THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

034/1 **AGRICULTURE SCIENCE 1**

(For Both School and Private Candidates)

Time: 3 Hours **ANSWERS** **Year: 2015**

Instructions

1. This paper consists of sections A, B and C with a total of **eleven (11)** questions.

2. Answer **all** questions in sections A and B and **one (1)** question from section C.

3. Sections A and C carry **fifteen (15)** marks each and section B carries **seventy (70)** marks.

4. Cellular phones and any unauthorised materials are **not** allowed in the examination room.

5. Write your **Examination Number** on every page of your answer booklet(s).

1. For each of the items (i)–(x), choose the correct answer among the given alternatives and write its letter beside the item number.

(i) Animals giving out a lot of tears from the eyes is one of the typical symptoms of
A. mastitis
B. anthrax
C. blackquarter
D. rinderpest
E. brucellosis

Answer: D. rinderpest

(ii) Manure that releases its nutrients gradually as a result of microbial activity in the soil is called
A. kraal
B. farmyard
C. green
D. compost
E. poultry

Answer: D. compost

(iii) The step in innovation adoption process where a farmer mentally thinks about and applies the idea to his/her own situation is called
A. trial
B. awareness
C. evaluation
D. interest
E. adoption

Answer: C. evaluation

(iv) What would the farmer realize upon enterprise substitution where the effect projected is extra costs 3,200/=, costs saved 4,760/=, revenue lost 20,000/=, and extra revenue 14,400/=?
A. net profit of 4,040/=
B. net profit of 7,160/=
C. net loss of 4,040/=
D. net loss of 7,160/=
E. net profit of 23,200/=

Answer: D. net loss of 7,160/=

(v) Wood can be prevented from fungal attack by the use of
A. sodium dichromate

B. old engine oil
C. tar
D. creosote
E. pentachlorophenol

Answer: D. creosote

(vi) Tomatoes grow well in
A. cold climates
B. excessive humid conditions
C. high temperatures
D. warm climates
E. dry conditions

Answer: D. warm climates

(vii) In a mouldboard plough, the part that is concerned with cutting a furrow slice is called
A. land side
B. share
C. frog
D. beam
E. standard

Answer: B. share

(viii) Which one of the following causes negative soil pollution?
A. pesticides
B. domestic wastes
C. herbicides
D. radioactive substances
E. overgrazing

Answer: D. radioactive substances

(ix) Propagation of fruit crops that involves joining of a small piece of shoot onto a shoot containing a root system with good characteristics is referred to as
A. layering
B. budding
C. grafting
D. division
E. cutting

Answer: C. grafting

(x) In scientific investigation procedures, experimentation is followed by
A. data collection
B. observation
C. conclusion
D. data analysis
E. measurement

Answer: C. conclusion

2. Match the items in List A with the responses in List B by writing the letter of the correct response beside the item number.

List A
(i) Tomato
(ii) Pea
(iii) Cabbage
(iv) Local spinach
(v) Sweet pepper
(vi) Lettuce
(vii) Okra
(viii) Eggplant
(ix) Carrot
(x) Onion

List B
A. Daucus carota
B. Lactuca sativa
C. Hibiscus esculentus
D. Lycopersicon esculentum
E. Allium porrum
F. Brassica oleraceae
G. Allium cepa
H. Capsicum annuum
I. Pisum sativum
J. Citrullus lanatus
K. Amaranthus hybridans
L. Beta vulgaris
M. Solanum melongena
N. Cucumis sativa
O. Solanum nigrum

Answers

(i) D
(ii) I
(iii) F
(iv) K
(v) H
(vi) B
(vii) C
(viii) M
(ix) A
(x) G

3. (a) What do you understand by the term 'hypothesis' as it is used in scientific investigation procedure?

Hypothesis refers to a tentative statement or prediction that provides a possible explanation for a phenomenon, which can be tested through experiments or observations.

(b) Imagine that, for several seasons, your school farm has been experiencing low maize production despite the fact that:
- Land preparation and planting are done on time using recommended certified seeds.
- Proper spacing is used.
- There is reliable and well-distributed rainfall.
- Weeding is done on time, and
- Pests and diseases are managed accordingly.

Design a scientific investigation procedure that supports your hypothesis to investigate the cause of the problem.

1. Problem identification: Identify potential causes such as soil fertility, pest resistance, or other factors.
2. Formulate hypothesis: "The low maize yield is caused by nutrient deficiencies in the soil."
3. Experimental setup: Divide the field into plots and apply different treatments (fertilizers, pest control measures, etc.).
4. Data collection: Measure maize growth, yield, and soil nutrient levels.
5. Analysis and conclusion: Compare results across treatments to identify the primary cause.

4. (a) Explain briefly three considerations in starting fish farming.

1. Site selection: Ensure the location has access to a reliable water source and favorable environmental conditions.
2. Pond construction: Build well-designed ponds with appropriate depth and drainage.
3. Stock selection: Choose fish species suitable for local climate and market demand.

(b) (i) What are the two advantages of fish farming?

1. Provides a sustainable source of protein for human consumption.
2. Offers income opportunities for farmers through fish sales.

(ii) Account for four methods of preserving fish.

1. Smoking: Reduces moisture content and preserves fish for longer periods.
2. Salting: Prevents microbial growth by creating a high-salinity environment.
3. Freezing: Maintains freshness by lowering temperatures and slowing microbial activity.
4. Drying: Removes moisture to inhibit bacterial growth.

5. (a) (i) Differentiate macro from micro plant nutrients.

Macro plant nutrients are required in large quantities for plant growth, such as nitrogen, phosphorus, and potassium.
Micro plant nutrients are needed in smaller quantities but are essential, such as iron, zinc, and copper.

(ii) A careful observation on a certain plant showed that the young leaves of the first plant became chlorotic in areas between veins and later on the leaves turned completely white. Identify the nutrient that was deficient in the plant and state its role.

Nutrient: Iron
Role: Iron is essential for chlorophyll synthesis and enzyme activity, facilitating photosynthesis and energy production.

(b) Examine four effects caused by excess supply of nitrogen to the plant.

1. Excessive vegetative growth: Leads to poor flowering and fruiting.
2. Lodging: Weak stems may collapse under the weight of excessive foliage.
3. Reduced resistance: Makes plants more susceptible to pests and diseases.
4. Environmental pollution: Leaching of nitrogen can contaminate water sources.

6. (a) What is a balance sheet in farm bookkeeping?

A balance sheet is a financial statement that shows the assets, liabilities, and equity of a farm at a specific point in time.

(b) When valuation was done at a school farm on 30th December 2011, the situation was as follows:
- 20 bags of broilers' mash each 20,000/= bought from Kisiju Millers.
- 30 bags of fungicide worth 12,000/= obtained from TFA.
- 20 bags of NPK fertilizer worth 200,000/= bought from Kilimo Traders.
- Payments for all the above items had not yet been done.
- In addition, there were implements worth 40,000/= and maize bags worth 150,000/=.
- The farm had 200,000/= at CRDB Bank and 100,000/= on hand.

Prepare a balance sheet of the school farm as at 30th December 2011.

Balance Sheet as at 30th December 2011

Assets
Cash at bank: 200,000/=
Cash on hand: 100,000/=
Implements: 40,000/=
Maize bags: 150,000/=
Broilers' mash: 400,000/= (20 bags x 20,000/=)
Fungicides: 360,000/= (30 bags x 12,000/=)
NPK fertilizer: 200,000/=

Total Assets: 1,450,000/=

Liabilities
Broilers' mash (Kisiju Millers): 400,000/=
Fungicides (TFA): 360,000/=
NPK fertilizer (Kilimo Traders): 200,000/=

Total Liabilities: 960,000/=

Net Equity: 490,000/= (Total Assets - Total Liabilities)

7. (a) (i) Explain briefly why it is likely for the extension work to be more effective when it is conducted by a female extension worker than men.

i. Women have better communication and interpersonal skills – Female extension workers may communicate in a more approachable and understanding way, encouraging farmers to share their challenges openly.
ii. Understanding the needs of women farmers – Female extension workers are more likely to address the unique needs of women farmers, who often play a critical role in agricultural activities but may be overlooked by male extension workers.

(ii) Why is it important for the extension worker to win the support of the local leaders in the community?

i. Influence on the community – Local leaders have significant influence over community members, and their support can encourage widespread adoption of agricultural innovations.
ii. Building trust – When local leaders endorse an extension worker, it creates trust and acceptance among the community, facilitating effective knowledge transfer.

(b) Comment on the behavior shown by the extension worker as far as the desirable qualities of the extension agent are concerned.

i. Lack of constructive feedback – Criticizing and blaming the farmer without providing guidance shows poor problem-solving skills and discourages collaboration.
ii. Failure to listen – Interrupting the farmer indicates a lack of respect and empathy, which can harm relationships with the community.
iii. Poor time management – Postponing the visit to other farms without proper explanation demonstrates unprofessional behavior and can reduce farmers' confidence in the extension worker.
iv. Lack of patience – A good extension worker should remain patient and supportive, especially when addressing challenges with farmers.

8. (a) (i) Write down the scientific name for cassava.

i. Manihot esculenta

(ii) State four advantages of growing cassava.

i. Drought tolerance – Cassava can grow in arid and semi-arid areas, making it suitable for regions with low rainfall.
ii. High productivity – Cassava produces high yields even on marginal soils, providing a reliable source of food and income.
iii. Versatility – Cassava has multiple uses, including human food, animal feed, and industrial applications such as starch and biofuel production.
iv. Low input requirements – Cassava requires minimal fertilizers and pesticides, making it affordable for small-scale farmers.

(b) (i) Why are nitrogenous fertilizers not recommended when growing cassava?

i. Excessive vegetative growth – Nitrogen promotes lush leaf growth, which diverts energy away from tuber formation, reducing the yield and quality of cassava roots.

(ii) Briefly describe the procedure for propagating cassava.

i. Selection of planting materials – Choose healthy and mature cassava stems from disease-free plants.
ii. Cutting – Cut the stems into 20–30 cm pieces, ensuring each has 3–5 nodes.
iii. Planting – Insert the cuttings vertically or at an angle in well-prepared soil.
iv. Spacing – Maintain a spacing of about 1 meter between plants to allow proper growth.
v. Watering – Provide adequate moisture during the early stages to ensure successful establishment.

9. (a) What do you understand by the following terms as they are used in livestock production?

(i) Hay – Hay refers to dried grasses or legumes harvested at their optimal nutritional stage, cured, and stored as feed for livestock during periods of feed scarcity.
(ii) Silage – Silage is fermented green fodder preserved in an anaerobic environment, such as silos or pits, to maintain its nutritional value for feeding livestock.

(b) (i) Assess the importance of hay and silage in livestock production.

i. Ensures feed availability – Hay and silage provide reliable feed sources during dry seasons or droughts.
ii. Enhances livestock productivity – Both are rich in nutrients, supporting optimal growth and milk production.
iii. Reduces dependence on commercial feeds – They lower feed costs by providing locally produced alternatives.

(ii) Briefly describe the process of making hay.

i. Selection – Choose high-quality grasses or legumes such as alfalfa or clover.
ii. Cutting – Harvest the crops at their peak nutritional value, typically before flowering.
iii. Drying – Spread the cut grass evenly and dry it in the sun to reduce moisture content to about 15%.
iv. Storage – Collect and store the hay in a dry, well-ventilated place to prevent mold and spoilage.

10. (a) What is meant by draught animals?

Draught animals are domesticated animals such as oxen, donkeys, or camels, used for performing heavy labor tasks like ploughing, transporting goods, and powering irrigation systems.

(b) Briefly explain four advantages and two limitations of using draught animals in agriculture.

Advantages
i. Cost-effective – Draught animals are cheaper to acquire and maintain compared to machinery, especially for small-scale farmers.
ii. Multipurpose – They can be used for various tasks, including ploughing, transportation, and producing manure for fertilization.
iii. Environmentally friendly – Unlike machinery, draught animals do not produce greenhouse gases, making them sustainable for the environment.
iv. Suitable for rural areas – They can operate in areas where machinery access is limited due to infrastructure challenges.

Limitations
i. Lower efficiency – Draught animals are slower and less powerful than tractors, limiting their effectiveness for large-scale operations.
ii. Maintenance challenges – They require regular feeding, healthcare, and proper shelter, which can be burdensome for resource-constrained farmers.

11. Soil pollution causes environmental degradation. Explain four causes of soil pollution and suggest six suitable measures to manage the environment from soil pollution.

Causes of soil pollution
i. Industrial waste – Discharge of toxic chemicals, heavy metals, and hazardous substances into the soil from industries contaminates soil and reduces fertility.
ii. Agricultural activities – Excessive use of chemical fertilizers, pesticides, and herbicides introduces harmful chemicals into the soil, affecting its composition.
iii. Improper waste disposal – Dumping of plastics, electronic waste, and non-biodegradable materials leads to soil contamination.
iv. Mining activities – Mining operations disturb soil layers and release harmful substances like mercury and arsenic into the soil, reducing productivity and causing long-term damage.

Measures to manage soil pollution
i. Proper waste management – Implement recycling programs and ensure safe disposal of hazardous materials to reduce soil contamination.
ii. Use of organic farming practices – Promote organic fertilizers and biopesticides to minimize chemical inputs in agriculture.
iii. Reforestation – Planting trees and maintaining vegetative cover helps bind the soil, preventing erosion and leaching of pollutants.
iv. Soil remediation – Use bioremediation or chemical treatments to remove contaminants and restore soil health.
v. Monitoring and regulation – Enforce strict regulations on industries to control the release of pollutants into the environment.
vi. Education and awareness – Educate communities on the importance of soil conservation and responsible waste disposal to ensure sustainable practices.

12. Besides having many advantages, goat farming is rarely practiced in some parts of Tanzania. Account for twelve advantages of goats and explain any four problems of keeping goats.

Advantages of goats
i. High adaptability – Goats can thrive in various climates and terrains, including arid and semi-arid areas.
ii. Low maintenance costs – Goats require less feed and care compared to other livestock, making them cost-effective for small-scale farmers.
iii. Multipurpose animals – Goats provide meat, milk, skins, and manure, contributing to diverse income streams.
iv. Short gestation period – With a gestation period of five months, goats reproduce quickly, increasing herd size rapidly.
v. Disease resistance – Goats are less susceptible to common livestock diseases, reducing veterinary expenses.
vi. Minimal space requirement – They can be kept in small spaces, making them ideal for farmers with limited land.

vii. Market demand – Goat meat and milk are in high demand locally and internationally, ensuring good returns.
viii. Easy management – Goats are hardy and require minimal inputs for feeding and healthcare.
ix. Nutritional benefits – Goat milk is rich in nutrients and easier to digest than cow milk, benefiting human health.
x. Manure production – Goat droppings enrich the soil, improving crop yields.
xi. Suitable for mixed farming – Goats can graze alongside crops without significant damage.
xii. Source of income – Selling goats and their products provides financial stability for rural households.

Problems of keeping goats
i. Susceptibility to predators – Goats are vulnerable to attacks by wild animals, requiring secure enclosures.
ii. Seasonal feed availability – Limited pasture during dry seasons may lead to malnutrition and low productivity.
iii. Competition for resources – Goats may compete with other livestock or crops for feed and grazing land.
iv. Poor market infrastructure – Farmers may face challenges accessing markets to sell their products, reducing profitability.

13. Explain seven problems associated with marketing of agricultural produce and propose possible solutions for each problem.

Problems and solutions

i. Price fluctuation – Agricultural prices often fluctuate due to market supply and demand, affecting farmers' income.
Solution: Establish price stabilization mechanisms, such as government subsidies or minimum price guarantees.

ii. Perishability – Fresh produce like fruits and vegetables spoils quickly without proper storage and transport.
Solution: Invest in cold storage facilities and efficient transport systems to reduce losses.

iii. Inadequate market information – Farmers lack access to market prices, trends, and demand data, leading to poor decision-making.
Solution: Provide farmers with access to market information through mobile apps, extension services, and cooperatives.

iv. Poor infrastructure – Inadequate roads and transport networks hinder farmers from reaching markets, especially in rural areas.
Solution: Develop rural infrastructure, including roads and transport facilities, to improve market access.

v. Middlemen exploitation – Farmers often rely on middlemen, who pay low prices and take advantage of their lack of bargaining power.

Solution: Encourage farmers to form cooperatives to market their produce collectively and negotiate better prices.

vi. Low quality of produce – Lack of grading and standardization reduces the competitiveness of agricultural products in the market.
Solution: Train farmers on post-harvest handling, grading, and quality standards to improve marketability.

vii. Limited market access – Farmers may struggle to find buyers for their products due to competition or lack of connections.
Solution: Develop local and export markets, and organize trade fairs or exhibitions to link farmers with buyers.