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

CANDIDATES' ITEM RESPONSE ANALYSIS REPORT ON THE CERTIFICATE OF SECONDARY EDUCATION EXAMINATION (CSEE) 2022

AGRICULTURAL SCIENCE

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034 AGRICULTURAL SCIENCE

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FOREWORD

This report presents Candidates' Items Response Analysis (CIRA) on the performance of the candidates who sat for the Certificate of Secondary Education Examination (CSEE) 2022 in Agricultural science subject. The report aims to provide feedback to all educational stakeholders on the factors that contributed to the candidates' performance in Agricultural science.

The CSEE is a summative evaluation which measure learners' achievement after completing four years of study in secondary education. Ideally, it is designed to assess the effectiveness of the education system and the learning of the candidates in terms of knowledge gained and skills developed. It also evaluates the extent to which the candidates can utilize the knowledge and skills gained to solve the social, political, economic and technological challenges to enhance individual and national development. More importantly, the examination is used for screening purposes to identify candidates with outstanding academic merits to continue learning at the advanced secondary school level and other learning institutions.

This analysis shows justification for the candidates performance in the Agricultural science subject. The candidates who attained high scores had adequate knowledge and practical skills of the subject matter.

However, candidates who scored low marks faced difficulties in responding to the questions due to their insufficient knowledge of the tested concepts and poor English language.

The National Examinations Council of Tanzania (NECTA) expects that the feedback provided in this report will shed light on the challenges for which education stakeholders should take proper measures to improve teaching and learning the Agricultural science subject.

The Council appreciates the contribution of all those who prepared this report.

Dr. Said Ally Mohamed
EXECUTIVE SECRETARY

1.0 INTRODUCTION

This report presents the analysis of the candidate's performance in the Certificate of Secondary Education Examination (CSEE) 2022 for the Agricultural science subject. The examination was set as per 2019 examination format and Agricultural Science Syllabus published in 1997.

The examination had two papers namely 034/1 Agricultural Science 1 (Theory paper) and 034/2 Agricultural Science 2 (Practical paper). The theory paper of 3 hours duration had three sections A, B and C with a total of eleven (11) questions. As per instructions, the candidates were required to answer all questions in sections A and B and one (1) question from section C. Section A had two objective questions. Question one consisted of ten (10) multiple choice items each carrying 1 mark, making a total of 10 marks and question two comprised five (5) matching items each carrying 1 mark, making a total of 5 marks. The section carried a total of 15 marks. Section B consisted of seven (7) short answer questions each carrying 10 marks, making a total of 70 marks. Section C had two (2) essay questions each carrying 15 marks. This section carried a total of 15 marks. Therefore, paper weighed 100 marks. The practical paper of 2.30 hours consisted of two (2) short answer questions each carrying 25 marks. The candidates were required to answer all the questions. The paper weighed 50 marks.

The examination was attended by a total of 6,884 candidates out of which 6,475 (94.09%) passed and 407 (5.91%) failed. Generally, the analysis shows that the general performance of the candidates was good. The performance of this year's examination is an increase of 4.41 per cent compared to 2021. The grade performance of the candidates in CSEE 2022 is shown in Table 1.

Table 1: The Candidates' Performance by Grades in CSEE 2022

Grades	A	B	C	D	F	Withheld	Total
Male	102	344	2,204	837	125	0	3,612
Female	35	183	1,641	1,129	282	2	3,272
Total	137	527	3,845	1,966	407	2	6,884

Source: NECTA Statistics Book, **pg 6**, CSEE (2022)

The performance of the candidates is categorized into five grades (A, B, C, D and F). Each grade had a respective score interval and remarks as follows: A (75-100) Excellent, B (65-74) Very good, C (45-64) good, D (30-44) Satisfactory and F (0-29) Fail.

The rest of this report is organized into three sections; the analysis of the candidates' performance on each question, the analysis of the candidates' performance on each topic as well as field, and the conclusion and recommendations.

2.0 THE ANALYSIS OF THE CANDIDATES' PERFORMANCE ON EACH QUESTION

This section covers the analysis of the candidates' performance on each question. The description provided focuses on the demand of the question, the performance of the candidates for the question based on their responses and reasons for the level of performance. Extracts showing samples of correct and incorrect responses for specific questions from candidates' scripts and graphics for illustrations have also been included.

In the analysis, the performance is considered weak, average or good if the percentage of the candidates' scores ranges from 0-29, 30-64 and 65-100 respectively. Three colours (Green, Yellow and Red) are used to indicate good, average and weak performance respectively.

2.1 034/1 AGRICULTURAL SCIENCE 1 (Theory paper)

2.1.1 Question 1: Multiple Choice Items

This question consisted of ten items picked from the following topics: Livestock Feeds and Feeding, Weathering and Soil Formation, Farm Workshop, Handling and Processing of Crop Products, Scientific Procedures in Agriculture Science, Crop Protection, Fisheries and Fish Production, Methods of Improving Soil Fertility and Productivity, Price and Its Determinants and Factors of Production. The candidates were required to choose the correct answer from the given alternatives and write its letter beside the item number in the answer booklet provided.

The question was attempted by 6,884 (100%) of the candidates; out of which 1,344 (19.52%) scored from 0 to 2 marks; 4892 (71.06%) from 3 to

6 marks and 648 (9.41%) from 7 to 10 marks. Figure 1 shows the distribution of candidates' scores on question one.
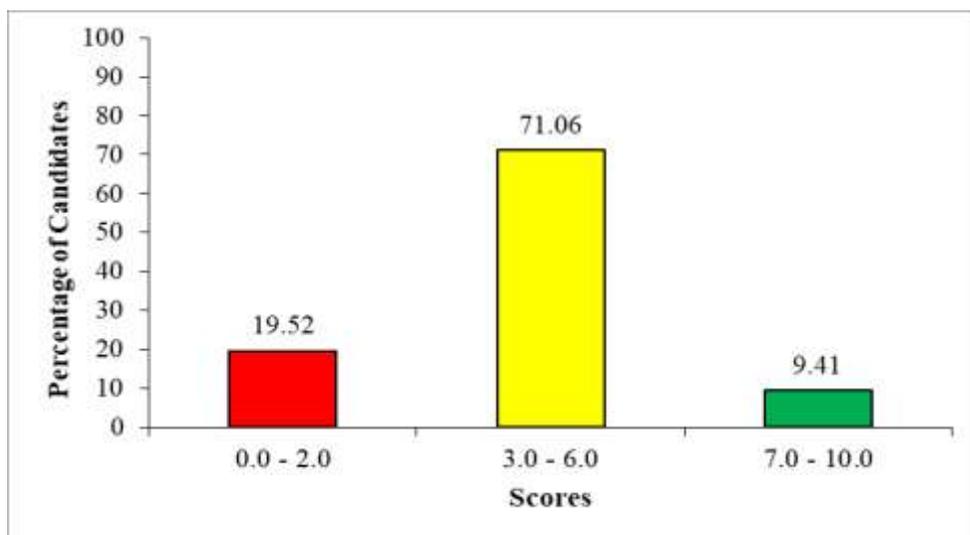

Figure 1: *Distribution of candidates' scores on Question 1*

Refering to Figure 1, most of the candidates (80.47%) scored from 3 to 10 marks and 19.52 per cent from 0 to 2 marks. This indicates general good performance of the candidates. The analysis of candidates' responses revealed that, most of them responded correctly to items (i), (ii), (iii), (v), (vi), (vii) and (x) and incorrectly to items (iv), (viii) and ((ix). The analysis of each item is as follows:

Item (i) demanded the candidates to choose an alternative that represents a reason why making hay and silage is important in dairy cattle farming. The item tested the candidates' knowledge of fodder crops. The correct response was C (Hay and silage can be used during the dry season). The distractors were A (Hay and silage are very nutritious than green fodder), B (Hay and silage are very good in preventing bloat), D (Hay and silage are used for faltering dairy cattle) and E (Hay and silage are very useful during the rainy season). This item was attempted well by most of the candidates indicating good understanding of the role of hay and silage. Hay is herbage such as grass which is cut and then dried and silage is livestock fodder which is stored in a silo while it is still in a green moist state. Both hay and silage are preserved for feeding livestock when there is scarcity normally during the dry season. The candidates were familiar that, hay and silage are

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not nutritious than green fodder in option A and do not prevent bloat in option B. In addition, they are not specifically for feeding dairy cattle in option D and they are useful in dry season and not during rain season in option E. The candidates who chose incorrect responses did not understand the reason for making hay and silage.

Item (ii) required the candidates to choose an option which is the factor that influence soil formation by affecting the speed of physical and chemical weathering processes. The item assessed the candidates' understanding of the factors influencing soil formation. The correct response was A (Climate) whereas alternatives B (living organism), C (Time), D (Topography) and E (Parent material) were incorrect. The majority of the candidates provided correct response signifying good understanding of the influence of the factors of soil formation. Climate by means of precipitation strongly influence physical and chemical reactions on parent material. The candidates were knowledgeable that, living organisms in option B add organic matter, aid decomposition, weathering and nutrient cycling. Time in option C is a critical factor for the level of maturity of the soil since it depends on how long the soil forming process took place. Topography in option D determines runoff of water, and its orientation affects micro-climate which in turn affects vegetation and parent material in option E influence the type of soil formed. The candidates who responded incorrectly did not understand the influence of climate in soil formation.

Item (iii) tasked the candidates to choose an alternative which explains the use of a rip saw. The item examined the candidates' knowledge and skills of the use of saws. The correct alternative was C (Cutting along the wood grain). The distractors were; A (Cutting metal), B (Cutting across the wood grain), D (Sawing small works such as dovetail joints) and E (Cutting tenons for joining wood). Most of the candidates chose the correct response. This demonstrates that, they were knowledgeable and skilled on the use of saws. Distractor A is a metal work performed by hack saw whereas distractors B, D and E are wood works performed by a cross-cut saw, dovetail saw and tenon saw respectively. The candidates who provided incorrect responses were not familiar of the use of rip saw.

Item (iv) required the candidates to choose an alternative for a farm machine used for the primary processing of sisal leaves. The item tested the

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candidates' knowledge of the primary processing equipment. The correct option was D (Decorticator). The distractors were: A (Harvester), B (Mower), C (Roller) and E (Pulper). Most of the candidates provided incorrect responses to this item showing lack of knowledge of primary processing machines. Most of them were attracted to alternatives B and C. Alternative B, (Mower) is a machine which is used for cutting/ harvesting grasses while alternative C, (Roller) is a machine used for removing cotton lint from the seeds. The candidates were unaware of the functions of mower and roller. Option A, (Harvester) is used for harvesting crops while option E, (Pulper) is a machine designed to remove pulp (soft flesh) from agricultural produce.

In item (v), the candidates were required to choose an alternative which is the first step to be done after setting an experiment in the scientific investigation process. The item assessed the candidates' understanding of the steps in scientific investigation procedures. The correct option was E (Observation and data recording). Observation and data recording is a step that follows after setting an experiment where an experimenter will be making observations and recording the data on what is being observed. The distractors were; A (Data interpretation), B (Conclusion), C (Formulating hypothesis) and D (Asking questions). Most of the candidates attempted correctly the item justifying possession of adequate knowledge of the steps in scientific investigation procedures. The stepwise procedures are observation and data collection, formulation of hypothesis, asking question, data interpretation and conclusion in alternatives E, C, D, A and B respectively. The candidates who opted for A, B, C and D did not understand the steps in the scientific investigation procedures.

Item (vi) required the candidates to choose a method which is used to control pests by breaking their life cycles. The item tested the candidates' knowledge and skills of pest control methods. The correct option was B (Cultural method). The incorrect alternatives were: A (Biological method), C (Chemical method), D (Mechanical method) and E (Legislative method). Majority of the candidates who attempted this item gave the correct response. This suggests that they had good understanding of the mechanisms of action of the pest control methods. Cultural pest control methods refers to the manipulation of the crops production system or cultural practices to reduce or eliminate pest populations by interfering

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their life cycles. Biological methods in option A involves the use of other organisms to control pests. Chemical method in option C is the use of chemicals to kill pests. Mechanical method in option D is the control of pest by physical means whereas legislative method in option E is the imposition of restrictions to control pests. The candidates who attempted the item incorrectly were not conversant with the pest control method that breaks their life cycles.

Item (vii) required the candidates to choose an option for the reasons of applying manure in a fish pond. The item examined the candidates knowledge and skills of fish management practices. The correct alternative was A (It encourages the development of natural foods for fish in the pond). The incorrect options were: B (It changes water colour to protect fish), C (It fertilizes plants along the fish pond), D (It facilitates digestion of food in the fish alimentary canal) and E (It encourages the growth of pastures along the fish pond. Most of the candidates chose the correct response showing good understanding of the importance of applying manure in a fish pond. The candidates had good understanding that it is important for water in the fish pond to be clear to facilitate availability of dissolved oxygen for fish in option B. In option C they understood that fertilization of plants along the fish pond is not an intention of applying manure. In option D they were aware that application of manure has nothing to do with digestion in fishes and pasture is not required in fish farming in option E. The candidates who chose options B, C, D and E were not familiar with the importance of applying manure in the fish pond.

Item (viii) tasked the candidates to choose an alternative which represents the qualities of green manuring crops. The item tested the candidates' understanding of the concept of manure. The correct alternative was D (Should be able to grow in poor soil and should be able to produce large quantiy of vegetative material). The distractors were: A (Should be able to grow in poor soil and should not compete with the crop for nutrients), B (Should not be an alternative host of insect pests and should not compete with the crop for nutrients), C (Should not compete with the crop for nutrients and should be perennial grasses) and E (Should be perennial grasses and should be able to produce a large quantity of vegetative material). Most of the candidates attempted incorrectly this item. This indicates possession of ineadequate knowledge of qualities of green

manuring crops. The characteristics of green manuring crops include; should be able to grow rapidly, highly leafy, high nitrogen content/leguminous, faster rate of decomposition, capable of growing in poor soil conditions. The distractors contain one or a combination of two incorrect qualities hence the candidates' choices were incorrect.

In item (ix), the candidates were asked to choose an alternative that identifies the types of price Mr Yona paid for buying a litre of milk at a diary unit he visited. The item tested the candidates knowledge of types of agricultural prices. The correct response was B (Farm gate price). The incorrect options were: A (Import price), C (Whole sale price), D (Retail price) and E (Export price). Majority of the candidates provided incorrect responses to this item. This is an indication that they had poor understanding of the types of agricultural prices. Farm gate price is the price which is received at the farm boundary. A variety of incorrect responses provided by the candidates were; Option A (Import price) - price which is paid for buying goods from abroad, C (Whole sale price) – price received when selling goods in large quantities, D (Retail price) – price received when selling goods in small quantities and E (Export price) – price received when selling goods abroad. The candidates who chose A, C, D and E did not understand the meaning of the farm gate price.

Item (x) required the candidates to choose an option which refers to a term for price of management in production. The item assessed the candidates' familiarity of the prices for factors of production. The correct option was E (Profit). The distractors were: A (Rent), B (capital), C (wage) and D (interest). Most of the candidates responded correctly to this item signifying to be familiar with prices of factors of production. Profit is a financial benefits realized in production process when revenue exceeds the expenses as a result of combination of factors of production which is the function of management. The other prices of factors of production are; rent in option A which is the cost of land, capital in B is one of the factors of production not the price of factors of production, wage in C is the cost of labour usually fixed and paid daily or on hourly basis and interest in D is the price for borrowing cash capital (money). The candidates who responded incorrectly were unaware that profit is a price of management.

2.1.2 Question 2: Matching Items

The question consisted of five items from the topic of *Livestock Improvement*. The candidates were required to match the items in List A with their respective responses in List B by writing the letter of the correct response beside the item number in the answer booklet. List A comprised phrases that describe the animal breeding methods whereas List B comprised breeding methods. The question measured the candidates' knowledge of the breeding methods.

List A		List B	
(i)	Mating closely related animals	A.	Upgrading
(ii)	Mating of distantly related animals.	B.	Cross breeding
(iii)	Mating unrelated animals of the same breed.	C.	Seasonal breeding
(iv)	Mating of two animals of different breeds.	D.	In breeding
(v)	Mating between the female animal of low-grade stock with pure breed male.	E.	Line breeding
		F.	Outbreeding
		G.	Continuous breeding

The question was attempted by 6,884 (100%) of the candidates; among them 1,679 (24.39%) scored from 0 to 1 mark; 3,385 (49.17 %) from 2 to 3 marks and 1,820 (26.44%) from 4 to 5 marks. Figure 2 indicates the distribution of candidates' scores on the question.
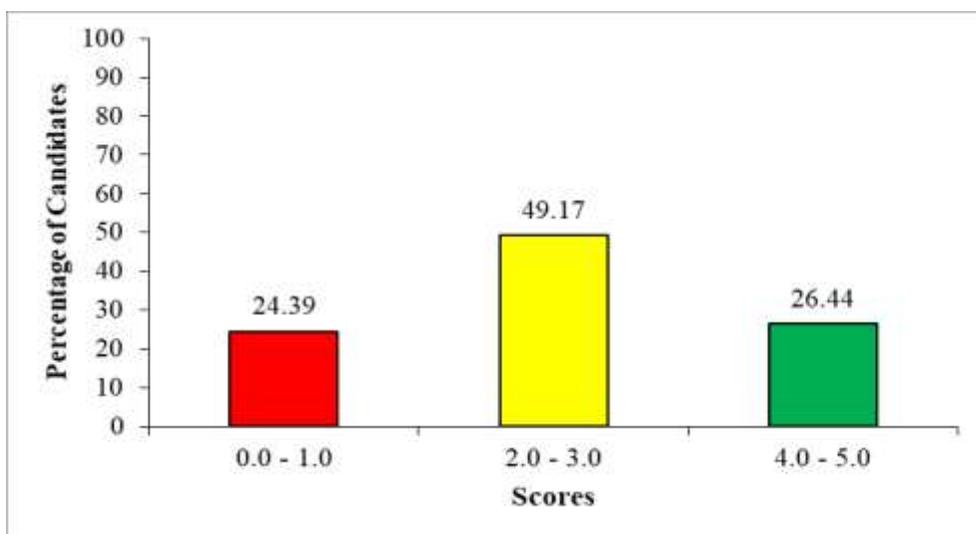

Figure 2: *Distribution of candidates' scores on Question 2*

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Figure 2 indicates 75.61 per cent of the candidates scored from 2 to 5 marks whereas 24.39 per cent from 0 to 1 mark. This shows the candidates' performance was generally good. It was observed in the analysis that, majority of the candidates attempted correctly items (i), (ii) and (v). The candidates had misconceptions in item (iii) and (iv) thus provided incorrect responses. The analysis of the items is as follows:

Item (i), required the candidates to provide the breeding method that matches the mating closely related animals. The correct response was D (Inbreeding). Most of the candidates chose the correct response indicating good understanding of the method.

In item (ii), the candidates were tasked to give the breeding method that matches the mating of distantly related animals. The correct response was E (Line breeding). Majority of the candidates attempted correctly the item. This suggests they were knowledgeable of the method.

Item (iii) required the candidates to provide the breeding method that matches the mating of unrelated animals of the same breed. The correct response was F (Outbreeding). Most of the candidates provided incorrect response to this item. They were attracted to option B (Cross breeding) which is the mating of two animals of different breeds.

In item (iv), the candidates were required to provide the breeding method that matches the mating of two animals of different breeds. The correct response was B (Cross breeding). Most of the candidates incorrectly attempted the item by choosing option F (Outbreeding) which is the mating of unrelated animals of the same breed.

Item (v) required the candidates to provide the breeding method that matches the mating between the female animal of low-grade stock with a pure breed male. The correct response was A (Upgrading). The item was attempted correctly by majority of the candidates showing possession of adequate knowledge.

2.2 SECTION B: Short Answer Questions

2.2.1 Question 3: Fundamentals of Agriculture

The question demanded the candidates to give five points to justify the statement that, 'Agriculture still remains to be the backbone of Tanzanian's economy as the majority of people live in rural area and engage in crop and livestock production'. The question assessed the candidates' knowledge of the importance of agriculture to the economy of Tanzania.

The question was attempted by 6,884 (100%) candidates; where 521 (7.57%) scored from 0 to 2.5 marks; 1,942 (28.21%) from 3 to 6 marks and 4,421 (64.22%) from 6.5 to 10 marks. Figure 3 illustrates the distribution of candidates' scores on the question.
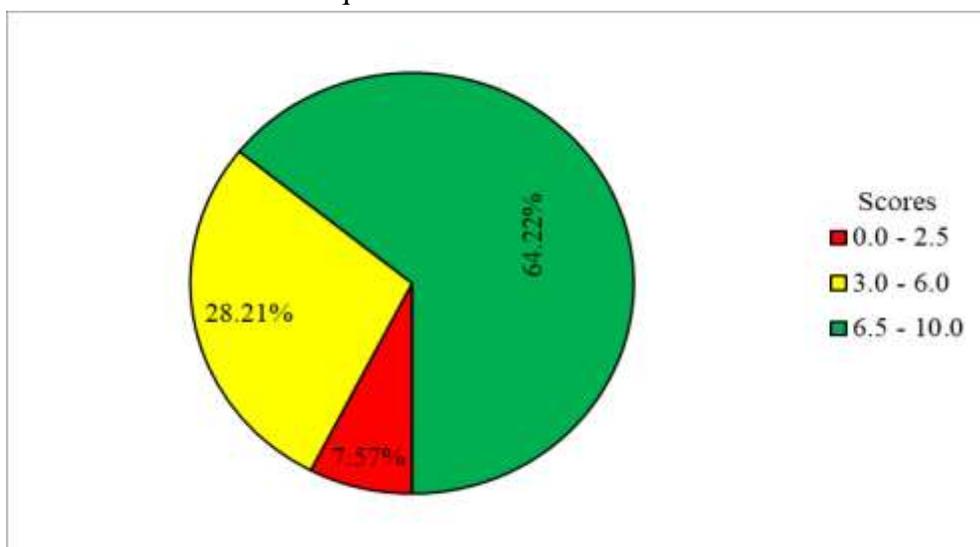
Figure 3: *Distribution of candidates' scores on Question 3*

Figure 3 shows that majority of the candidates (92.43%) scored from 3 to 10 marks and 7.57 percent from 0 to 2.5 marks. The general performance of the candidates was good.

Statistical analysis depicted 64.2 percent of the candidates performed well in the question. Most of them correctly attempted the question by giving the importance of agriculture to the economy of Tanzania such as *agriculture provides the raw material for industry*, *provides employment*, *is the source of foreign exchange*, *is a source of capital and provides a market for*

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industrial goods. This implies that the candidates had good understanding of the role of agriculture to the economy of Tanzania. Extract 1.1 shows a sample of the correct responses to this question.

03.	(i) Agriculture provides nutritious food in the country from plants and animals. Example Maize, beans, milk and meat.
	(ii) Agriculture provides raw materials to our industries. Example Cotton, sisal, Coffee and rubber.
	(iii) Agriculture creates employment opportunities. Example Self-employment and employed from other people like poultry dealers.
	(iv) Agriculture raises income of the nation since agricultural goods are exported and imported outside and inside the country.
	(v) Agriculture gives foreign currency when goods are sold outside boundaries. Example Animal skins

Extract 1.1: *A sample of the candidate's correct responses to Question 3.*

Extract 1.1 indicates responses from a candidate who demonstrated good understanding of the role of agriculture to the economy of Tanzania.

The candidates who had average performance in the question were 28.21 per cent. Besides the candidates providing correct importance of agriculture to the economy of Tanzania, most of them mentioned the points without giving full explanations. Other candidates failed to exhaust all the points demanded; indicating possession of partial understanding of the role of agriculture.

Nevertheless, 7.57 per cent of the candidates had weak performance in the question. Majority of the candidates failed to give the importance of

agriculture to the economy of Tanzania to justify the statement given. Most of their responses reflected the challenges facing agriculture like *occurrence of pests and diseases*, *poor transport and communication*, *lack of government support*, *shortage of capital and lack of extension services*. This justifies that the candidates had inadequate knowledge of the importance of agriculture to the economy of Tanzania. Extract 1.2 presents a sample of the incorrect responses to the question.

Extract 1.2 : *A sample of the candidate's incorrect responses to Question 3*

Extract 1.2 illustrates incorrect responses where the candidates provided ways of improving agriculture instead of its importance as a justification of a given statement.

2.2.2 Question 4: Environmental Degradation

The question required the candidates to give brief explanations of any five human activities that facilitate land degradation. The question examined the candidates' understanding of the concept of land degradation.

A total of 6,884 (100%) of the candidates attempted this question, out of which 284 (4.13%) scored from 0 to 2.5 marks; 2,420 (35.15%) from 3 to 6 marks and 4,180 (60.72%) from 6.5 to 10 marks. Figure 4 illustrates the distribution of candidates' scores on the question.
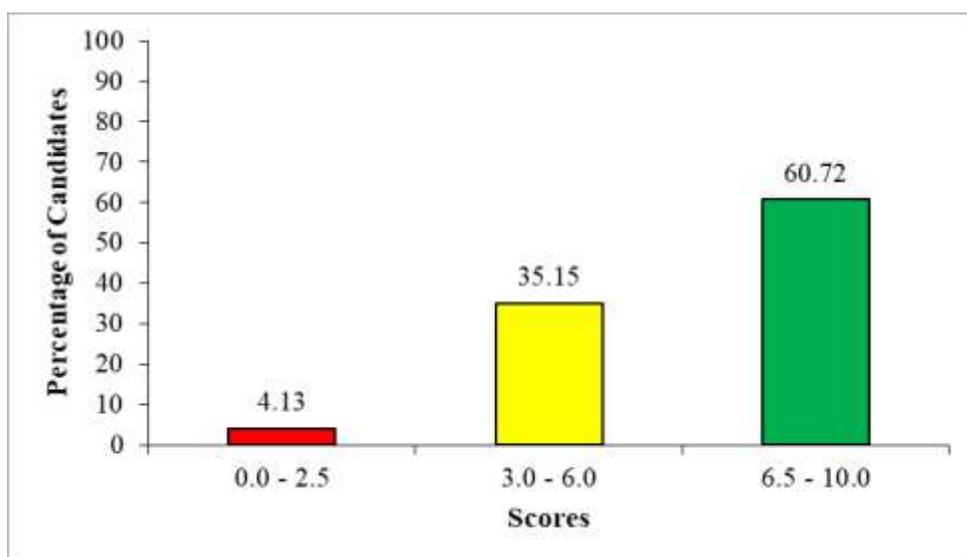
Figure 4: *Distribution of candidates' scores on Question 4*

Figure 4 denotes majority of the candidates (95.87%) scored from 3 to 10 marks while 4.13 per cent from 0 to 2.5 marks. Data show that the general performance of the candidates was good.

The question had 60.72 per cent of the candidates with good performance. Most of them correctly explained human activities that facilitate land degradation. Examples of correct responses provided were *overgrazing*, *removal of vegetation*, *improper farming methods*, *mining and construction*

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activities. The candidates understood the meaning of land degradation hence provided correct responses to the question. This indicates they had good mastery of subject matter. Extract 2.1 presents a sample of correct responses to the question.

4	Human activity that facilitate land degradation	
	i) Defforestation; This is the process of Cutting down trees when trees are cutted down It may led to the Soil erosion in which crop can not grow well int hat areas So that deffirestation cause the landde gradation to our land and loss of Soil fertility.	
	ii) Overgrazing; Also the issue of grazing many animal in a small piece of land also le ad to the land degradation because the our good arable land is degraded by those manya	

4	nimal in asmall piece of land and cause soil to loo se its fertility	
	iii) Burning of vegetation; when human being bur n vegetation It can led to the more destruction of o rganic matter in the Soil and Cause environmental de gradation due to the vegetation burned in that area s So that through burning vegetation cause land degrad ation	
	iv) Bad farming practices Such as monocropping and monoculture; Also the bad farming practices Can led to the degradation of land or environment because through monocropping It degraded the land So that no fertile Soil in that area because of bad farming practices	
	v/ Industrial activity; Also human activity such as Industrial activity can lead to the degradation of our beuty land through throwing bad ordirtw ater to our land so it destroy our land with t heir Chemicals in industry when manufactring So Its one of the cause of land degradation.	

Extract 2.1: *A sample of the candidate's correct responses to Question 4*

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Extract 2.1 portrays responses from one of the candidates who provided correct responses in whole question. This is a fact that, he/she had good knowledge of human activities which influence land degradation.

Futhermore, 35.15 per cent of the candidates had average performance. A good number of these candidates did not manage to give and explain all the human activities facilitating land degradation as per demand of the question. This signifies that, candidates had partial knowledge of human activities that cause land degradation.

However, 4.13 per cent of the candidates had weak performance. The candidates failed to explain the human activities facilitating land degradation. The variety of responses given suggests that they did not understand the meaning of the land degradation. Examples of responses provided are; *it helps to improve infrastructure*, *source of food*, *land degradation should be able to produce a large quantity of vegetative material*, *the human activities should be able to produce economic*, *it transports material for living things and water management*. Some of them mentioned different human activities like *farming*, *livestock keeping*, *fishing* and *bee keeping*. The candidates were not aware that all these activities do not cause land degradation except when carried out in a way that is not recommended such as ploughing along the slope, overfertilization and overgrazing. Extract 2.2 shows a sample of incorrect responses to the question.

4 (i) land degradation It encourages the developments of natural foods for fish in the pond; Was the most Serious problem in many, arable land of Tanzania from the land degradation into the development into the human being.	

(ii) Land degradation It, was high and silage are used for faltering dairly Cattle; This means that to the matting destantly related animal from the developments in natural food and the mating between the female animal or low grade stock with pure breed male into the land degradation.

(iii) land degradation it should be able to grow in poor soil; Because it was the mating any male which are Closely related into the edu cation people from other Country,

(iv) Land degradation It should not be an alte mative host of insect pests; Because insect Pest and disease that to the land degradat ion and the high silage are used for faltering dairly Cattle from the poor tran sport and Communication into the land degradation,

(v) land degradation it facilitate digestion of food in the fish; This means that to the alimentary canal from female animal of low grade stock with pure breed male,

Extract 2.2: *A sample of the candidate's incorrect responses to Question 4*

Extract 2.2 indicates responses from a candidate who did not understand the meaning of the land degradation hence provided responses that were not related to the demand of the question.

2.2.3 Question 5: Cropping Systems and Planting Patterns

The question had parts (a) and (b). It required the candidates to: (a) differentiate plant population from seed rate and (b) give seven points explaining why crop spacing is not always the same. The question tested the candidates' knowledge of crop spacing.

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The question was attempted by 6,884 (100%) of the candidates; where by 4,735 (68.78%) scored from 0 to 2.5 marks; 1,787 (25.96%) from 3 to 6 marks and 362 (5.26%) from 6.5 to 10 marks. Figure 5 presents the distribution of candidates' scores on the question.
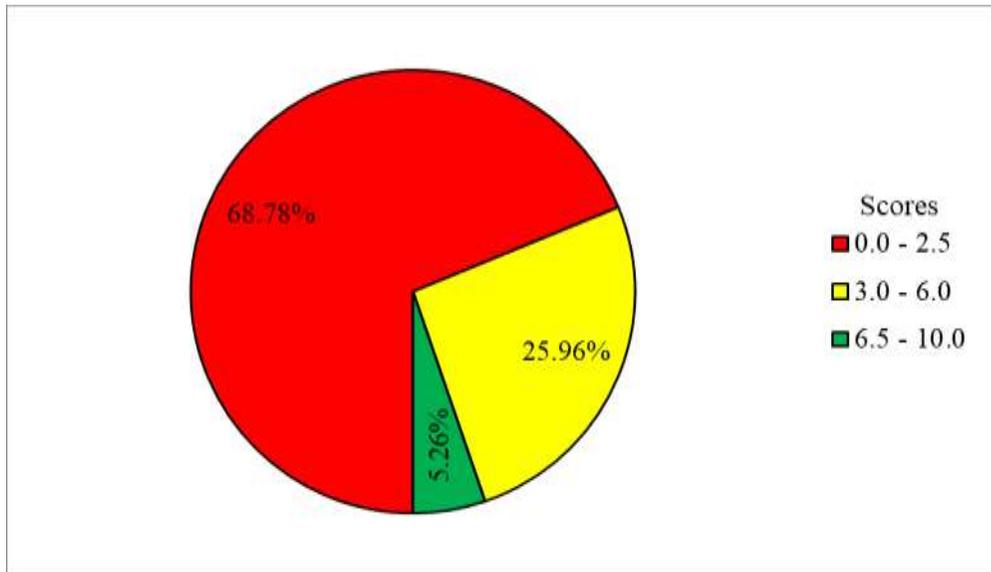
Figure 5: *Distribution of candidates' scores on Question 5*

According to Figure 5, 31.22 percent of the candidates scored from 3 to 10 marks and 68.78 from 0 to 2.5 marks. This indicates general average performance of the candidates.

Data shows that 5.26 per cent of the candidates had good performance. Most of them attempted correctly nearly all parts of the question. In part (a), they managed to differentiate plant population from seed rate. Plant population *is the number of crops stands per area* and seed rate *refers to the number or amount of seeds or planting materials required per unit area*. Likewise, in part (b) they were able to explain why crop spacing is not aways the same. Some of the responses provided include; *The moisture available in the soil or amount of rainfall*, *the fertility status of the soil*, *the type of machinery to be used for other operations like weeding* and *the purpose of which the crop is being grown*. This implies that the candidates were knowledgeable of the reasons for different crop spacing. Extract 3.1 is an example of correct responses to the question.

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Q5 a) Plant population:	Seed rate.
i. Refers to the number of plants in the farm per unit area.	i. Refers to the amount of planting materials required for sowing per unit area
ii. Plant population = $\dfrac{Area}{Spacing}$	ii. Seed rate = $\dfrac{Number\ of\ planting\ materials}{Area}$
iii. It is expressed in number of plant per hectares.	iii. It is expressed in amount of planting materials per hectares (kg/h)

b) i. Spacing of crops depend on vegetative growth of the specific crop.
⟹ The crops with wide vegetative growth and short like Robusta coffee and Katumani composite (maize) require wide space when are planted while crops like Arabica coffee require minimum spacing when are planted.

5 b) iii. Spacing of the crops depend on the the soil fertility of an area.
⟹ The more the soil fertile is the more plants it can support so the spacing to the area with fertile soil is different from the infertile land in which support few plants by planting crops with wide distance.

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iii. Amount of rainfall affect spacing of crops ⇒The area with high amount of rainfall support high number of plants to be grown while in marginal areas crops are few due to the planting then with wide spacing.		
iv. Farm mechanization affect spacing of crops ⇒ Some of the pl farm machinery lead to the different in distance when planting for example so as to operate mower to the farm the distance should be wide between crops in the farm this makes different in spacing when planting.		
v. Purpose for the crop intended affect spacing ⇒The purpose of the crop make crops not planted on the same spacing for example the maize which are grown for forage (pasture) are planted closely compared to the maize planted for the consumption of human being since they require wide spacing.		
vi. Diseases makes crops not planted on the same spacing ⇒Diseases like rosette disease in groundnuts is controlled by planting the groundnuts close to each other		

Extract 3.1: *A sample of the candidate's correct responses to Question 5*

Extract 3.1 portrays responses from a candidate who exhibited good mastery of the subject matter by attempting correctly both parts of the question.

The candidates who had an average performance in the question were 25.96 per cent. Most of them attempted correctly part (a). In part (b), they did not exhaust all points concerning the factors that determine spacing for planting crops or seeds. Their responses reflect possession of insufficient knowledge of the reasons for different crop spacing.

On the other hand, the candidates who had weak performance were 68.78 per cent. Majority failed to differentiate plant population from seed rate in

part (a). Examples of incorrect responses provided by some of the candidates were; *Plant population is many plant in the farm while seed rate is the number of seeds in the hole*, *plant population refer to the plant in the same area while seed rate is the rate of planting seed*, *plant population is the process whereby many plants are planted in the same area while seed rate is the situation whereby the seed that formed in a small area*, *plant population is the vegetative plant while seed rate is a grain and plant population is a place where the plant lives together while seed rate is a time when seed merged*. Similarly, they failed to explain the determinants of spacing for crops or seeds in part (b). Some of the candidates tried to provide crop spacing for different crops such as *50 x 40 for maize*, *20 x20 for cassava* and *beans 10 x25*. Others gave the importance of crop spacing such as *crops grow well*, *control pest and diseases* and *help weeding*. These responses suggest that the candidates lacked adequate knowledge of the concept of crop spacing. Extract 3.2 exemplifies a sample of incorrect responses to the question.

5.	a) Plant population refers to plants in the field or farm have high also you can say is high or large group of plant While Seed rate is the proces of to make or to prepare early seed before planting.	
	b) i) Climate this is a factor can chang crop in the mind of these farmers	
	ii) Type of soil also it can change the mind of these farmers	
	iii) Lack of education for farmer it can couce to change the mind of these farmers	

iv) Lack of skilled for farmers it can ce cause change the mind of these farmer		
v) Lack of enough fund it can couse to change the mind of these farmer		
vi) Poor communication and transport also it can couse change the mind of these farmers.		
vii) Poor government support also it can cause change the mind of these farmers		

Extract 3.2: *A sample of the candidate's incorrect responses to Question 5*

Extract 3.2 shows responses from a candidate who had poor mastery of the subject matter. In part (a), he/she incorrectly differentiated plant population from seed rate by pointing out issues of abundance of plants in the farm and seed preparation respectively. In part (b), the candidate outlined factors that hinder agricultural development instead of explaining the determinants of spacing bween crops or seeds.

2.2.4 Question 6: Soil Fertility and Productivity

The question had parts (a) and (b) and the candidates were required to (a) examine five causes of the loss of soil fertility and (b) analyze five factors that influence the quality of farmyard manure. The question assessed the candidates' knowledge and skills of the concept of soil fertility.

The question was attempted by 6,884 (100%) of the candidates; of which 2,403 (34.91%) scored from 0 to 2.5 marks; 3,749 (54.46%) from 3 to 6 marks and 732 (10.63%) from 6.5 to 10 marks. Figure 6 illustrates the distribution of candidates' scores on the question.
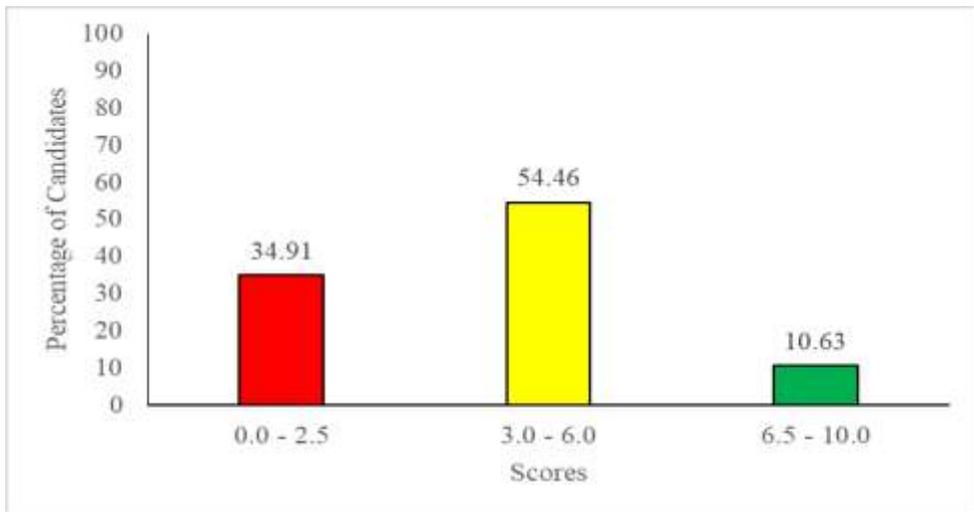
Figure 6: *Distribution of candidates' scores on Question 6*

Figure 6 indicates that 65.09 percent of the candidates scored from 3 to 10 marks and 34.91 percent from 0 to 2.5 marks. The performance of the candidates on the question was good.

The candidates who had good performance accounted 10.63 per cent. Most of them responded correctly to almost all parts of the question. In part (a), they managed to examine causes of the loss of the soil fertility by providing responses such as *soil erosion*, *leaching*, *volatilization*, *burning*, *weeds*, *monoculture and mono-cropping and harvesting of crops or crop removal*. This shows they were conversant with the causes of the loss of soil fertility. Moreover, they were able to analyse factors that determine quality of farm yard manure in part (b). Examples of responses given were; *the quality and type of feed an animal is feeding on*, *the age of farmyard manure, the method of storage*, *the type of bedding material used and the animal from which the manure is made*. This proves they had good mastering of the subject matter. Extract 4.1 is an example of correct responses to the question.

6 (a) CAUSES OF LOSS OF SOIL FERTILITY.

i/ soil erosion

This is wearing of the topmost layer of soil by agents like wind, water and gravity. It wears off top soil which contain organic matter and expose sub soil, thus soil infertility.

ii/ Volatilization.

This is evaporation of volatile elements like nitrogen into the atmosphere due to maximum exposure to sunlight.

iii/ Weed infestation.

Weeds absorb high amount of nutrients from the soil and leave it with very low amount of nutrients thus leading to soil infertility.

iv/ Leaching

This is the downward movement of nutrients from top layer to underlying layers of soil. This makes the top layer of soil loose its fertility.

6 | v/ Burning of crop residues after harvesting.
plants contain high amount of carbon, so when they are burned carbon is converted into another form instead of returning back into soil. Thus burning of vegetation leads the soil to loose its fertility.

(b) Factors that influence the quality of farm yard manure.

i/ Age of the animal
A young animal produced a more quality manure than an old one because digestive system of a young animal is more effective.

ii/ Age of the manure.
Old manure is more quality than young manure. This is because the old manure has beed decomposed at a high rate than young manure.

iii/ Type of the animal
Manure from poultry has more quality than large animals like cow. This is because ammonia is contained in feaces of poultry while in large animals ammonia is removed out as part of urine.

iv/ Method of storage of manure.
A manure which is stored in a shed place has more quality than that stored at bare place experiencing to the sunlight, hence a manure exposure to sunlight/bare place can undergo volatilization and leaching.

6	(b) ✓ Feed given to the animal	
	An animal given a nutrious feed produce a	
	more quality manure than that given a	
	non-nutrious feed like dry grasse.	

Extract 4.1*: A sample of the candidate's correct responses to Question 6*

Extract 4.1 justifies good mastery of the subject matter by the candidate as he/she attempted correctly both parts of the question.

The candidates who performed averagely were 54.46 percent. Majority attempted correctly part (a) of the question. In part (b), they failed to analyse the factors that determine the quality of farm yard manure. Most of their responses were the characteristics of organic manure like*; contains all plant nutrients*, *remain in the soil for long time*, *have high organic matter* and *low concentration.*

Contrary, 34.91 percent of the candidates had weak performance. Majority failed to provide correct responses in almost both parts of the question. In part (a), they were unable to examine causes of the loss of soil fertility. Some of the candidates mentioned means of adding nutrients to the soil for example *mulching*, *manure*, *cover crops*, *crop rotation* and *intercropping*. Others provided agents of soil erosion such as *water* and *wind*. A few gave means of controlling soil erosion like planting trees, keep less animals, avoid burning and good planting of crops on mountains. This suggest that they had inadequate knowledge of causes of the loss of soil fertility. Likewise, in part (b), they failed to analyse factors that determine qualities of farm yard manure. Some of the candidates mentioned types of organic manure such as *farmyard manure*, *composite manure*, *green manure*, *poultry manure* and *kraal manure*. Other pointed incorrect responses like; *they are very sweet*, *have a good smell*, *it is attractive in colour*, *they are a fine texture and are sticky when touched.* This is a fact that they lacked knowledge of the subject matter. Extract 4.2 shows a sample of incorrect responses to the question.

06.	(a) To examine the causes of the loss of soil fertility	
	① Poor Farm Operations.	
	- Poor farming operations and activities causes much of loosing soil fertility due to destruction of soil nutrients through poor farming operations.	
	② Pest and Diseases	
	- Pest and Diseases causes loss of soil fertility when some pests and weeds absorp all the nutrients from the soil to the plant.	
	③ Use of Chemical Inhibitors.	
	- Too much using of chemicals inhibitors on the lands makes the soil or land lose its fertility due to soil structure and porosity destructions	
	④ Poor Soil Profile.	
	- Poor formation of soil profile causes infertility due to unproportional profile of the soil throught the seasons.	
	⑤ Poor Soil Structure.	
	- Poor arrangement of soil structure causes infertility on the soil through arrangement of unwanted soil properties on the soil.	
	(b) five factors that Influence the quality of farm yard manure.	
	① Presence of Calcium. ⑤ Presence of Ammonium.	
	② Presence of Nitrate.	
	③ Presence of Phosphorus.	
	④ Presence of Nitrogen.	

Extract 4.2: *A sample of the candidate's incorrect responses to Question 6*

Extract 4.2 shows responses from a candidate who lacked knowledge of the concept of soil fertility. In part (a), he/she provided a variety of incorrect responses that were out of the question demand. In part (b), the candidate named plant nutrients instead of the factors that influence the quality of farmyard manure.

2.2.5 Question 7: Agricultural Marketing

The question demanded the candidates to suggest five possible solutions to marketing problems facing the agricultural produce in Tanzania. The question tested the candidates' knowledge of the concept of agricultural marketing.

The question was attempted by 6,884 (100%) of the candidates; among them 2,487 (36.13%) scored from 0 to 2.5 marks; 3,172 (46.08%) from 3 to 6 marks and 1,125 (17.79%) from 6.5 to 10 marks. Figure 7 illustrates the distribution of candidates' scores on the question.

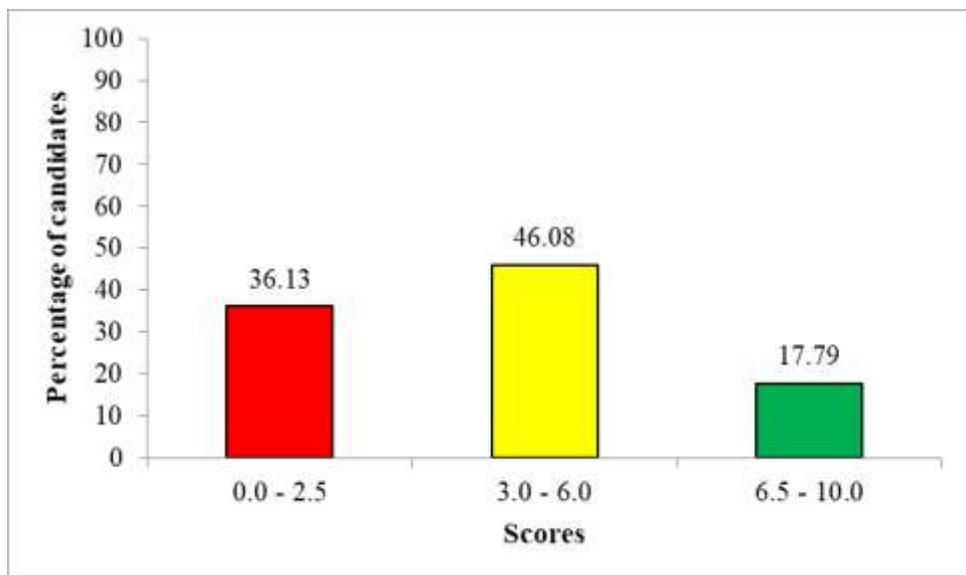**Figure 7**: *Distribution of candidates' scores on Question 7*

According to Figure 7, 63.87 per cent of the candidates scored from 3 to 10 marks whereas 36.13 per cent from 0 to 2.5 marks. This indicates general average performance of the candidates.

Statistics show that, 17.79 per cent of the candidates performed well. Most of them seemed to have good understanding of the marketing problems

hence provided correct solutions. Examples of solutions to marketing problems given were; *establishment of cooperatives*, *establishment of buffer stocks*, *establishment of stabilization funds*, *joining international agreements or trade blocks*, *improvement of transportation and acquisition of market information*. Extract 5.1 presents a sample of correct responses to the question.

7 (i) Improvement of transport.	
This means that one of the problem facing Agricultural marketing is transport, so, if the transport is available the Agricultural marketing will brought its need and avoid such a problems.	
(ii) To enhance the formation of cooperative societies.	
Through forming cooperation with different agents the agricultural marketing problem will be solved as possible. Also this can be done through making some cooperation with farmers.	
(iii) Regulation in supply.	
This means that the supply of the products should be remained constant and not to rise and some times to fall. This can be done through the use of different formation and cooperation.	
(iv) Presence of market information.	
This means that a farmar should be informed that there is the need of products in order to be transported to the required area and be used for a right-time. This may make the agricultural produce to get a high investment.	
(v) Provision of loans to the farmers.	
This means that may a farm fail to produce agricultural products due to having low money. So, the government should be responsible to give loans to the farmers in order to make them to produce a good agricultural products.	

Extract 5.1: *A sample of the candidate's correct responses to Question 7*

Extract 5.1 is an illustration of good responses from one of the candidates who attempted correctly the question. He/she had good understanding of solutions to marketing problems.

The candidates who had average performance were 46.08 per cent. Most of them correctly suggested the solutions to the marketing problems though not exhaustful. Some of the candidates did not come up with all the solutions demanded thus scored average marks.

However, 36.13 per cent of the candidates had weak performance. They failed to suggest solutions to the marketing problems. Some of them pointed out problems of marketing such as *poor transport*, *low price*, *poor storage* and *middlemen* instead of solutions to the problems. Others outlined functions of marketing for example *buying*, *processing*, *storage* and *market information*. The responses given imply that the candidates were not familiar with marketing problems and their solutions. Extract 5.2 portrays a sample of the incorrect responses to the question.

7	Market; is the process of buying and seling of the people. Marketing is the transation of good or services from one place to another. Also it was used to avoid other of the count to wed of quaidy people the wed to avoid then of the othe moike of Agriculture.	
	poor of transport and Communication; Also it was used people to wed of avoid in order to wed of the other in awordy people then It was wed for the other in order to wed the another country.	
	poor of science and technology; It was wed of the people then it was wed to destory of the other country to wed of people then it wod of controlly of the people then destory.	

	poor capital; In wed of people became of capitd to wed of avordy to wed of people then It was wed to avord other of people then It was wed to avordy other of the country of people	
	Land; It wed of the people then for business It wed of the other in order to avord to wed in order to avordy other pople to wed for Contrally in order to wed people of the contributes to wed people.	
	Generally; All of the wed of contrbuty to wed of the other people then It was wed in order to avordy of wed people tear to wed of people.	

Extract 5.2: *A sample of the candidate's incorrect responses to Question 7*

Extract 5.2 exemplifies the responses from one of the candidates who failed to provide correct responses in the whole question. He/she provided marketing problems and not solutions. Moreover, land and labour were also included but they are generally factors of production. The candidate lacked understanding of solutions to marketing problems. The responses also exemplify the candidates' poor command of the English language. He/she wrote sentences that were not clearly understood.

2.2.6 Question 8: Goat Farming

The question required the candidates to give five importance of keeping goats. The question measured the candidates' understanding of the importance of keeping goats in Tanzania.

The question was attempted by 6,884 (100%) of the candidates; out of which 89 (1.29%) scored from 0 to 2.5 marks; 1,555 (22.59%) from 3 to 6 marks and 5,240 (76.12%) from 6.5 to 10 marks. Figure 8 denotes the distribution of candidates' scores on the question.
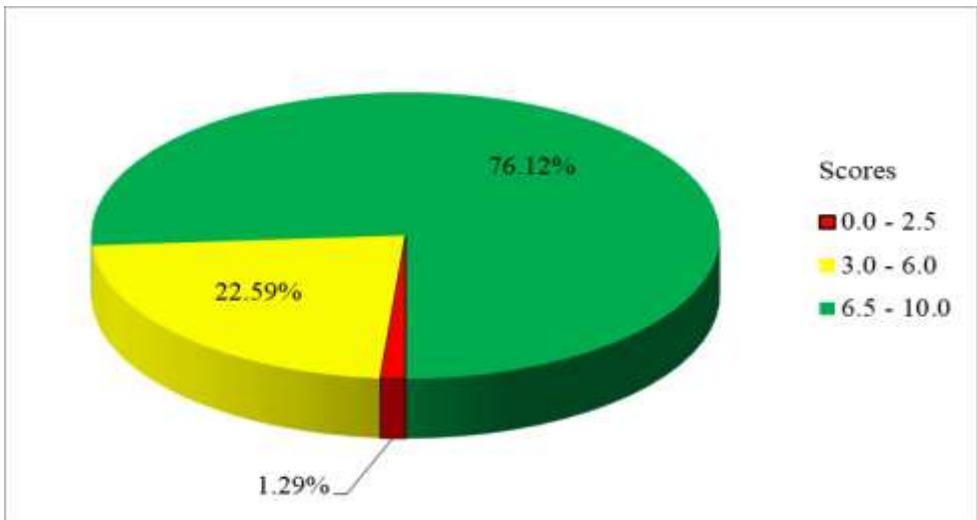
Figure 8: *Distribution of candidates' scores on Question 8*

Figure 8 shows that majority of the candidates (98.71%) scored from 3 to 10 marks while 1.29 per cent from 0 to 2.5 marks. This signifies general good performance of the candidates.

The candidates who had good performance were 76.12 per cent. Majority correctly gave the importance of keeping goats such as *provide several products to humans*, *they are resistant to diseases*, *are more efficiency in converting feeds into milk*, *they are prolific*, *withstand thirsty and easy to mature*. This shows that they had good understanding of keeping goats as shown in Extract 6.1.

Many people reqmures/prefers the products
of goats like meat since it more tenderness, juicin

8. ess, also milk is prefeeable for growth of children
as it reaches in protein.

iiij Goat are drought resistance
          Goat they can feeds in arid and semi-ari
d areas since they can feeds on tree leaves
so the drought condition may favours their
life compared to other animals depends on
grasses like cattle they can be favoured on the
arid areas.

iv) Goats are prolific.
          - They have ability to birth more than
one kid so this will be beneficial to the far
mer who keeps them as they can obtain mo
re than one kide.

v) Goat are resistance to some pests and diseases.
          Some of the pests and diseases can be
resisted by the goat Example pests like ticks Mostly
they can not affects the goats also others like
mittes can be resisted since goat excretes the urine
which is More unfavourable for habitat of these pests.

vi) Goats can withstand thirst for long time
          Goat can stand for long time without
drinking water, this situation favours them
to stay on drought areas arid and semi-arids
due to scarcity of water.

Extract 6.1: *A sample of the candidate's correct responses to Question 8*

Extract 6.1 indicates responses from a candidate who demonstrated good mastery of the subject matter. He/she provided correct importance of keeping goats.

Furthermore, the question had 22.59 per cent of the candidates who had average performance. They provided most of the correct points on the importance of keeping goat but they incorrectly elaborated them. For example, *Adapted to the environment - protect the environment*, *Highly profic - can grow fast*, *resistance to disease - attack the diseases* and *source of income – it is offer high cost*. At many times the point of source food was not elaborated and sometimes they pointed out the importance of goat as a working animal which was incorrect. Their responses were attributed to the partial understanding of goat farming.

On the other side, 1.29 per cent had weak performance. The candidates failed to give the importance of keeping goat. Examples of incorrect responses given were; *the scarcity of feeds*, *bad climatic conditions*, *lack of capital*, *lack of animal doctor* and *lack of dipping area*. All these were the factors that hinder livestock production. Other candidates named domesticated animals like *cattle*, *sheep*, *pig* and *chicken*. Extract 6.2 presents a sample of incorrect responses to the question.

08. (ii) Choose a suitable breeds for the livestock; This means that livestock keepers should choose a suitable breed for goats in order to get high yield of products from the goat farming.

(iii) Control pests and diseases of the livestock, regularly; This means that livestock keepers should control pest and disease of goats in order to maintain and improve livestock keeping in Tanzania and hence production of different product.

(iv) Provide livestocks with good pasture and water; This means that when improving the livestock production in Tanzania there should be the provision of good pasture and water to the goats for their survival and this lead to get better yields.

(v) Built a suitable housing for the livestock; There must be the suitable housing for the livestock because all livestocks need the place to rest so this may help livestock keepers to improve livestock keeping in Tanzania.

Extract 6.2: *A sample of the candidate's incorrect responses to Question 8*

Extract 6.2 illustrates responses from a candidate who failed to give the importance of keeping goats. The responses provided focused on management practices of animals rather than importance of keeping goat. This indicates the lack of knowledge of goat farming.

2.2.7 Question 9: Agricultural Mechanization

The question comprised parts (a) and (b) which required the candidates to: (a) briefly explain five good management practices required by oxen for maximum output and (b) give five necessary conditions for successful oxenization in tropical areas. The question examined the candidates' understanding of the concept of oxenization.

The question was attempted by 6,884 (100%) of the candidates; whose scores were as follows: 1,915 (27.82%) candidates scored from 0 to 2.5 marks; 3,105 (45.10%) from 3 to 6 marks and 1,864 (27.08%) from 6.5 to 10 marks. Figure 9 illustrates the distribution of the candidates' scores on the question.
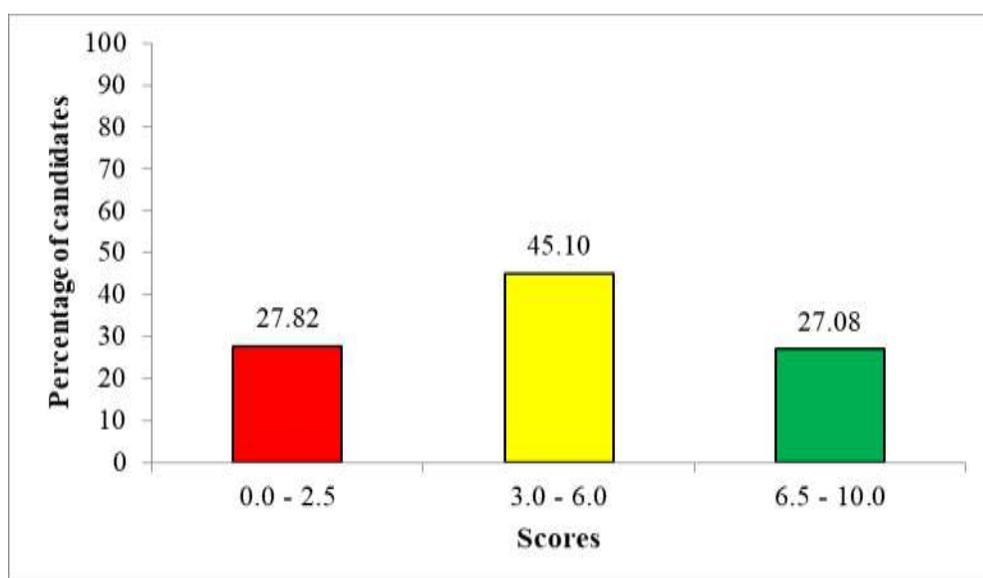
Figure 9: *Distribution of candidates' scores on Question 9*

Figure 9 indicates 72.18 per cent of the candidates scored from 3 to 10 marks and 27.82 per cent from 0 to 2.5 marks. The general performance of the candidates was good. The candidates who performed well in the question were 27.08 per cent. These candidates attempted almost all parts of the question correctly. In part (a), they correctly explained the management practices required for oxen such as *working animals must be well fed, working animals should be kept under the shade to protect them from strong wind, sun and rain*, *working animals must be protected from*

diseases and parasites, *working animals should be checked for injuries every day* and *working animals should be utilized during the cool portion of the day*. Similarly, they managed to give necessary conditions for successful oxenization in part (b) like; *farmers in a particular area must have cattle as their part of the farming business*, *animal diseases and parasites should not be a great problem*, *vegetation should be relatively short and light*, *the land should be reasonably flat with light soils* and *there should be an advisory service to train and advise farmers on the use of oxen*. The responses provided justify good understanding of the concept of oxenization. Extract 7.1 depicts a sample of correct responses on the question.

9a) i) Providing oxen an extra feeds. Extra Feeds Must be provided to the working animals (oxen) apart from the normal feeds provided so as to regain their power lost during working ii) Control pests and diseases. —Different pests and diseases must be controlled so as to ensure effiency working since the pests like ticks and tsetsefly they disturb them, so must be controlled. iii) Working in cool condition. —The animal must work in cool conditions to avoid the tiredness since during the sun day they may become tired easy compaired to the cool condition so its recomed like this	

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iv) Check for injuries and health of animal in general.		
- The injured animals must be treated using appropriate drugs so as to control the intance of pests and diseases in their bodies and checking their health and ability of working		
v) Treating (vaccinating) the sick animals regularly		
vi) Working animals must put under the shade to prevent them from sun and rainfall condition. These conditions may affect the health of the animals as during the rainfall they can get pneumonia so this situation may make them to fail in working.		

Extract 7.1: *A sample of the candidate's correct responses to Question 9*

Extract 7.1 shows a sample of a responses from a candidate who attempted correctly all parts of the question. This demonstrates that he/she had adequate knowledge of agricultural mechanisation.

The candidates who had average performance were 45.10 per cent. Most of them succeded to explain the management practices required for oxen in part (a). Part (b) of the question was not well attempted by the candidates. Examples of incorrect responses given for the conditions necessary for oxenization were; *presence of oxen*, *availability of ox-plough* and *cheap spare parts and presence of work man*. This is a fact that they had partial understanding of the concept of oxenization.

Nevertheless, the candidates who had weak performance were 27.82 per cent. Majority responded incorrectly nearly in all parts of the question. In part (a), they were unable to explain the management practices required for oxen for maximum output. Examples of incorrect responses given were; *it is cheap*, *work hard*, *do not need skill*, *do not need fuel* and *do many works* which were generally the importance of using animal power. Others mentioned types and breeds of cattle such as *cow*, *bull*, *calf*, *heifer*, *zebu* and *fresian*. Likewise, in part (b) they failed to give the necessary

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conditions for successful oxenization. Examples of incorrect responses provided were; *they should be health and strong, they should have short horns*, *they should be at the age of two to three years*, *they should be steers*, *they should be of quite a temperament and they should have a hump.* These are the criteria for selecting an oxen. Other incorrect reponses given were *need security*, *choose best oxen*, *need large area of land* and *control weed.* This implies that the candidates were not knowledgeable and skilled on oxenization. Extract 7.2 portrays a sample of incorrect responses on the question.

9ⓐ. The following are the good management practice s required for oxen for maximum output.	
i) Use of good agronomic practices.	
ii) Practices of Irrigation.	
iii) To Practice maximum or minimum tillage.	
iv) Effective control of soil erosion	
v) Maintainance of correct soil pH.	
ⓑ The following are the necessary conditions for a successful oxenization in tropical areas i	

ᵢᵢ) Availability of water.		
ᵢᵢᵢ) Availability of flower.		
ᵢᵢᵢ) iᵥ where & Drainage		
ᵢᵥ) Good wind condit direction.		
ᵥ) Good climatic condition.		

Extract 7.2: *A sample of the candidate's incorrect responses to Question 9*

Extract 7.2 indicates responses from a candidate who lacked knowledge of the subject matter. In part (a), the candidate outlined agronomic practices in crop production whereas in part (b) he/she provided factors to consider in choosing suitable land for crop production contrary to the demands of the question.

2.3   SECTION C: Essay Questions

2.3.1   Question 10: Annual Field Crops Production

The question required the candidates to explain the production of beans from land preparation to harvesting stage. The question evaluated the candidates' knowledge and skills of producing beans.

The question was opted by 4,144 (60.20%) of the candidates; where by 1,217 (29.37%) scored from 0 to 4 marks; 2,551 (61.56%) from 4.5 to 9.5 marks and 376 (9.07%) from 10 to 15 marks. Figure 10 indicates the distribution of candidates' scores on the question.
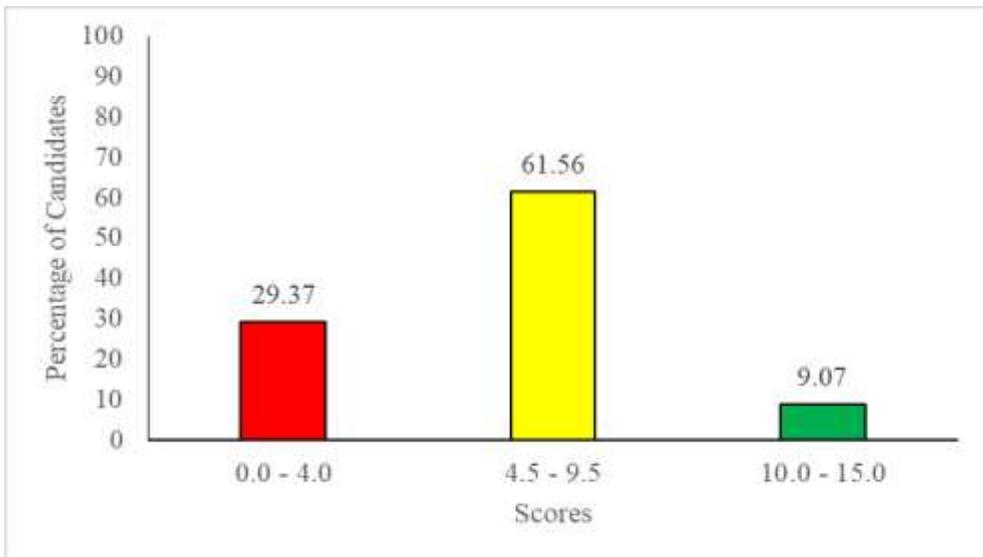
Figure 10: *Distribution of candidates' scores on Question 10*

Refering to Figure 10, 70.63 percent of the candidates scored from 4.5 to 15 marks and 29.37 from 0 to 4 marks. This shows general good performance of the candidates. Data indicate that 9.07 per cent of the candidates have performed well. Most of them explained correctly the important farm operations and requirements in the production of beans from land preparation to harvesting stage. These include *land preparation*, *seedbed preparation*, *climatic and soil requirements*, *crop varieties*, *weeding*, *fertilization*, *pests and diseases control* and *harvesting*. This is an indication that they were knowledgeable and skilled in the production of the crops. Moreover, the candidates had an added advantage thus scored high marks since they organized well their essays into introduction, main body and conclusion. Extract 8.1 presents a sample of correct responses on the question.

10. Beans (phaseolus vulgaris) are leguminous crops which are grown to be eat as greenpod or dry seed. They used as protein in the diet also the leaves of beans are used as a vegetable.

Land preparation. The land repaired both prepared by primary tillage and prepared by secondary tillage to form a fine tilth.

Climate And soil. The beans grow well in drained loam soil which is high in organic matter also grow well in 1000metre to 2000 metre above the sea level.

Rainfall. The beans required adequate rainfall especiall before flowing and during seed setting.

Varities varieties of beans. The beans has many local varieties and other such as Tengeru

10. wonder masai red, canadvain and Mexico 142.

propagation of beans. The beans are propageted by its seed.

spacing. The space of beans done in 45 cm to 60 cm in row and 10 cm to 15 cm betw een the plant

Fertilization application. apply triple super phosphate (TSP) in the land after planting the beans at the rate of 200 kgh between the space of row also apply as top dressing the sulph ate of ammonia (SA) in order to boost the production.

weeding. weeding done in 10 day up to 20 day after plant ng and repeat for 30 day if is necessary. dont weeding during floweng or seed marking that will result to fall the seed.

Pest of beans. There are man y pest that face the beans such as Beanfly, Beans aphid, american Lollworm suppose to apply DDT sprayo to kill the pests also the. Beans aphid should be contr olled by crops rotation, early planting and to spray with insecticide so as to kill them also the Beans fly controlled by

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10	spraying DDT spray and practice crop rotation also early planting.

Diseases of Beans. The beans have many diseases such as leaf rust, Angular leaf spot, anthracnose, blight. The anthracnose is controlled by planting the infected plant, by crops rotation and early planting. The leaf rust controlled by crops rotation to the farmer. The leaf spot is controlled by planting infected seed and early planting.

Harvesting and storages. The beans must harvested when the pod become yellowish or when the pod ~~donot~~ donot shater or open up because will cause the many seed to fall down.

Storage of beans. Stort beans in 2 months to 3 months then apply or dusted with Malathion or permethrin to protected from beans borer. Wash the beans with water after cooking to remove the chemicals to the beans seeds. which was being dusted to the beans seed.

Extract 8.1: *A sample of the candidate's correct responses to Question 10*

Extract 8.1 shows responses from a candidate who correctly explained production of beans indicating possession of adequate knowledge and skills of the process.

The candidates who performed averagely were 61.56 percent. The candidates showed good essay organizational skills but most of them missed some important farm operations and requirents in the production of beans. Some farm operations and requirements that were missed were particulary seedbed preparation, climatic requirement and crop varieties. Sometimes the explanations given on farm operations and requirements were incorrect as far as production of beans is concerned.

However, 29.37 per cent of the candidates had weak performance. Majority failed to explain the production of beans from land preparation to harvesting stage. They seemed not to understand the demand of the question. Some of them gave different protein sources such as *egg*, *meat*, *fish* and *pea*. Others tried to define the terms land preparation and harvesting that appeared in the question stem. This justifies that the candidates were not knowledgeable and skilled on the production of beans. However, majority showed poor essay organizational skills that contributed to loss of more marks. Extract 8.2 represents a sample of incorrect responses on the question.

10.	**Plant Proteins** are plants rich in protein nutrition such foods are beans, meat, fish and eggs, this foods provide energy and growth of the body. The following how you could raise the beans production from land preparation to harvesting stages;	
	Investing the Production Interest; To increase the beans demand in the market there should be a good investment of interest in producing beans so as do reach the market demand!	
	Proper price fluctuation; To increase the beans demand in the market there should be a well planned market price for selling and buying the beans. This help in investing in the production due to good price fluctuation.	
	Production market supply; To increase the beans demand in the market there should be a good supply of the beans production to the markets inorder to reach them easily.	
	Production in Quality and Quantity; To increase the beans demand in the market the production of beans should be high in quantity and good in quality to emphasize more market demand	

10	_Using Proper Production methods_: To	
	increase the production of beans in the market the farmers	
	should use good and well farm operations to produce in	
	good quantity and quality to reach the demand of	
	the production.	
	Generally: To raise beans production there must be a	
	high demand of the product and investment.	

Extract 8.2: *A sample of the candidate's incorrect responses to Question 10*

Extract 8.2 shows incorrect responses that were contrary to the demand of the question. The candidate demonstrated poor mastery of the subject matter.

2.3.2 Question 11: Agricultural Mechanization

The question required the candidates to explain six steps to be followed by farmers when training draught animals for efficient work. The question tested the candidates' knowledge and skills of training draught animals.

The question was opted by 2,741 (39.80%) of the candidates; whose scores were as follows: 1,416 (51.66%) scored from 0 to 4 marks; 966 (35.24%) from 4.5 to 9.5 marks and 359 (13.10%) from 10 to 15 marks. Figure 11 illustrates the distribution of candidates' scores on the question.
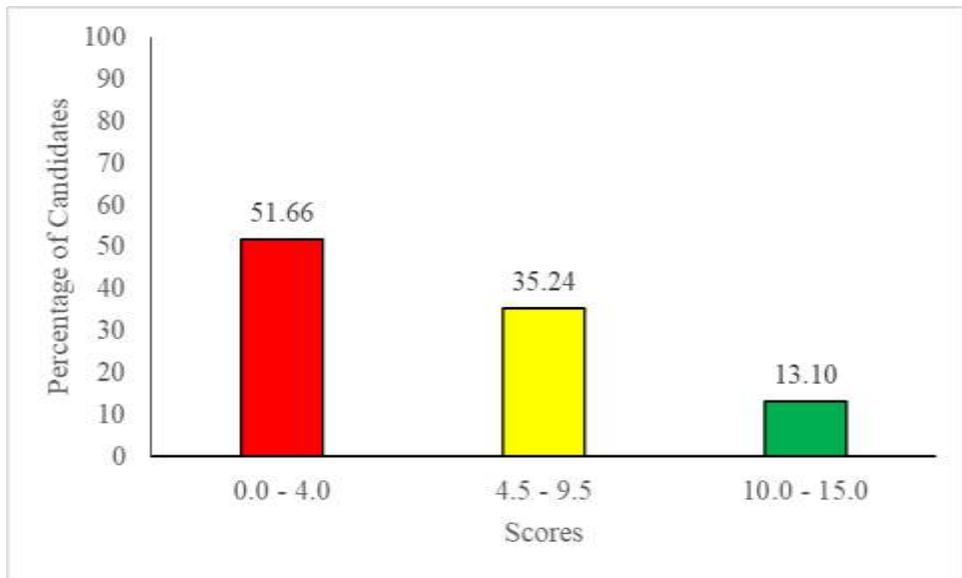
Figure 11: *Distribution of candidates' scores on Question 11*

Figure 11 shows that 48.34 per cent of the candidates scored from 4.5 to 15 marks while 51.66 per cent from 0 to 4 marks. The general performance of the candidates was average. The candidates who performed well in this question were 13.10 per cent. Most of them wrote good essays explaining step by step procedures to be followed when training draught animals. These are *selection of animal*s, *assigning names*, *tying, moving in pairs*, *Familiarization with a yoke*, *use of suitable words*, *light works and making them do heavy work*. This implies the candidates were familiar with the stepwise procedures to be followed when training draught animals. Extract 9.1 is an example of correct responses on the question.

Draught animals; Are animals which are used as a source of farm power. Example cattle, camel, buffaloes just to mention few. Inorder for draught animal to work appropiately they must be trained so as to perform appo piately.

The following are the steps to be followed by farmers when training draught animals which are:-

Each animal should be asigned a name". Inorder to ensure that animal work properly, each animal should be given a name that will help a farmer to know the work performance of each animal.

Animal should be accustomed to being tied by a rope". Each animal should be familiarized to being tied by a rope so as to make it easy for a farmer when controlling an oxen. during performing different farm operation.

11. Animals should be accustomed to move in pairs; For those farmers who have many farm operations it will be difficult for one draught animal to operate so so draught animals should be trained to move in pairs.

Animal must be familiarized with a yoke: After some steps later on the animal should be familiarized with the yoke which rest on the hump. Yoke is where the implement is hatched so as to perform farm operations.

Also, suitable words should be choosen as a command: During working with a fo draught animal a farmer must choose the words which he/she will uses when work with a draught animal. Example of command word is "Go"- means "flicking the reins" when a farmer use this words it will enable to perform many operations.

	Lastly, during the first lessons, animal should work only for light works; Inorder for a farmer to know whether the animal is well trained should allow the animal to work on the farm but only for light work such as cultivation of the land.	
	Generally, there should be advisory services in different areas especially rural areas which used animal power These services should train farmers on how they can train oxen for farm activities so as to obtain maximum output.	

Extract 9.1: *A sample of the candidate's correct responses to Question 11*

Extract 9.1 exemplifies the responses from the candidate who attempted well the question. He/she showed good understanding of the steps to be followed when training draught animals.

Moreover, the candidates who had average performance were 35.24 per cent. Analysis of their responses shows that they were familiar with the procedures for training draught animals. The exception is that they failed to present them in a stepwise manner, which made them loose some marks. This concludes that they had insufficient knowledge and skills of step by step procedures to be followed when training draught animals.

On the other hand, 51.66 percent of the candidates had weak performance. Majority were unaware of the steps to be followed when training draught animals since their responses were out of the question demand. For example, some explained the steps that were related to process of artificial insermination like *collect sperm*, *prepare cow*, *give the food to cow*, *detect heat*, *mount a bull and put sperm to cow*. Others tried to explain procedures involved in milking such as *give feed to cow*, *tie the cow*, *prepare milking material*, *wash hands* and *press teats*. Other incorrect responses reflected the management practices required for oxen such as *provide food*, *control disease and parasite*, *draught animals should be checked for injuries, good handling of animals* and *work them in a cool condition*. The responses provided suggest that the candidates lacked understanding of the procedures

to be followed when training draught animals. Extract 9.2 presents a sample of incorrect responses on the question.

11.	Farm Mechanization: Is the application of engineering principles and techniques in Agricultural and involves the utilization of all form of energy through Mechanical assistance in Agricultural production. The following are farmers when training draught animals so that they can work appropriately from the farm Mechanization. by draught animals.
	Increas speed of working; Also are farmer application of provide to increased speed of working for sources good management to facilitate activities and Move farmer Mechanization.
	It reduce Labour shortage; They facilitate farmer Mechanical and where through Agricultural production from the traditional between and provide all form of energy to body from people another Labour shortage in source of income and Mechanical assistance reducing effort used.
	It reduce the production costs; During are through which to control weed pest and reduce the production costs all more activities for social economic facilitated to working application of engineering principles and technology in social economic to Agricultural production.

It reduce drugging involves
with hard and dirty; through were by
source of income and reducing drugging
involves with hard trade and production.
to farmer draught animal.

Cultivate a large area;
Also are facilitate people to change an
which source traditional and techniques
in farm mechanization assistance in
Agricultural production are source
of facilitate social economic to used.
and draught animals.

Reduce Druagery; They
are source production people to exchang
e in Mechanization Agricultural
reducing drug druagery and farmer
Mechanical draught animal to from
form source of food to through.
which reduce druagery in animal.

Genellay; The following are
farm Mechanization b; draught animal
is the Cheapest for small scale where
by this to tradional source of the
facilitate source animal to reduce is
Tanzania and Agricultural Mechaniza
tion to farmer draught animal.

Extract 9.2*: A sample of the candidate's incorrect responses to Question 11*

Extract 9.2 indicates responses from a candidate who lacked knowledge and skills of the subject matter. He/she provided advantages of mechanization in agriculture instead of the steps to be followed when training draught animals.

2.4 034/2 AGRICULTURAL SCIENCE 2 (Practical paper)

2.4.1 Question 1: Soil and its Agricultural Utilization and Crop Production

The question constituted parts (a) and (b). In part (a), the candidates were provided with the specimens, apparatuses and materials as follows: **A** (Dry sand soil), **B** (Dry clay soil), Measuring cylinder, Beaker, distilled water and Stirring rod. They were required to perform the following procedures and answer the questions that follow:

Procedures
(i) Put 100 cm^3 of water in the 250 cm^3 measuring cylinder.
(ii) Using a beaker, put soil sample A up to 100 cm^3 mark and pour the soil into the 250 cm^3 measuring cylinder with 100 cm^3 of water.
(iii) Record the volume of the mixture in the measuring cylinder.
(iv) Repeat steps (i) –(iii) using soil sample B.
(v) Cover the mouth of the measuring cylinder with a hand and shake well, do it for both cylinders.
(vi) Stir the mixtures with a stirring rod so that all the bubbles come out.
(vii) After all the bubbles have escaped, record the final reading of the mixture in both cylinders.

Questions
(i) What caused the bubbles to come out?
(ii) Why did you stir the mixture for bubbles to come out?
(iii) Comment with reason on the volume of the mixture before and after shaking and stirring in both cylinders.
(iv) Compare the volume of bubbles lost in soil samples A and B. Give reasons to support your answers.
(v) State the relationship between bubbles that have been lost in the experiment and water in the soil.
(vi) What conclusion can you draw from the experiment you have done?

The question examined the candidates' knowledge and practical skills of the soil constituents.

In part (b), they were provided with specimen **G** (Knapsack sprayer) filled with water and bucket. They were required to perform the following procedures and answer the questions that follows:

Procedures
(i)   Strap specimen **G** in the back in a comfortable position.
(ii)   Use the handle to pump up and down until it becomes hard to do so, then stop.
(iii)   Direct the lance into the bucket provided.
(iv)   Press the trigger control to release the content in the tank into the bucket and observe its flow for one minute.
(v)   Unstrap the specimen.

Questions
(i)   Briefly describe the purpose of doing procedure (ii).
(ii)   Assume you are spraying pesticide on crops in the field (procedure (iv)), outline three important safety precautions would you have to consider.
(iii)   How would you care for and maintain part of specimen **G** that disperses liquid spray into the spray area? Give six points .
         The question tested the candidates' knowledge and skills of using sprayers.

The question was attempted by 6,884 (100%) of the candidates; among them, 3,338 (49.17%) scored from 0 to 7 marks; 2,976 (43.23%) from 7.5 to 16 marks and 523 (7.60%) from 16.5 to 25 marks. Figure 12 indicates the distribution of candidates' scores on the question.
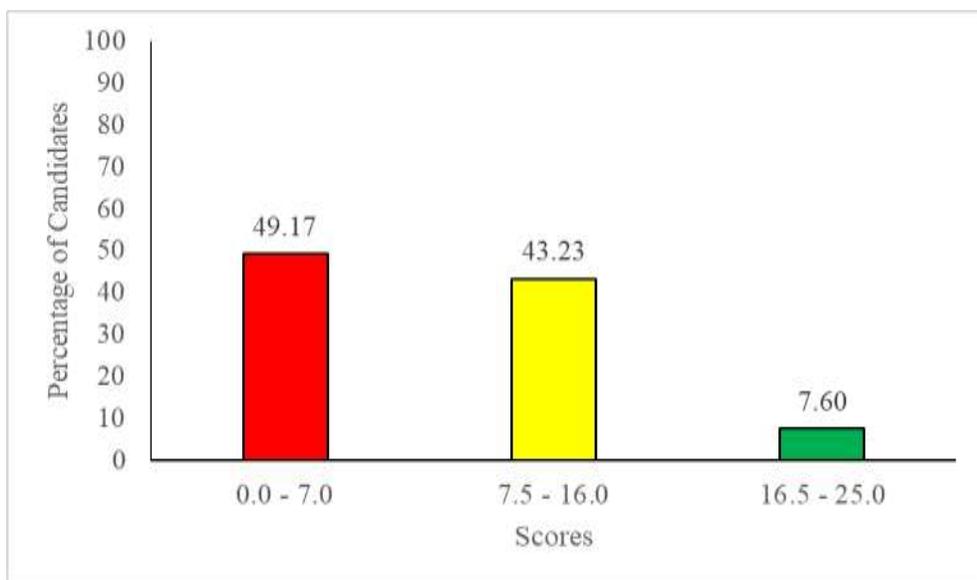
Figure 12: *Distribution of candidates' scores on Question 1*

According to Figure 12, 50.83 per cent of the candidates scored from 7.5 to 25 marks and 49.17 from 0 to 7 marks. This shows general average performance of the candidates. The candidates who had good performance accounted 43.23 percent. The majority of the candidates responded correctly in almost all parts of the question. They correctly followed the procedures of the practical activities hence arrived at the correct observations and results.

In part (a) (i), they adequately gave the reason for bubbles to come out. The reason was; *air bubbles were formed because water occupied the spaces that air had occupied.* In (a) (ii), they managed to give correct importance of stirring the mixture which is *to ensure uniform/evenly dissolving or breakdown of the soil aggregates containing pore space to release the air.*

Likewise, in (a) (iii) they gave correct comment and reasons on the volume of the mixture before and after shaking and stirring in both cylinders. The responses provided were; *before shaking, the expected volume of the mixture (soil +water) was 200 cm³. After shaking and stirring in both cylinders, the level of the mixture decreased due to air that have escaped from the soil.*

 In (a) (iv), they managed to compare the volume of bubbles lost in samples A and B as follows; *more volume of the air bubbles would have been lost in*

sample A (sand soil) compared to sample B (clay) soil because sample A contains large air spaces as a result of having large particles compared to sample B which have small air space as a result of having closely packed particles. In (a) (v), they were able to state the relationship between bubbles that have been lost in the experiment and water in the soil as *the more the soil air, the less the soil water and vice versa* and in (a) (vi), the conclusion provided was; *soil contains air in its pore spaces*. The responses given show that the candidates were knowledgeable and skilled in determining that soil contains air.

Similarly, in part (b) (i) the candidates were able to explain the purpose of doing procedures (ii) which is *to create high pressure that breaks liquid into finer droplets to increase spraying drifts.* In (b) (ii), they provided the correct important safety precautions to be considered when spraying pesticides on crops in the field. The precautions given were; *the user should wear protective gear, not blow or suck blocked nozzle and avoid inhaling the chemical by not spraying against the wind*.

In (b) (iii), they correctly gave care and maintenance of the part of specimen G (knapsack sprayer) that disperse liquid spray. These include *never smoke*, *eat*, *or drink anything while spraying pesticide*, *replace a worn out nozzles where necessary*, *clear nozzle tip with clean water after uses and use a pump to blow air through the orifice* then *clean and dry it*. The candidates demonstrated good ability of using Knapsack sprayer. Extract 10.1 is a sample of candidate's correct responses on the question.

01(a)	The bubbles come out because as water replaced the air from the sample.	
(b)	The process of stiring helps water to mix well with the soil.	
(c)	The volume in both cylinder decreased after shaking as air moved out from samples.	
(d)	The volume in Sample A give out more bobbles than in Sample B because Sample A have got big particles that creates more pore space compared to Sample B.	
01(b)	(b) - Wear protective gloves - Avoid smocking when spraying.	
	(c) Cares of part G that disperses liquid. - Wash the nozzel to reduce the dirtyness which can lead ito do not displace.	
	- Filtrate the water before introducing into a tank	
	- Make sure the pressure in the tank is high in order to make easy spray of chemicals.	

– Make sure the chemicals introduced into the knap sack sprayer is safe (with no contaminants and	
– Avoid the use the sprayer while placing down the nozzel (to the soil)	
– Donot direct the nozzel to the source of heat. example fire.	
– Do not use the steer wire when washing the knap sack sprayer to avoid over working of the nozzel.	

Extract 10.1: *A sample of the candidate's correct responses to Question 1*

Extract 10.1 presents responses from a candidate who attempted well the question. He/she demonstrated good ability in determining soil constituents and use of sprayers.

The question had 43.23 per cent of the candidates who performed averagely. It was observed that most of them attempted well part (b) showing good ability in the use of Knapsack sprayer. In part (a), most of them seemed not to follow correctly the procedures of the practical activities thus arrived at wrong observation and results. This resulted into providing incorrect responses to most of the items indicating difficulties in the determination of soil constituents.

On the other hand, 49.17 per cent of the candidates had weak performance. Most of them responded incorrectly in nearly all parts of the question. This was attributed to the failure to follow the procedures of the practical activities hence arrived at wrong observations and results. Provision of correct responses depended on the correct observations made. For example, in part (a)(i) they failed to give the reason for bubbles to come out by presenting wrong answer such as; *because mixture take place*, *it increases the volume of sample*, *it causes penetration of water to the soil and because of evaporation of water to the soil*.

In (a) (ii), they were unable to give correct benefits of stirring the mixture. Examples of incorrect responses provided by some of the candidates were;

to make mud, *to improve soil structure*, *in order to increase volume of soil*, *to maintain fertility of the soil*, *to make solution and to improve aeration of the soil*.

In (a) (iii), they displayed incorrect responses of comments and reasons on the volume of the mixture before and after shaking and stirring in both cylinders. Examples of such responses were: *the volume of samples increases, it absorbs air from the atmosphere, to remove stones and sand, it leads to competition of water and soil* and *to get suspension.*

In (a) (iv), the candidates failed to compare volume of bubbles lost in sample *A* and *B* by giving incorrect responses. Examples of responses provided were; *the sample A and B had the same volume of bubble lost in the sample*, *soil clay is more colloid*, *clay soil has high soil fertility compared to sand soil*, *sample A and B lost the volume of 20 cm^3 and sample B is black in colour compare to sample A*.

In addition to that, the candidates were unable to state the relationship between bubbles that have lost in the experiment and water in the soil in (a) (v). The responses given by the candidates were; *it absorbs water holding capacity, it helps to determine good holding capacity of the air, clay soils are heavy in weight compared to sand soil, both of them enhance the plant growth and it supply nutrients to the soil*.

In (a) (vi), they failed to draw conclusion from the experiment by providing wrong responses such as; *this is the soil and it support the plant growth*, *sand and clay soil*, *clay soil was wet than sand soil*, *the aim is to test pH of the soil*, *to see the colloidal particles in the solution and to determine the colour change of the mixture*. This proves that the candidates were incompetent in carrying out experiments to determine constituents of the soil.

Likewise, in part (b) (i) the candidates were unable to describe the purpose of pumping the Knapsack sprayer by providing incorrect responses such as; *to control pests and diseases*, *to improve nutrients in the soil*, *doing a spraying in the bucket*, *it encourages to clean the knapsack part*, *it tests to apply liquid form which are found in chemicals and it is used in irrigation*.

In (b) (ii), they displayed incorrect responses concerning the important safety precautions to be considered when spraying pesticides on crops in

the field. Such responses were; *control pests and diseases*, *to control weeds*, *it adds nutrients to the soil*, *it helps to spray the animals* and *the mixture are poisons to human being*.

In (b) (iii), the candidates failed to give care and maintenance of parts of Knapsack sprayer. Examples of incorrect responses given were; *to keep amount of water you want to spray*, *mixed with amount of pesticides*, *it is affected by soil erosion*, *should maintain distance between farmer and crop*, *use low power when pumping* and *it brings weed to the environment*. This indicates that the candidates were unfamiliar with the use of Knapsack sprayer. Extract 10.2 presents a sample of the incorrect responses to the question.

1a) a) The caused bubbles to come out is the waste materials come out of the bubbles.	
b) Inorder the soil to make different- either Up is water and down is soil.	
c) The volume of the mixture before and After shaking stirring which are the volume of the sample A and B is 100m³ of the measuring cylinder which can make to Identify the different of the Soil Samples.	

1 d) The volume of bubbles lost in Samples A and B is volume 170 cm³ of those Samples Because the water move from 100 cm³ to upward because the Soil Sample are very large in mass.

e) The bubbles that have lost in the experiment is coming upward and formed the waste that become upward WHILE water in the soil, this are those remains in the soil Samples downward

F) The conclusion is that the Soils Samples are very having Particles but the bubbles to come is waste that are found in Soils.

1:b) a) The purpose of doing is to make sure that those are Inside of knapsack are Medicines that are putting in insects.

b) i) It help in Spraying the pesticides in crop production when the Bacterial are found.

ii) It help in cheap for Spraying pesticides during your Spraying those chemicals.

iii) Help the farmers to put the chemicals those are poisonous in crop production in border to Spraying the diseases.

1 b)	i) Make sure that after Spraying the crops you make sure to clean the knapsack Inorder to remove the chemicals	
	ii) you Should Prapare well befor tuksing for Spraying.	
	iii) You Should Put very wel plare that can be having believes.	
	iv) You Should mantain the disease that can be Inter Into the knapsackss.	
	v) You Should mantain the Plare where are very to be conducted.	
	vi) After doing the protess you Should keep the Parts well Example on-off level lanre and others.	

Extract 10.2: *A sample of the candidate's incorrect responses to Question 1*

Extract 10.2 is an illustration of responses from a candidate who performed poorly in all parts of the question. It shows he/she lacked observational and practical skills on determining soil constituents and use of sprayers, and hence came out with wrong results.

2.4.2 Question 2: Livestock Production

The question consisted of parts (a) and (b). In part (a), the candidates were provided with specimens and apparatuses as follows: L_1 (Hard tick), L_2 (Tsetse flies), watch glass and hand lens. They were required to observe

carefully the given specimens, perform the following procedures then answer the questions that follow:

Procedures

(i)   Place the specimen **L₁** on the watch glass with its dorsal side facing upwards. Use a hand lens to observe the specimen.

(ii)   Place the specimen **L₂** on the watch glass with its dorsal side facing upwards, while wings are at rest. Use a hand lens to observe the specimen.

Questions

(i)   From procedure (i) and (ii), state two distinctive features observed for specimen **L₁** and three for specimen **L₂**.

(ii)   Name two host animals for specimen **L₁**.

(iii)   Examine three effects of specimen **L₁** and two effects of specimen **L₂** to the host animal in livestock production.

(iv)   Suggest three control measures for each specimen **L₁** and **L₂**.

(v)   The question assessed the candidates' ability to identify external parasites.

In part (b), they were provided with specimen, apparatuses and materials as follows: **J** (Cow milk), measuring cylinder, Pyrex beaker, cold water and source of heat. They were required to carry out the following procedures and then answer the questions that follow:

Procedures

(i)   Measure 200 mls of specimen J and pour it into a 500 mls pyrex beaker.

(ii)   Heat the specimen J until it starts to raise and ballooning upwards.

(iii)   Leave the specimen J for 5 seconds on heat.

(iv)   Remove the specimen J from the heat and cool it in cold water bath.

Questions

(i)   Why did the specimen rise when heated?

(ii)   Give the name of the process you have been doing.

(iii)   What is the negative effect of heating the specimen?

(iv)   State the objective of the process.

The question evaluated the candidates' practical skills on milk preservation.

The question was attempted by 6,884 (100%) of the candidates; out of which, 480 (6.97%) scored from 0 to 7 marks; 4,755 (69.07%) from 7.5 to 16 marks and 1,649 (23.96%) from 16.5 to 24 marks. Figure 13 shows the distribution of candidates scores on the question.
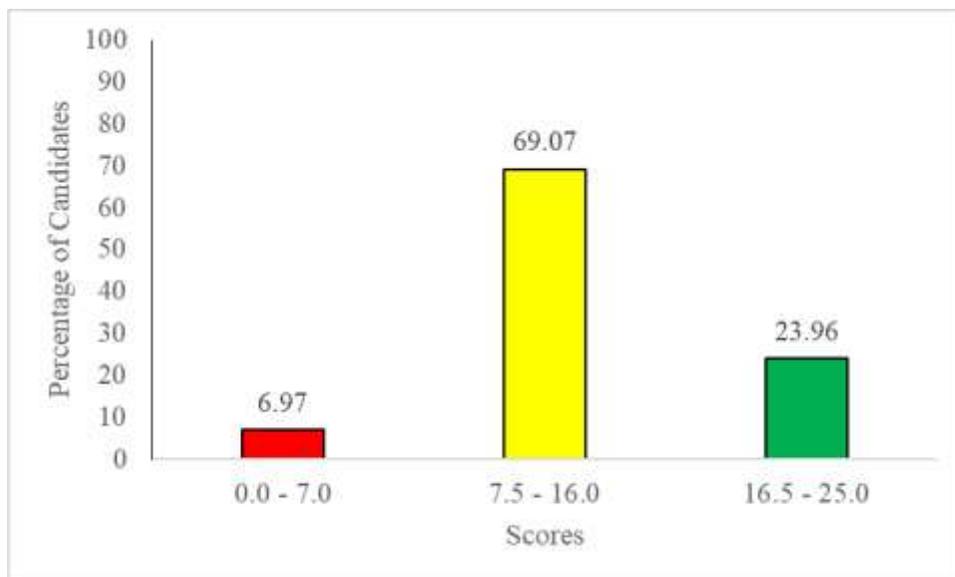

Figure 13: *Distribution of candidates' scores on Question 2*

Figure 13 depicts majority of the candidates (93.03 %) scored from 7.5 to 24 marks and 6.97 per cent from 0 to 7 marks. The general performance of the candidates was good. The candidates who performed well in the question were 23.96 per cent. Most of them attempted correctly both parts of the question. They made correct observation and followed the procedures of the practical activities precisely. In part (a) (i), they managed to state the distinctive features observed in procedure (i) and (ii). Examples of correct responses provided were*; have a hard dorsal plate*, *its mouth parts projects forward*, *head and thorax are fused together*, *have no wings and have four pairs of legs* for specimen L_1. For L_2 were; *have compound eyes*, *have two wings*, *have three pairs of legs*, *have abdominal segments and the body is divided into three parts (head*, *thorax* and *abdomen)*.

In (a) (ii), they gave correct names of host animals for specimen L_1 which were *cattle*, *sheep*, *donkeys*, *horse and goats*. Similarly, in (a) (iii) they were able to examine effects of specimen L_1 and L_2 to the host animal in livestock production. The correct responses given for specimen L_1 include;

transmission of protozoan diseases, *skin irritation*, *anaemia*, *skin damage and prolonged damage of teats or udder*. The effects of specimen *L₂* included; *transmission of trypanosomiasis*, *skin irritation and hence discomfort due to poisonous substances it injects in the animal bodies and painful biting effect and disturbance when biting the animals*.

In (a) (iv), the candidates managed to suggest control measures for specimen *L₁* and *L₂*. The control measures given were; *rotational grazing*, *controlled burning of vegetation*, *spraying animals' body with acaricide*, *and fencing to avoid entry of other animals* for specimen *L₁*. For specimen *L₂* the correct responses were; *Spray the bush with agrochemicals*, *to smear animals' bodies with tsetse flies repellant chemicals*, *placing tsetse flies attractive clothing flags in the bush* and *selective bush clearing to destroy the habitat of selected Glossina spp*. This signifies that the candidates were knowledgeable on hard ticks and tsetse flies.

Furthermore, in part (b) (i) the candidates were able to give the reasons for the rise of specimen J (Cow milk) when heated. The reason provided was: *specimen rose due to entrapped air that expand and tend to escape lifting the specimen*. In (b) (ii), they managed to give the correct name of the process they did in the experiment which was *pasteurization*. This is a process of food preservation in which packaged and non-packaged foods (such as milk) are treated with mild heat, usually to less than 100 °C (212 °F), to eliminate pathogens and extend shelf life.

In (b) (iii), they correctly gave the negative effect of heating the specimen which was *heating reduces nutritional value of the specimen through vapour*. In (b) (iv) the candidates stated correctly the objective of the process which was t*o kill micro-organism and increase milk keeping quality*. The responses from the candidates demonstrate good masterly of the process of pasteurization in milk preservation. Extract 11.1 presents a sample of the correct responses to the question.

2 @. _Specimens._

L_1 = Hard ticks
L_2 = Tsetseflies.

i/ Distinctive features of L_1 (2 points)

- They have hard cover on top of their dorsal side.
- They have four pairs of walking legs.

Distinctive features of L_2 (3 points.)

- They have mouth like structure called probocis.
- They have a pair of wings.
- They are divided to three parts which are head, thorax and abdomen.

ii/ Host for specimen L_1 (Hard ticks).
- Cattle
- Goats.

iii/ Effect of specimen L_1 (3 points).

- They cause diseases to livestocks Example are East coast fever, Red water, heart water.
- They destroy the quality of the skin.
- They result to stress and disturbance on livestock

2 | @ iii/ Effects of specimen L_2 (2points.

- They spread diseases on livestock. Example trypanosomiasis (nagana).
- They cause much pain on livestock when they suck blood.

iv/ Control measure for specimen L_1 (Hard tick).
- ploughing the land
- spraying with acaricides.
- practising rotation grazing.

Control measure for specimen L_2 (Tsetsefly).
- Sterilization of the male tsetsefly.
- Trapping the flies through special net.
- Spraying with the insecticides.

(b). The specimen.
J = cattle milk.

2 (b). i/ The specimen rised so when heated, this was due to the effect of escaping bubbles which formed as when the hydrogen and oxyg, oxygen that forms water compounds found in the milk were escaping from the specimen.

ii/ The name of the specimen process used is pasteurisation.

iii/ Negative effect of heating milk.

i/Reduces some components of milk. such as water
ii/ Kills/micro-organism/s /that/ would increase taste in milk.
iii/Lowers the nutritive value of the milk.
iii/Kills the cells found in the milk.

iv/ The objective of heating the specimen (milk) is to kill the micro-organisms found in the speci-men that would cause to the spoilage of the the milk.

Extract 11.1: *A sample of the candidate's correct responses to Question 2*

Extract 11.1 is a sample of responses from a candidate who met the requirements of the whole question. He/she possessed adequate knowledge and skills of external parasites and pasteurization as milk preservation process.

The candidates who had average performance were 69.07 per cent. Majority did well in part (b). They demonstrated good practical skills on pasteurization hence provided correct responses to the questions asked.

In part (a), the candidates were observed to possess poor observational skills in the identification of external parasites hence provided incorrect responses to most parts of the question.

However, 6.97 per cent of the candidates had weak performance. Most of them provided incorrect responses nearly to all parts of the question. The candidates exhibited poor observational and practical skills. For example, in part (a) (i) they failed to provide correct distinctive features for specimen L_1 (hard ticks) and L_2 (Tsetse fly). Examples of incorrect responses given for specimen L_1 include; *they have husks, they have eyes, they have high amount of protein, they have hands, they have three pairs of legs, they have antenna and they have wings*. For specimen L_2 were; *it has sting, they live to the shade area, they have mouth, they have arms, and they have teeth*.

In (a) (ii), they failed to name the host animals for specimen L_1 by providing responses such as *dogs*, *pigs*, *duck*, *chicken* and *cats*. Similarly, in (a) (iii) they were unable to examine the effects of specimen L_1 and L_2 to the host animal. For specimen L_1 the incorrect effects provided were; *cause loss of appetite*, *it increases production costs*, *causes abdominal pain, it reduces death*, *and it cause malaria*. For specimen L_2 were; *it causes trypanosome disease to human beings, it causes headache, it causes stomach ache and it causes nuisance*.

In (a) (iv), they failed to suggest the control measures for specimen L_1 and L_2. For specimen L_1 the incorrect responses provided were: *to use good varieties, to provide vaccination, to remove the affected animals, clean the animal houses and open the carcass*. For L_2 were; *weed control, crop rotation, drenching, castration and catching by hands*. Their responses demonstrate inadequate knowledge and practical skills on external parasite.

Moreover, in part (b) (i), the candidates failed to give reason that caused specimen J to rise when heated. Examples of incorrect responses given were; *due to the presence of heat, have high amount of protein, increases in volume due to raise in temperature, due to escape of microorganisms and due to expansion of milk*.

In (b) (ii), they provided incorrect name of the process of heating specimen *J* (Cow milk) such as *evaporation*, *boiling*, *cooking*, *heating*, *making fat and melting*.

In (b) (iii), the candidates were unable to give negative effects of heating the specimen. The incorrect responses were; *it decreases when heated*, *it causes burning accident when heating*, *it increases constipation*, *it decreases fat in the milk and it cause contamination of milk*.

In (b) (iv), they failed to state the objective of the process by providing incorrect responses such as *it determines the source of food*, *it determine the source of protein*, *it determine the amount of lactose*, *it determine the temperature rise and it determine in vitamins milk.* Their responses signify lack of knowledge and practical skills on pasteurization. Extract 11.2 illustrates a sample of incorrect responses to the question.

(iii) Effect of the specimen L1.
(i) It affect cow and to cause cow disease.
(ii) It affect living organism like men and women
(iii)

(iv) (a) Avoid environmental pollution of the certain of livestock production.
(b) Avoid livestock to eat grass to another or other day.
(c) It avoid high livestock production and to give livestock production food.

2(b)(i) Rise when heated because to avoid other organism that to affect people.

(ii) Heated milky Heating of milk in the beaker.

(iii) Effect of heating the specimen
(a) Ignorant
(b) Igneous
(c) Don't support for other part of the body

(iv) Objective of the process.
(i) It help to provide energy and fuel of the people
(ii) It help to provide food.
(iii) It help to repair body Shape of the people.
(iv) Help to provide people

Extract 11.2 : *Sample of the candidate's incorrect responses to Question 2*

Extract 11.2 portrays responses from a candidate who responded incorrectly in all parts of the question. He/she lacked knowledge and skills of external parasites and milk preservation process.

3.0 THE ANALYSIS OF THE CANDIDATES' PERFORMANCE ON EACH TOPIC AND FIELD

This section encompasses the analysis of the candidates' performance on each topic and field. The analysis was based on the percentage of candidates who scored an average of 30 marks and above on each topic and field.

A total of 17 topics were examined in a theory paper and 3 fields in a practical paper. The performance of the candidates in 2022 examination was as follows:

The candidates had good performance on the topics and field of *Goat Farming* (98.71%); *Environmental Degradation* (95.87%); *Livestock Production* (93.02%); *Fundamentals of Agriculture* (92.43%); *Multiple Choice Items* (80.47) which covered the topics of *Methods of Improving Soil Fertility and Productivity; Livestock Feeds and Feeding; Weathering and Soil Formation; Farm Workshop; Handling and Processing of Crop Products; Scientific Procedures in Agriculture Science; Crop Protection; Fisheries and Fish Production; Price and Its Determinants* and *Factors of Production*.

Other topics which had good performance were *Livestock Improvement* (75.61%); *Annual Fields Crops Production* (70.63%) and *Methods of Improving Soil Fertility and Productivity* (65.09%).

On the other hand, the candidates had average performance on the topics and fields of *Agricultural Marketing* (63.87%); *Agricultural Mechanization* (60.26%); *Soil and Its Agricultural Utilization and Crop Production* (50.83%) and *Cropping Systems and Planting Patterns* (31.22%). Inadequate mastery of the subject matter and practical skills were identified to be the main factors that contributed to such average performance. Candidates' performance on topics and fields is summarised in the Appendix.

When compared to 2021, the topic of Methods of Improving Soil Fertility and Productivity has maintained its good performance. Moreover, the topics of Agricultural Mechanization and Cropping Systems and Planting Patterns shows decrease in performance from good to average.

4.0   CONCLUSION AND RECOMMENDATIONS
This section gives the general picture of the analysis and the proposed measures to improve candidates' performance.

4.1   Conclusion
The results of this year's examination show good performance of the candidates. The statistical analysis has indicated 65.51 per cent of the candidates scored high marks (grades A, B and C) and 34.49 percent low marks (grades D and F).

The candidates' response analysis from those who scored high marks reveals possession of adequate knowledge of the subject matter and practical skills.

Contrary, those who scored low marks were found to possess inadequate knowledge of the subject matter and practical skills. They also had misconceptions and poor command of English language.

Inadequate mastery of the subject matter was found to be the major contributing factor towards candidates' failure. This resulted into the provision of incorrect responses and sometimes candidates failed to attempt the questions.

Inadequate laboratory and field practical skills were noted to be among the cause of candidates failure. Lack of exposure to laboratory practicals caused some of the candidates fail to follow the procedures of the practical activities in the examination hence arrived at incorrect observations and results. Likewise, possession of field practical skills could have been an added advantage in responding correctly to some of the questions.

It was also observed that, some of the candidates had misconceptions on different questions. This led to provision of incorrect responses contrary to the demands of the questions.

Further analysis pointed out the problem of English language proficiency to be a setback to most of the candidates who scored low marks. Analysis of their responses showed that, they failed to respond precisely to the questions particularly those which demanded detailed information. They either failed to explain their points or wrote sentences that were not clear. In some cases they responded by writing things that were not related to the questions asked. This signifies that they did not understand the questions due to language barrier.

4.2 Recommendations

The following are recommended to enhance teaching-learning process hence improving candidates' performance in future examinations:

(a) Teachers should adopt the use of student – centred teaching approach. This method stimulate creative and critical thinking. It also promotes learning mentality among the students as they become centre of focus. For example, use of brain storming and group discussion methods in developing and rainforcing the knowledge of crop spacing on the topic of cropping systems and planting patterns.

(b) Students should be subjected to more laboratory and field practicals as they can learn better through seeing and doing. For example determination of soil constituents on the field of soil and its agricultural utilization can be learned better through practicals in the laboratory. Furthermore, students can learn better management and training of oxen on the topic of agricultural mechanization through

doing field practicals. This can also be applied when learning the use of knapsack sprayer on the field of crop production.

(c)   Guest speakers who are experts in different fields should be invited to explain different concepts on the topics. For example, a cooperative officer can be invited to explain the concept of marketing problems and their solutions on the topic of agricultural marketing.

(d)   Students should deeply immerse into the English language programme. This can be done by listening and watching English programmes, reading English writtings, exercising writing in English and practicing speaking the language.This will improve their English language proficiency.

Appendix: Candidates' Performance On Each Topic and Field in CSEE 2022

S/n	Topic/Field	Question Number	Percentage of candidates who scored the average of 30 per cent or above	Comments
1.	Goat Farming	8	98.71	Good
2.	Environmental Degradation	4	95.87	Good
3.	Livestock Production	2	93.02	Good
4.	Fundamentals of Agriculture	3	92.43	Good
5.	Methods of Improving Soil Fertility and Productivity; Livestock Feeds and Feeding; Weathering and Soil Formation; Farm Workshop; Handling and Processing of Crop Products; Scientific Procedures in Agriculture Science; Crop Protection; Fisheries and Fish Production; Price and Its Determinants and Factors of Production	1	80.47	Good
6.	Livestock Improvement	2	75.61	Good
7.	Annual Fields Crops Production	10	70.63	Good
8.	Methods of Improving Soil Fertility and Productivity	6	65.09	Good
9.	Agricultural Marketing	7	63.87	Average
10.	Agricultural Mechanization	9,11	60.26	Average
11.	Soil and Its Agricultural Utilization na Crop production	1	50.83	Average
12.	Cropping Systems and Planting Pattern	5	31.22	Average