THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL

ADVANCED CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

134/2 **AGRICULTURE 2**

(For Both school and Private Candidates)

Time: 2:30Hours **ANSWERS** **Year: 2017**

Instructions

1. This paper consists of **ten (10)** questions in sections A, and B.
2. Answer **five (5)** questions choosing at least one question from each section.
3. Each question carries twenty marks

1(a) Write the meaning of the following terms as applied in crop pests.

(i) Key pests: These are pests that cause consistent economic damage to crops, requiring regular control measures.
(ii) Minor pests: Pests that cause occasional damage and do not require frequent control, as they usually remain below economic thresholds.
(iii) Occasional pests: Pests that appear irregularly or seasonally, causing damage only under specific conditions.
(iv) Potential pests: Pests that currently cause minimal damage but can become significant if environmental conditions or farming practices change.

(b) Identify the crop and damage caused by each of the following pests.

(i) Prostephanus truncatus: Attacks stored maize and cassava, causing weight loss and reduced storage quality.
(ii) Acanthoscelides obtectus: Targets beans in storage, leading to seed perforation and reduced germination.
(iii) Heliothis armigera: Affects cotton and tomatoes, causing fruit and boll damage.
(iv) Dysdercus fasciatus: Infests cotton, resulting in seed discoloration and reduced lint quality.

(c) Show six cultural methods of insect pest control that can be applied by small farmers.

- Crop rotation: Prevents pest buildup by alternating crops.
- Timely planting: Reduces pest infestations by avoiding peak pest periods.
- Intercropping: Confuses pests and reduces their impact.
- Proper sanitation: Removes crop residues that harbor pests.
- Use of resistant crop varieties: Minimizes pest damage.
- Handpicking: Physically removes pests from crops.

2(a) Briefly explain the following terms as applied in plant breeding.

(i) Selection: The process of choosing plants with desirable traits for further breeding.
(ii) Hybridization: Crossing two genetically different plants to produce offspring with superior traits.
(iii) Mass selection: Collecting seeds from many plants with desirable traits for the next planting.
(iv) Apomixis: A form of reproduction where seeds are produced without fertilization, maintaining genetic uniformity.
(v) An inbred line: A genetically uniform line developed through self-pollination over several generations.
(vi) Gene: A hereditary unit in an organism's DNA that determines specific traits.

(b) Mention three methods of plant breeding which are appropriate for progeny testing.

- Hybridization
- Crossbreeding
- Mutation breeding

(c) Explain three advantages and two disadvantages of progeny testing.
Advantages:
- Identifies superior genotypes for breeding programs.
- Enhances the accuracy of selecting plants with desired traits.
- Increases crop yield and quality through better plant varieties.

Disadvantages:
- Time-consuming as it requires several generations.
- Expensive due to the need for controlled environments and extensive resources.

3(a) Assess the effectiveness of the following methodology in plant disease controls.

(i) Manuring: Improves soil fertility and plant health, making plants less susceptible to diseases.
(ii) Dead season: Breaks disease cycles by removing infected plant residues.
(iii) Quarantine and legislation: Prevents the spread of diseases across regions.
(iv) Use of clean planting materials: Reduces the introduction of pathogens into fields.
(v) Early planting: Avoids peak periods of disease outbreaks.

(b) Give a brief summary on each of the following plant diseases by clearly explaining the nature, symptoms, and control measures.

(i) Maize streak: A viral disease causing yellow streaks on leaves. Symptoms include stunted growth. Controlled through resistant varieties and proper weed management.
(ii) Common leaf rust: A fungal disease forming reddish-brown pustules on leaves. Control includes fungicide application and resistant varieties.
(iii) Common smut: A fungal disease forming galls on maize ears. Managed by crop rotation and removing infected plants.

4(a) Describe the following terms as used in weed science.

(i) Crop rotation: This is the practice of growing different crops sequentially on the same land to reduce weed pressure and break weed life cycles.
(ii) Mulching: The use of organic or synthetic materials to cover the soil surface, suppress weeds, and conserve soil moisture.

(b)(i) Explain the meaning of the “biological control of weeds” as used in crop production.
Biological control of weeds involves the use of natural enemies such as insects, fungi, or animals to suppress weed populations.

(ii) What are the two potential benefits of biological methods of weed control?
- Environmentally friendly as it avoids chemical use.
- Provides long-term weed suppression without regular interventions.

(iii) Suggest four limitations of biological control methods.
- Slow action compared to chemical methods.
- May require specific environmental conditions to succeed.
- Risk of non-target effects on other plants or organisms.
- Expensive initial research and implementation.

(c) Describe four basic categories used in classifying herbicides.
- Pre-emergence herbicides: Applied before the weeds emerge.
- Post-emergence herbicides: Applied after the weeds have emerged.
- Selective herbicides: Target specific weeds without harming the crop.
- Non-selective herbicides: Kill all plants they come in contact with.

5(a) Briefly explain three major groups of parasitic fungi by giving vivid examples.

- Obligate parasites: Fungi that depend entirely on a host for survival, e.g., powdery mildew.
- Facultative parasites: Fungi that can survive both as parasites and saprophytes, e.g., Alternaria species.
- Necrotrophic parasites: Fungi that kill host tissues before feeding on them, e.g., Botrytis species.

(b) Outline the following.

(i) Five visible outcomes of a viral infection on a plant:
- Stunted growth.
- Yellowing or chlorosis of leaves.
- Leaf curling.
- Formation of galls.
- Reduced yield and fruit quality.

(ii) Three visible outcomes of a bacterial infection on a plant:
- Water-soaked lesions.
- Leaf spots with yellow halos.
- Wilting of plant parts.

(iii) Four indicators of nutritional disorders:
- Yellowing leaves due to nitrogen deficiency.
- Purpling of leaves indicating phosphorus deficiency.
- Stunted growth due to potassium deficiency.
- Leaf scorching caused by calcium deficiency.

(c) How do the following cause diseases in plants?

(i) Flooding: Causes root rot and reduces oxygen availability.
(ii) Chemicals: Leads to phytotoxicity and damage to plant tissues.
(iii) Poor weather: Promotes fungal and bacterial growth.

(iv) Stress: Weakens plant defenses, making them prone to pathogens.

6(a) Distinguish between organic farming and sustainable agricultural production.

Organic farming refers to a system of farming that strictly avoids the use of synthetic fertilizers, pesticides, and genetically modified organisms, relying on natural methods such as composting, crop rotation, and biological pest control to maintain soil fertility and control pests. Sustainable agricultural production, on the other hand, focuses on conserving resources, maintaining ecological balance, and ensuring the long-term productivity of the farming system while addressing the socioeconomic needs of farmers. Unlike organic farming, sustainable agriculture does not necessarily exclude synthetic inputs but emphasizes resource efficiency and environmental conservation.

(b) Briefly explain five ways in which sustainable agricultural production can be helpful to farmers.

i. Sustainable agriculture enhances soil fertility by employing techniques like crop rotation, cover cropping, and organic matter addition, ensuring long-term productivity.
ii. It reduces input costs by minimizing dependency on expensive synthetic fertilizers and pesticides through integrated pest and nutrient management.
iii. Encourages biodiversity, which increases ecosystem resilience and provides natural pest control and pollination services.
iv. Mitigates the effects of climate change by promoting practices such as agroforestry, conservation tillage, and water conservation.
v. Improves the socioeconomic well-being of farmers by offering opportunities for higher incomes through diversified farming systems and eco-friendly product markets.

(c) Account for six characteristics of organic farming.

i. Relies on natural fertilizers like compost, manure, and green manure to improve soil fertility.
ii. Prohibits the use of synthetic pesticides, herbicides, and chemical fertilizers.
iii. Emphasizes biodiversity through the cultivation of multiple crops and inclusion of natural pest control mechanisms.
iv. Avoids genetically modified organisms (GMOs) at all stages of production.
v. Promotes humane treatment of animals, avoiding the use of growth hormones and antibiotics.
vi. Enhances soil health by encouraging biological activity and natural nutrient cycling.

7. (a) Analyse effects of parasites on the livestock.
i. Parasites cause reduced productivity due to poor growth, weight loss, and decreased milk or meat production.
ii. They result in blood loss and anemia, which weaken livestock and make them susceptible to other diseases.
iii. Cause damage to organs such as the liver and intestines, affecting digestion and overall health.
iv. Increase the cost of veterinary care and parasite control measures for farmers. v. Can lead to mortality in severe infestations, causing significant economic losses.

(b) Describe four ways which can be employed to eradicate tsetse flies in a grazing area.

i. Clearing bushes and vegetation where tsetse flies breed and rest.
ii. Using insecticides to spray grazing areas, killing tsetse flies and their larvae.
iii. Introducing traps and targets treated with insecticides to attract and kill flies.
iv. Applying biological control methods, such as releasing sterile male flies to reduce reproduction rates.

(c)(i) Briefly explain six conditions that assist farmers to identify sick animals in their farms.

i. Loss of appetite or refusal to eat.
ii. Dull and rough coat indicating poor health.
iii. Unusual behavior, such as lethargy or isolation from the herd.
iv. Abnormal body temperature, indicating fever or hypothermia.
v. Presence of unusual discharges from the eyes, nose, or mouth.
vi. Signs of lameness or difficulty moving.

(ii) Identify three symptoms associated with New Castle Disease in poultry.

i. Respiratory distress, such as coughing and sneezing.
ii. Neurological symptoms, including paralysis or twisting of the neck.
iii. Sudden drop in egg production or abnormal eggshells.

(iii) Suggest appropriate measures that can be taken to eliminate New Castle Disease in poultry farms.

i. Vaccinating poultry regularly to prevent disease outbreaks.
ii. Maintaining proper hygiene and biosecurity measures, such as disinfecting equipment and restricting farm access.

8(a) Give the meaning of the following terms as used in animal nutrition:

i. Rumination
Rumination refers to the process where ruminant animals regurgitate partially digested food from the rumen, chew it again to further break it down, and swallow it for complete digestion.

ii. Balanced ration
A balanced ration is a feed that provides all the necessary nutrients—carbohydrates, proteins, fats, vitamins, and minerals—in the right proportions required for the proper growth, maintenance, and reproduction of an animal.

iii. Ration
Ration is the total amount of food given to an animal in a day to meet its nutritional needs, which can be maintenance or production rations.

iv. Roughages
Roughages are coarse, fibrous feeds such as hay, silage, and pasture grasses that are high in fiber and essential for proper digestion in ruminants.

(b) Briefly describe four functions of calcium in the animal body.

i. Calcium strengthens bones and teeth, making them more resilient to physical stress.
ii. It plays a key role in blood clotting by activating clotting factors.
iii. It aids in muscle contraction, facilitating movement and other physical activities.
iv. Calcium is critical for proper nerve signal transmission, maintaining coordination in body functions.

(c) Enumerate four deficiency symptoms of calcium in farm animals.

i. Weak and brittle bones, leading to conditions such as rickets.
ii. Reduced milk production in lactating animals.
iii. Muscle tremors or spasms caused by impaired nerve and muscle function.
iv. Poor growth and delayed development in young animals.

(d) Explain four functions of water in the animal body.

i. Water is essential for maintaining body temperature through processes like sweating and respiration.
ii. It facilitates digestion by dissolving nutrients for absorption.
iii. Water aids in excreting waste products through urine and sweat.
iv. It serves as a transport medium for nutrients and hormones within the body.

9. (a) Briefly explain the roles played by each of the following reproductive organs of a hen in egg formation:

i. Infundibulum
The infundibulum captures the ovum after ovulation and is the site where fertilization occurs if sperm is present.

ii. Magnum
The magnum secretes layers of albumen (egg white) around the yolk to provide nutrients and protection.

iii. Isthmus
The isthmus adds the inner and outer shell membranes around the albumen.

iv. Shell gland
The shell gland deposits calcium carbonate to form the hard outer shell of the egg.

(b) Account for the events that take place in each of the five phases of the oestrus cycle.
i. Proestrus
The follicle grows, and estrogen levels rise, preparing the animal for mating.

ii. Estrus
The animal is in heat, ovulation occurs, and the animal is receptive to mating.

iii. Metestrus
The corpus luteum forms, and progesterone production begins to prepare for pregnancy.

iv. Diestrus
The corpus luteum is fully functional, and progesterone maintains the uterine lining for potential pregnancy.

v. Anestrus
The reproductive system is inactive, and no hormonal activity occurs.

(c) Enumerate four hormones which play roles in oestrus cycle of a cow and briefly describe the role of each hormone.

i. Estrogen
Induces heat and prepares the uterus for mating.

ii. Progesterone
Maintains pregnancy by supporting the uterine lining.

iii. Luteinizing hormone (LH)
Triggers ovulation and development of the corpus luteum.

iv. Follicle-stimulating hormone (FSH)
Stimulates follicular development and maturation.

10. (a) Analyse five characteristics of a good pasture suitable for high milk-yielding cows.

i. Rich in high-quality grasses like alfalfa, providing adequate protein and energy.
ii. Free from harmful weeds that could reduce nutritional value or cause toxicity.
iii. Well-drained soil to prevent waterlogging and root diseases.
iv. Ability to regrow quickly after grazing, ensuring consistent availability.
v. Contains legumes that fix nitrogen, enhancing soil fertility naturally.

(b) Enumerate nine principles underlying pasture improvement for both natural and cultivated pasture.

i. Rotational grazing to prevent overgrazing.
ii. Introduction of legumes to enrich nitrogen content.
iii. Proper fertilization to improve soil fertility.
iv. Use of improved pasture seeds for higher yields.
v. Controlled stocking rates to avoid pasture degradation.

vi. Regular weed control to enhance grass growth.
vii. Watering during dry seasons to maintain productivity.
viii. Soil aeration to improve root penetration and water infiltration.
ix. Pests and disease management to ensure healthy growth.

(c) Briefly explain four effective measures that may be used to control weeds in pastures.

i. Mechanical weeding using tools or machines to cut or uproot weeds.
ii. Chemical control through the application of selective herbicides.
iii. Biological control by introducing natural predators of weeds.
iv. Timely mowing to prevent weed flowering and seed dispersal.

(d) Identify four benefits of applying rotational grazing in the pasture.

i. Improves pasture regrowth by allowing recovery time after grazing.
ii. Prevents overgrazing, maintaining the quality and productivity of the pasture.
iii. Reduces the spread of pests and diseases by limiting animal exposure to one area.
iv. Promotes uniform manure distribution, enhancing soil fertility.