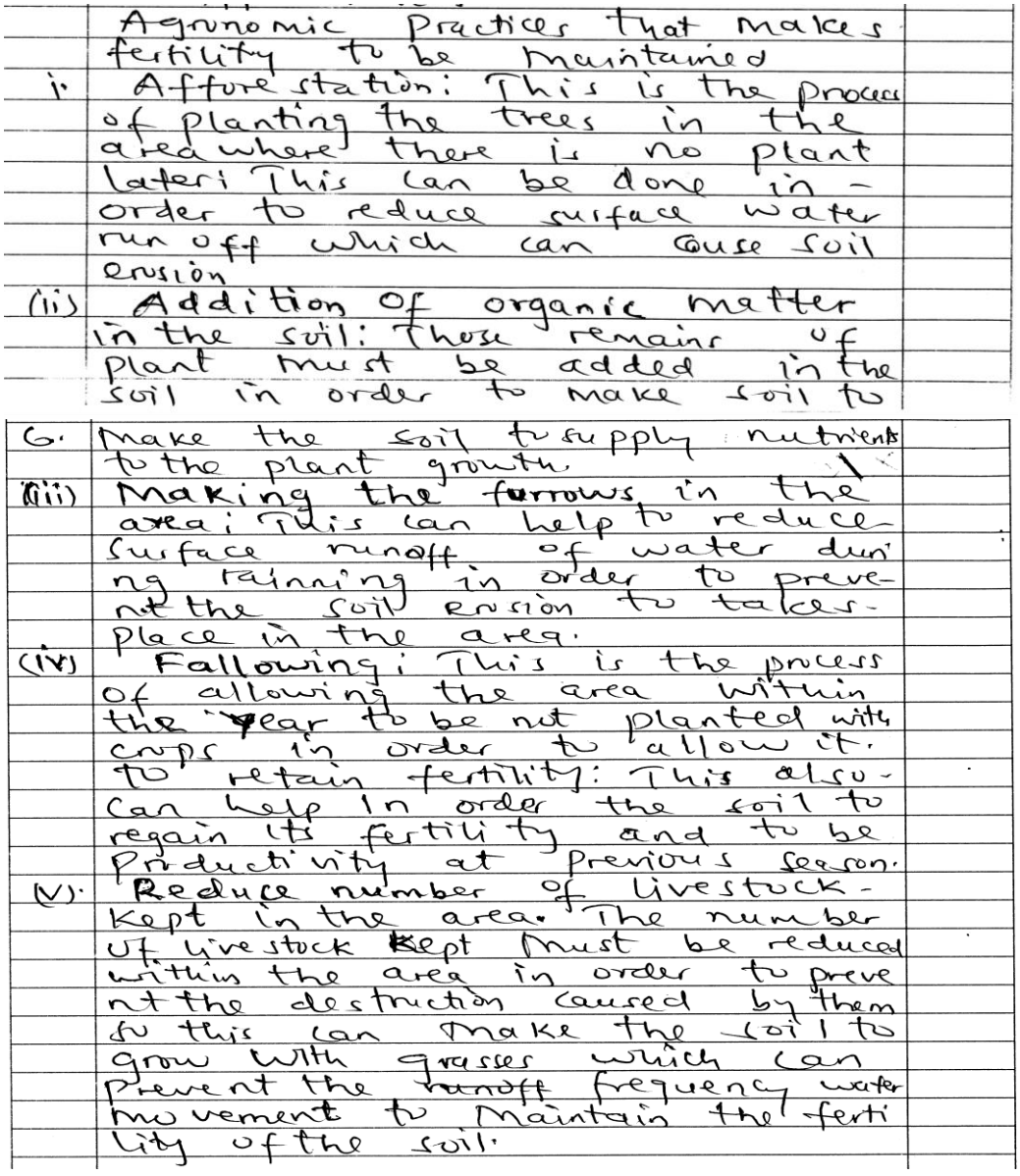
iv) Green manuring:
- The green manuring involve the growing of the plants especially legumes and allowed to incorporate to the soil to increase the fertility status of the soil. they are incorporated through

6 iv)- ploughing or tillaging

v) Liming:
- It involve the addition of the lime materials such as $CaCO_3$, $Ca(OH)_2$, CaO and Cario into the acidic soil so as to neutralize such acidity of the soil. The ~~mize~~ acidic soil does not contribute to the action of microorganisms, since the liming provide the best PH for the soil microbes to work properly hence increase the soil fertility.

Extract 6.1: *A sample of candidates' good responses in Question 6*

Contrarily, 15.3 percent of the candidates provided most of the incorrect responses to this question. The analysis indicates that some of the candidates had their responses focusing on ways of controlling or facilitating soil erosion and not the demanded task. Examples of incorrect responses were: *minimum tillage, ploughing, afforestation* and *overstocking.* These candidates were observed to possess inadequate knowledge and skills on maintenance of soil fertility. However, some candidates managed to give a few correct responses on the agronomic practices that can be used by the farmer to ensure that soil fertility is maintained hence scored few marks. Extract 6.2 represents a sample of poor responses from one of the candidates.



Extract 6.2: *A sample of candidates' poor responses in Question* 6

In Extract 6.2, the candidate had his/her responses focusing on the ways of controlling soil erosion instead of demanded task hence provided incorrect responses to all parts of the question.

2.1.7 Question 7: Introduction to Soil Chemistry

The question had parts (a) and (b) carrying a total of 10 marks. The candidate were required to: (a) justify the statement that "addition of organic matter to the soil improves soil characteristics" by giving five points and (b) compare

sand and clay soils based on the physical characteristics that are affected by compactness of the soil.

The question was attempted by 627 (99.8%) candidates. The statistics shows that 92 (14.7%) scored from 0 to 3 marks, 257 (41%) scored from 4 to 5.5 marks, and 278 (44.3%) scored from 6 to 9 marks. The candidates' scores are summarized in Figure 7.

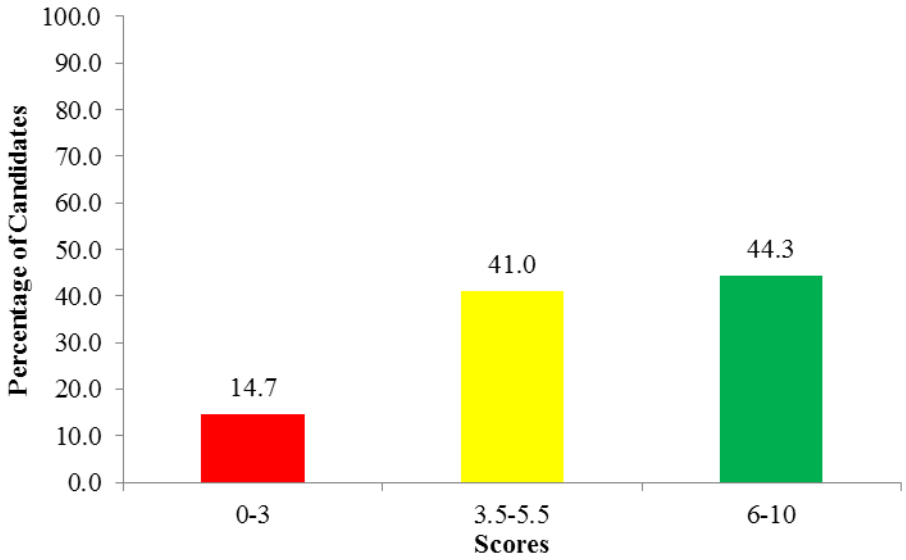


Figure 7: *Distribution of candidates' scores in Question 7*

According to Figure 7, 44.3 percent of the candidates scored high (6-10) marks while 14.7 percent of the candidates scored low (0-3) marks. The analysis of the candidates' responses indicates that, 85.3 percent candidates responded correctly to most parts of the question. In part (a), the candidates managed to justify the statement that "addition of organic matter to the soil improves soil characteristics". The candidates' good responses were due to their ability to compare different soil characteristics in relation to organic matter in the soil. This is evidence that candidates had sufficient knowledge on physical characteristics of the soil. In part (b), some of these candidates partially provided correct responses hence could not score full marks. However, other candidates failed to compare sand and clay soils based on the physical characteristics that are affected by compactness of the soil. Extract 7.1 shows a sample of good responses from one of the candidates.

Qn7 (a) (iv) Organic matter has influence in water retaining the soil due to the presence of small pores in the soil containing organic matter.

(v) Improve the soil structure in great extend.

(vi) Addition of organic matter in the soil lower soil density due to the fact that organic matter are less ~~on~~ density.

(vii) Influence microbial activities in the soil due free air circulation.

~~(viii)~~

(b.) Comparison between sand and clay soil basing on the physical characteristics that are affected by compactness

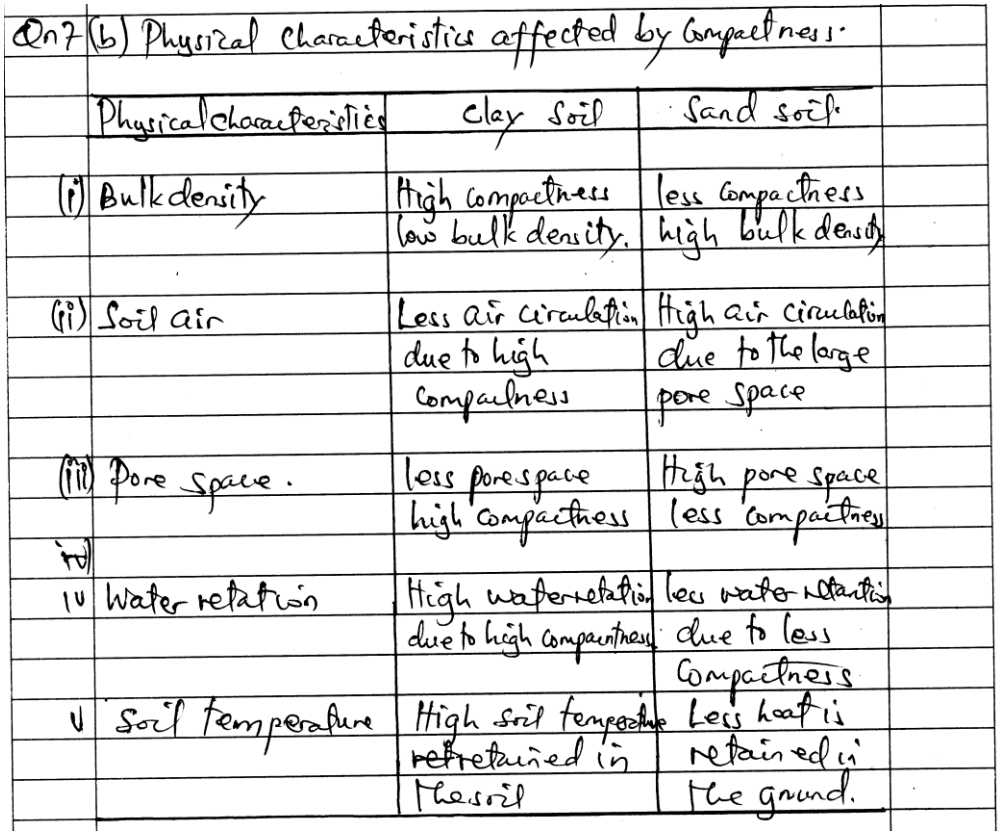
Qn8 (a) Reasons for addition of organic matter in the soil.

(i) It improve the soil fertility when decomposed hence improve soil porosity.

(ii) It influence air circulation in the soil which is required by microorganism during decompositio

(iii) It influence management of soil temperature into the require amount.

(iv) It influence the soil colour high organic matter soil become brown.



Qn7 (b) Physical characteristics affected by compactness.

	Physical characteristics	clay soil	sand soil
(i)	Bulk density	High compactness low bulk density.	less compactness high bulk density
(ii)	Soil air	Less air circulation due to high compactness	High air circulation due to the large pore space
(iii)	Pore space.	less pore space high compactness	High pore space less compactness
iv)			
iv	Water retention	High water retention due to high compactness	less water retention due to less compactness
v	Soil temperature	High soil temperature retretained in the soil	Less heat is retained in the ground.

Extract 7.1: *A sample of candidates' good responses in Question 7*

In Extract 7.1, the candidate managed to justify how organic matter improves soil characteristics and how compactness of the soil affects physical properties, although he/she missed one point in part (b).

However, the analysis revealed that, 14.7 percent of the candidates provided incorrect responses in almost all parts of the question. Most of the candidates failed to justify the statement that "addition of organic matter to the soil improves soil characteristics" in part (a). Most of them focused on the effects of organic matter in the soil rather than the effects of organic matter on soil characteristics. For instance one candidate wrote: *organic matter affect rain water, organic matter prevent erosion* and *improve growth of crops.* Likewise in part (b), the candidates also failed to compare sand and clay soil based on the physical characteristics that are affected by compactness of the soil. The majority explained the physical characteristics that are not affected by compactness of the soil such as: *soil temperature, soil organic matter and boma manure*. Inadequate knowledge on the significance of organic matter and physical characteristics of the soil led the candidates to respond incorrectly to these parts of the question. However, few of the candidates managed to

provide few correct points which resulted into low scores. Extract 7.2 presents a sample of poor responses by one of the candidates.

07a) Organic matter are those materials which can be added on the soil in order to improve the soil characteristics. The following are the organic matter that can be used to improves the soil characteristics.

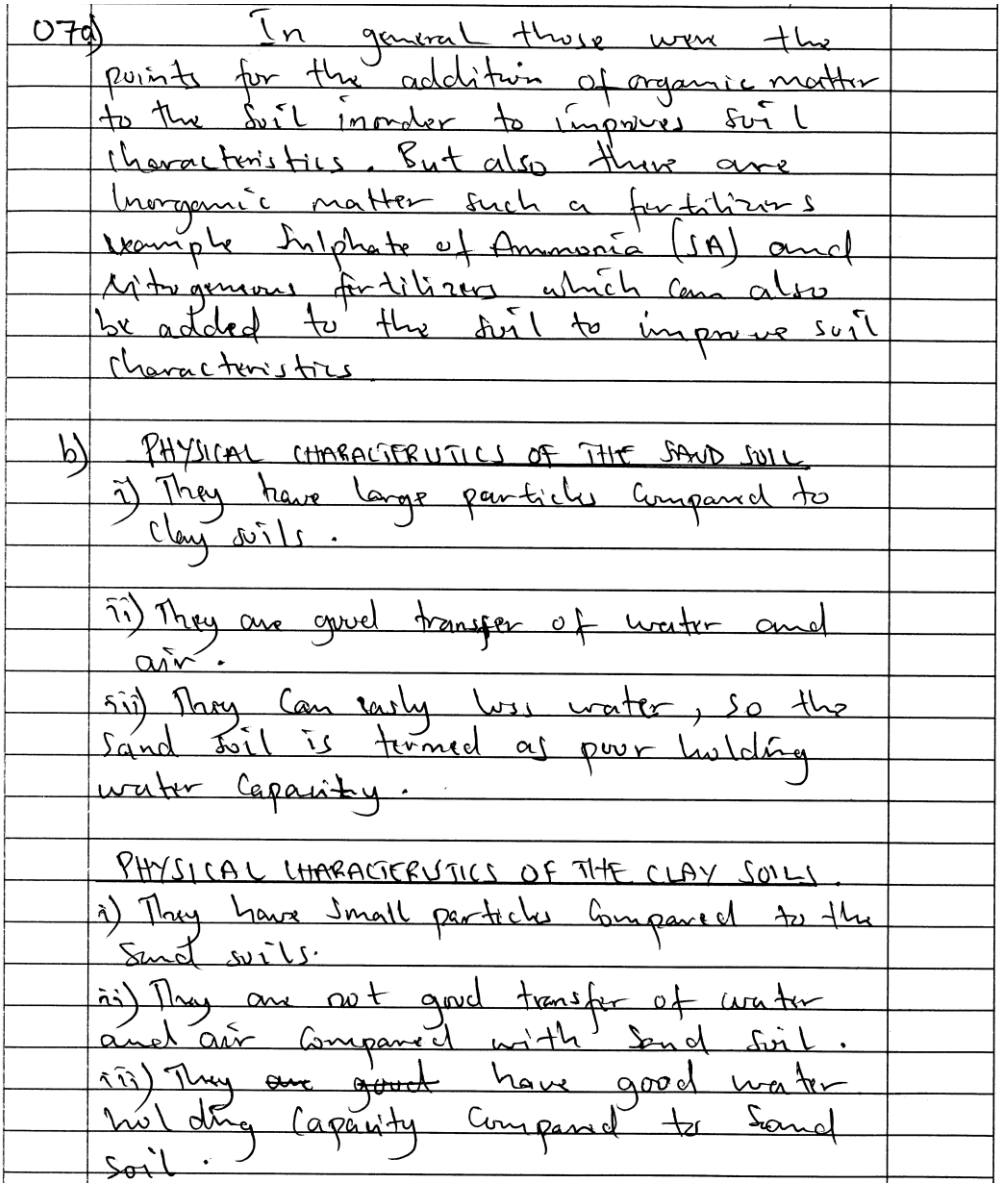
the use of Kraal manures, the kraal manure is the manure which is formed by the mixture of Cow dung, grasses and urine this can improve the soil ability when it applied through the soil.

the use of boma manure, this manure is formed by the ~~mixture~~ of only Cow dungs whereby it can be used to improve the characteristics of the soil when applied on it.

the application of Green manure, also green manure can be used to improve the soil ability because green manure it contain the high fertility ~~ratio~~ ratio due to its green.

also the use or application of poultry manure, can also improves the soil characteristics, poultry manure are the product from livestock such as hen, goose, duck and birds.

Organic manure such from dead decaying leaves, nuts and tubers can also improves the soil characteristics when they are decompose at a proper ways.


07a) In general those were the points for the addition of organic matter to the soil inorder to improves soil characteristics. But also there are inorganic matter such a fertilizers example Sulphate of Ammonia (SA) and Nitrogenous fertilizers which can also be added to the soil to improve soil characteristics.

b) PHYSICAL CHARACTERISTICS OF THE SAND SOIL
i) They have large particles compared to clay soils.

ii) They are good transfer of water and air.

iii) They can easily loss water, so the sand soil is termed as poor holding water capacity.

PHYSICAL CHARACTERISTICS OF THE CLAY SOILS.
i) They have small particles compared to the Sand soils.
ii) They are not good transfer of water and air compared with Sand soil.
iii) They ~~are~~ ~~good~~ have good water holding capacity compared to Sand soil.

Extract 7.2: *A sample of candidates' poor responses in Question 7*

In Extract 7.2, the candidate failed to relate organic matter with soil characteristics and soil physical properties with compactness of soil particles hence provided incorrect responses to all parts of the question.

2.1.8 Question 8: Production Economics

The question had parts (a) and (b) carrying a total of 10 marks. The candidates were required to (a) use the data given on the table showing the yield per hectare of beans (Y_1) which was obtained with varying levels of application of urea fertilizer (X_1) to calculate the level of fertilizer application at which profit was at maximum given that, the price paid by co-operative society for beans

was 700 shillings per kg and urea could be purchased at the commercial fertilizer manufacturing industry for 140,000 shillings per 50 kg bag and (b) calculate the marginal product and average product at the point when profit was at maximum.

Kg of urea (X_1)	Kg of beans (Y_1)
0	800
50	1100
100	1350
150	1550
200	1700
250	1800

The question was attempted by 554 (88.2%) candidates, out of which 432 (78%) scored from 0 to 3 marks, 73 (13.2%) scored from 3.5 to 5.5 marks and 49 (8.8%) scored from 6 to 9.5 marks. Figure 8 summarizes candidates' performance in this question.

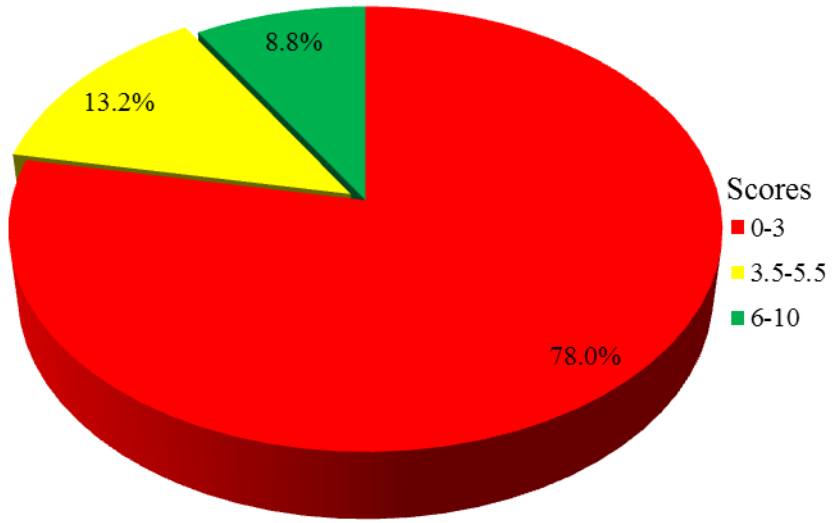
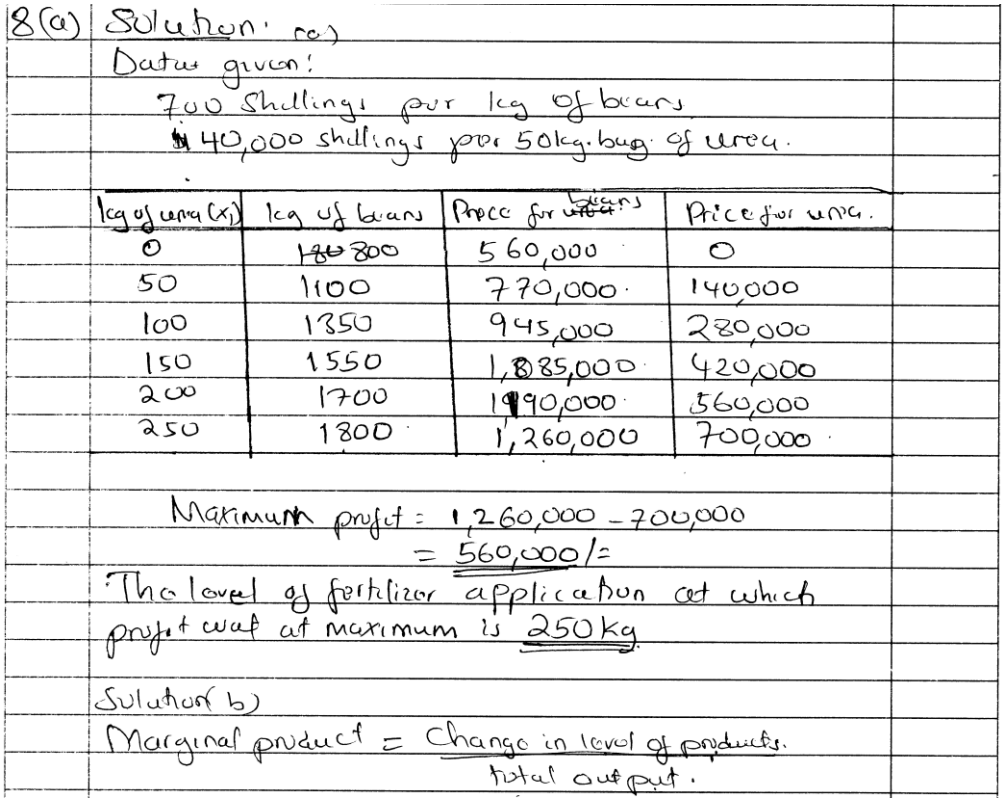


Figure 8: *Distribution of candidates' scores in Question 8*

Figure 8 indicates that, more than half (78%) of the candidates scored low (0-3) marks. The analysis shows that, 78 percent of the candidates provided incorrect responses to this question. In part (a), most of the candidates failed to calculate the level of fertilizer application at which profit was at maximum. In part (b), they used the formula for calculating gross margin instead of the

formula for calculating marginal product. However, a few candidates who applied appropriate formula failed to arrive at the correct value due to poor mathematical computation skills. Extract 8.1 presents a sample of poor responses by one of the candidates.



8(a) Solution: ra)

Datas given:

700 Shillings per 1kg of beans

40,000 shillings per 50kg bag of urea.

1kg of urea (x)	1kg of beans	Price for beans	Price for urea.
0	~~180~~ 800	560,000	0
50	1100	770,000	140,000
100	1350	945,000	280,000
150	1550	1,085,000	420,000
200	1700	1190,000	560,000
250	1800	1,260,000	700,000

Maximum profit = 1,260,000 - 700,000

= 560,000/=

The level of fertilizer application at which profit was at maximum is 250kg

Solution b)

Marginal product = Change in level of products.
total output.

Extract 8.1: *A sample of candidates' poor responses in Question 8*

In Extract 8.1, the candidate failed to use appropriate formula to calculate the maximum level of fertilizer application at which profit was maximum, average product and marginal products. He/she gave incorrect responses to all parts.

On the other hand, 22 percent of the candidates managed to calculate the level of fertilizer application at which profit was at maximum in part (a) of the question. Similarly, in part (b), the candidates were able to calculate the marginal product and average product at the point when the profit was at maximum. The candidates' ability to use appropriate formulae and manipulation of data enabled them to obtain correct values. However, a few candidates in this group failed to arrive at the correct values in both parts of the question. This was attributed by wrong choices of formula and incorrect data interpretation. Extract 8.2 presents a sample of good responses by one of the candidates.

8. (a)

Table shown yield of bean per hectare to

TABLE SHOWING THE YIELD PER HECTARE OF BEANS kilo (Y_1) WHICH WAS AT VARYING LEVEL OF FETILIZER.

kg of urea x_1	kg of beans Y_1	ΔX $x_2 - x_1$	ΔY $Y_2 - Y_1$	$\Delta Y_1 P_Y$	$\frac{\Delta Y_1 P_Y}{\Delta X_1}$
0	800				
		50	300	210,000	4,200
50	1100				
		50	250	175,000	3,500
100	1350				
		50	200	140,000	2,800
150	1550				
		50	150	105,000	2,100
200	1700				
		50	100	70,000	1,400
250	1800				

Recom. Price Paid in buying beans (P_Y) = 700 per kg

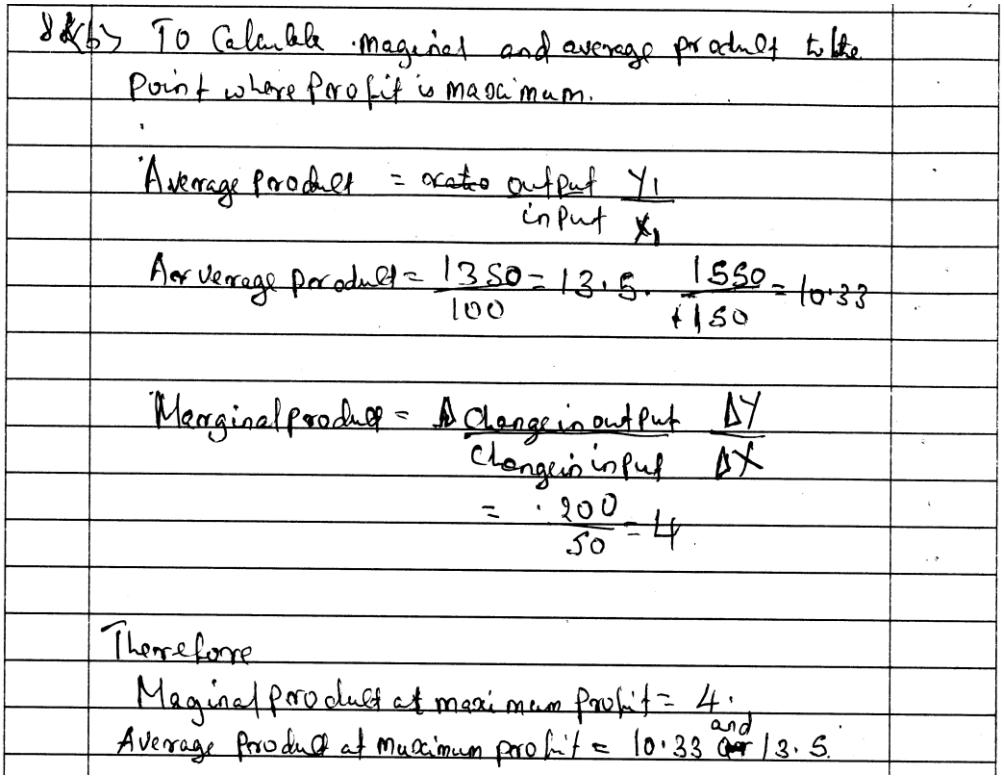
price of purchasing urea P_X = 140,000 per 50kg

= 2,800 per 1kg.

but

Profit level of fertilizer = $\frac{\Delta Y_1 P_Y}{\Delta X_1} = P_{X_1}$

Therefore in order for the farmer to obtain high Profit they must apply 100kg to 150 kg of urea in order to get output (beans) of 1350 kg to 1550 kg. of beans (Y_1)



Extract 8.2: *A sample of candidates' good responses in Question 8*

In extract 8.6, the candidate had good mathematical computation skills in solving production economics problems except just one point in part (a).

2.1.9 Question 9: Introduction to Agricultural Prices

The question had two parts; (a) and (b) carrying a total of 10 marks. The candidates were required to (a) briefly explain three measures that the government of Tanzania should take to encourage farmers to continue with production of the crop with which its world market price has fallen in the last season and (b) use cobweb theorem to explain the phenomenon that "producers of cowpea have reduced production of crops this season as a result of low market price for the crop in the last season".

The question was attempted by 623 (99.2%) candidates, out of in which 321 (51.5%) scored from 0 to 3 marks, 134 (21.5%) scored from 3.5 to 5 marks and 168 (27%) scored from 6 to 10 marks. Figure 9 summarizes the candidates' performance in this question.

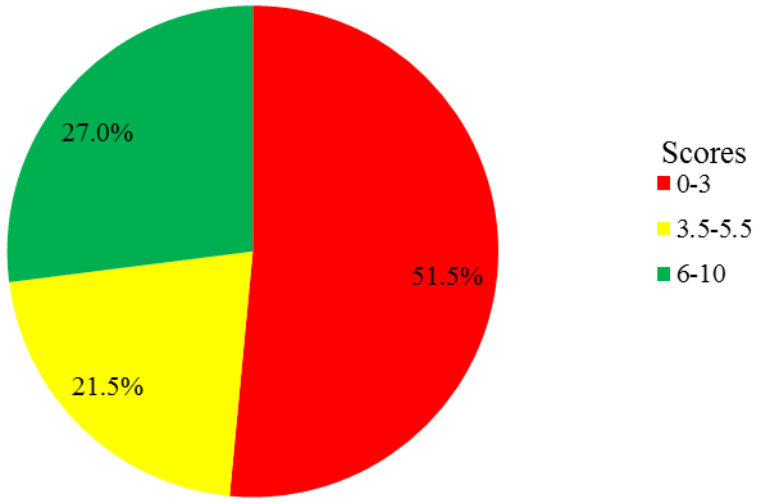
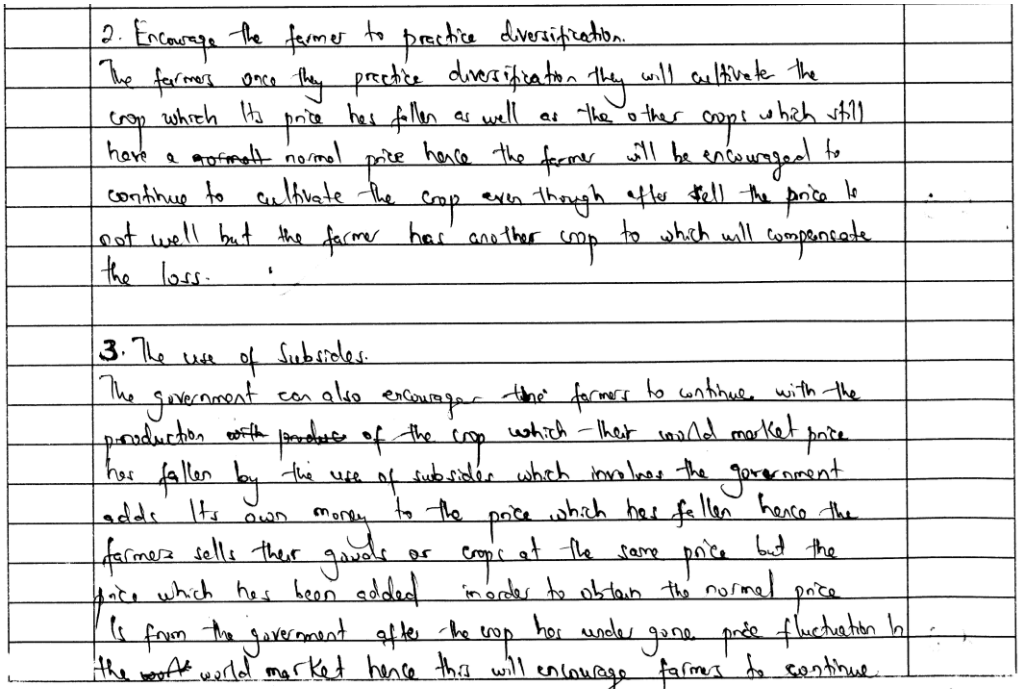


Figure 9*: Distribution of candidates' scores in Question 9*

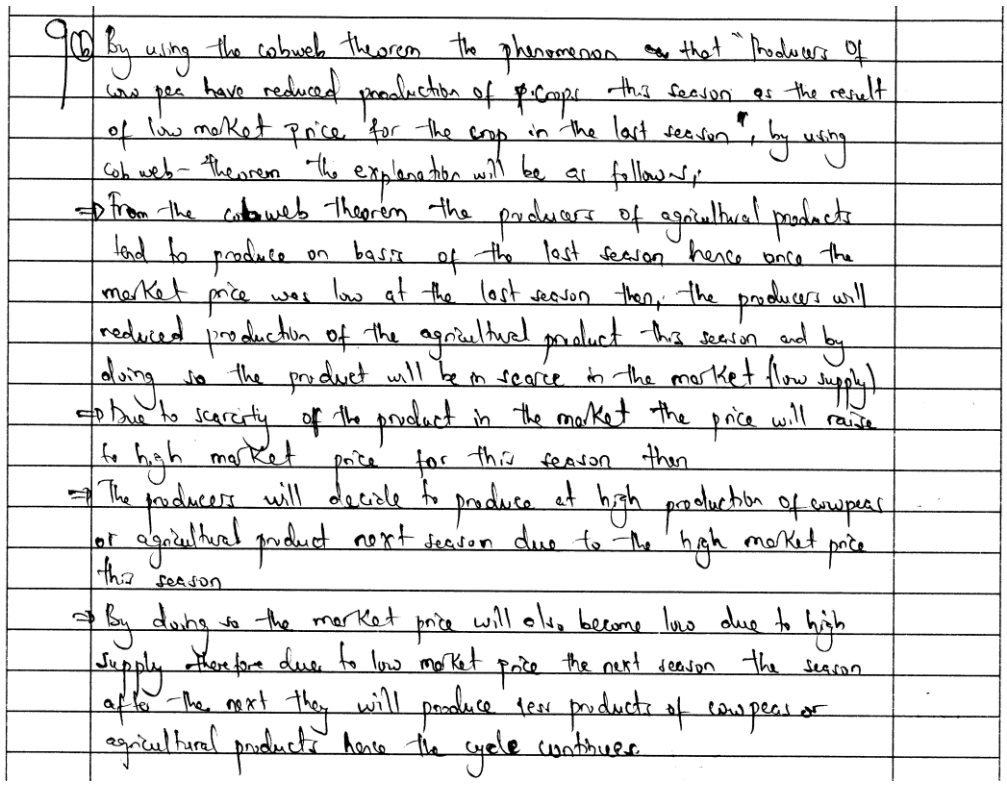
According to Figure 9, more than half (51.5%) of the candidates scored low (0-3) marks while 27 percent candidates scored high (6-10) marks. The analysis shows that, about 48.5 percent of the candidates provided correct responses to this question. In part (a), some of the candidates were able to explain measures that the government of Tanzania would take to encourage farmers to continue with production of the crop whose world market price has gone down in the last season. Similarly, in part (b), they provided correct responses to the question. However, some of the candidates failed to relate cobweb theorem with the phenomenon that "price of commodity in the previous season determine the quantity to be produced in the current season". Extract 9.1 presents a sample of good responses by one of the candidates.

9. (a) The first is by
The method which the government must taKen to encourage farmers to continue with production of the Crop which their world market price has fallen in the last season includes:
1. The Use of buffer stock funds.
This involves the government buys the products from the farmers at the normal equilibrium price and hence then when the world market price will stabilize the government will sell the product hence the by doing so the price of the crop in the country will remain the same.



2. Encourage the farmer to practice diversification.
The farmers once they practice diversification they will cultivate the crop which its price has fallen as well as the other crops which still have a ~~normal~~ normal price hence the farmer will be encouraged to continue to cultivate the crop even though after fall the price is not well but the farmer has another crop to which will compensate the loss.

3. The use of subsides.
The government can also encourage the farmers to continue with the production ~~with products~~ of the crop which their world market price has fallen by the use of subsides which involves the government adds its own money to the price which has fallen hence the farmers sells their goods or crops at the same price but the price which has been added in order to obtain the normal price is from the government after the crop has under gone price fluctuation in the ~~world~~ world market hence this will encourage farmers to continue with the production of the crops.



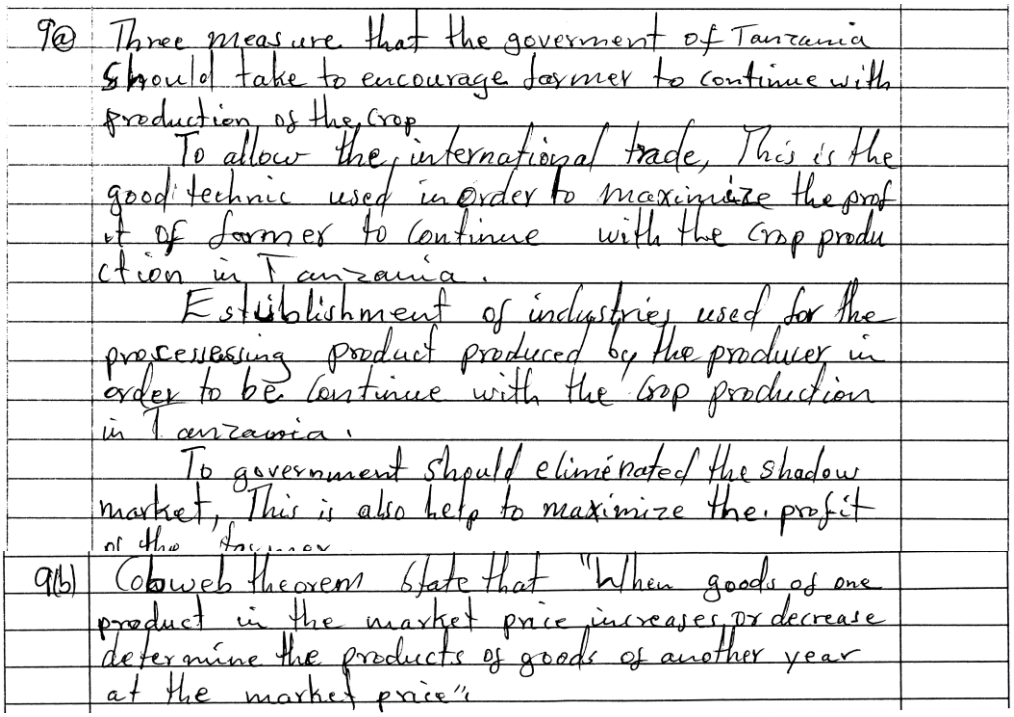
9(b) By using the cobweb theorem the phenomenon ~~as~~ that "Producers of cow pea have reduced production of ~~p~~ crops this season as the result of low market price for the crop in the last season", by using cob web - theorem the explanation will be as follows;
⇒ From the cobweb theorem the producers of agricultural products tend to produce on basis of the last season hence once the market price was low at the last season then, the producers will reduced production of the agricultural product this season and by doing so the product will be in scarce in the market (low supply)
⇒ Due to scarcity of the product in the market the price will raise to high market price for this season then
⇒ The producers will decide to produce at high production of cowpeas or agricultural product next season due to the high market price this season
⇒ By doing so the market price will also become low due to high supply therefore due to low market price the next season the season after the next they will produce less products of cowpeas or agricultural products hence the cycle continues

Extract 9.1*: A sample of candidates' good responses in Question 9*

On the contrary, 51.5 percent of the candidates had poor performance. In part (a), they had responses focusing on government support to facilitate production

and not government support to control and stabilize price. Example of incorrect responses provided were: *provision of capital through allowing farmer to access credit, providing farmer land reserve, informing farmer about high demand of product*. Inability to provide correct responses was due to insufficient knowledge on agricultural prices control and stabilization.

Similarly, in part (b) the candidates failed to relate the concept of cobweb theorem with quantity produced, market price and season of production. Some of the incorrect responses provided were; *when good of one product in the market price increase or decrease determine the product of good of another year at the market price", cobweb state that "the price of today will depend on the price of the previous season", and cobweb theorem state that "the amount of produce of the current year or season depend much on the products of last year.* These responses suggest lack of sufficient knowledge on how quantity of product produced currently depends on the price of the previous products. Extract 9.2 is one of the poor responses from one of the candidates.


9@ Three measure that the goverment of Tanzania should take to encourage farmer to continue with production of the crop

To allow the international trade, This is the good technic used in order to maximize the prof it of farmer to continue with the crop produ ction in Tanzania.

Establishment of industries used for the processessing product produced by the producer in order to be continue with the crop production in Tanzania.

To government should eliminated the shadow market, This is also help to maximize the profit of the farmer

9(b) Cobweb theorem state that "When goods of one product in the market price increase or decrease determine the products of goods of another year at the market price"

Extract 9.2: *A sample of candidates' poor responses in Question 9*

In Extract 9.2, the candidate had poor understanding of agricultural price fluctuation, hence provided incorrect responses in all parts of the question.

2.1.10 Question 10: Fundamentals of International Trade and Farm Planning

This question had three parts; (a), (b) and (c) carrying a total of 10 marks. The candidates were required to: (a) give five point on what would happened in the absence of international commodity agreements (b) explain why do we plan in the farm by giving three points and (c) give two ways in which partial budget can be used as a tool of farm planning in the farm.

The question was attempted by 619 (98.6%) candidates, whereby 376 (60.7%) scored from 0 to 3 marks, 157 (25.4%) scored from 3.5 to 5.5 marks and 86 (13.9%) scored from 6 to 9.5 marks. Figure 10 summarizes candidates' performance in this question.

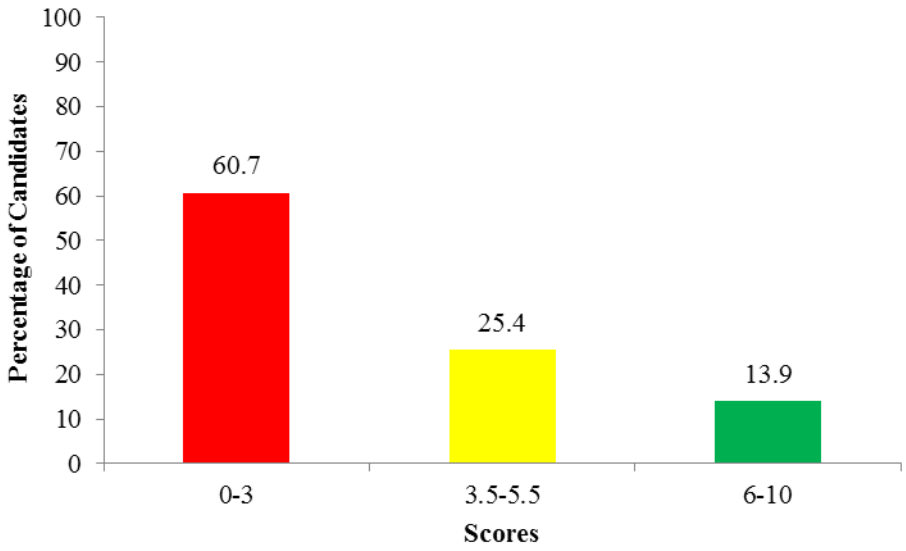


Figure 10: *Distribution of candidates' scores in Question 10*

According to Figure 10, 39.3 percent of the candidates scored from 3.5 to 10. The analysis shows that the candidates with high scores provided correct responses to almost all parts of the question. However, some of the candidates failed to explain ways in which partial budget can be used as a tool of farm planning in the farm hence could not score full marks. These candidates mixed up partial budget with other tools of farm planning such as complete budget and program planning which led them to score low marks. Extract 10.1 is one of the good responses from one of the candidates.

10. The following will happen if international commodity agreements is absence:-
(i) There would be no protection for the countries which export primary goods against excessive production on the international market.
(ii) There would be no protection for the countries which export primary goods against excessive competition
(iii) The world price would not be stabilized.
(iv) The overall out put level of the whole word will not be set.
(v) There would be no allocation of quota shares for each producing country which produce primary goods like coffee

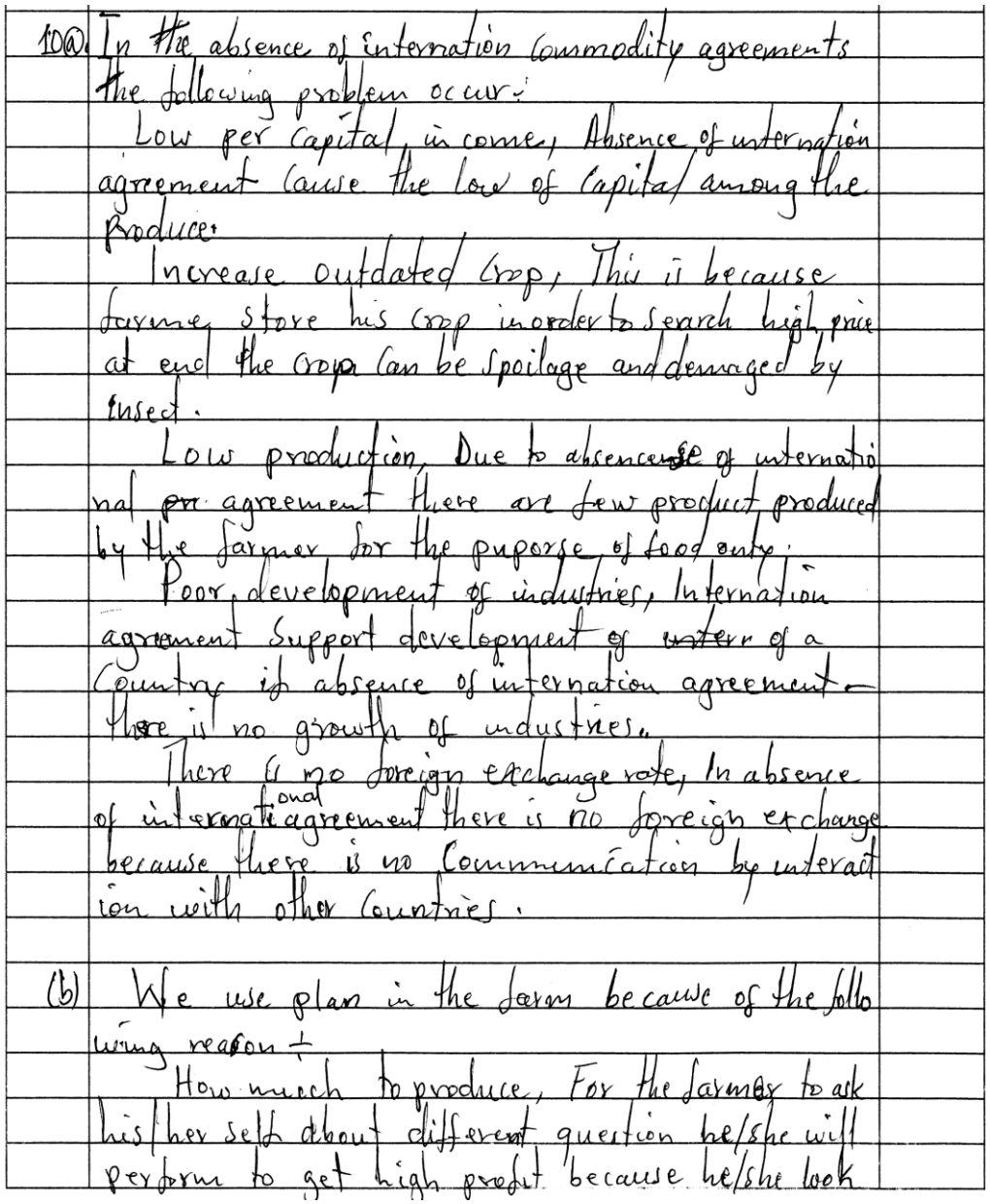
(b) Reasons for plan in the farm.
(i) It help to allocate scarce resources for maximum production.
(ii) It help to reduce risk and uncertainties which caused by lack of plan.
(iii) It help to ensure proper utilization of resources.

(c) Two ways in which partial budgeting can be used as a tool of farm planning in the farm are:-
(i) Expansion or introducing supplementary enterprise in the production.
(ii) Substituting of one enterprise by another.

Extract 10.1: *A sample of candidates' good responses in Question 10*

Conversely, 60.7 percent of the candidates failed to explain what would have happened in the absence of International Commodity Agreements in part (a). The majority had their responses focusing on what would affect the country which is not engaging in international trade instead of the role played by international commodity agreements. Examples of such incorrect responses are: *low per capital income, low production, poor development of industrial and lack of market.*

Likewise, in part (b), most of the candidates confused partial budget with producers decisions in the production processes as they provided responses such as; *how much to produce, to whom to produce* and *where and when to produce*. These candidates suggested that they have poor understanding on the ways of making improvement in the farm business using farm planning tools. However, a few candidates managed to give ways in which partial budget can be used as a tool of farm planning in the farm in part (c), hence scored few marks. Extract 10.2 presents poor responses by one of the candidates.



10(a) In the absence of internation commodity agreements the following problem occur:-

Low per capital income, Absence of internation agreement cause the low of capital among the produce.

Increase outdated crop, This is because farmer store his crop in order to search high price at end the crops can be spoilage and demaged by insect.

Low production, Due to absence of internatio nal agreement there are few product produced by the farmer for the puporse of food only.

Poor development of industries, Internation agreement support development of ~~inter~~ of a country in absence of internation agreement there is no growth of industries.

There is no foreign exchange rate, In absence of international agreement there is no foreign exchange because there is no communication by interact ion with other countries.

(b) We use plan in the farm because of the follo wing reason :-

How much to produce, For the farmer to ask his/her self about different question he/she will perform to get high profit because he/she look

10(b) population size and to produce according to the population.

To whom to produce, Farmer finding to whom to produce because farmer can incurred cost and the goods can not buying because of their nature of that area.

When and where to sale, Farmer ask when and where to produce that is good question because direct the farme when to produce goods and there is high scarcity of that goods for that time.

10c. Two ways in which partial budget can be used as a tool of farm planning in the farm.
- What of amount of extra cost caused and
- What amount of Revenue lost

Solution

Kg of urea X_1	Kg of beans Y_1	ΔX_1	ΔY_1	$\Delta X_1/\Delta Y_1 \times P$	$\frac{\Delta X}{\Delta X} \times P_2$
0	900				
50	1100	50	300	116'6	
100	1350	50	250	140	
150	1550	50	200	175	
200	1700	50	150	233.3	
250	1800	50	100	350	

Extract 10.2: *A sample of candidates' poor responses in Question 10*

In Extract 10.2, the candidate lacked knowledge on the concept of international trade and tools of farm planning, hence failed to provide correct responses in all parts of the question.

2.2 134/2 Agriculture 2

2.2.1 Question 1: Crop Pest

The candidates were required to give a brief explanation on four cultural control methods that suppress pest population in integrated pest management. This question carried 10 marks.

The question was attempted by 624 (99.4%) candidates, out of which 60 (9.6%) scored from 0 to 3 marks, 115 (18.4%) scored from 3.5 to 5.5 marks and 449 (72%) scored from 6 to 10 marks. Figure 11 summarizes candidates' performance in this question.

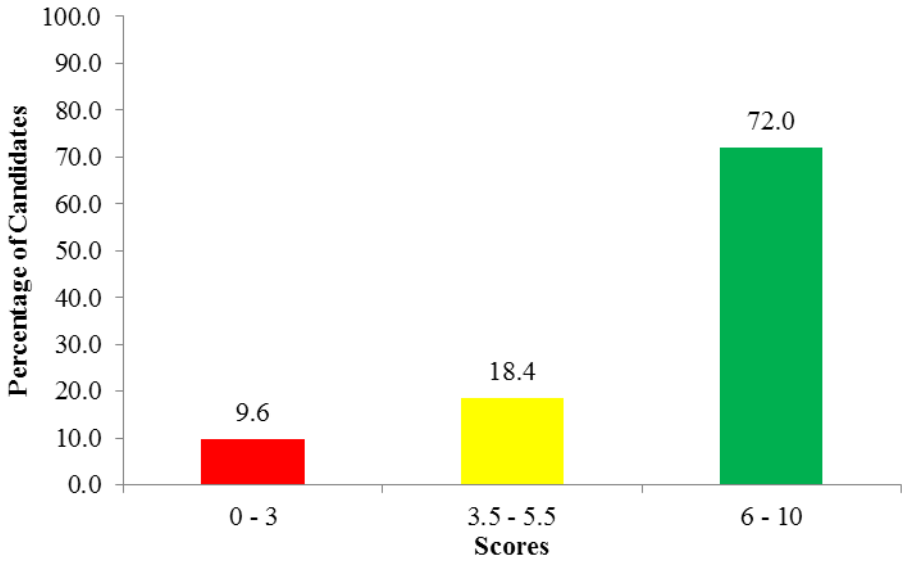


Figure 11: *Distribution of candidates'score in Question 1*

With respect to Figure 11, 72 percent scored high (6-10) marks while 9.6 percent scored low (0-3) marks. The analysis shows that, 90.4 percent of the candidates were able to identify cultural pest control methods from other methods such as mechanical, chemical and biological. Good responses from the candidates exhibit possession of adequate knowledge on pest control methods. However, a few of the candidates only outlined the intended methods without explanations, hence could not score full marks. Extract 11.1 presents a sample of good responses by one of the candidates.

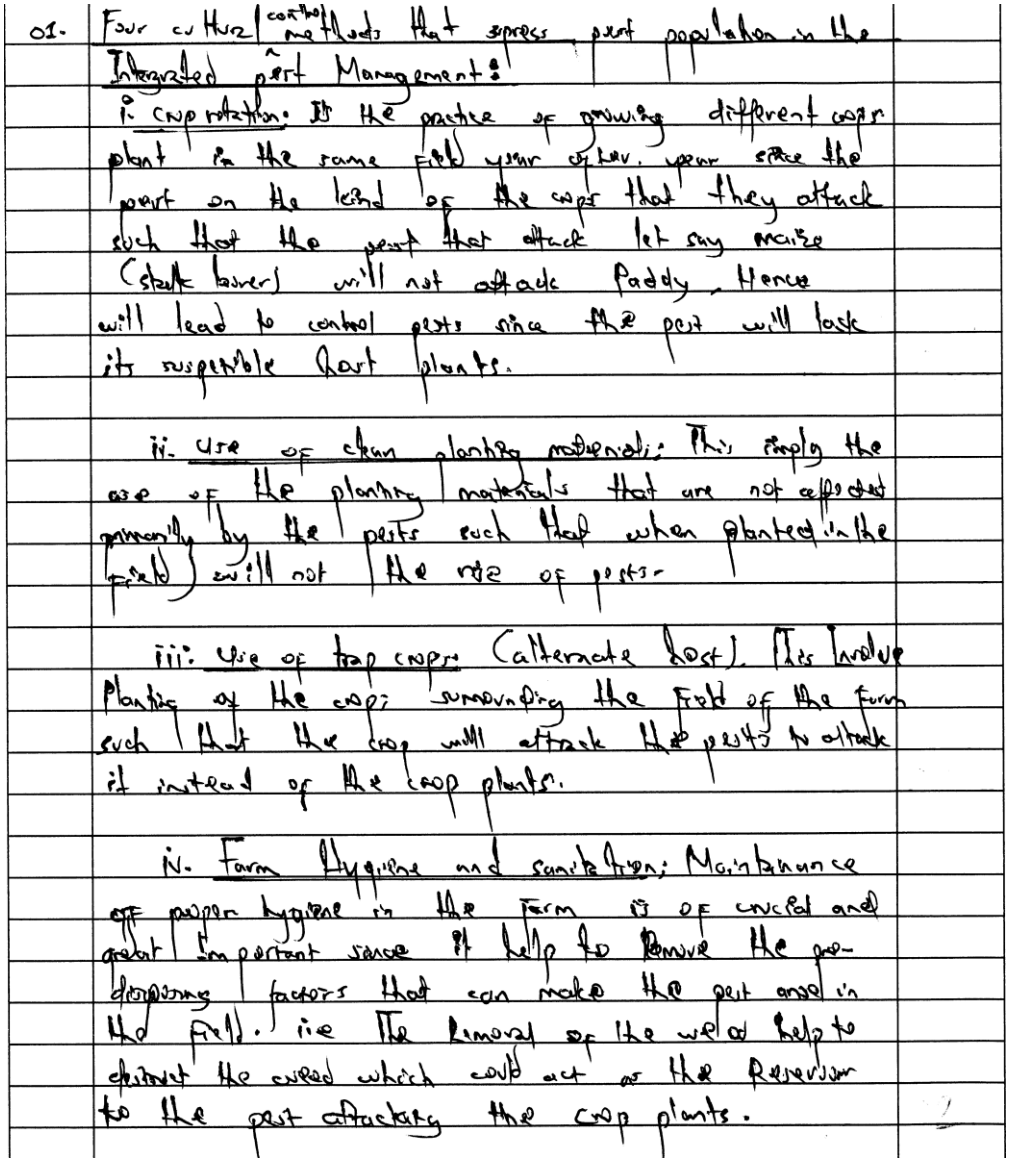
01. Four cultural control methods that express pest population in the Integrated pest Management:

i. Crop rotation: It the practice of growing different crops plant in the same field year after year. year since the pest on the land of the crop that they attack such that the pest that attack let say maize (stalk borer) will not attack Paddy. Hence will lead to control pests since the pest will lack its susceptible host plants.

ii. Use of clean planting materials: This imply the use of the planting materials that are not affected primarily by the pests such that when planted in the field will not the rise of pests.

iii. Use of trap crops: (Alternate host). This involve planting of the crop surrounding the Field of the farm such that the crop will attack the pests to attack it instead of the crop plants.

iv. Farm Hygiene and sanitation: Maintenance of proper hygiene in the farm is of crucial and great important since it help to remove the pest-disposing factors that can make the pest arise in the field. ie The removal of the weed help to obstruct the cycle which could act as the Reservoir to the pest attacking the crop plants.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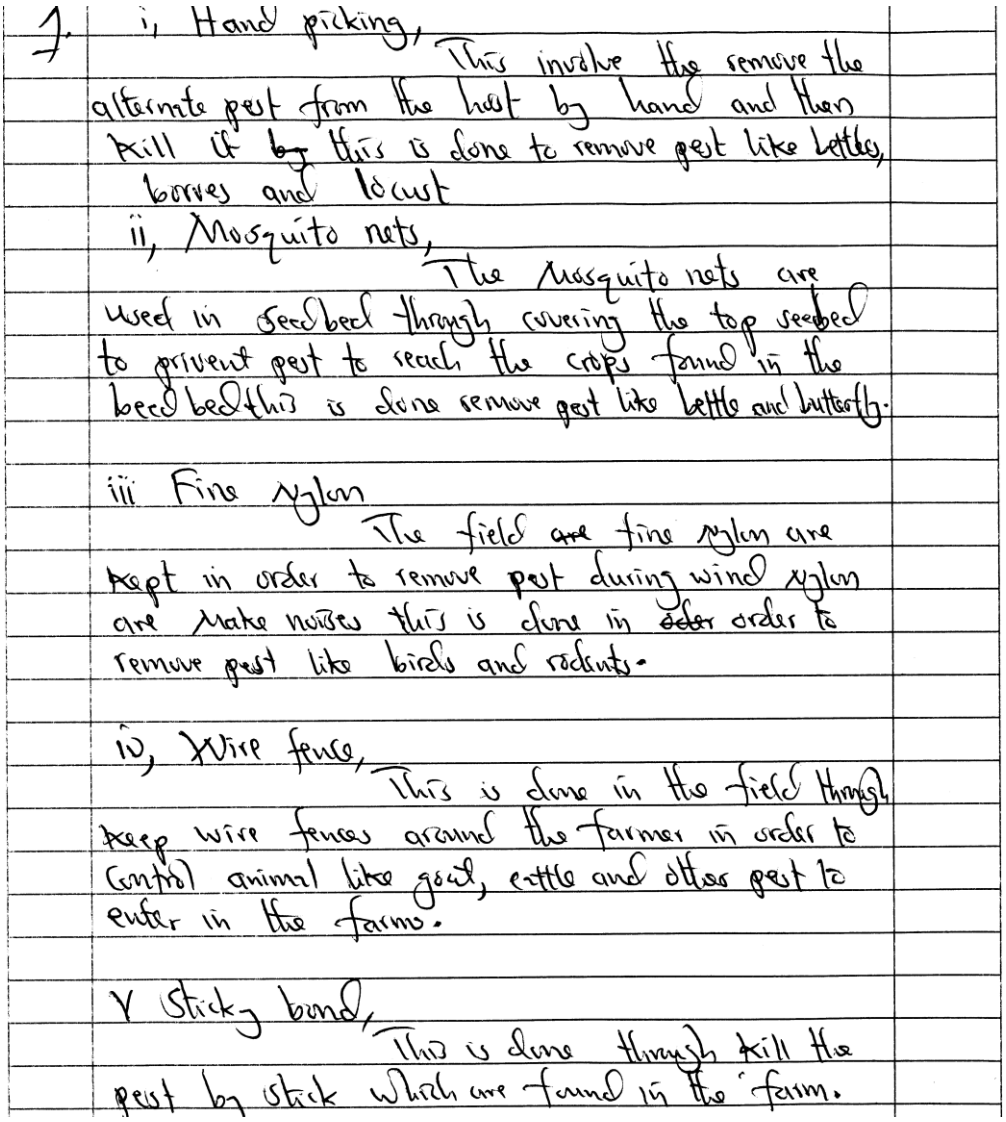
iv. Farm Hygiene and sanitation: Maintenance of proper hygiene in the farm is of crucial and great important since it help to remove the pre-disposing factors that can make the pest arise in the field. i.e The removal of the weed help to distract the weed which could act as the Reservoir to the pest attacking the crop plants.

Extract 11.1: *A sample of candidates' good responses in Question 1*

On the other hand, 9.6 percent of the candidates failed to distinguish cultural pest control methods from other methods such as mechanical, chemical and biological. Some of the incorrect responses provided by the candidates are: *picking by hand, spraying pesticide and physical barriers.* The responses show that, the candidates lacked knowledge and skills on various pest control methods. However, few of the candidates managed to mention the cultural control methods without giving explanations hence scored few marks. Extract 11.2 is one of the poor responses by one of the candidates.


1. i, Hand picking,
This involve the remove the alternate pest from the host by hand and then kill it by this is done to remove pest like Lattles, borves and locust
ii, Mosquito nets,
The Mosquito nets are used in seedbed through covering the top seedbed to privent pest to reach the crops found in the beed bed this is done remove pest like lattle and butterfly.
iii Fine nylon
The field ~~are~~ fine nylon are kept in order to remove pest during wind nylon are make nowes this is done in ~~order~~ order to remove pest like birds and rodents.
iv, Wire fence,
This is done in the field through keep wire fences around the farmer in order to control animal like goat, cattle and other pest to enter in the farms.
v Sticky bond,
This is done through kill the pest by stick which are found in the farm.

Extract 11.2: *A sample of candidates' poor responses in Question 1*

In Extract 11.2, the candidate mixed up cultural pest control methods with mechanical pest control methods. He/she provided incorrect responses to the question.

2.2.2 Question 2: Plant Diseases

The question was divided into parts (a) and (b) carrying a total of 10 marks. The candidates were required to: (a) explain to farmers on how to identify prevalence of viral disease in crop plants on the field by giving five points and (b) briefly describe five agronomic practices that can be used to control disease infestation in plants.

The question was attempted by 626 (99.7%) candidates, in which 131(20.9%) scored from 0 to 3 marks, 256 (40.9%) scored from 3.5 to 5.5 marks and 239 (38.2%) scored from 6 to 9.5 marks. Figure 12 summarizes the candidates' performance in this question.

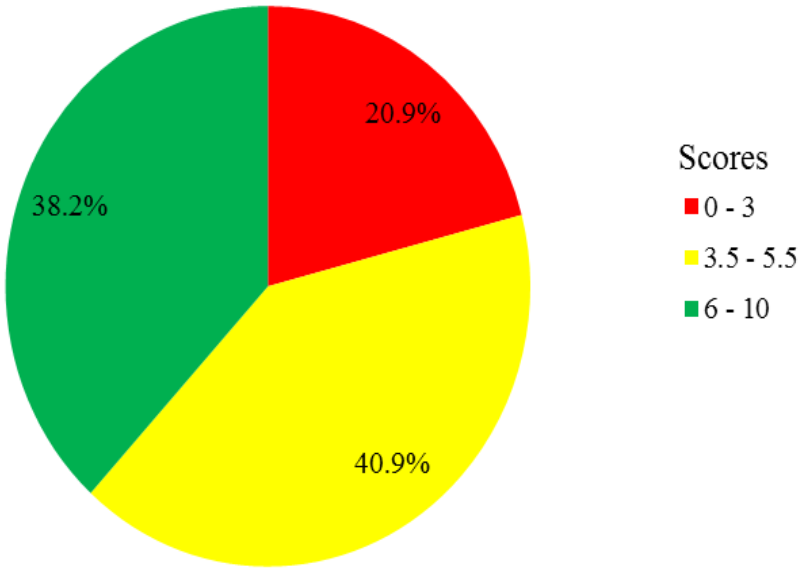


Figure 12: *Distribution of candidates' scores in Question 2*

Figure 12 shows that, 38.2 percent of the candidates scored high (6-10) marks while 20.9 percent scored low (0-3) marks. The analysis shows that, 79.1 percent of the candidates provided correct descriptions on agronomic practices that can be used to control disesase infestation in plants. The candidates' good responses were attributed by their ability to distinguish agronomic practices that are used to control disease from other methods especially chemical method. This signify that the candidates had sufficient knowledge on plant disease control methods. However, a few candidates failed to provide all the correct points in part (a), hence could not score full marks. Extract 12.1 represents a sample of good responses from one of the candidates.

2 (a) Viral disease are the disease which are caused by virus such disease include Tobacco mosaic disease caused by East Africa Tobacco mosaic virus, Maize streak disease caused by Maize Strik virus. The viral disease are identified with unique symptoms which are likely similar to all plants affected by the virus. The following are the common symptoms of viral disease in plant as follows:-

Leaf mosaic; It is appearance of uniform light yellow and dark green lesion on the leaf of the plant. The most obvious symptoms to disease such as cassava mosaic disease caused by East Africa cassava mosaic virus and Tobacco mosaic disease.

Stunting growth; The crop plant affected by virus get stunted as little growth is observed to the plant. the internode do not elongate to increase in length. Such as Stunting in maize affected by maize streak virus.

Leaf curling; The leaves of the infected plant with virus appear curled and fail to photosynthesize its own food.

rosetting condition; the leaves of the infected plants are clustered like petal of the rose due to virus attacks so the farmer can observe it as a viral disease example in groundnut rosette

Yellowing of the plant; the plant become extremely yellow this is due to loss of the chlorophyll of the plant which give the green colouration of plant. Appearance of uniform yellow to the plant sign the viral attack to the plant. Hence farmer should recognize that its is viral disease if the plant is well supplied with water.

2 (b) Agronomic practices to control disease involves the alternation of the environment to unfavour the vector of disease or environment of the disease to non-pathological disease and non-vector disease. The change of environment can suppress the survival of disease causing agent by breaking its life cycle. The following agronomic practices can be used to control plant disease as follows:-

Crop rotation; Changing of the crop to be grown in a piece of Land can be useful to break the life cycle of disease causing organisms. This make the association between plant and pathogen to break hence the pathogen die. ~~hen~~ On crop rotation the rotating crops must be unrelated to avoid association of pathogen with the crop plant which are rotating. The crop rotation also control the vector of the disease

Weeding; This remove the alternative host of disease causing organisms hence remove the secondary host on the field as a result the life cycle of the pathogen can be broken as one of its host is eliminated in the system

Closed season; when a certain crop is not grow in a given area for a period of time it may result of death of disease causing organisms. Example when a piece of Land is not grown with a crop the spores Landed on the ground to wait to germinate into plant the absence of the plant lead to death of the spore hence no further disease on such piece of Land.

Early planting; planting when the disease causing organism are at low Level when the environment is not favourable to them to multiply it is an effective way of preventing disease ~~control~~ to plant as plant grow and get ~~of~~ harvested before the environment be favourable

2(b) to disease causing agents.

proper spacing and improving air circulation; The proper spacing of crop plant to avoid Overcrowding of plant is an effective way of controlling most of fungal disease as it facilitate the air circulation and drying of humidity to make the environment unfavourable to the fungal attack hence the disease is controlled. Also proper spacing prevent the dispersion of disease causing agents as it make a barriers between plants.

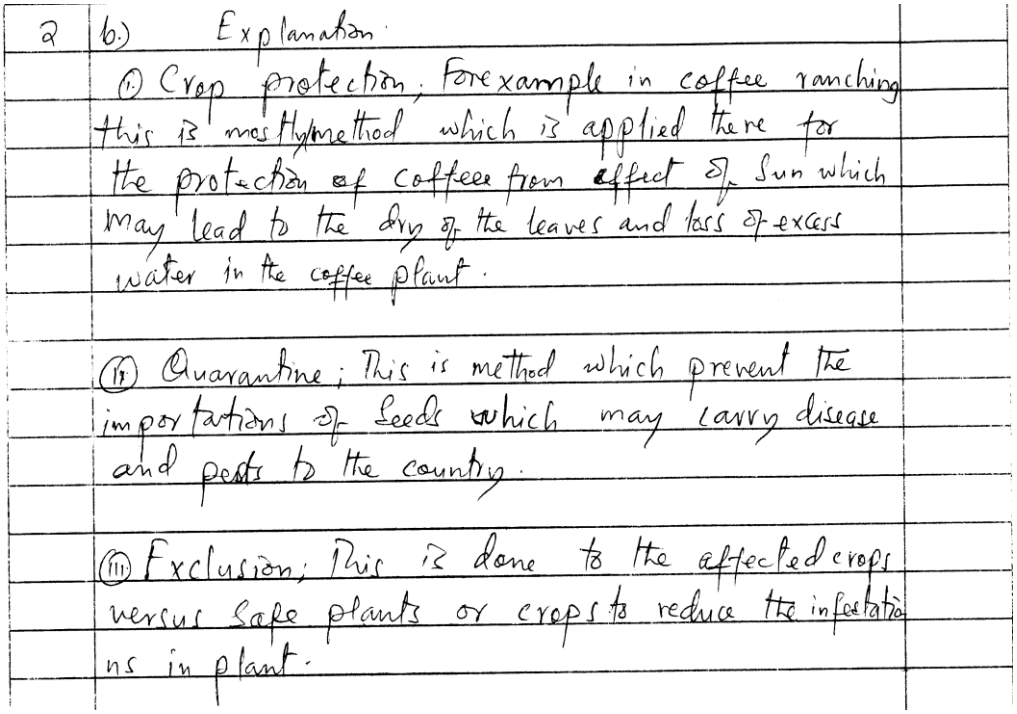
Extract 12.1: *A sample candidates' good responses in Question 2*

On the other hand, the analysis reveals that, 20.9 percent of the candidates who scored low (0-3) marks were unable to give points in educating farmers on how to identify prevalence of viral disease in crop plants in the field. Most of the candidates had their responses focusing on ways of combating viral disease, which was not the demand of this question. Examples of such incorrect responses were: *to educate about the types of crop which is mostly affected by viral disease, identifying the types of soil* and *check up the stem of the crop plant.* The incorrect responses provided by this group of candidates show lack of knowledge and skills on symptoms of viral diseases.

Similarly, the candidates failed to describe agronomic practices that can be used to control disease infestation in plant in part (b). Inability of the candidates to distinguish agronomic practices from other methods of disease control resulted in provision of irrelevant responses such as: *crop protection, spraying fungicide and herbicide application.* The performance of the candidates in this part implies lack of knowledge and practical skills on plant disease. Nevertheless, a few candidates in this group were able to give few correct responses in part (a) and (b) hence scored few marks. Extract 12.2 represents a sample of poor responses from one of the candidates.

2. (a) (i) I can educate the farmers to identify prevalence of viral diseases in crop plants on a field by the following points;
(i) By looking the leaves of the crop plant.
(ii) By looking the productivity level of the crop plant year after year.
(iii) By checkup of the stems of the crop plant.
(iv) By detecting the type of soil if is acidic or basic soil.
(v) By detecting the quality of seed that has been used in the farm.

(b) Five agronomic practices;
(i) Immunization
(ii) Crop protection
(iii) Quarantine
(iv) Avoidance
(v) Exclusion.



Extract 12.2: *A sample of candidates' poor responses in Question 2*

In Extract 12.2, the candidate failed to distinguish agronomic practices in controlling disease from other methods of disease control, as a result provided incorrect responses in all part of the question.

2.2.3 Question 3: Introduction to Weed Science

The candidates were required to briefly describe five ways to be taken in order to control *Striga spp*. This question carried 10 marks.

The question was attempted by 627 (99.8%) candidates out of which 256 (40.8%) scored from 0 to 3 marks, 318 (50.7%) scored from 3.5 to 5.5 marks, and 53 (8.5%) scored from 6 to 9.5 marks. Figure 13 summarizes candidates' performance in this question.

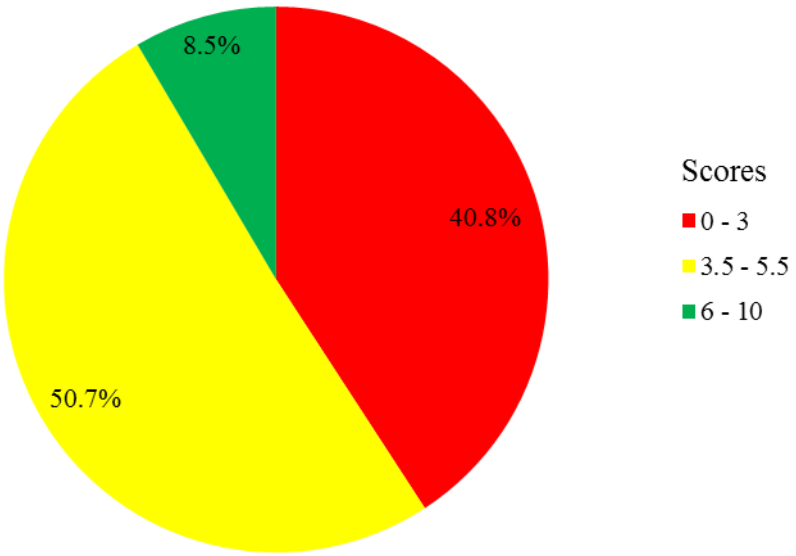
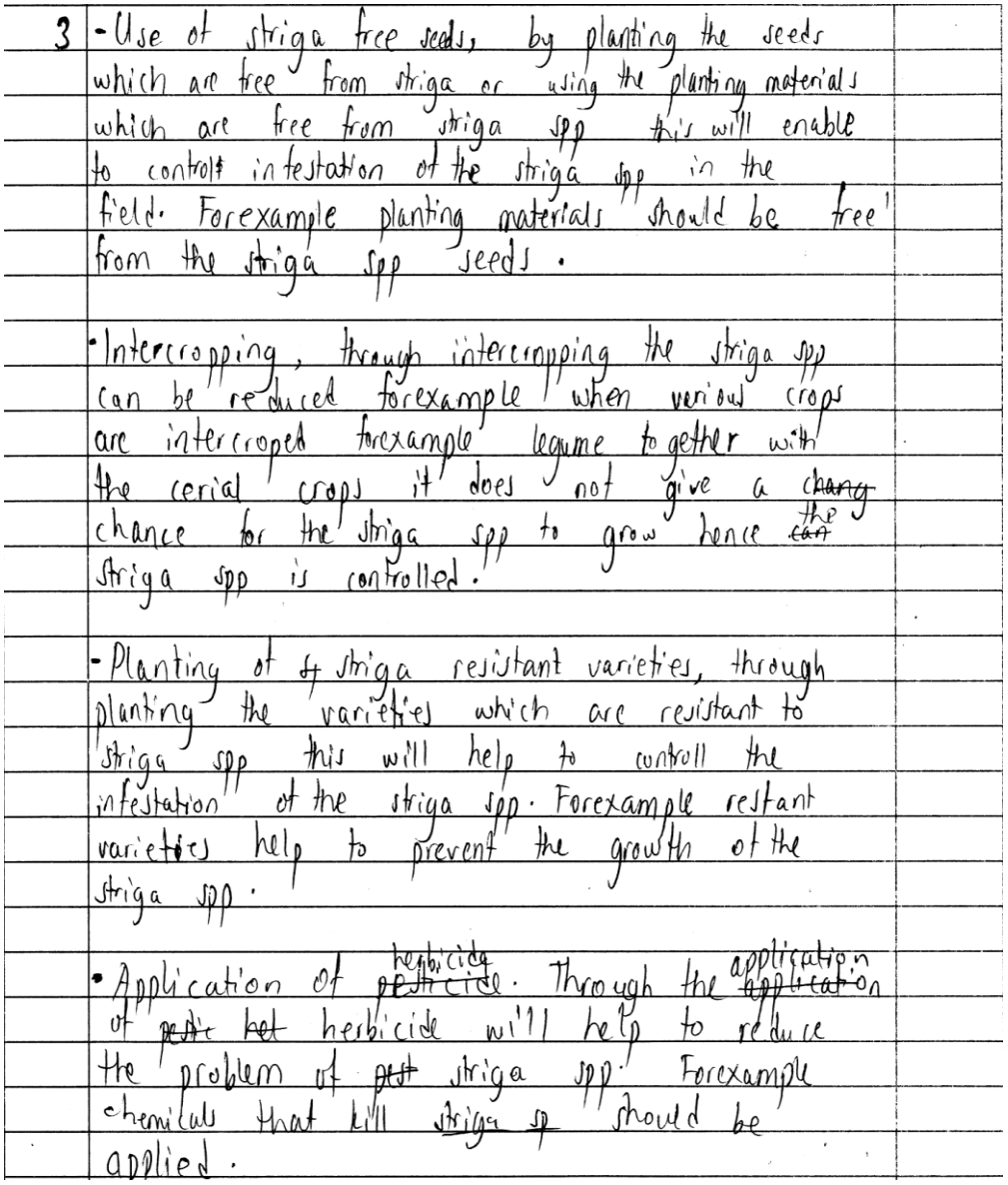


Figure 13: *Distribution of candidates'scores in Question 3*

In Figure 13, 50.7% of the candidates' scored average marks and few (8.5%) scored high marks. The analysis indicates that, 59.2 percent of the candidates were able to specifically identify ways of controling *Striga* spp despite the fact that there are several ways of controlling different weed species. However, some of the candidates in this group did not manage to provide all correct responses, hence could not score full marks. Extract 13.1 represents a sample of good responses from one of the candidates.

3. -Crop rotation, through crop rotation the striga spp can be reduced. Forexample striga spp grows well in association with the cerial crops but when in the legume it crops it does not survive any more, through crop rotation the striga can be controlled because the striga grows well whe is in cereal crops but when in the legume crops it does not grow.


3 - Use of striga free seeds, by planting the seeds which are free from striga or using the planting materials which are free from striga spp this will enable to control infestation of the striga spp in the field. Forexample planting materials should be free from the striga spp seeds.

- Intercropping, through intercropping the striga spp can be reduced forexample when veriou crops are intercroped forexample legume to gether with the cerial crops it does not give a ~~chang~~ the chance for the striga spp to grow hence ~~can~~ striga spp is controlled.

- Planting of striga resistant varieties, through planting the varieties which are resistant to striga spp this will help to controll the infestation of the striga spp. Forexample restant varieties help to prevent the growth of the striga spp.

- Application of ~~pesticide~~ herbicide. Through the ~~application~~ of ~~pest~~ ~~het~~ herbicide will help to reduce the problem of ~~pest~~ striga spp. Forexample chemicals that kill striga sp should be applied.

Extract 13.1: *A sample of candidates' good responses in Question 3*

On the other hand, 40.8 percent of the candidates failed to describe ways to be taken in order to control *Striga spp.* The candidates' responses focused on the adaptation of *Striga spp* to its environment and methods of controlling other weeds apart from *Striga spp*. The candidates' responses were such as: *its method of reproduction, resistance to adverse condition* and *grazing animals in the farm*. These responses suggest that candidates lacked knowledge and skills on ways of controlling different weed species. Extract 13.2 represents a sample of poor responses from one of the candidates.

03. (i) – Ways to be taken inorder to control weeds.

(i) To determine the lifecycle of the weed, This will be taken inorder to control weed for a certain Specified measure. like the perennial weeds are requiring use of herbicide and also heavy tillage inorder to remove the different parts In the Soil which are storage parts.

(ii) To determine the habits of the weed and its habitats, These will help a person who controlling weed to know the which way In which a person will use to control the certain weed at certain areas.

(iii) Dispersal mechanisms, This will help to determine in which way can be control weed. either by chemical or mechanical methods. Inorder to select → better ways of controlling the weed of the plant.

3 (iv) To determine the morphology of the weed, This will help to determine the method of controlling of weed ie having the broad or Narrow leaved helps to know which will be sufficient to control ~~the~~ a weed.

(v) Plant species. Must knowing the planting species inorder to control because there is other species which are difficult to control like the couch grass and Wondering jews, so required to knowing the species of the weed Inorder to propose a control to be taken.

(vi) Storage organ, this will help to choose the method which will controlling all plant due to the other plants which destroyed the leaf only. So after determination of the storage of the plant will determine which method are good to be used.

Extract 13.2*: A sample of candidates' poor responses in Question 3*

In Extract 13.2, the candidate had poor understanding on specific ways of controlling *Striga spp* hence provided incorrect responses in all parts of the question.

2.2.4 Question 4: Plant Diseases

The question comprised of parts (a) and (b) carrying a total of 10 marks. The candidates were required to: (a) justify the contention that 'plant disease are harmful' by giving four points and (b) (i) give three symptoms which might be observed to enable the farmer to identify Maize Streak Virus Disease, (ii) suggest six control measures of maize streak disease.

The question was attempted by 627 (99.8%) candidates, out of which 18 (2.9%) scored from 0.5 to 3 marks, 190 (30.3%) scored from 3.5 to 5.5 marks and 419 (66.8%) scored from 6 to 9.5 marks. Figure 14 illustrates candidates' performance in this question.

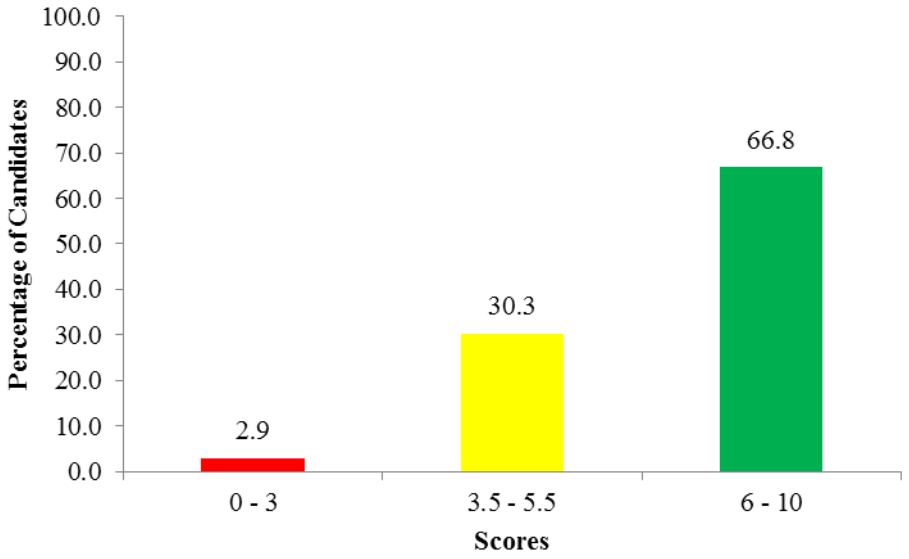


Figure 14: *Distribution of candidates' scores in Question 4*

According to Figure 14, 66.8 percent of the candidates scored high (6-10) marks. The analysis indicates that, 97.1 percent of these candidates managed to justify the contention that "plant diseases are harmful". Furthermore, they managed to identify symptoms of Maize Streak Virus Disease in part (b) (i) and consequently suggested correctly control measures for the disease in part (b) (ii). However, in both parts of the question some candidates provided incorrect responses hence could not score full marks. Extract 14.1 is one of the good responses by one of the candidates.

4. (a)

→ Plant diseases leads to food poisoning e.g poisoning of cereal grains.

→ Plant diseases leads to reduction in the quality of farm products due to harmful effects they cause to plants and crops.

→ Plant diseases leads to decreased crop yield, due to spending much energy by the plants in acquiring tolerance to the disease.

→ Plant diseases reduces the number of plants that can be grown in an area, because they limit the ~~are~~ area and causes much death to plants

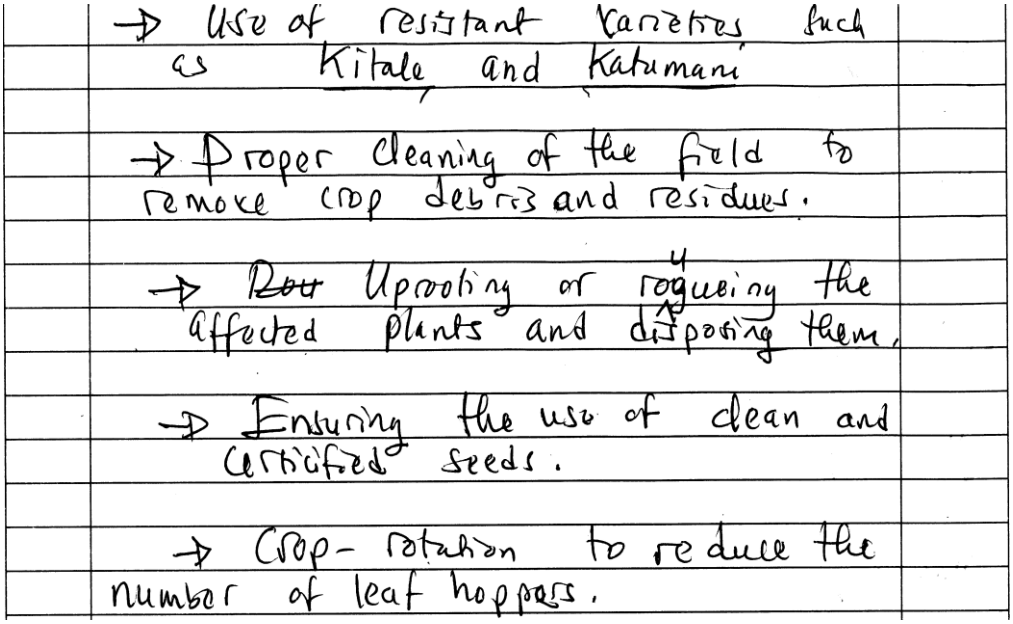
(b) (i)

→ Parallel yellowish lines in the veins along the leaves.

→ Stunted growth.

→ Poor filled or unfilled cobs with grains.

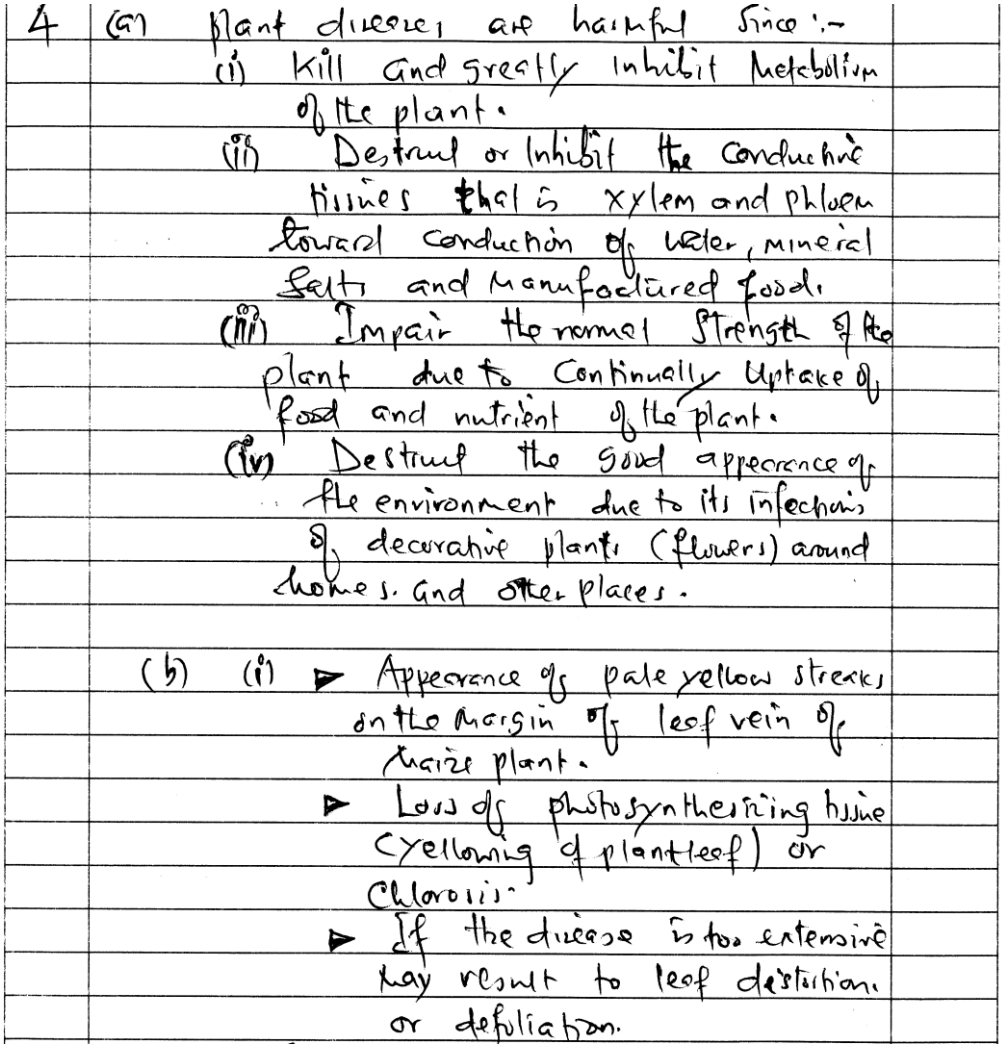
(ii) → Control of leaf hoppers (scanduling mbila) which transmit the disease by insecticides.



Extract 14.1: *A sample of candidates' good responses in Question 4*

In Extract 14.1, the candidate had almost all responses correct except in part (a) where only one point was incorrect.

On the contrary, 2.9 percent of the candidates had almost all parts of the question incorrectly attempted. In part (a), majority of the candidates failed to justify the contention that "plant diseases are harmful". The candidates provided incorrect responses such as: *they lead to bad taste of food, plant disease may lead to poor soil and lead to death of other plant species.* These responses justify that they had insufficient knowledge on the effect of plant diseases. Furthermore, in part (b) (i), the focus of the candidates' responses was on the symptoms of other diseases of maize rather than Maize Streak Virus such as: *leave curling, die back of the leaves, death of the plant root, decay of stem and gummosis*. These incorrect responses led the candidates/ failure to suggest control measures in (b) (ii). This indicates candidates' poor understanding on maize plant diseases. Extract 14.2 presents a sample of poor responses by one of the candidates.


4 (a) Plant diseases are harmful since :-
(i) Kill and greatly inhibit Metabolism of the plant.
(ii) Destruct or Inhibit the Conductive tissues that is xylem and phloem toward conduction of water, mineral salts and Manufactured food.
(iii) Impair the normal Strength of the plant due to Continually Uptake of food and nutrient of the plant.
(iv) Destruct the good appearance of the environment due to its infections of decorative plants (flowers) around homes and other places.

(b) (i)
- Appearance of pale yellow streaks on the margin of leaf vein of maize plant.
- Loss of photosynthesizing tissue (yellowing of plant leaf) or Chlorosis.
- If the disease is too extensive may result to leaf destruction or defoliation.

Extract 14.2: *A sample of candidates' poor responses in Question 4*

In Extract 14.2, the candidate lacked knowledge on plant diseases except in part (b) (ii) where only one point was correct.

2.2.5 Question 5: Plant Breeding

The candidates were required to argue for and against the use of pure line selection in plant breeding by giving five points in each case. The question carried 10 marks.

The question was attempted by 598 (95.2%) candidates, in which 148 (24.7%) scored from 0 to 3 marks, 192 (32.2%) scored from 3.5 to 5.5 marks, and 258 (43.1%) scored from 6 to 10 marks. Figure 15 illustrates candidates' scores in this question.

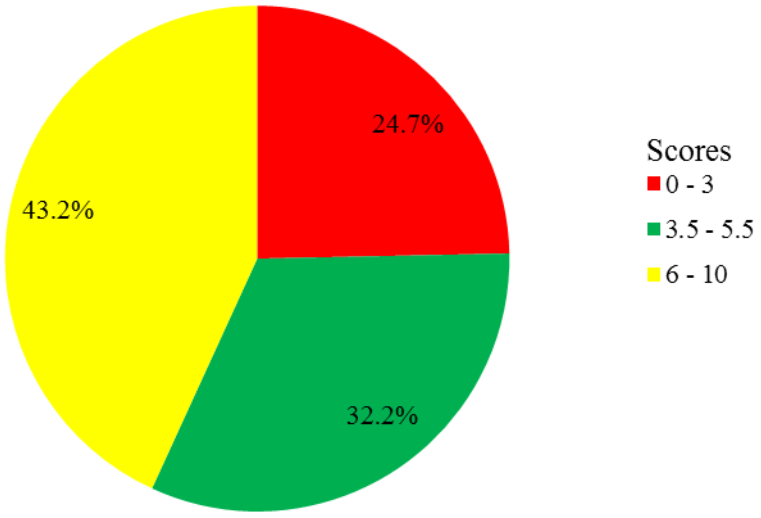
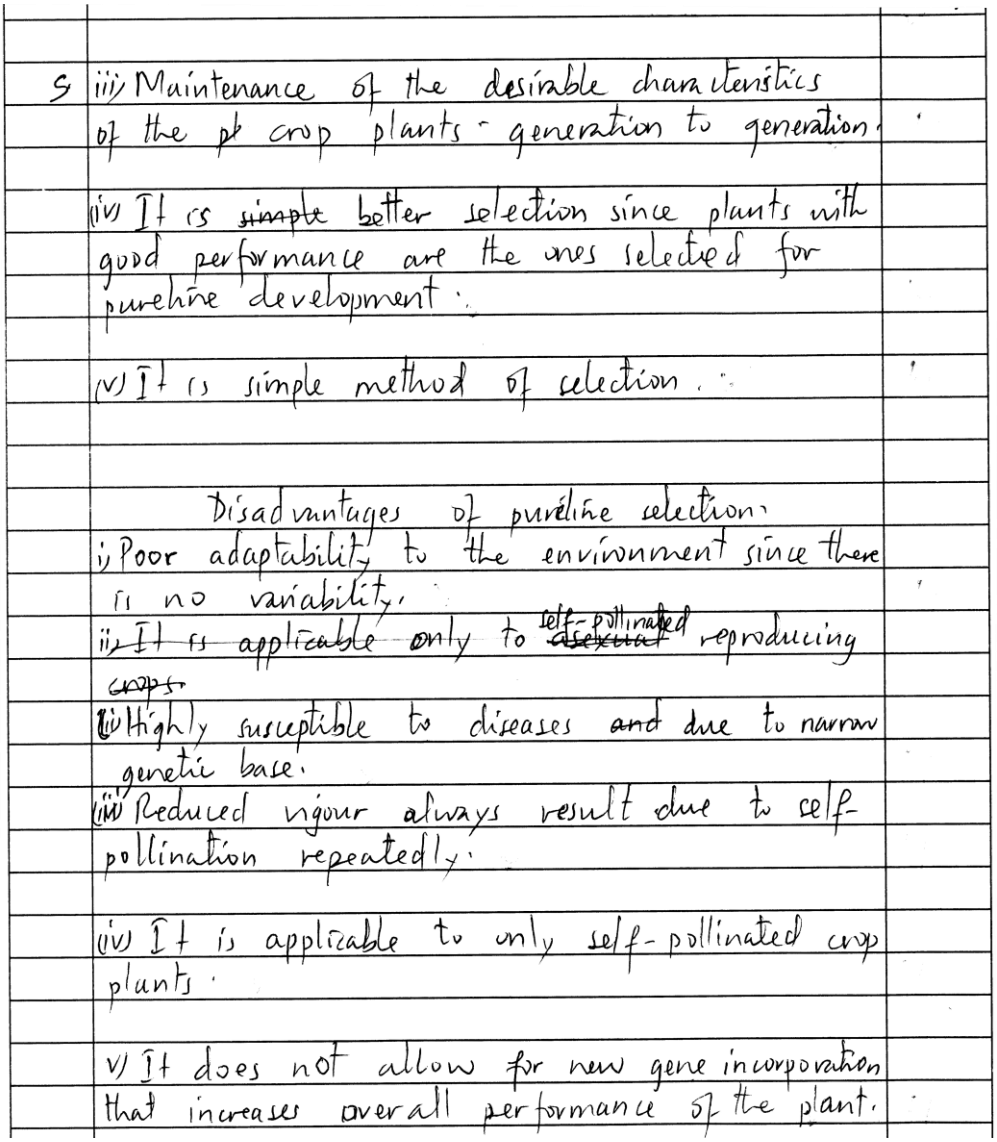


Figure 15: *Distribution of candidates' scores in Question 5*

According to Figure 15, majority (43.2%) of the candidates had average scores (3.5-5.5) while a few (32.2%) had high (6-10) marks. However, 24.7% candidates failed. The analysis shows that, 75.3 percent candidates managed to argue for and against the use of pure line selection in plant breeding. Candidates' correct responses were due to their understanding on advantages and disadvantages of pure line selection. Nevertheless, some of the candidates did not exhaust all the correct points in arguing for and against the use of pure line selection in plant breeding hence could not score full marks. Extract 15.1 presents a sample of good responses by one of the candidates.

5. Importance of pureline selection.
i) Creation of uniformity of plants with good or desirable characteristics.
ii) There is no contamination with the other varieties which can reduce or contaminate the desirable characteristics of plants or purelines.


5 iii) Maintenance of the desirable characteristics of the pt crop plants - generation to generation.

iv) It is ~~simple~~ better selection since plants with good performance are the ones selected for pureline development.

v) It is simple method of selection.

Disadvantages of pureline selection.

i) Poor adaptability to the environment since there is no variability.

ii) ~~It is applicable only to asexual~~ self-pollinated reproducing ~~crops~~.

iii) Highly susceptible to diseases ~~and~~ due to narrow genetic base.

iii) Reduced vigour always result due to self-pollination repeatedly.

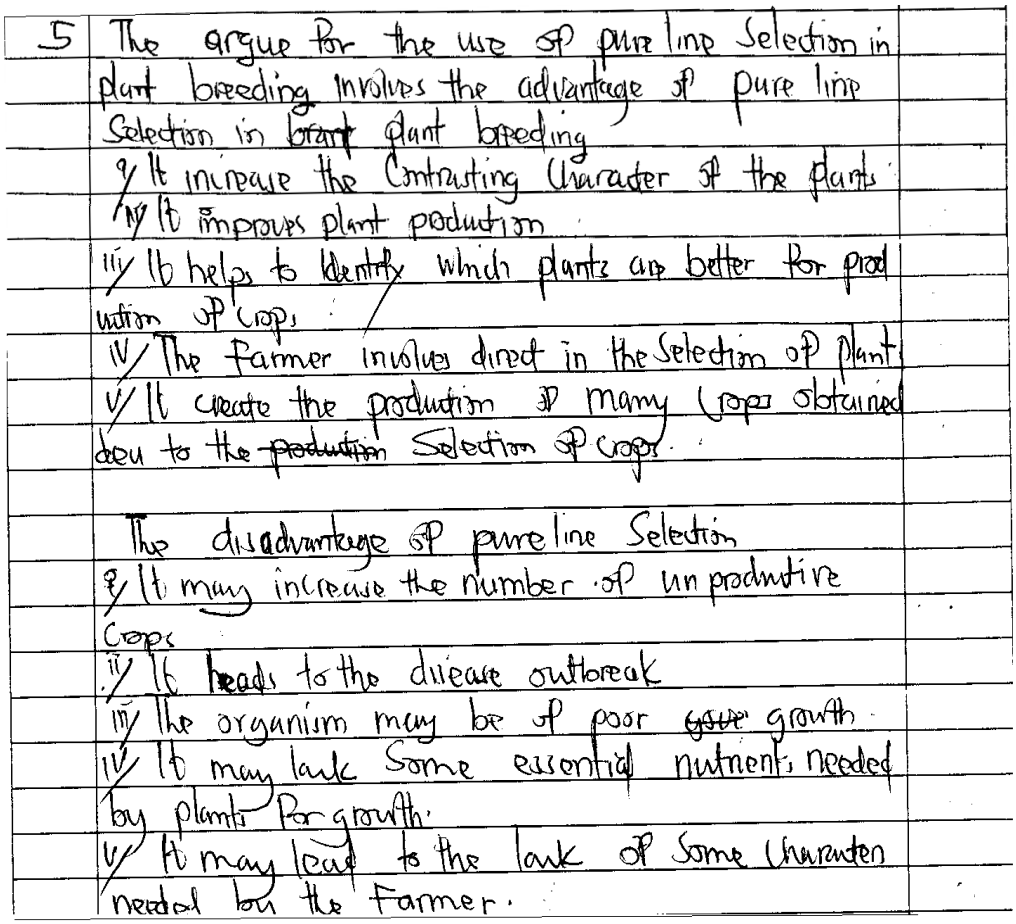
iv) It is applicable to only self-pollinated crop plants.

v) It does not allow for new gene incorporation that increases overall performance of the plant.

Extract 15.1: *A sample of candidates' good responses in Question 5*

On the other hand, 24.7 percent candidates provided incorrect responses to almost all parts of the question. The candidates mixed up pureline selection with other methods of plant breeding hence failed to provide correct responses. Some examples of incorrect responses provided by the candidates in arguing for were: *It is useful method in few plants, plants produced have different traits, high trait heritability is improved and it does not fix traits*. Furthermore, in arguing against, incorrect responses such as *it occur only in cross pollinated flowers, pure line can show proper arrangement of the breed and high value* were provided. This was due to the candidates' insufficient

knowledge and skills on plant breeding methods. Extract 15.2 presents a sample of poor responses from one of the candidates.


5 The argue for the use of pure line Selection in plant breeding involves the advantage of pure line Selection in ~~brant~~ plant breeding
i/ It increase the Contrasting Character of the plants
ii/ It improves plant production
iii/ It helps to identify which plants are better for production of crops
iv/ The farmer involves direct in the Selection of plant
v/ It create the production of many crops obtained dou to the ~~production~~ Selection of crops

The disadvantage of pure line Selection
i/ It may increase the number of unproductive Crops
ii/ It leads to the disease outbreak
iii/ The organism may be of poor ~~gose~~ growth
iv/ It may lack Some essential nutrients needed by plants for growth.
v/ It may lead to the lack of Some Characters needed bou the Farmer.

Extract 15.2: *A sample of candidates' poor responses in Question 5*

In Extract 15.2, the candidate failed to argue for and against, showing lack of knowledge on plant breeding. He/she provided incorrect responses to all parts of the question.

2.2.6 Question 6: Livestock Reproduction, Breeding and Improvement

The candidates were required to describe the ways of collecting semen by using artificial vagina in a cattle by giving seven points. The question carried 10 marks.

The question was attempted by 602 (95.9%) candidates, whereby 154 (25.6%) scored from 0 to 3 marks, 177 (29.4%) scored from 3.5 to 5.5 marks and 271 (45%) scored from 6 to 10 marks. The distribution of the candidates' scores is shown in Figure 16.

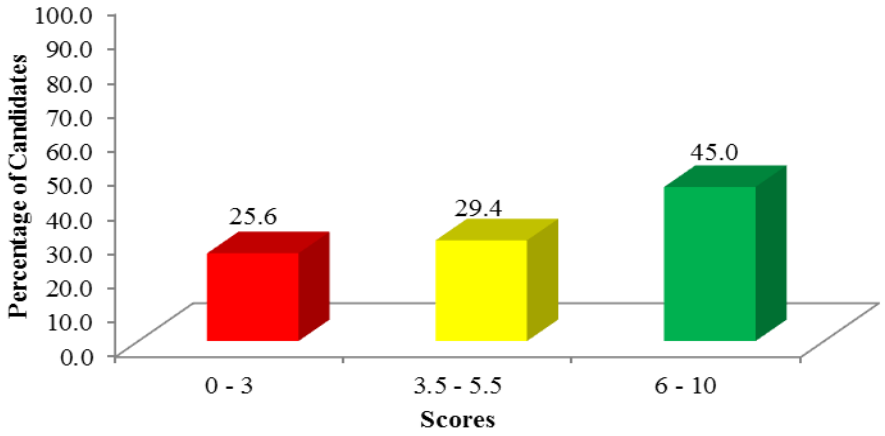
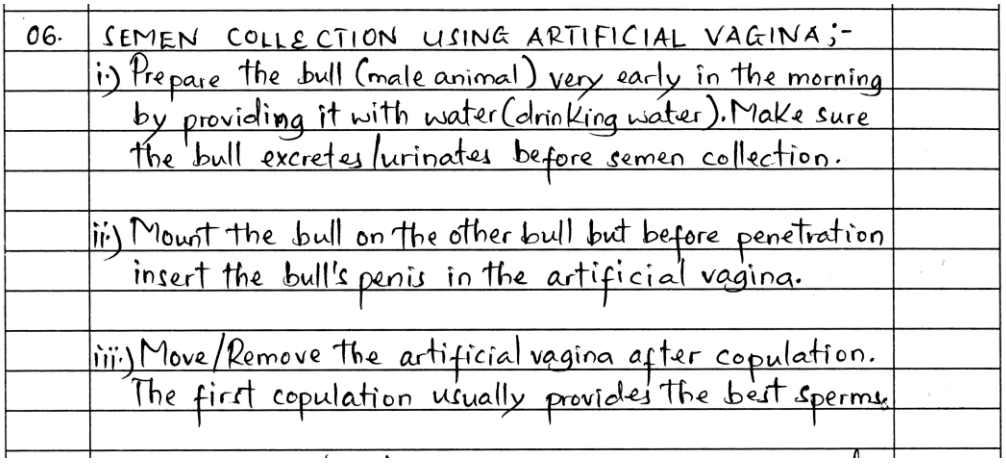


Figure 16 Distribution *of candidates' scores in Question 6*

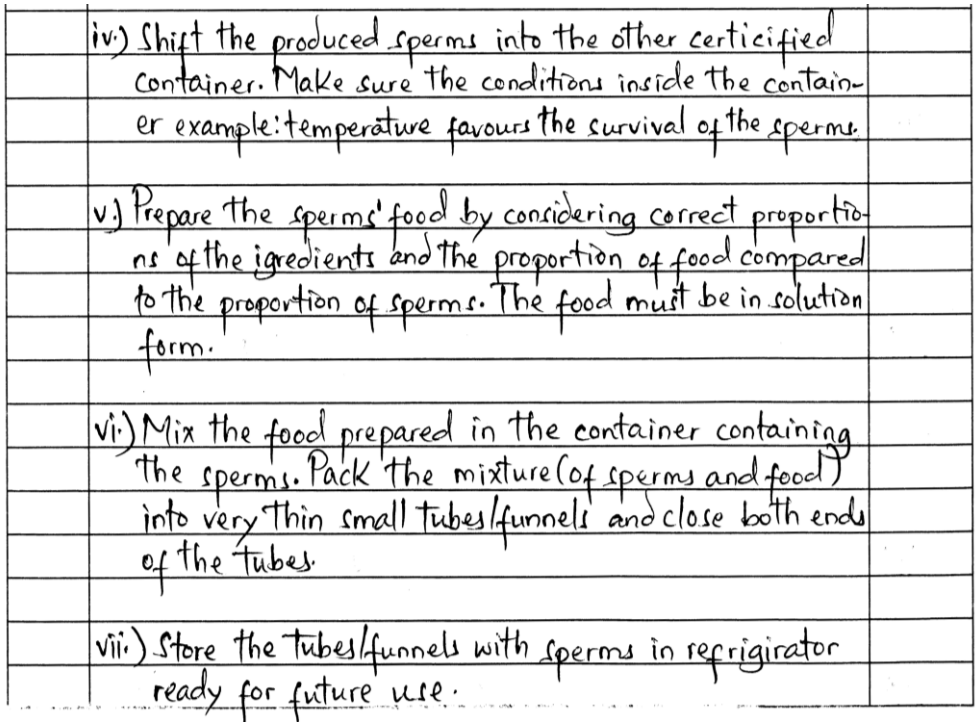
Figure 16 show that, majority (45.0%) of the candidates scored high (6-10) marks and a few (25.6%) had low (0-3) marks. Since 74.4 percent of the candidates scored from 3.5 to 10 marks, the performance was good. The analysis shows that, 74.4 percent of the candidates were knowledgeable enough on livestock breeding techniques in farm animals as they correctly described the procedures of collecting the semen using artificial vagina. However, it was observed that, though some of the candidates provided correct responses for the procedures, they did not arrange them in a systematic order. Furthermore, few candidates did not exhaust all the needed procedures for semen collection using artificial vagina in a cattle hence could not score full marks. Extract 16.1 is one of the good responses from one of the candidates.


06. SEMEN COLLECTION USING ARTIFICIAL VAGINA;-

i.) Prepare the bull (male animal) very early in the morning by providing it with water (drinking water). Make sure the bull excretes/urinates before semen collection.

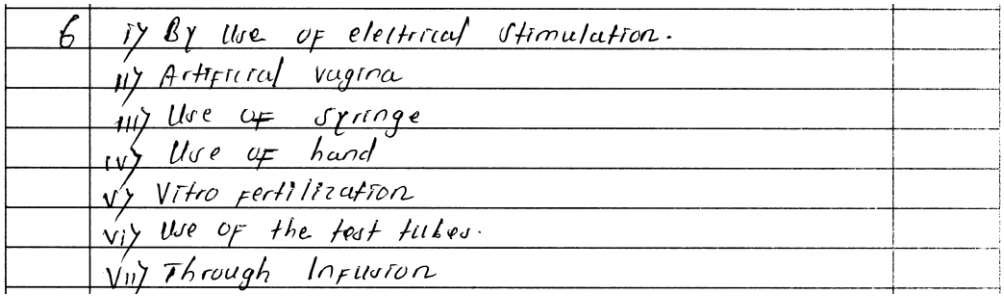
ii.) Mount the bull on the other bull but before penetration insert the bull's penis in the artificial vagina.

iii.) Move/Remove the artificial vagina after copulation. The first copulation usually provides the best sperms.



Extract 16.1: *A sample of candidates' good responses in Question 6*

On the contrary, the majority of the candidates with poor performance had their responses focusing on different ways of collecting semen from the bull using various equipment and not artificial vagina only. The candidates provided incorrect responses such as: *use of breed bag method, massage method, use of electrical stimulation, by use of special equipment, spraying the chemical into artificial vagina* and *semen recovering from cow vagina soon after mating.* However, few candidates managed to outline few correct procedures to be taken during semen collection using artificial vagina in cattle, hence scored low marks. Extract 16.2 is one of the poor responses from one of the candidates.



Extract 16.2: *A samples of candidates' poor responses in Question 6*

In Extract 16.2, the candidate focused his/her responses on ways of collecting semen using various methods and not specifically on artificial vagina.

2.2.7 Question 7: Introduction to Animal Nutrition

The candidates were required to describe the function of the parts of the digestion system in poultry with the aid of an illustration. The question carried 10 marks.

The question was attempted by 617 (98.2%) candidates, whereas 73 (11.8%) scored from 0 to 3 marks, 181 (29.4%) scored from 3.5 to 5.5 marks and 363 (58.8%) scored from 6 to 10 marks. Figure 17 summarizes candidates' performance in the question.

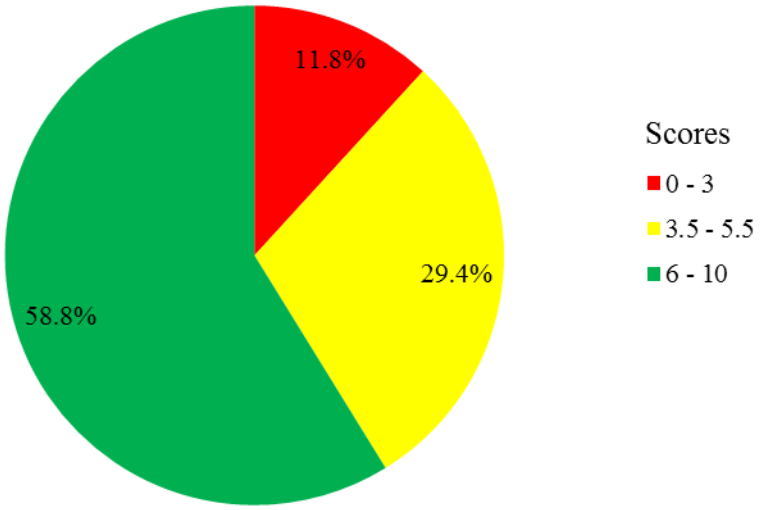


Figure 17*: Distribution of candidates scores in Question 7*

Figure 17 indicates that, 58.8 percent scored high (6-10) marks while 29.4 percent scored average (3.5-5.5) marks. However, 11.8 percent candidates failed. The analysis shows that, 88.2 percent of the candidates managed to describe functions of the parts of the digestive system in poultry. However, it was observed that, besides describing accurately the functions, some of the candidates were unable to draw and label correctly the digestive system in poultry, hence could not score full marks. Extract 17.1 is one of the good responses by one of the candidates.

• Oesophagus

- This is the tubular like structure between the mouth and crop. Its function is to allow the passage of the material (food material) to crop.

• Crop

This is the sac like structure which is connected to oesophagus. It's function is to receives food material from through oesophagus and store is temporary

• Proventriculus

- This is the second sac like structure from the crop which receives the food material from the crop and transport them to gizzard.

• Gizzard

This is the sac like structure which inside contain muscular to gether with sand which used to grind the food material from coarse form into fine form.

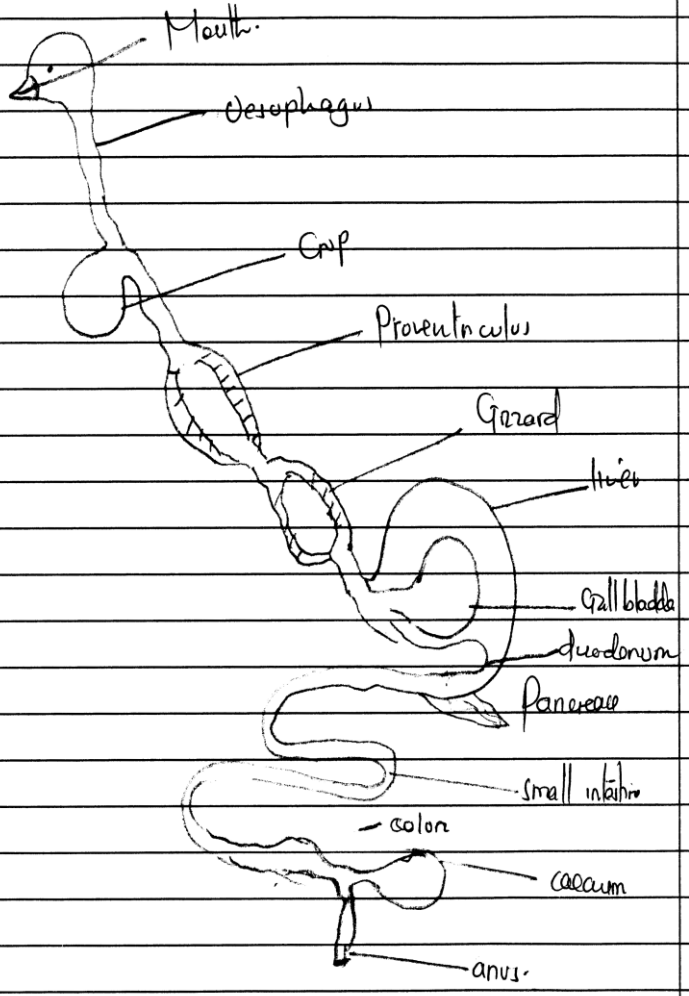
• Liver

- This organ responsible for production of bile.

• Duodenum

- This is the vital organ which produce pancreatic juices such lipase responsible for digestion of lipid into fatty acid, amylase responsible for digestion of carbohydrate into maltose and trypsin for digestion of protein into amino acid.

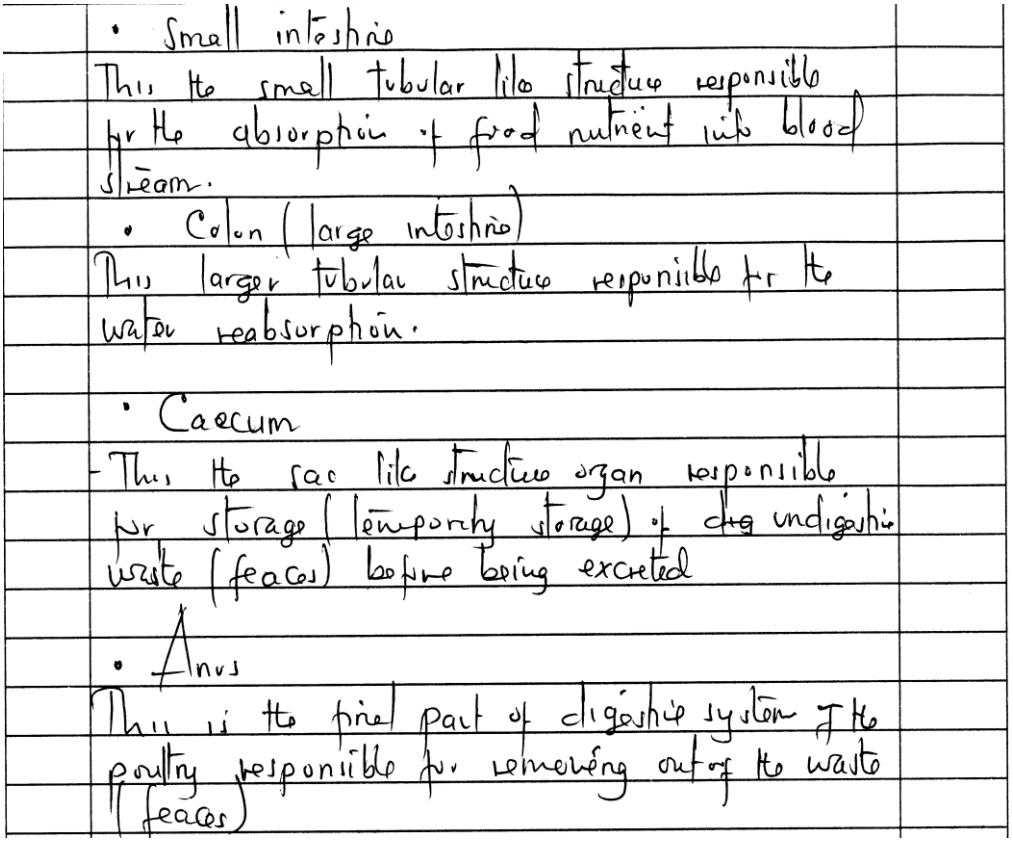
7. DIAGRAM OF POULTRY SHOWING PART OF DIGESTIVE SYSTEM.



Function of each part

- Mouth

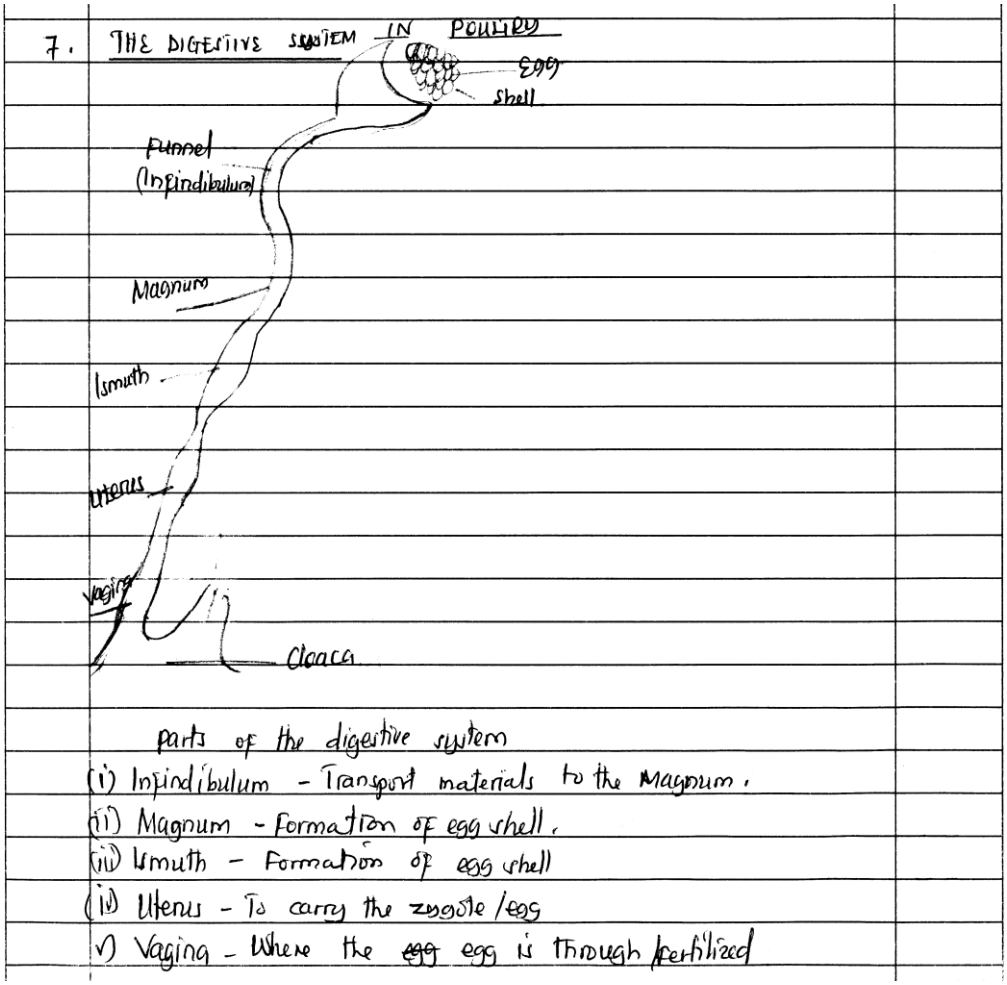
- This is the initial part in digestive system which involve in picking of food material such as maize grain inside the body.



Extract 17:1: *A sample of candidates' good response in Question 7*

In Extract 17.1, the candidate correctly drew and labeled the digestive system in poultry with correct descriptions of the functions of the system parts.

On the contrary, the candidates with low (0-3) mark, did not only failed to draw and label the digestive system in poultry but also failed to describe the functions of parts of digestive system in poultry. Examples of incorrect responses were: *mouth is used for swallowing, pancrease is used to secrete juice and duodenum is used to produce juice for digestion*. These responses justify possession of inadequate knowledge on poultry digestive system. However, a few candidates mixed up digestive system and reproductive system in poultry. Extract 17.2 is one of the incorrect responses by one of the candidates.



Extract 17.2: *A sample of candidates' poor responses in Question 7*

In Extract 17.2, the candidate drew the reproductive system instead of digestive system of poultry.

2.2.8 Question 8: Pasture Agronomy

The question had parts (a) and (b) carrying a total of 10 marks. The candidates were required to: (a) briefly explain four limitations of natural pastures in livestock production in Tanzania and (b) give five points to educate livestock keeper in Tanzania on how to overcome limitations of natural pastures.

The question was attempted by 626 (99.7%) candidates, out of which 276 (44.1%) scored from 0 to 3 marks, 271 (43.3%) scored from 3.5 to 5 marks, and 79 (12.6%) scored from 6 to 9 marks. Figure 18 summarizes candidates' performance in this question.

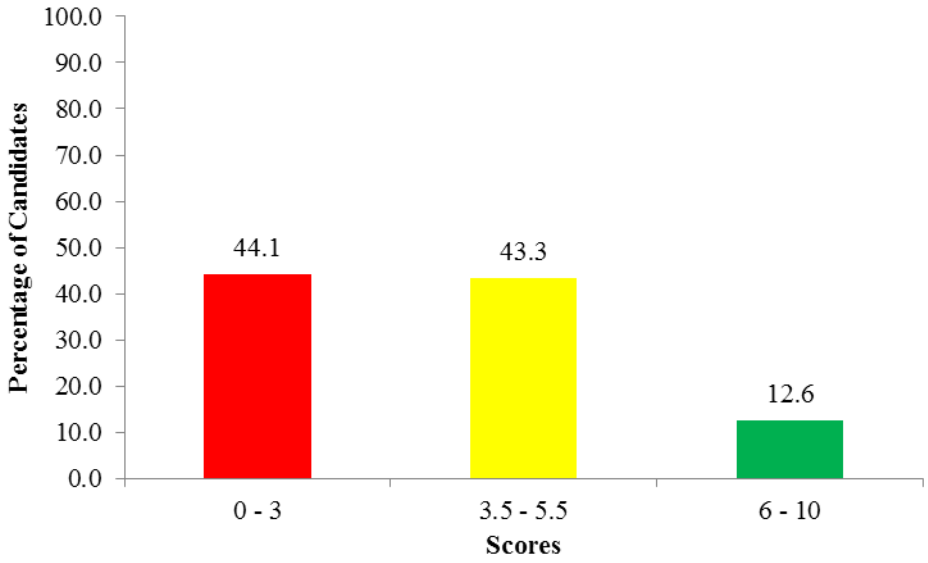
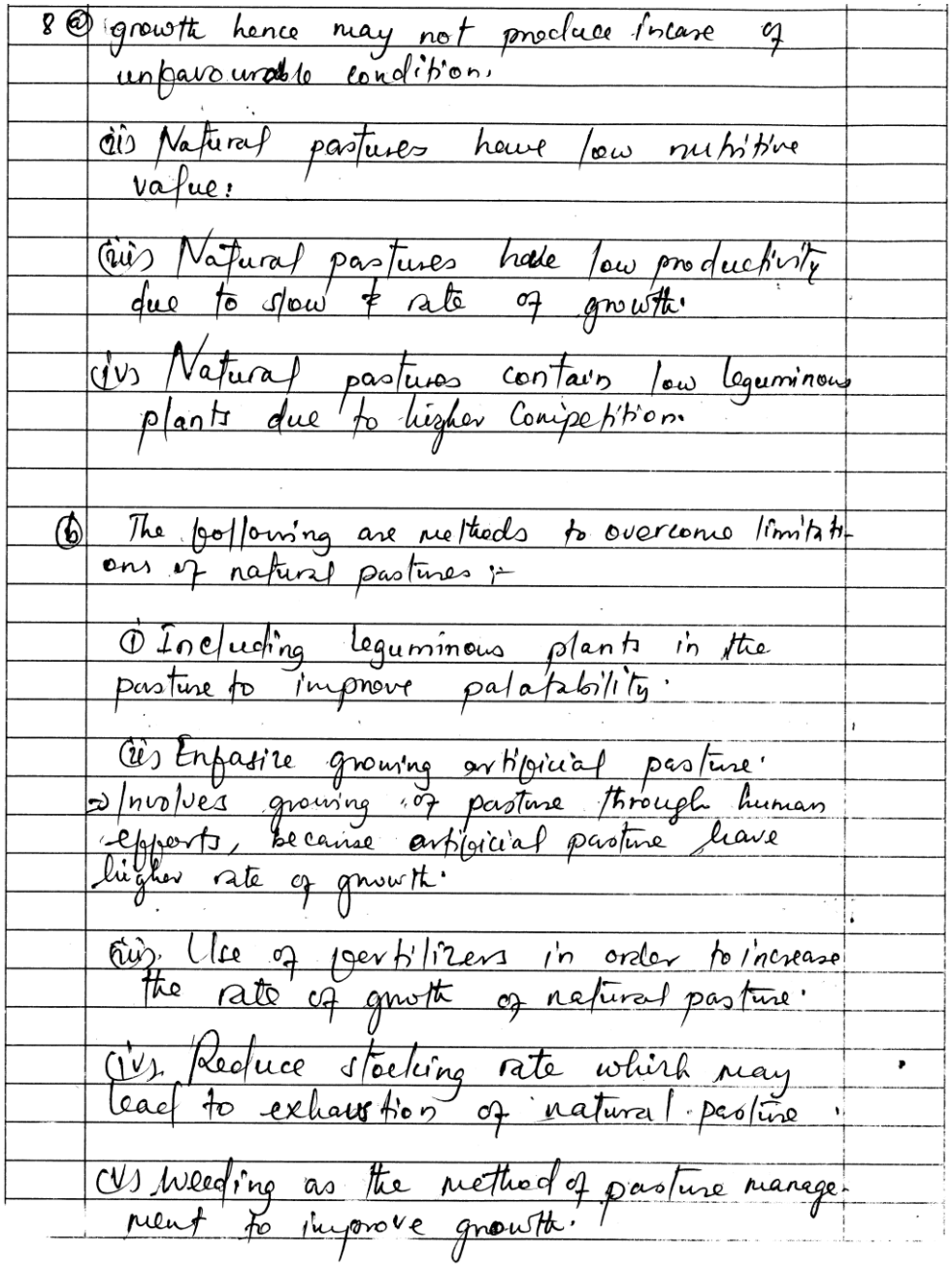


Figure 18: *Distribution of candidates' scores in Question 8*

Figure 18 shows that, 43.3 percent of the candidates scored from 3.5 to 5.5 marks which is average performance. 12.6 percent scored high (6 – 10) marks. The analysis of the responses indicates that, 55.9 percent of the candidates managed to explain correctly the limitations of natural pastures in livestock production. Likewise, they were also able to give points to educate livestock keepers on how to overcome limitation of natural pastures in part (b). Correct responses given by the candidates indicate that they had adequate knowledge on natural pastures. Extract 18.1 is one of the good responses by one of the candidates.

8 (a) The following are limitations of natural pasture in livestock production:

(i) Natural pastures have slow rate of


8 (a) growth hence may not produce incase of unfavourable condition.

(ii) Natural pastures have low nutritive value.

(iii) Natural pastures have low productivity due to slow & rate of growth.

(iv) Natural pastures contain low leguminous plants due to higher Competition.

(b) The following are methods to overcome limitations of natural pastures :-

① Including leguminous plants in the pasture to improve palatability.

(ii) Enfasize growing artificial pasture.
⇒ Involves growing of pasture through human efforts, because artificial pasture have higher rate of growth.

(iii) Use of fertilizers in order to increase the rate of growth of natural pasture.

(iv) Reduce stocking rate which may leaf to exhaustion of natural pasture.

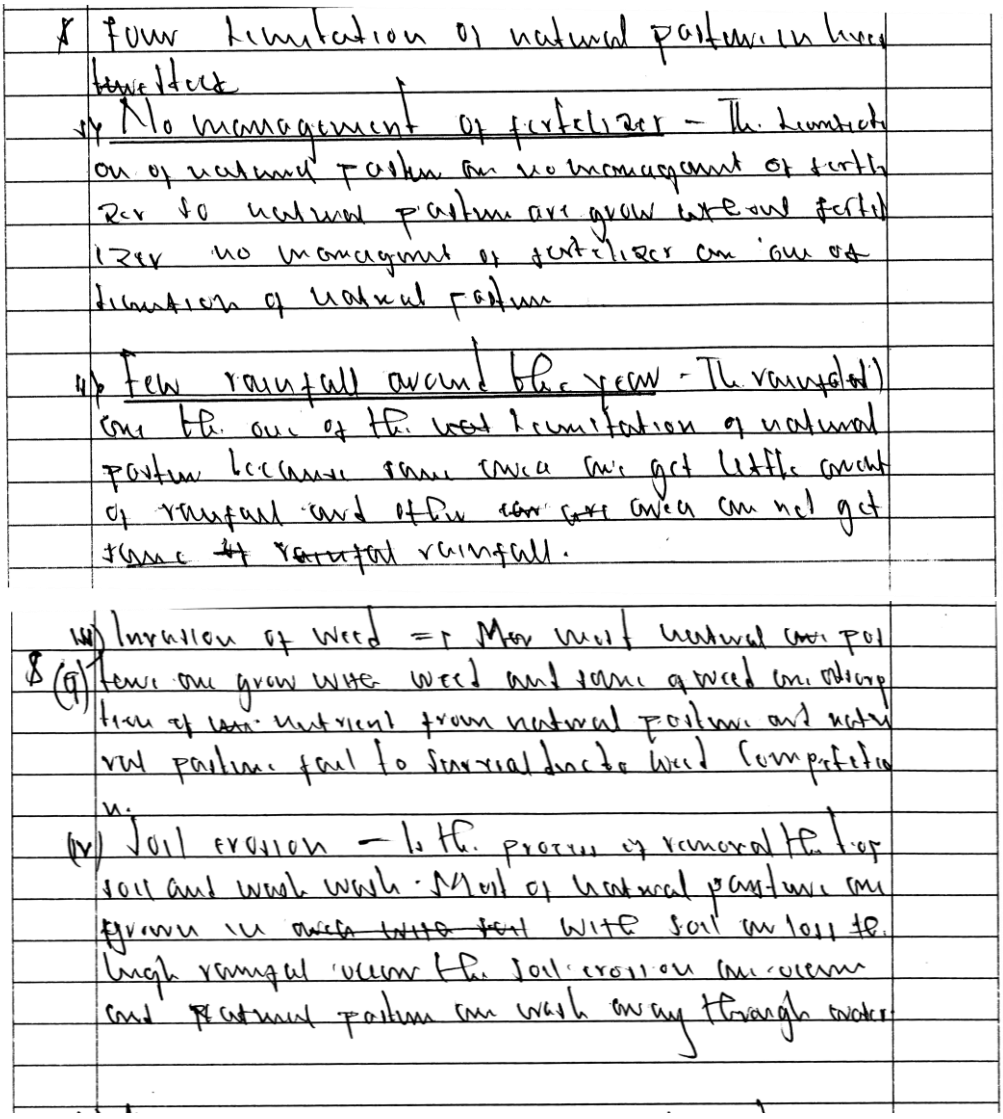
(v) Weeding as the method of pasture management to improve growth.

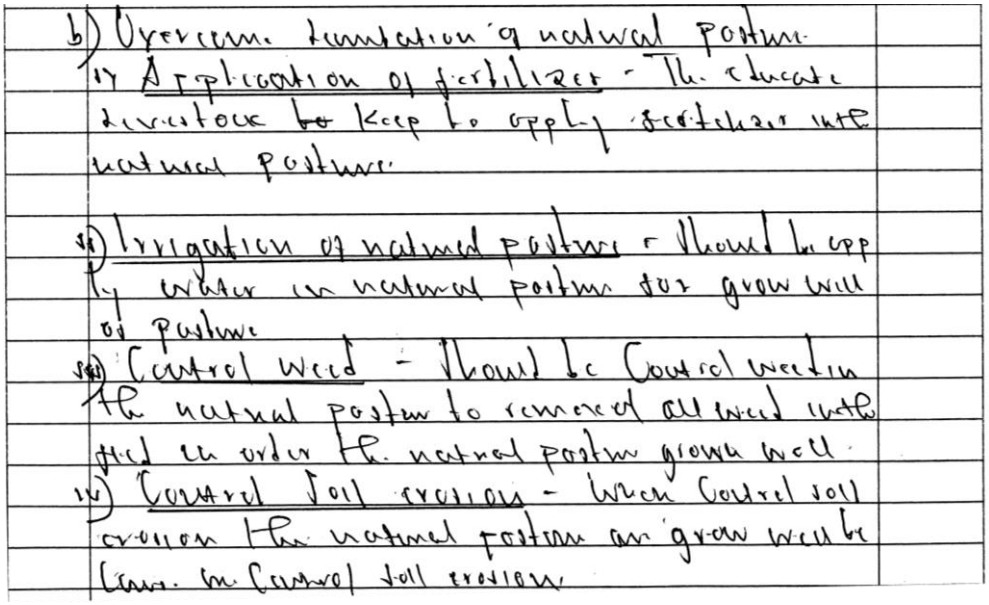
Extract 18.1: *A sample of candidates' good responses in Question 8*

In Extract 18.1, the candidate was able to state the limitations of natural pastures and the ways to overcome the limitations except only one point in each part (a) and (b).

On the other hand, it was noted that the candidates who performed poorly (44.1%) had their responses focusing on factors affecting soil fertility instead of limitation of natural pastures. They provided incorrect responses such as:

soil erosion management, harvesting of pasture, weeding in the pasture and shifting cultivation. Similarly, in part (b), the candidates failed to point out the ways to overcome limitations of natural pasture by stating ways of establishing artificial pastures. Examples of incorrect responses provided were such as; *seeding, fertilizer application, harvesting and watering.* The incorrect responses given by the candidates exhibit insufficient knowledge and skills on natural pasture. However, a few candidates managed to point out some ways that could be used to overcome limitations of natural pastures, hence scored few marks. Extract 18.2 is one of the poor responses by one of the candidates.




b) Overcome formation of natural pasture
i) Application of fertilizer - The educate livestock to keep to apply fertilizer into natural pasture.
ii) Irrigation of natural pasture - Should be apply water in natural pasture for grow well of pasture
iii) Control weed - Should be Control weed in the natural pasture to removed all weed with feed in order the natral pasture grows well.
iv) Control soil erosion - When Control soil erosion the natural pasture can grow well be Learn. to Control soil erosion.

Extract 18.2: *A sample of candidates' poor responses in Question 8*

Responses in Extract 18.2, suggest that the candidate had poor undestanding on pasture agronomy, hence he/she responded incorrectly in all parts of the question.

2.2.9 Question 9: Environmental and Technological Challenges in Agricultural Development

The candidates were required to briefly explain to what extent is genetic engineering important in agriculture by giving five points.

The question was attempted by 628 (100%) candidates, out of which 13 (2.1%) scored from 0 to 3 marks, 65 (10.3%) scored from 4 to 5.5 marks and 550 (87.6%) scored from 6 to 10 marks. Figure 19 presents the distribution of the candidates score.

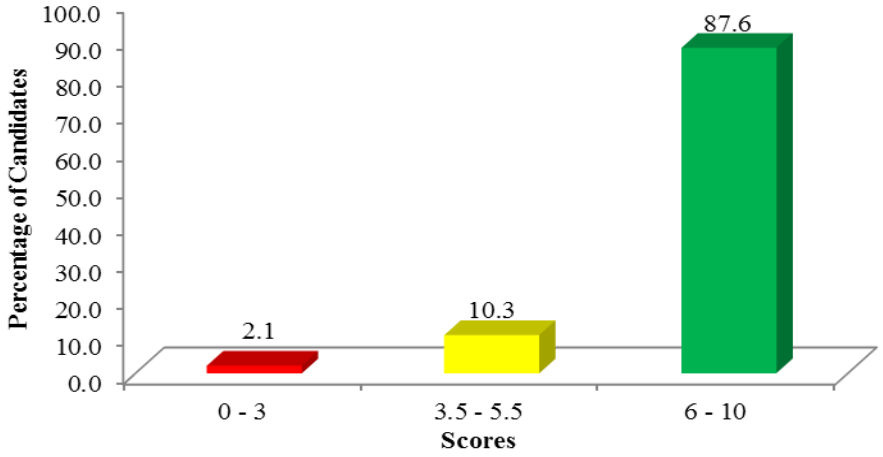
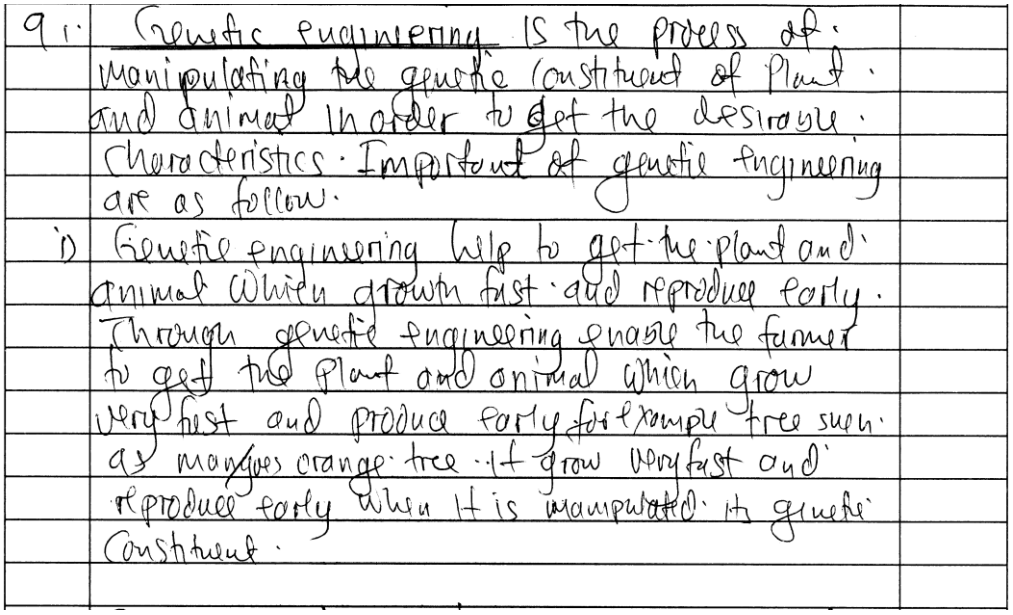
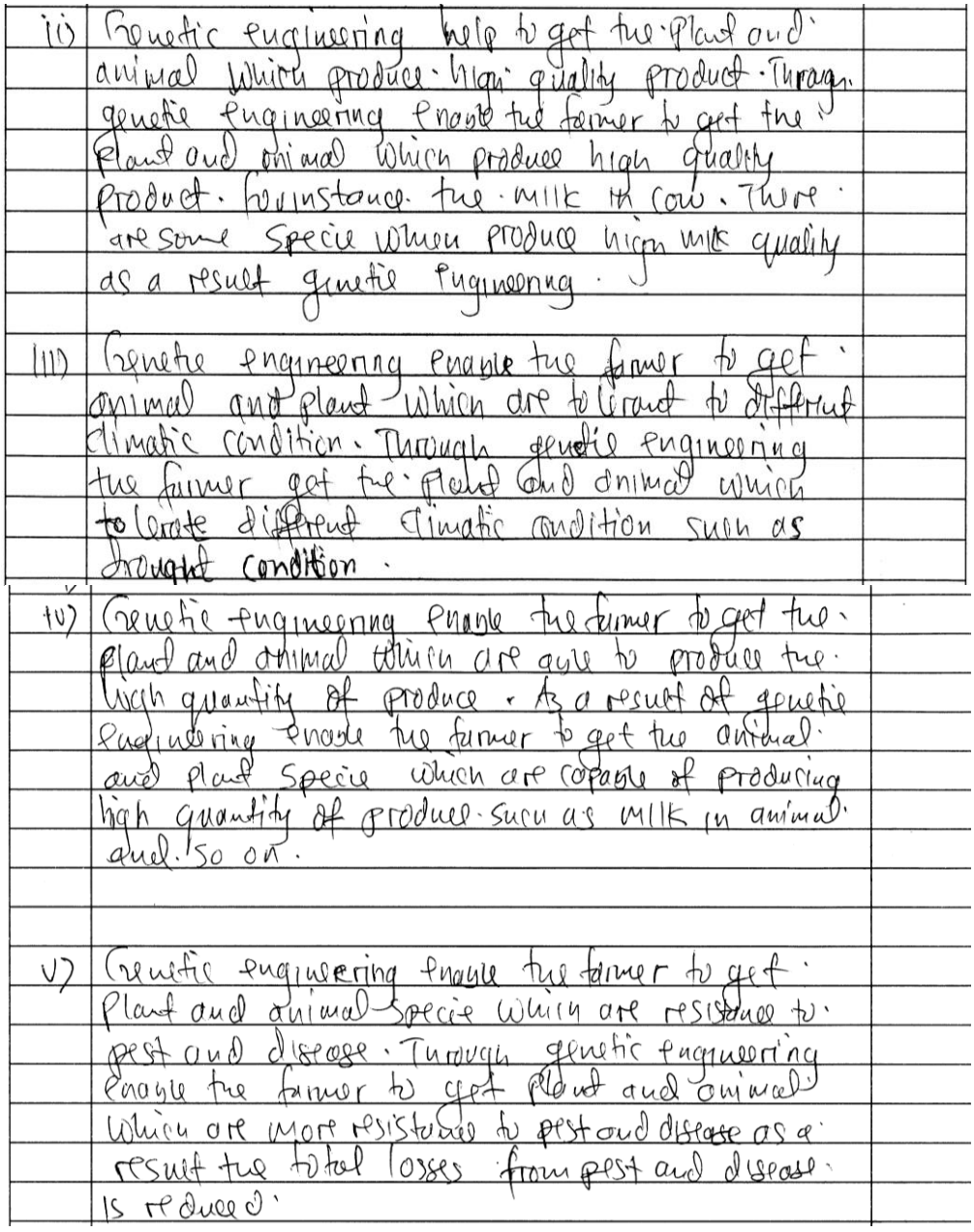


Figure 19*: Distribution of candidates' scores in Question 9*

Figure 19 shows that, 87.6 percent had high (6-10) marks. The analysis shows that, the candidates with good performance (97.9%) correctly explained the importance of genetic engineering in agriculture, signifying to have adequate knowledge on the subject matter. However, some of them could not score full marks because they failed to explain all five points. Extract 19.1 is one of the good responses by one of the candidates.

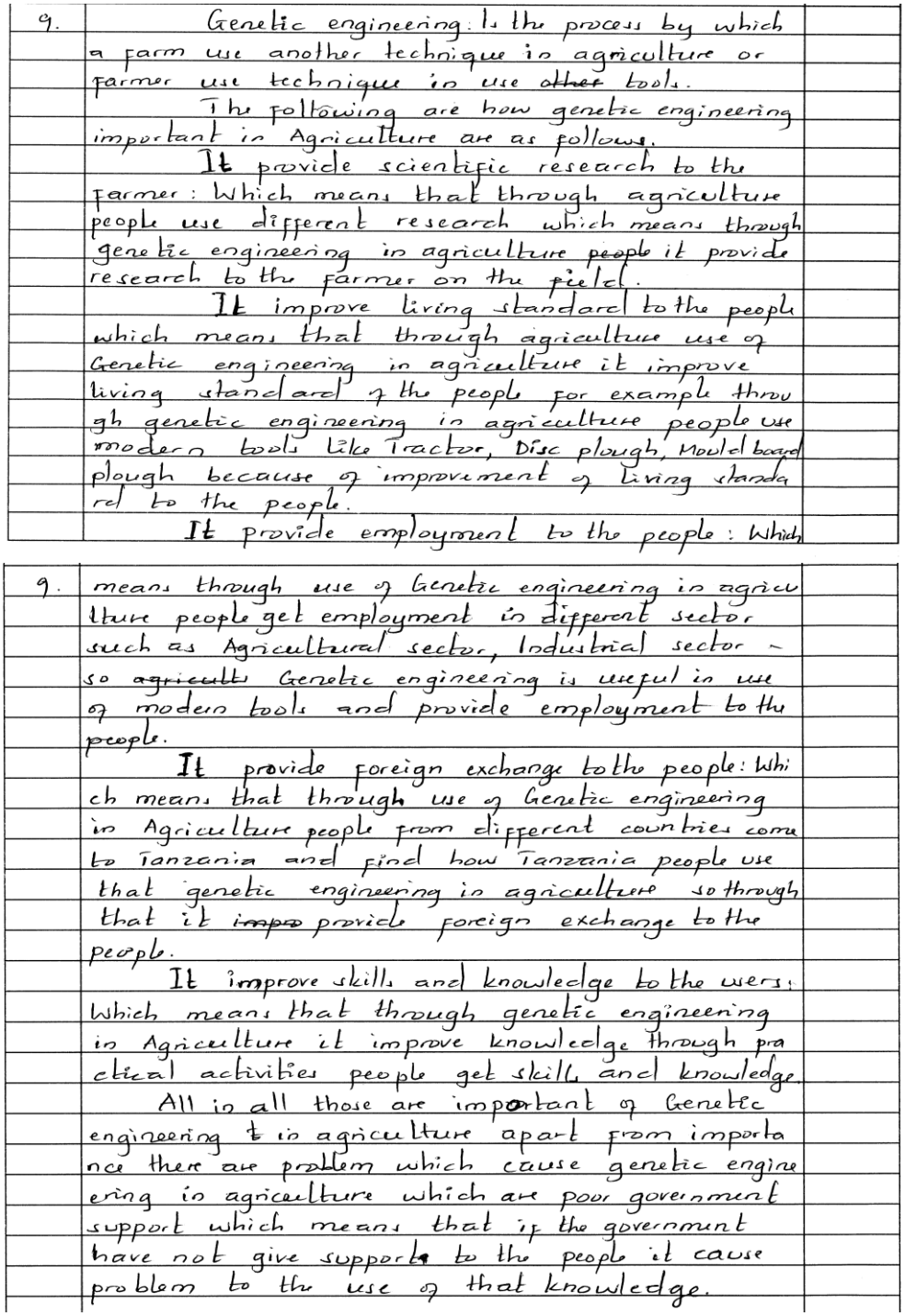

9 i. Genetic engineering is the process of manipulating the genetic constituent of plant and animal in order to get the desirable characteristics. Important of genetic engineering are as follow.

i) Genetic engineering help to get the plant and animal which growth fast and reproduce early. Through genetic engineering enable the farmer to get the plant and animal which grow very fast and produce early for example tree such as mangoes orange tree. It grow very fast and reproduce early when it is manipulated its genetic constituent.



Extract 19:1: *A sample of candidates' good responses in Question 9*

As far as, the candidates with poor (2.1%) performance are concerned, some focused their responses on the importance of agriculture instead of the importance of genetic engineering in agriculture. They provided incorrect responses such as: *promote economic develpmeny, insure availability of raw materials for the industries, provide employment* and *provide foreign currency*. Generally, the candidates were observed to have insufficient knowledge in the subject matter. Extract 19.2 is one of the poor responses by one of the candidates.



9. Genetic engineering: Is the process by which a farm use another technique in agriculture or farmer use techniques in use ~~other~~ tools.

The following are how genetic engineering important in Agriculture are as follows.

It provide scientific research to the farmer: Which means that through agriculture people use different research which means through genetic engineering in agriculture ~~people~~ it provide research to the farmer on the field.

It improve living standard to the people which means that through agriculture use of Genetic engineering in agriculture it improve living standard of the people for example through genetic engineering in agriculture people use modern tools like Tractor, Disc plough, Mould board plough because of improvement of living standard to the people.

It provide employment to the people: Which means through use of Genetic engineering in agriculture people get employment in different sector such as Agricultural sector, Industrial sector - so ~~agricult~~ Genetic engineering is useful in use of modern tools and provide employment to the people.

It provide foreign exchange to the people: Which means that through use of Genetic engineering in Agriculture people from different countries come to Tanzania and find how Tanzania people use that genetic engineering in agriculture so through that it ~~impro~~ provide foreign exchange to the people.

It improve skills and knowledge to the users: Which means that through genetic engineering in Agriculture it improve knowledge through practical activities people get skill and knowledge.

All in all those are important of Genetic engineering ~~t~~ in agriculture apart from importance there are problem which cause genetic engineering in agriculture which are poor government support which means that if the government have not give supports to the people it cause problem to the use of that knowledge.

Extract 19.2: *A sample of candidates' poor responses in Question 9*

In Extract 19.2, the candidate had his/her responses focusing on the importance of genetic engineering to farmers and not to agriculture.

2.2.10 Question 10: Introduction to Animal Health

The question was divided into three parts, namely (a), (b) and (c) carrying a total of 10 marks. The question presented results of microscopic examination on chicken faeces sample from which the farmer complained to have mucous like diarrhoea in which the presence of coccidian oocysts where diagnosed. The candidates where required to: (a) identify other six symptoms expected from a chicken in which the faeces sample were taken, (b) prescribe appropriate treatment for the infection of the chicken of which faeces were taken for laboratory examination and (c) suggest six measures to be taken by farmers to control and prevent infection of the parasite of which oocysts were observed in the faeces.

The question was attempted by 619 (98.6%) candidates. The statistics show that 77 (12.4%) scored from 0 to 3 marks, 303 (49%) scored from 3.5 to 5.5 marks, and 239 (38.6%) scored from 6 to 10 marks. Figure 20 present the distribution of the candidates' scores.

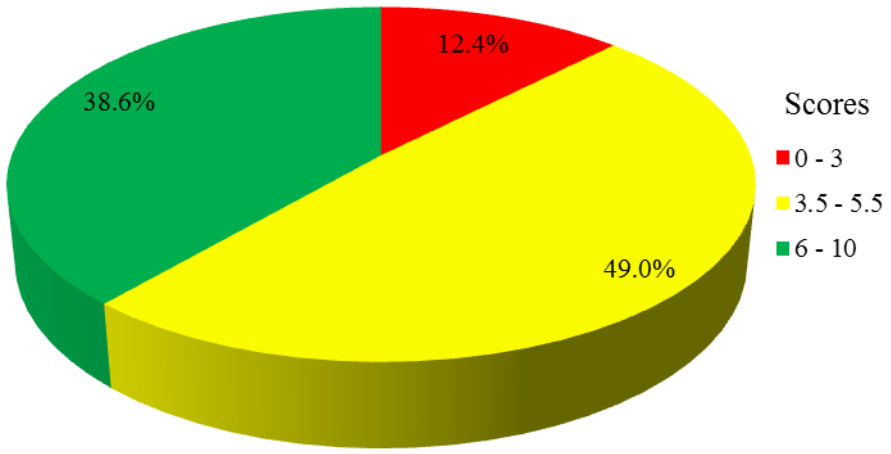
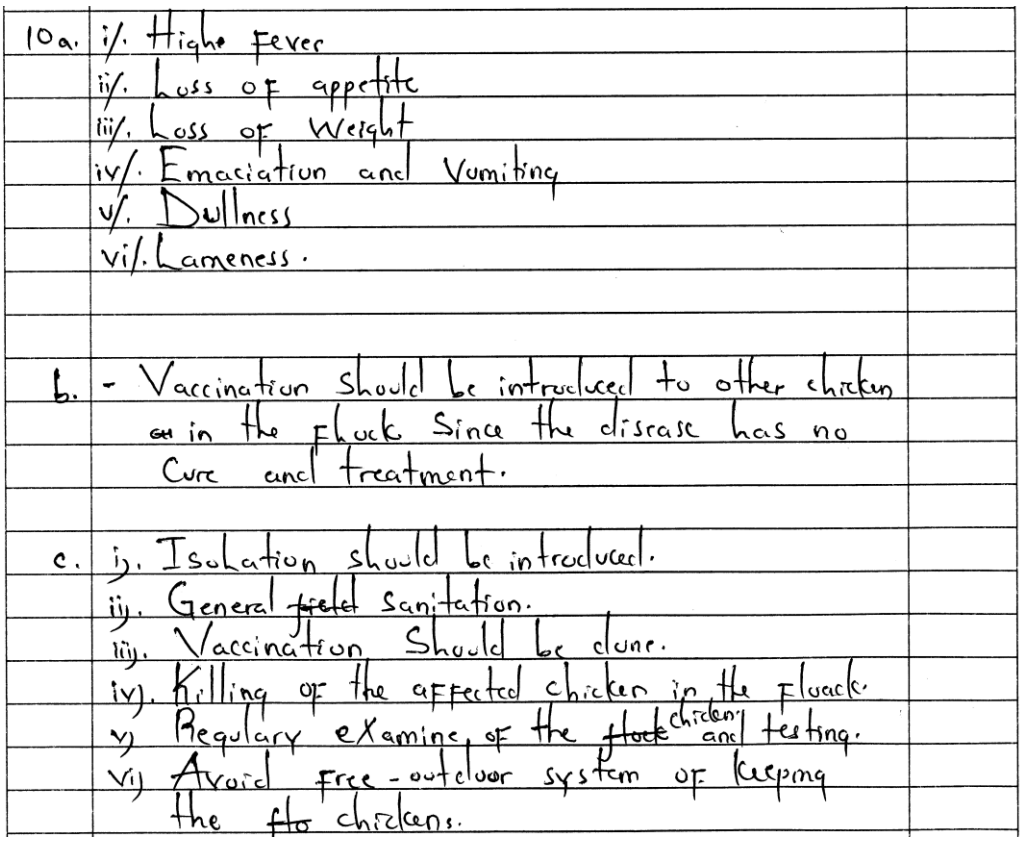


Figure 20*: Distribution of candidates' scores in Question 10*

Figure 20 indicates that 12.4 percent candidates scored low (0-3) marks while 38.6 percent scored high (6-10) marks. The analysis shows that, in part (a), the candidates with good performance (87.6%) were able to name other symptoms apart from discharge of mucus like diarrhoea. Furthermore, in part (c) the candidates suggested correctly the measures to be taken by farmers to control and prevent infection of the parasite of which oocysts were observed in the faeces. The analysis revealed that the candidates were able to distinguish

coccidiosis with other diseases of poultry by giving correct responses. However, some of the candidates failed to prescribe the appropriate treatment for the infection of the chicken whose faeces were taken for laboratory test hence could not score full marks. Extract 20.1 is one of the good responses by one of the candidates.

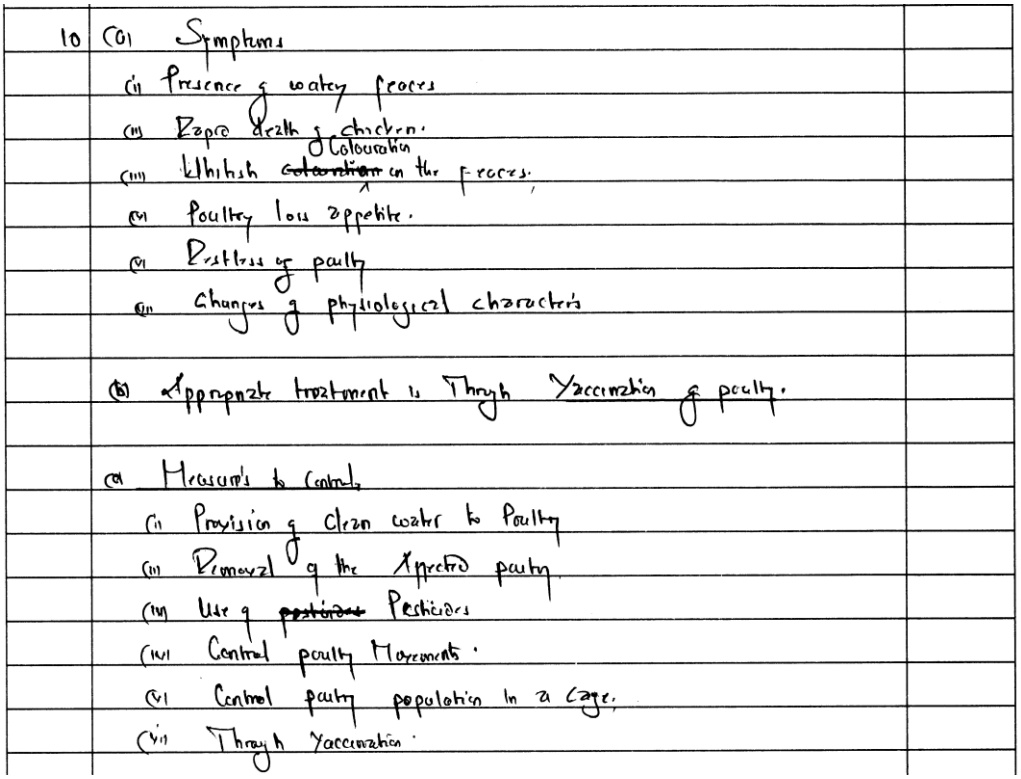


Extract 20.1: *A sample of candidate' good responses in Question 10*

In Extract 20.1, the candidate failed only in part (b) to prescribe the appropriate treatment of coccidiosis.

On the contrary, the candidates who performed poorly (12.4%) confused coccidiosis with other diseases of poultry, hence failed to name other symptoms apart from discharge of mucus like diarrhoea in part (a) which led into failure in parts (b) and (c). Examples of incorrect responses provided in part (a) were: *yellow-green diarhoea, pale comb, pale wattle and respiratory problems* and *tetracycline injection, use furazolidone,* and *use streptomycin* in part (b). Furthermore, in part (c) the candidates provided incorrect responses such as *slaughter the animal for sell, give enough food not contaminated* and *avoid dirty water for* drinking as suggestions on the measures to be taken by

farmers to control and prevent infection of the parasite. However, a few candidates managed to name few symptoms, control and treatments measures hence scored few marks. Extract 20.2 is one of the poor responses by one of the candidates.


10 (a) Symptoms
(i) Presence of watery feaces
(ii) Rapid death of chicken.
(iii) Whitish ~~colouration~~ Colouration on the feaces.
(iv) Poultry loss appetite.
(v) Restless of poultry
(vi) Changes of physiological characters
(b) Appropriate treatment is Thrugh Vaccination of poultry.
(c) Measures to control
(i) Provision of clean water to Poultry
(ii) Removal of the Infected poultry
(iii) Use of ~~pesticides~~ Pesticides
(iv) Control poultry Movements.
(v) Control poultry population in a Cage.
(vi) Thrugh Vaccination.

Extract 20.2: *A sample of candidates' poor responses in Question 10*

In Extract 20.2, the candidate mixed up coccidiosis with other diseases hence provided incorrect responses to all parts of the question.

2.3 134/3 Agriculture 3

2.3.1 Question 1: Soil Science

The candidates were provided with specimens: S_1 (200 cm^3 fine sand soil) and S_2 (200 cm^3 clay soil), two 250 cm^3 measuring cylinders, two 100 cm^3 beakers and a wall clock. Candidates were instructed in experiment I to: (i) put 100 cm^3 of water in a 250 cm^3 measuring cylinders (ii) Use a 100 cm^3 beaker and put specimen S_1 up to the 100 cm^3 mark (iii) empty specimen S_1 into the measuring cylinder at step (i) and shake well and (iv) let the mixture to stand for ten minutes while observing what happens in the mixture and record the final reading of the mixture in the measuring cylinder. In experiment II, the

candidates were instructed to repeat the same procedures of experiment I for specimen S_2 using another set of apparatuses.

The question carried 20 marks, The candidates were required to: (a) explain what would be observed after shaking well the mixture in experiments I and II, (b) make inference of the observation in experiments I and II (c) comment on the volumes of the mixture in experiments I and II after shaking well the mixture and let it to stand for 10 minutes by giving a reason (d) calculate the percentage of air composition in each of specimen S_1 and S_2, (e) suggest the types of soil in each of specimen S_1 and S_2 based on the percentage of air composition calculated in part (d) and in each case a reason for your suggestion and (f) briefly describe air-water relationship in the two specimen referring to the percentage of air composition in each of specimen S_1 and S_2.

The question was attempted by 628 (100%) candidates, out of which 465 (74%) scored from 0 to 6.5 marks, 154 (24.6%) scored from 7 to 11.5 marks, and 9 (1.4%) scored from 12 to 19 marks. Figure 21 summarizes the candidates' performance in this question.

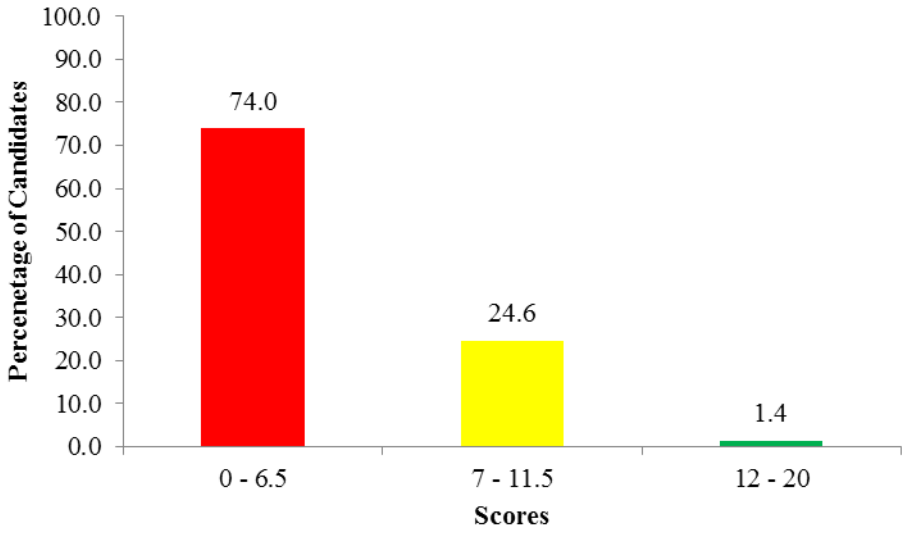
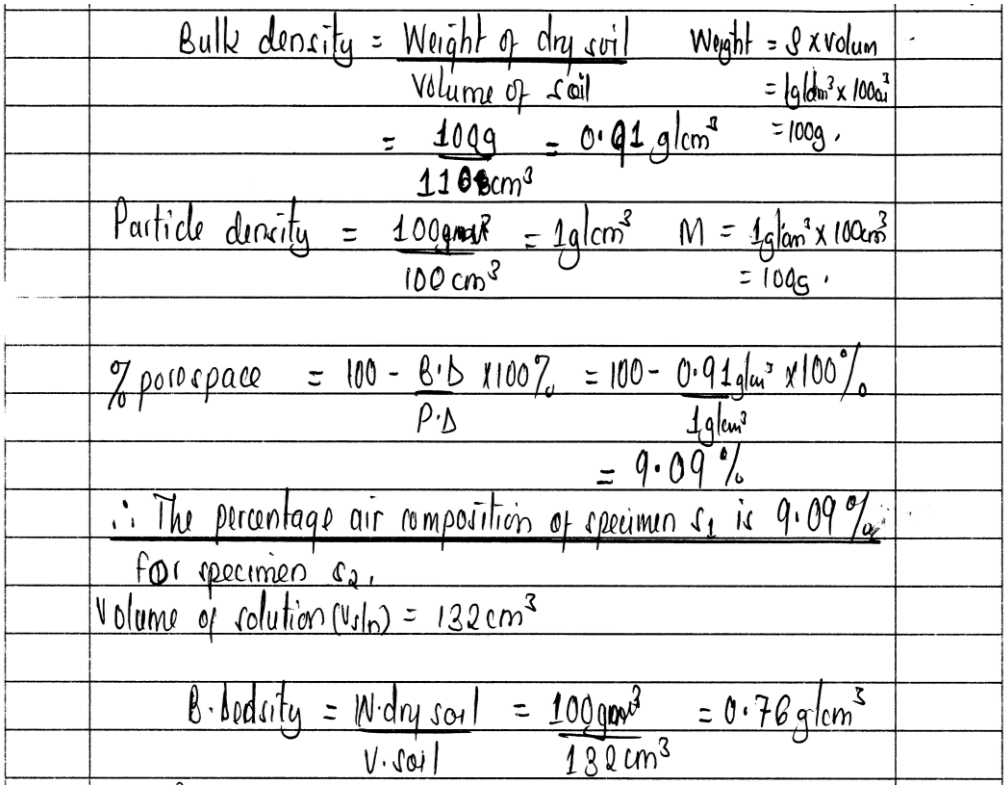


Figure 21*: Distribution of candidates scores in Question 1*

Figure 21 indicates that, 74 percent of the candidates scored low (0-6.5) marks while only 1.4 percent scored high (12-20) marks. The analysis shows that, 74 percent of the candidates failed to give correct observation after shaking well the mixture in experiments I and II which led to incorrect inference in part (b). Examples of incorrect responses in part (a) were: *the sample S_1 was dissolved completely in the water, layer of organic matter was observed* and *the layer of*

water appeared on the top of the specimen. In part (c), the candidates failed to provide correct comment on what led to the change in volumes of the mixture after being unable to make correct inference in part (b). The candidates provided incorrect responses such as *volumes raised, volumes increase and volumes decrease* after being unable to associate the results from different procedures.

Likewise, in part (d) the candidates failed to obtain correct volumes of the mixture after 10 minutes hence could not be able to obtain correct percentage of air in specimen S_1 and S_2. Concurrently, the candidates failed to arrive at the correct responses in part (e) and (f) due to failure in calculating the percentage of air composition in part (d), with which the value were part and parcel for the other computation. This indicates that, the candidates lacked knowledge and practical skills on physical properties of the soil. Extract 21.1 is one of the poor responses by one of the candidates.


Bulk density = Weight of dry soil / Volume of soil Weight = ρ x volum
= 1g/cm³ x 100cm³
= 100g / 1100cm³ = 0.91 g/cm³ = 100g.

Particle density = 100g / 100 cm³ = 1g/cm³ M = 1g/cm³ x 100cm³
= 100g.

% porospace = 100 - B.D / P.D x 100% = 100 - 0.91 g/cm³ / 1g/cm³ x 100%
= 9.09 %

∴ The percentage air composition of specimen S_1 is 9.09 %

for specimen S_2.

Volume of solution (V/In) = 132 cm³

B.bodsity = W.dry soil / V.soil = 100g / 132 cm³ = 0.76 g/cm³

Particle density = $\frac{\text{Weight of soil solid}}{\text{volume of soil solids}} = \frac{100g}{100cm^3}$

$= 1 g/cm^3$

Now,

% pore space = $100 - \frac{B.D}{P.D} \times 100\%$

$= 100 - \frac{0.76 g/cm^3}{1 g/cm^3} \times 100\%$

$= 24.24\%$.

∴ The percentage of air space in specimen S_2 is 24.24 %.

1 a) After shaking well the mixture in experiments I and II, in experiment I the soil settled down and water remains at the top.
In experiment II the soil mixed completely with water.

b. From experiment I, this means that soil sample S_1 has low water holding capacity as much water remained on top of the soil.

From experiment II, this means that soil sample S_2 has high water holding capacity as a small amount of water remained on top.

c. The volume of mixture in specimen experiment I was remains nearly the same because sand soil do not expand even when water is added to it.

- The volume of mixture in experiment II was raised since clay soil expands when water is added to it hence making the volume of mixture to increase

d. Data given for S_1

Volume of soil (V_s) = $100cm^3$

Volume of water(V_w) = $100cm^3$

Volume of solution (V_{sln}) = $110cm^3$

Density of water (ρ_w) = $1g/dm^3$

From, porosity (% air composition) = $\frac{\text{Bulk density}}{\text{Particle density}} \times 100\%$

1 e. The type of soil

Specimen S_1 - sand soil.

S_2 - clay soil

Specimen S_1 is sand soil because it has lower porosity as it is soil particles are compacted.

Specimen S_2 is clay soil since it has higher porosity which makes the soil loosely compacted thus holds more water.

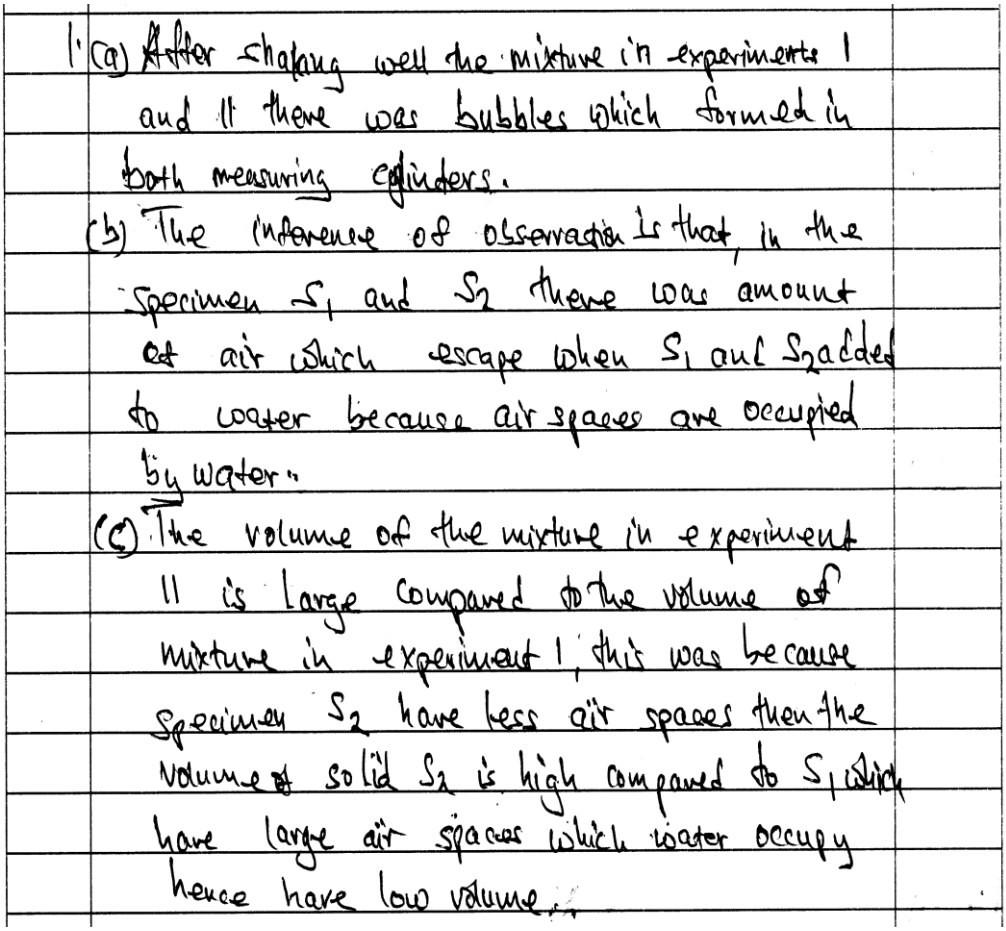
f. In specimen S_1 air-water relationship is lower since the soil has smaller porosity hence poorly aerated with small amount of water.

In specimen S_2, air-water relationship is higher since it has higher porosity which are spaces occupied by water and air.

Extract 21.1: *A sample of candidates' poor responses in Question 1*

In Extract 21.1, the candidate lacked practical skills, as a result he/she provided incorrect responses to all parts of the question.

On the contrary, 26 percent of the candidates clearly reported the observation made after shaking well the mixture in experiments I and II in part (a) and consequently made correct conclusion of the observations in experiments I and II in part (b). Similarly, in part (d), they managed to calculate the percentage of air composition in each of the specimens S_1 and S_2 and hence suggested correctly the types of soil in part (e) and described correctly air-water relationship in part (f). The correct responses provided by the candidates in these parts indicate possession of adequate knowledge and practical skills on physical properties of the soil. Extract 21.2 is one of the good responses from one of the candidates.


1. (a) After shaking well the mixture in experiments I and II there was bubbles which formed in both measuring cylinders.
(b) The inference of observation is that, in the specimen S_1 and S_2 there was amount of air which escape when S_1 and S_2 added to water because air spaces are occupied by water.
(c) The volume of the mixture in experiment II is large compared to the volume of mixture in experiment I, this was because specimen S_2 have less air spaces than the volume of solid S_2 is high compared to S_1 which have large air spaces which water occupy hence have low volume.

d) Percentage of air in specimen S_1.

Data:

Volume of water = 100 cm^3.

Volume of soil = 100 cm^3.

Expected volume after adding soil with water = 100 cm^3 + 100 cm^3 = 200 cm^3.

Readings of cylinder after mixing = 160 cm^3.

Then:

$$\text{Percentage of air composition} = \frac{\text{Volume of air}}{\text{Volume of soil}} \times 100\%$$

But:

Volume of air = Expected volume − Volume of cyl cylinder after mixing.

Volume of air = 200 cm^3 − 160 cm^3.

Volume of air = 40 cm^3.

1. % air composition = $\frac{40 cm^3}{100 cm^3} \times 100\%$ ..

= 40% ..

∴ The percentage of air composition in S_1 is 40% ..

Percentage of air is specimen S_2 ..

Data ..

Volume of water = $100 cm^3$ ..

Volume of soil = $100 cm^3$ ..

Expected volume after adding soil with water = $100 cm^3 + 100 cm^3 = 200 cm^3$ ..

Reading of cylinder after mixing = $165 cm^3$ ..

Then ..

% of air composition = $\frac{\text{Volume of air}}{\text{Volume of soil}} \times 100\%$ ..

But ..

Volume of air = Expected volume − Volume of mixture

Therefore ..

Volume of air = $200 cm^3 - 165 cm^3$ ..

Volume of air = $35 cm^3$ ..

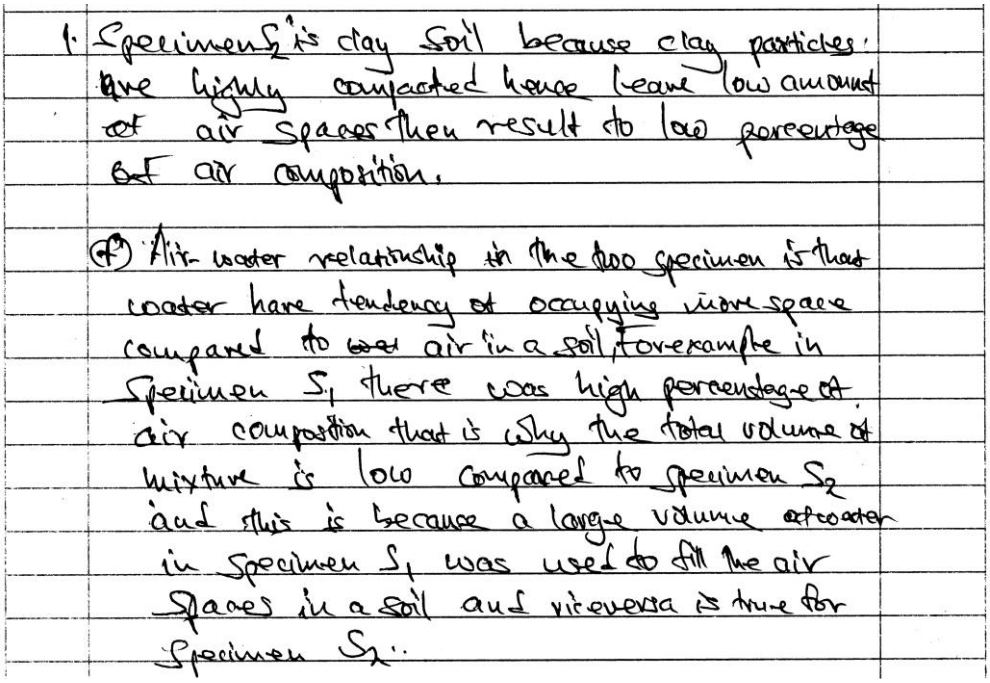
Then ..

% of air composition = $\frac{35 cm^3}{100 cm^3} \times 100\%$ ..

= 35% ..

∴ The percentage of air composition in S_2 is 35% ..

(d) The type of soil in specimen S_1 is Sand Soil because in reality sand soil have large soil particles which leave large air spaces between the particles. And type of soil in


1. Specimen S_2 is clay soil because clay particles are highly compacted hence leave low amount of air spaces then result to low percentage of air composition.

(f) Air-water relationship in the two specimen is that water have tendency of occupying more space compared to air in a soil, For example in Specimen S_1 there was high percentage of air composition that is why the total volume of mixture is low compared to specimen S_2 and this is because a large volume of water in specimen S_1 was used to fill the air spaces in a soil and vice versa is true for Specimen S_2.

Extract 21.2: *A sample of candidates' good responses in Question 1*

In Extract 21.2, the candidate demonstrated possession of good practical skills although he/she missed one point in part (c).

2.3.2 Question 2: Agricultural Engineering and Land Planning

The candidates were provided with specimens: E_1 (100 cm^3 of water in a Pyrex beaker) and E_2 (100 cm^3 of ethanol in a 250 cm^3 Pyrex beaker), two Bunsen burners, two tripod stands, a match box, two wire gauzes and two thermometers, and in the procedures, the candidates were instructed to: (i) put each of the wire gauze on top of the tripod stand (ii) place tripod stands over the Bunsen burners (iii) place each of the beakers containing specimen E_1 and E_2 on wire gauze on the tripod stands (iv) immerse thermometers in each of the beaker containing specimen E_1 and E_2 (v) light the Bunsen burners and heat specimens E_1 and E_2. Take records of the temperature for each of the specimen after 2 minutes of heating and (vi) switch off the Bunsen burner and remove beakers from the source of heat to let specimen E_1 and E_2 cool and take records of temperature for each of the specimens after 5 minutes of cooling.

The question carried 15 marks. The candidates were required to; (a) record result of the experiments by measuring temperature in centigrade after 2 minutes of heating and after 5 minutes cooling (b) suggest which specimen can best be used than other as coolant in a tractor engine based on the result of

the experiment and give two reasons for your suggestion (c) briefly describe the mechanism of cooling the tractor engine using the specimen (d) account for two limitation of a tractor engine cooling system that use the specimen you have suggested and (e) briefly explain four reasons for engine overheat in cooling system using the selected specimen.

The question was attempted by 628 (100%) candidates, out of which 185 (29.5%) scored from 0 to 5 marks, 278 (44.2%) scored from 5.5 to 8.5 marks and 165 (26.3%) scored from 9 to 15 marks. Figure 22 summarizes the candidates' performance in this question.

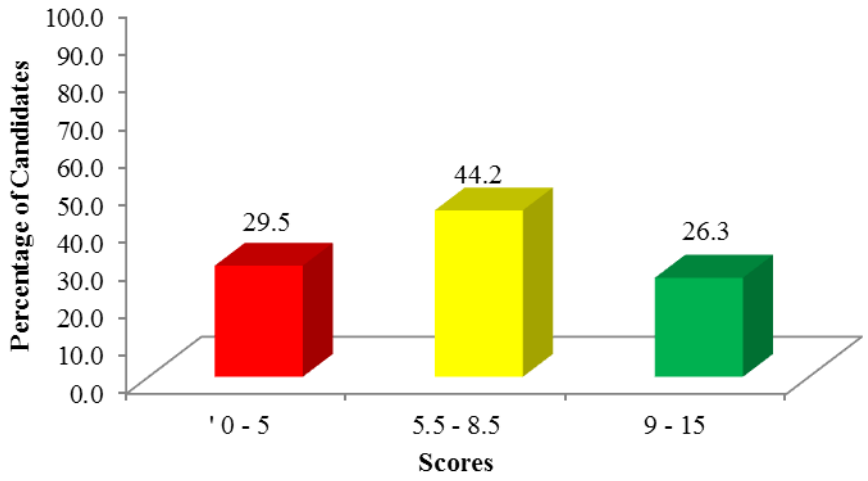


Figure 22: *Distribution of candidates' scores in Question 2*

According to Figure 22, 26.3 percent candidates scored high (9-15) marks while 29.5 percent candidates scored low (0-5) marks. The analysis shows that, 70.5 percent of the candidates managed to record the result of the experiment in part (a). The correct value of temperature recorded enabled the candidate to respond correctly in part (b) of the question. The correct identification of specimen enabled the candidates to describe the mechanism of water cooling system in part (c). Furthermore, the candidate managed to provide correct responses in part (d) after discovering the type of cooling system. Similarly, they correctly explained reasons for engine overheat in a cooling system using the selected specimen in part (e). These responses suggest that, the candidates had sufficient knowledge on the properties of a coolant in a engine cooling system. However, some of the candidates failed to account for limitation of a tractor engine cooling system that uses the correct specimen selected, hence

could not score full marks. Extract 22.1 is one of the good responses by one of the candidates.

2 (a)

Specimens	Temperature of the specimens after 2 minutes of heating (°C)	Temperature of the specimens after 5 minutes of cooling (°C)
E_1	61°C	52°C
E_2.	72°C	64°C

(b) The best specimen to be used as a coolant in a tractor engine is Specimen E_1

Due to following.

(i) It take much time for its temperature to rise hence it can absorb relative large amount of heat before to Loss it hence could be of economy in a tractor engine. High heat Capacity and boiling point.

(ii) It take short time to cool hence can be easily cooled to ensure much heat is removed from the engine as it carry much heat energy and fastly cooled within a short time. This tell that the Specimen E_1 has high boiling point, high heat capacity and easily cooled once it get heat energy.

(iii)

(c) Mechanism of cooling the tractor engine using Specimen E_1.

The cooling System involves the following components as follows:-(i) Pump which pump the coolant (Specimen E_1)

(ii) Radiator which cool the coolant (Specimen E_1 after absorbing the heat of the engine block and Cylinder jacket.

(iii) The thermostat which sense the engine temperature

(iv) holes which move coolant (Specimen E_1) from the engine to radiator and from radiator to the engine.

2 (c) Jacket System around the Cylinder through which the coolant (Specimen E_1) circulate.

So mechanism of cooling is as follows:-

The engine temperature rise is sensed by the thermostat which its valve open to allow ~~out~~ hot coolant from the engine jacket system to enter the radiator for cooling through the upper hole of radiator.

The ~~used~~ coolant (Specimen E_1) pull the radiator through its small fins which offer Large surface area for cooling of the coolant.

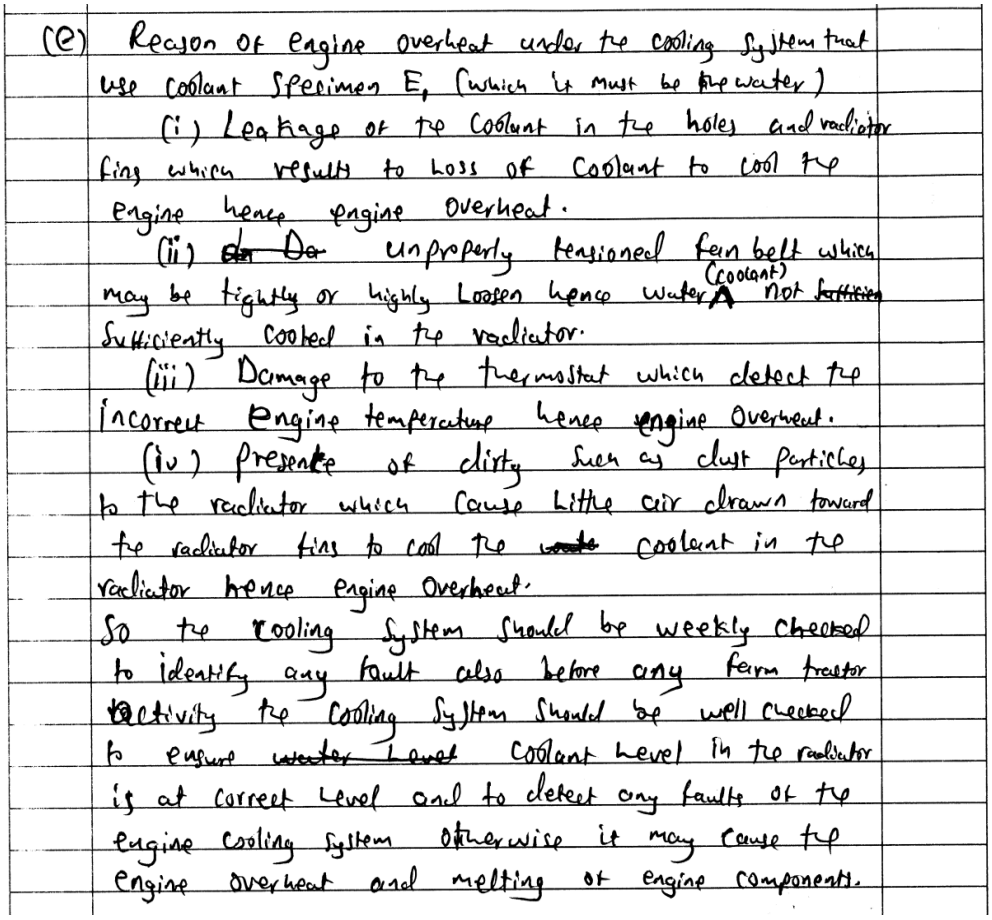
The Coolant leave the radiator through the hole ~~at~~ Lower ~~portio~~ position of the radiator to enter the jacket System around the Cylinder and engine ~~block~~. The pump is one which push the coolant to jacket system

The Coolant (Specimen E_1) absorbs heat from the cylinder and Cylinder head to get transported back to radiator for further cooling. The pump is responsible of pushing the Coolant from radiator towards the jacket and circulation as whole.

2 (d) Limitation of a tractor cooling System that use specimen E_1 as coolant.

(i) It has Large number of Parts such as pump, thermostat, radiator with fin and fan belt which its care and maintenance is complicated and costly to repair once there is damage or any fault

(ii) It depent of Specimen E_1 which may Sometime free to form frost especially in winter Season or may evaporate easily and get lost during hot Season such as Summer especially to dissert countries.


(e) Reason of engine overheat under the cooling system that use coolant Specimen E_1 (which is must be the water)

(i) Leakage of the coolant in the holes and radiator fins which results to loss of coolant to cool the engine hence engine overheat.

(ii) ~~Da~~ Da unproperly tensioned fan belt which may be tightly or highly Loosen hence water (coolant) A not sufficiently cooled in the radiator.

(iii) Damage to the thermostat which detect the incorrect engine temperature hence engine Overheat.

(iv) presence of dirty such as dust particles to the radiator which cause Little air drawn toward the radiator fins to cool the ~~wate~~ coolant in the radiator hence engine Overheat.

So the cooling system should be weekly checked to identify any fault also before any farm tractor activity the cooling system should be well checked to ensure ~~water Level~~ coolant level in the radiator is at correct Level and to detect any faults of the engine cooling system otherwise it may cause the engine overheat and melting of engine components.

Extract 22.1*: A sample of candidates' good responses in Question 2*

In Extract 22.1, a candidate demonstrated good practical skills although he /she missed one point.

On the other hand, 29.5 percent of the candidates failed to record the required temperature of specimens E_1 and E_2 after 2 minutes of heating and 5 minutes of cooling in part (a), hence failed to suggest and give reasons for correct specimen chosen as a coolant in a tractor engine in part (b). Similarly, in part (c), the candidates were unable to describe the mechanism of cooling the tractor engine using the specimen suggested. Examples of incorrect responses provided by one of the candidates were *the tractor engine is well frequently serviced, the full supply of water in the cylinder is required to cool the tractor when cylinder is suppied with little water tractor can overheat. The cylinder surround rotating parts should be supplied with lubricant.* Likewise, the candidates were also unable to account for limitations of a tractor engine cooling system that uses the specimen suggested in part (b). The candidates had their responses focusing on air cooling system instead of water cooling

system. Some of the incorrect responses provided were: *used only in small machines, it is not durable, not used to big mashine and it is cheap*. Provision of incorrect responses in these questions indicates insufficient knowledge and skills on water cooling system of the tractor engine. Extract 22.2 is one of the poor responses by one of the candidates.

Q2. (a) Results for the experiments.

SPECIMENS	TEMPERATURE OF SPECIMENS AFTER 2MINUTES OF HEATING (°C)	TEMPERATURE OF THE SPECIMENS AFTER 5MIN COOLING
E_1	39°C.	37.5°C
E_2.	49°C	44°C.

(b) From the experiment the best coolant is E_2. (Ethanol or alcohol)

Reasons:

01. Specimen E_2 it cools faster compared to E_1 specimen.

02. Specimen E_2 it has high boiling speed and cooling speed respectivelly compared to E_1 specimen. (Alcohol).

(c). Specimen E_2 (alcohol) in cooling tractor engine if is taken as water (water cooling system.

- It means that E_2 (alcohol) if is placed on a place of water (water Jackets) and continue functioning as a water.
- Specimen E_2 if is more efficient in cooling engine compared to water, the reason is that E_2 has high freezing speed compare to E_1 that is why E_2 is more efficiency compare to E_1.

(a) The following are two limitations of a tractor Engine cooling system that uses specimen suggested:-

01. The specimen E_2 it is flammable, so if can result fire to the tractor.

02. Specimen E_2 it is costfull and need knowledge to use it compare to other specimen.

02 (a). The following are four reasons for engine Overheat in a cooling system using the specimen.

01. Low amount of specimen if resulting Engine to Overheat.

02 Grade and type of specimen. (Poor grade)

- The low grade or grade number two of specimen E_2 is not Efficientlly in cooling engine compared to grade one which has high freezing point and hence cooling engine faster than grade two.

03. Damage within an Engine.

- It means that Engine may have other problems so it become difficult for the specimen to cool it efficientlly due to other cracks or problems within an engine or Engine cooling system parts.

04. Poor applying of specimen

- failure to supply a correct ammount of specimen it fails to cool the engine efficientlly.

- It means that its amount may be reduced or increased and resulting abnormal working of cooling system, hence poor efficiency in cooling the engine.

Extract 22.2: *A sample of candidates' poor responses in Question 2*

In Extract 22.2, the candidate failed to indentify the specimen suitable to be used as a coolant hence responded incorrectly in all parts of the question.

2.3.3 Question 3: Livestock Science and Production

The candidates were provided with specimens L_1 (50 cm^3 fresh milk from healthy cow) and L_2 (strip cup), a measuring cylinder and a beaker. In the procedures, the candidates were instructed to: (i) measure 25 cm^3 of specimen L_1 and pour it into a beaker (ii) squirt few streams of L_1 into specimen L_2 and observe carefully.

The question carried 15 marks. The candidates were required to: (a) state the aim of the experiment, (b) briefly explain the observations in the experiment and give three reasons to support their observation, (c) make the conclusion

from the experiment, (d) account for five predisposing factors for what had been diagnosed in the experiment and (e) give advice as livestock scientist to livestock keeper on five measures to be taken in order to obtain clean and normal specimen L_1.

The question was attempted by 628 (100%) candidates. The data show that 162 (25.8%) scored from 1 to 5 marks, 244 (38.8%) scored from 5.5 to 8.5 marks and 222 (35.4%) scored from 9 to 15 marks. The candidates' scores are summarized in Figure 23.

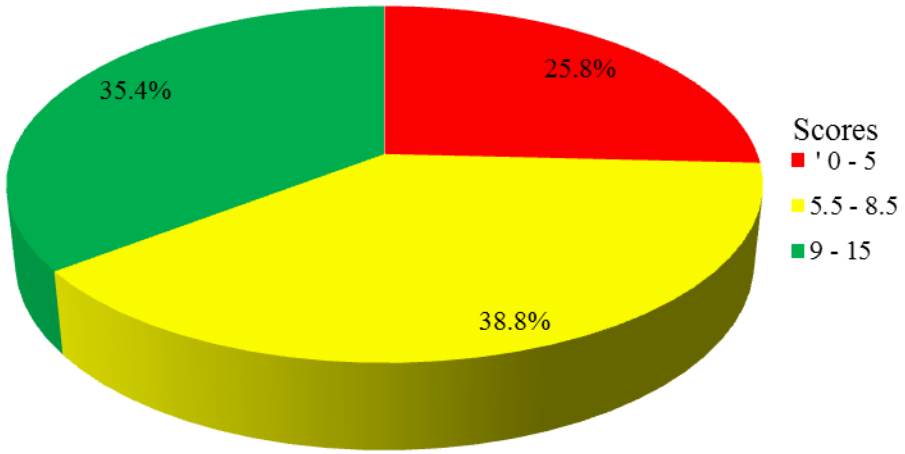


Figure 23: *Distribution of candidates' scores in Question 3*

Figure 23 shows that, 25.8 percent scored low (0-5) marks while 35.4 percent candidates scored high (9-15) marks. The analysis indicates that, 74.2 percent of the candidates managed to state the aim of the experiment in part (a) and explained correctly the observation of the experiment by giving reasons in part (b). Likewise, in part (c), they were able to make conclusion from the experiment. Also, in part (e), the candidates provided correct points to educate livestock keeper on how to obtain clean and normal specimen L_1 (fresh milk). However, in part (d) some candidates failed to provide correct responses on factors that predispose mastitis hence could not score full marks. Extract 23.1 is one of the good responses by one of the candidates.

3 (a) The aim of the experiment is to detect whether the specimen L_1 is affected by Mastitis or not.

(b) According to the experiment is that it shows just a normal fresh milk because

(i) There is no presence of blood clots and pus in the specimen L_1

(ii) The specimen L_1 is not watery

(iii) The specimen L_1 does not have bad odour.

(c) The conclusion that can be made from the experiment is that the specimen L_1 is not affected by the disease called Mastitis and hence it is a fresh normal milk.

(i) Incomplete milking

- Incomplete milking of the animal may lead to the formation of pus and accumulation of microorganisms in the udder and thereby leading to Mastitis

(ii) Age of the animal

- Old animals are more affected by disease, because of their weak immunity and hence they are affected by Mastitis

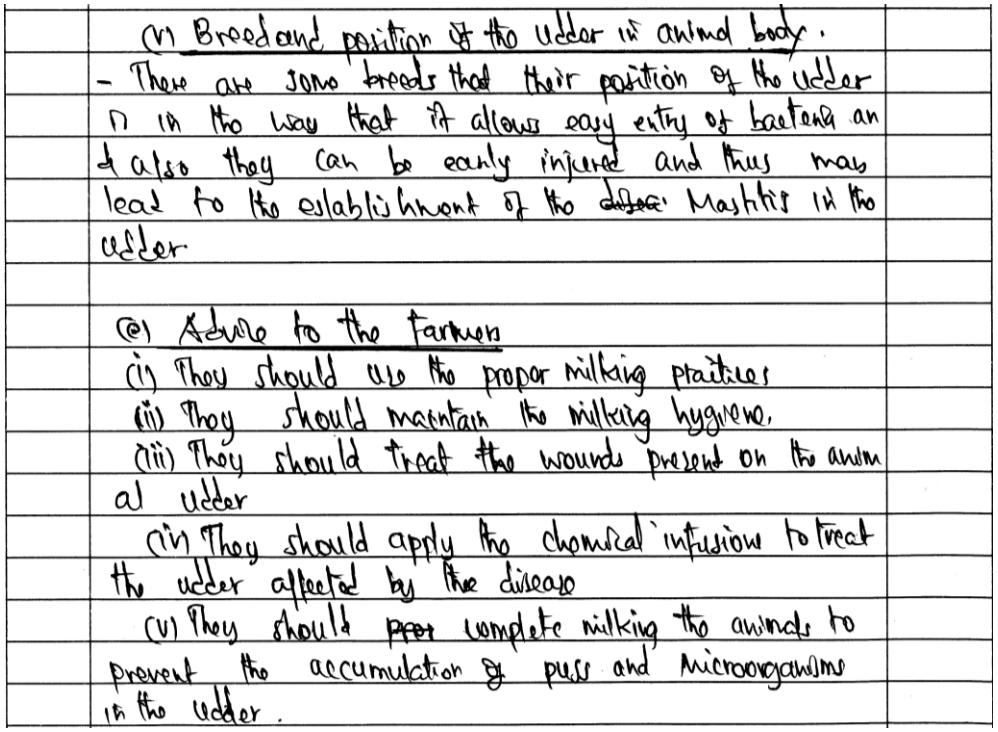
3 (d)(ii) - by Mastitis

(iii) Milking hygiene

- Bad milking hygiene may lead to establishment of the disease in the animal udder.

(iv) Injuries of the udder

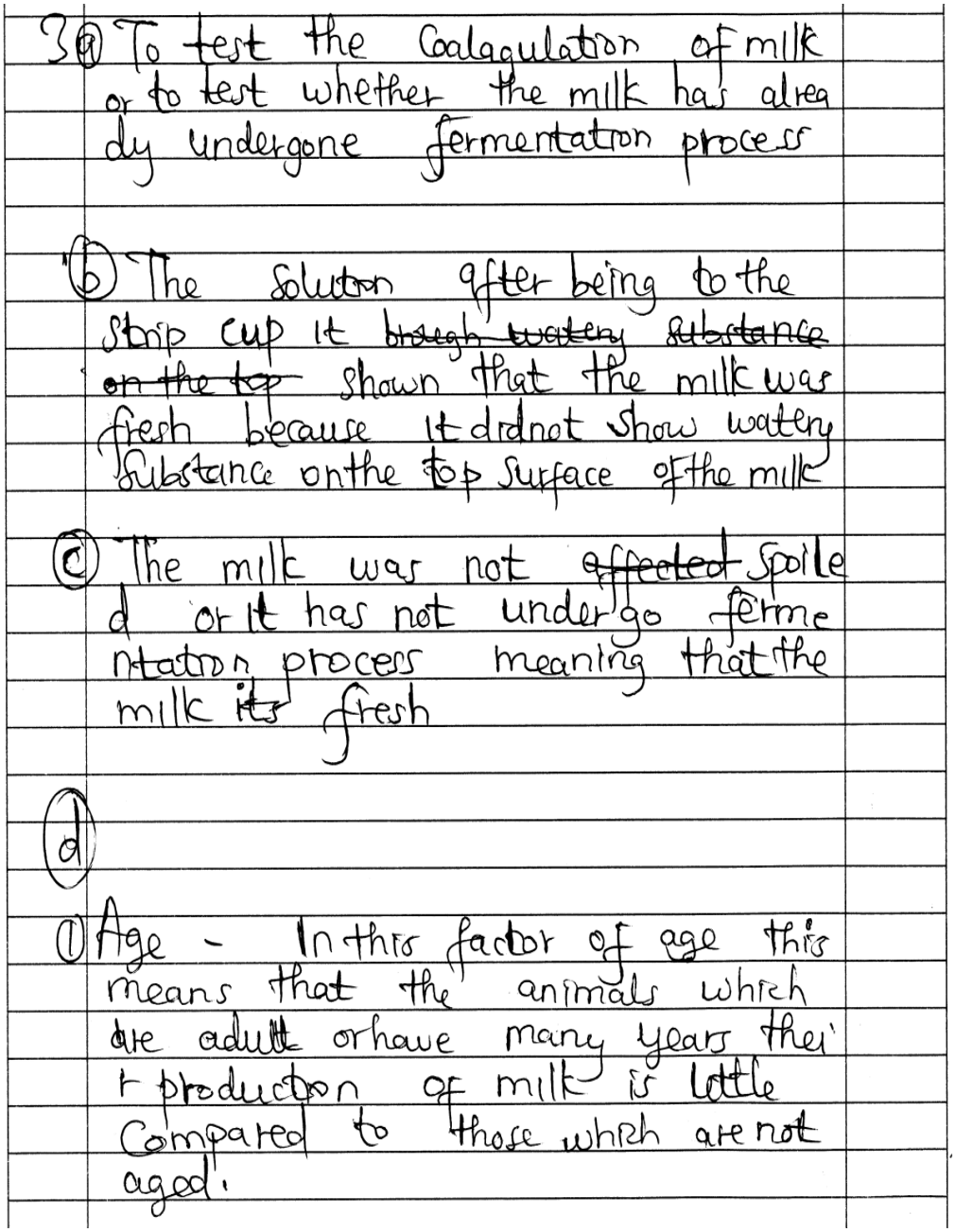
- When the animal is injured in the udder there is a great chance of entry of microorganisms such as the Mastitis bacteria and hence establishment of the particular disease in the animal udder.

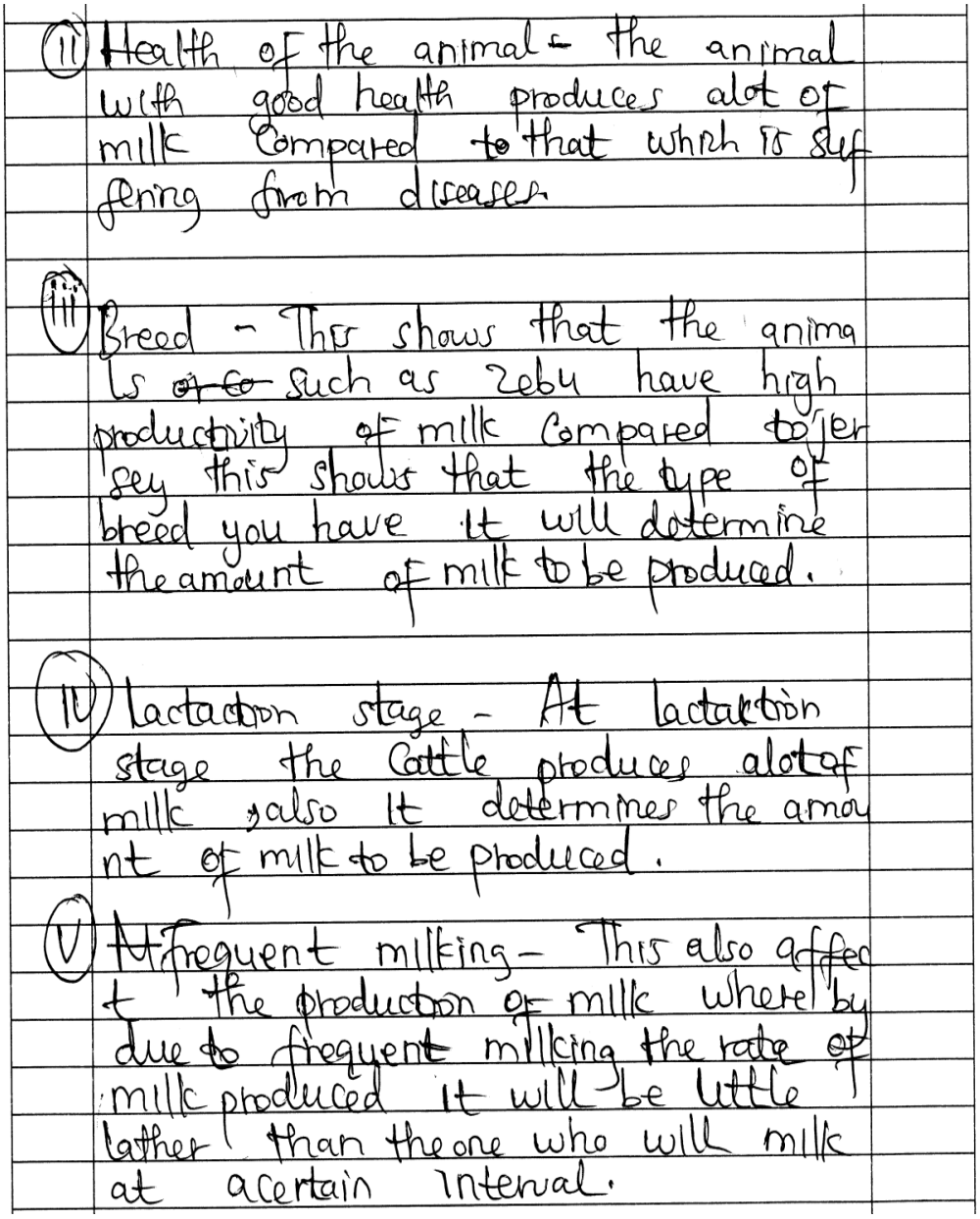


Extract 23.1: *A sample of candidates' good responses in Question 3*

On the other hand, in part (a), some of the candidates focused their responses to other milk quality parameters rather than detection of mastitis. They provided incorrect responses such as: *the aim of the experiment was to detect if specimen L_1 was diluted, to test the fat content of specimen L_1 and to test the coagulation of milk.* Similarly, the candidates were unable to explain the observation in the experiment and make appropriate conclusion in part (b) and (c) respectively. Examples of incorrect observation made in part (b) were: *specimen L_1 was white, milk colour were observed, specimen L_1 coagulates* and *specimen L_1 was not fit for consumption.* Moreover, the candidates concluded incorrectly the result of the experiment in part (c) by givng incorrect responses such as: *the milk was not spoiled, it does not undergo fermentation process and the milk is not healthy.* The candidates failed to account for predisposing factors for what was being diagnosed in part (d). The candidates seemed to have poor knowledge on subject matter about the mastitis by providing incorrect responses such as; *type of the disese, nature of the milk, milking time and nature of strip cup*. Furthermore, in part (e), the candidates failed to educate livestock keepers on how to obtain clean and normal specimen L_1. Examples of few incorrect responses provided were: *a person dealing on suckling cow must be health, avoid use of drug to animal and isolation of aninal.* This was a result of candidates' inadequate knowledge and

practical skills on conditions for clean milk production. However, some candidates provided few correct predisposing factors for mastitis in part (d) hence scored few marks. Extract 23.2 is one of the poor responses by one of the candidates.





Extract 23.2: *A sample of candidates' poor responses in Question 3*

In Extract 23.2, the candidate showed poor practical skills in testing the quality of milk. He/she responded incorrectly in most parts of the question except in part (d) where he/she had one correct point.

3.0 PERFORMANCE OF THE CANDIDATES IN EACH TOPIC/FIELD

This part indicates the performance of the candidates in the topics and field examined. All the topics in the subject syllabus were examined in 134/1 Agriculture 1 and 134/2 Agriculture 2 and three fields where examined in 134/3 Agriculture 3.

Among the 19 topics examined, 11 had good performance, 5 average and 3 poor performances. The candidates had good performance in the topics of Environmental and Technological Challenges in Agricultural Development (97.9%), Crop Pests (90.4%), Introduction to Animal Nutrition (88.2%), Plant Diseases (88.1%), Introduction to Animal Health (87.6%), Introduction to Soil Chemistry (85%), Plant Breeding (75.3%), Livestock Reproduction, Breeding and Improvement (74.4%), Livestock Science and Production (74.2%), Agricultural Engineering and land planning (70.5%) and Introduction to Soil Science (67%).

Candidates performed averagely in the topics of Introduction to Weed Science (59.4%), Pasture Agronomy (55.9%), Introduction to Agricultural prices and Agricultural Marketing (48.5), Fundamentals of International Trade (39.3%), The Farm Workshop and Farm Structure (38.7%).

On the other hand, performance of the candidates was poor on the topics of Farm Mechanization and Machinery and Introduction to Irrigation (33.4%), Farm Power (32.7%), Soil Science (26%) and Introduction to Agricultural Prices and Agricultural Marketing (22%).

4.0 CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

Statistical data from the ACSEE 2020 showed general good performance of candidates in Agriculture subject. This year's performance registers a rise of 0.24 percent pass compared to last year performance. However, the data indicate that majority of the candidates who passed the examination scored the lower pass grades.

The analysis of the candidates responses revealed that, the candidates faced difficulties in answering questions from the topics of Farm Mechanization and Machinery and Introduction to Irrigation, Farm Power, Introduction to Agricultural prices and Agricultural Marketing. The factors that have contributed to the majority of the candidates to score low pass in the topics include inadequate knowledge and practical skills of the subject matter

examined and failure to meet the demand of the questions set from the respective topics.

4.2 Recommendations

In order to improve performance in the poorly performed topics, the following are recommended:

(a) Teachers should make a site visit with the students so that the teacher or an expert can demonstrate how engine operating principles are employed in the farms. This will translate the theory into practice because students learn better by doing.

(b) Teachers should display pictures/slides/videos showing the main methods of irrigation or arrange visits to farms where irrigation is done for better acquisition of knowledge and gaining practical skills to understanding various methods of irrigation.

(c) Teachers should guide students in groups to discuss the causes and control of agricultural price fluctuation presents in gallery walk. However, teachers should arrange visits to market and commodity marketing boards to equip them with various agricultural price control mechanism.

(d) Teachers should guide the students to discuss in groups the objectives of international trade and the role of international commodity agreements in the world market. The concluding remarks drawn in the discussion will enlighten the students on the subject matter.

Appendix I

Candidates' Performance on each topic/field in ACSEE 2020

S/n	Topic/Field	2020	
		Percentage of Candidates who scored an Average of 35% or above	Comments
1.	Environmental and Technological Challenges in Agricultural Development	97.9	Good
2.	Crop Pests	90.4	Good
3.	Introduction to Animal Nutrition	88.2	Good
4.	Plant Diseases	88.1	Good
5.	Introduction to Animal Health	87.6	Good
6.	Introduction to Soil Chemistry	85	Good
7.	Plant Breeding	75.3	Good
8.	Livestock Reproduction, Breeding and Improvement	74.4	Good
9.	Livestock Science and Production	74.2	Good
10.	Agricultural Mechanics	70.5	Good
11.	Introduction to Soil Science	67	Good
12.	Introduction to Weed Science	59.2	Average
13.	Pasture Agronomy	55.9	Average
14.	Introduction to Agricultural prices and Agricultural marketing	48.5	Average
15.	Fundamentals of International Trade	39.3	Average
16.	The Farm Workshop and Farm Structure	38.7	Average
17.	Farm Mechanization and Machinery and Introduction to Irrigation	33.4	Weak
18.	Farm Power	32.7	Weak
19.	Production Economics	22	Weak