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: 2012**

Instructions

1. This paper consists of sections A, B and C with a total of **thirteen (13)** 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 in the answer booklet provided.

(i) Direct benefits from forests can be obtained due to their ability to regulate
A. water and charcoal supply
B. climate and water supply
C. honey and timber supply
D. pulp and soft wood supply
E. charcoal and wood supply

Answer: B. climate and water supply
Explanation: Forests regulate the climate through carbon storage and help in water conservation by maintaining the hydrological cycle.

(ii) The ratio of the value of exports to the value of imports is referred to as
A. terms of trade
B. balance of trade
C. international trade
D. barter trade
E. wholesale trade

Answer: B. balance of trade
Explanation: The balance of trade is a measure of the difference between a country's exports and imports.

(iii) Breaking up the hard soil pan or compacted soil can best be done by
A. mouldboard
B. disc
C. subsoiler
D. chisel
E. coulter

Answer: C. subsoiler
Explanation: A subsoiler is used to break up hard soil layers below the surface to improve drainage and root penetration.

(iv) The most commonly used system for commercial poultry rearing for both broilers and layers in Tanzania is
A. fold unit
B. house and run
C. battery cage
D. deep litter
E. semi-intensive

Answer: D. deep litter
Explanation: The deep litter system is widely used due to its efficiency in managing waste and providing a comfortable environment for poultry.

(v) All of the following equipment are used in bee keeping except
A. smokers
B. veils
C. swarm catchers
D. press
E. secateurs

Answer: E. secateurs
Explanation: Secateurs are pruning tools used in horticulture and are not used in beekeeping.

(vi) A system of grazing whereby an animal is tied with a rope on the neck or leg and the other end of the rope is tied to a tree or post is called
A. controlled grazing
B. zero grazing
C. tethered grazing
D. restricted grazing
E. confined grazing

Answer: C. tethered grazing
Explanation: Tethered grazing involves tying animals to a fixed point to restrict their movement while allowing access to nearby grass.

(vii) Which one of the following is not a method of controlling soil erosion?
A. over cropping
B. cover cropping
C. contour cropping
D. rotational cropping
E. strip cropping

Answer: A. over cropping
Explanation: Over cropping depletes soil nutrients and increases erosion, whereas the other methods prevent soil erosion.

(viii) A dieing tool in a farm workshop is used for
A. cutting steel
B. cutting pipes
C. cutting threads
D. cutting metal
E. cutting glass

Answer: C. cutting threads
Explanation: A dieing tool is used to cut threads on metal rods, typically for bolts or pipes.

(ix) Particle density of a soil sample is given as:
A. weight of soil over volume of soil
B. bulk density over weight of soil
C. weight of soil solids over volume of soil solids
D. bulk density over percentage pore space
E. weight of soil over bulk density

Answer: C. weight of soil solids over volume of soil solids
Explanation: Particle density is the ratio of the mass of soil solids to their volume, excluding pore spaces.

(x) One of the proper ways of fishing is by use of
A. dynamite
B. fish-wouldling gear
C. seine nets
D. endosulphan
E. fine mesh nets

Answer: C. seine nets
Explanation: Seine nets are legal and effective fishing tools that selectively catch fish without harming the environment.

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 in your answer booklet.

List A
(i) Amaranthus spp
(ii) Cyperus rotundus
(iii) Digitaria scalarum
(iv) Cynodon dactylon
(v) Pennisetum clandestinum
(vi) Eleusine indica
(vii) Solanum incanum
(viii) Lantana camara
(ix) Commelina benghalensis
(x) Striga hermontheca

List B
A. Nut grass

B. Forget-me-not
C. Tickberry
D. Wild finger millet
E. Star grass
F. Thorn apple
G. Wandering jew
H. Sodom apple
I. Pig weed
J. Wild rape
K. Kikuyu grass
L. Black jack
M. Couch grass
N. Black night shade
O. Witch weed

Answers
(i) I
(ii) A
(iii) D
(iv) K
(v) E
(vi) C
(vii) N
(viii) H
(ix) G
(x) O

3. (a) State three advantages of cultural methods in controlling pests.

i. Environmentally friendly – These methods avoid the use of chemicals, reducing pollution and conserving biodiversity.
ii. Cost-effective – Farmers can use locally available resources, minimizing the need for expensive inputs.
iii. Long-term pest control – Practices like crop rotation disrupt pest lifecycles, providing sustainable control.

(b) Briefly explain six cultural methods of pest control.

i. Crop rotation – Planting different crops in successive seasons prevents pests from establishing on a single crop.
ii. Intercropping – Growing multiple crops together reduces pest spread, as pests may not find their preferred host.
iii. Early planting – Sowing crops early helps them mature before pest populations peak.
iv. Proper field hygiene – Removing crop residues and weeds eliminates breeding grounds for pests.

v. Trap cropping – Planting a sacrificial crop attracts pests away from the main crop.
vi. Use of resistant varieties – Growing pest-resistant crop varieties minimizes pest damage.

4. (a) (i) Briefly explain the purpose of using mass methods in teaching agricultural extension.

Mass methods are used to disseminate agricultural knowledge to a large audience quickly and efficiently. They include methods like radio broadcasts, field days, and printed materials, enabling extension workers to reach more farmers at once.

(ii) State two advantages and two disadvantages of mass methods in teaching agricultural extension.
Advantages:
i. Reach a wide audience – Information is spread to many farmers simultaneously.
ii. Cost-effective – Fewer resources are needed compared to individual visits.

Disadvantages:
i. Lack of personalization – Farmers' specific needs and questions may not be addressed.
ii. Limited feedback – Difficult to assess how well the information is understood.

(b) Briefly describe the characteristic of the late majority category of innovation adopters in agricultural extension.

The late majority are skeptical individuals who adopt innovations only after most others have done so. They require proof of the innovation's success and often rely on peer influence before making changes.

5. (a) Write down the formula for calculating the annual depreciation of a farm asset using the Straight Line Method.

Annual Depreciation = (Original Cost - Salvage Value) / Useful Life

(b) Complete the following table by filling in the blanks. Show how each value is obtained.

Asset	Original Cost	Salvage Value	Annual Depreciation	Number of Years
Tractor	120,000	10,000	11,000	10
Harrow	16,000	2,000	200	15
Plough	3,000	2,000	150	20
Planter	20,000	6,000	600	6
Cultivator	17,000	2,000	1,071.43	14

6. (a) Briefly describe any five mechanical methods of weed control.

i. Hand weeding – Using simple tools like hoes to manually remove weeds.
ii. Mowing – Cutting weeds close to the ground with a mower to prevent seed production.
iii. Mulching – Covering soil with organic or synthetic materials to suppress weed growth.
iv. Ploughing – Tilling the soil to uproot weeds and bury their seeds.
v. Flaming – Using heat or flames to kill weeds on the surface.

(b) Study the diagram below (Figure 1) carefully and answer the questions that follow.

(i) Identify the weed by its common and botanical names.
Common name: Black jack
Botanical name: Bidens pilosa

(ii) Briefly explain two measures which have to be taken in order to control the weed identified in (b) (i) above in a field of sorghum.
i. Hand weeding – Regularly remove black jack manually to prevent competition with sorghum.
ii. Proper spacing – Ensure adequate spacing in sorghum planting to reduce light availability for weeds.

7. (a) Name any four pure breeds of dairy cattle which are found in Tanzania.

i. Friesian
ii. Jersey
iii. Ayrshire
iv. Guernsey

(b) Briefly explain five factors that limit the dairy industry in Tanzania.

i. High feed costs – Quality feeds are expensive and often unaffordable for small-scale farmers.
ii. Poor infrastructure – Lack of cold storage and transport facilities limits milk distribution.
iii. Low-quality breeds – Farmers often rear low-yielding breeds unsuitable for dairy production.
iv. Disease outbreaks – Diseases like mastitis and foot-and-mouth disease reduce milk production.
v. Limited market access – Farmers struggle to find reliable markets for their dairy products.

8. (a) Differentiate between nitrification and nitrogen fixation.

Nitrification is the biological conversion of ammonium (NH_4^+) into nitrate (NO_3^-) by soil bacteria.
Nitrogen fixation is the process by which atmospheric nitrogen (N_2) is converted into ammonia (NH_3) by bacteria in root nodules or soil.

(b) Without using chemical formula, explain briefly how nitrification and nitrogen fixation occur in the soil.

Nitrification involves bacteria in the soil, such as Nitrosomonas, converting ammonium from decomposed organic matter into nitrates that plants can absorb.

Nitrogen fixation occurs when bacteria like Rhizobium, found in legume root nodules, convert nitrogen from the atmosphere into forms usable by plants.

(c) Examine the importance of nitrification and nitrogen fixation in crop production.

i. Improve soil fertility – Both processes increase the availability of nitrogen, a vital nutrient for plant growth.
ii. Enhance crop yields – Nitrogen is essential for photosynthesis and protein synthesis, leading to better crop performance.
iii. Support sustainable farming – Nitrogen-fixing crops reduce the need for chemical fertilizers.
iv. Promote healthy ecosystems – Nitrification and nitrogen fixation maintain soil nutrient balance, benefiting subsequent crops.

9. (a) (i) What does Figure 2 represent?

Figure 2 represents a spark plug, a component used in internal combustion engines to ignite the air-fuel mixture.

(ii) Briefly explain the use of the device represented by Figure 2 above.

The spark plug generates a spark by creating an electric arc across its electrodes. This spark ignites the air-fuel mixture in the engine's combustion chamber, producing the energy needed for the engine's operation.

(b) (i) Name the parts labeled A to D in Figure 2 above.

A. Terminal
B. Insulator
C. Metal shell
D. Center electrode

(ii) What attachment is usually linked to D?

The ignition cable is attached to the center electrode (D) to transmit high voltage from the ignition coil.

(iii) State the function of the attachment named in (ii) above.

The ignition cable delivers high voltage to the spark plug's center electrode, enabling it to generate a spark for ignition.

10. (a) What do you understand by the term agro-forestry?

Agro-forestry is a land-use system that integrates trees, crops, and livestock on the same piece of land to optimize resource use, enhance productivity, and promote environmental sustainability.

(b) Explain briefly six advantages of agro-forestry in agricultural production.

i. Soil fertility improvement – Leguminous trees fix nitrogen in the soil, benefiting crops and reducing the need for chemical fertilizers.
ii. Erosion control – Tree roots stabilize the soil, preventing erosion caused by wind and water.
iii. Income diversification – Farmers can earn income from timber, fruits, and other tree products alongside crops and livestock.
iv. Biodiversity conservation – Agro-forestry promotes the coexistence of various plant and animal species, enhancing biodiversity.
v. Microclimate regulation – Trees provide shade, reduce wind speed, and regulate temperatures, creating favorable conditions for crops.
vi. Sustainable resource use – Combines forestry and agriculture, optimizing land productivity while maintaining ecological balance.

11. Suggest eight points to be considered when selecting a site for a nursery and explain six important husbandry practices to be done for good and high yield of the vegetable garden.

Factors for selecting a site for a nursery
i. Availability of water – Ensure a reliable water source for irrigation.
ii. Soil fertility – Choose a site with fertile, well-drained soil.
iii. Topography – A flat or gently sloping site prevents waterlogging and erosion.
iv. Accessibility – Easy access for workers and transport of inputs and seedlings.
v. Protection – Choose a location shielded from strong winds and animals.
vi. Climate – Select a site with favorable temperature and sunlight conditions.
vii. Proximity to markets – Reduces transportation costs for seedlings.
viii. Security – Ensure the site is secure to prevent theft or damage to seedlings.

Important husbandry practices
i. Regular weeding – Prevents competition for nutrients and light.
ii. Irrigation – Provides consistent moisture for healthy crop growth.
iii. Fertilizer application – Supplements soil nutrients for optimal plant development.
iv. Pest and disease control – Protects vegetables from damage and ensures high-quality produce.
v. Crop rotation – Prevents nutrient depletion and controls soil-borne pests and diseases.
vi. Proper spacing – Ensures adequate air circulation and reduces competition among plants.

12. Result demonstration and method demonstration are among the methods by which farmers learn various innovations. Compare and contrast the two methods.

Result demonstration
- Focuses on showing the end results of using an innovation.
- Conducted on a farmer's field or a research plot.
- The goal is to convince farmers of the benefits of adopting the practice or technology.

Method demonstration
- Focuses on the process of how to use or apply an innovation.
- Conducted in a training setting, such as a workshop or classroom.
- The goal is to teach farmers the skills and techniques needed to adopt the practice.

Similarities
i. Both are practical approaches to teaching farmers.
ii. Both aim to encourage the adoption of agricultural innovations.

Differences
i. Result demonstration emphasizes outcomes, while method demonstration emphasizes procedures.
ii. Result demonstration is more persuasive, whereas method demonstration is more instructional.

13. Account for six ways in which soil loses its fertility and explain five agronomic practices that can be used to maintain soil fertility.

Ways soil loses fertility
i. Erosion – Wind and water remove the topsoil rich in nutrients.
ii. Over-cropping – Continuous cultivation depletes soil nutrients.
iii. Leaching – Excess rainfall washes away nutrients beyond the root zone.
iv. Acidification – Overuse of chemical fertilizers lowers soil pH, reducing nutrient availability.
v. Deforestation – Removes vegetation cover, exposing soil to erosion.
vi. Overgrazing – Livestock compact the soil, reducing its ability to hold nutrients and water.

Agronomic practices to maintain soil fertility
i. Crop rotation – Alternating crops prevents nutrient depletion and breaks pest cycles.
ii. Use of organic manure – Adds nutrients and improves soil structure.
iii. Cover cropping – Protects soil from erosion and adds organic matter.
iv. Mulching – Retains moisture, reduces erosion, and adds organic matter as it decomposes.
v. Agro-forestry – Integrating trees enhances nitrogen fixation, controls erosion, and improves soil structure.