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: 3 Hours **ANSWERS** **Year: 2025**

Instructions

1. This paper consists of sections **ten (10)** questions
2. Answer **all** questions.
3. Each question carries **ten (10)** marks
4. Cellular phones are **not** allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet(s).

1. Non-pathogenic plant diseases are not greatly taken into consideration when one talks of plant diseases.

(a) What do you understand by non-pathogenic plant diseases?

Non-pathogenic plant diseases are plant disorders that do not originate from living organisms such as fungi, bacteria, viruses or nematodes. These diseases are caused by environmental stresses or chemical imbalances that interfere with the normal growth and functioning of plants. They arise from external physical or nutritional conditions rather than infectious agents, and although they do not spread between plants, they significantly weaken plant health and reduce productivity.

(b) Giving an example of a disease in each case, examine the following factors that cause non-pathogenic plant diseases in plants:

(i) Temperature fluctuation

Temperature fluctuation affects plants when sudden shifts between high and low temperatures damage plant tissues. An example is chilling injury in tomatoes, where exposure to cold temperatures disrupts cell membranes, causing uneven ripening and sunken spots. Plants fail to adapt quickly to rapid temperature changes, leading to physiological stress and visible injury.

(ii) Moisture fluctuation

Moisture fluctuation causes stress in the plant's ability to absorb water and minerals. Blossom end rot in tomatoes is an example where irregular watering restricts calcium transport, resulting in black, sunken patches at the base of the fruit. The inconsistency in soil moisture affects nutrient movement within the plant and leads to tissue breakdown.

(iii) Light fluctuation

Light fluctuation disrupts the balance of photosynthesis, causing plants to react adversely. Leaf scorch is an example observed when shaded plants suddenly receive intense light, damaging chlorophyll and causing leaf browning. Rapid light changes produce oxidative stress that exceeds the plant's ability to repair its tissues.

(iv) Nutritional deficiencies

Nutritional deficiencies arise when essential nutrients are lacking, leading to impaired physiological processes. Iron chlorosis is one example, where leaves turn yellow due to insufficient iron required for chlorophyll formation. The lack of nutrients weakens plant development and leads to poor growth and productivity.

2. Occurrence of pathogenic disease in plants is explained by the concept of disease triangle. Elaborate this statement.

The concept of the disease triangle states that three components must interact for a pathogenic disease to develop in plants: a susceptible host, a virulent pathogen, and a favourable environment. A susceptible host is necessary because disease cannot occur if the plant has resistance traits that prevent pathogen entry or multiplication. A virulent pathogen must also be present and capable of invading plant tissues, overcoming plant defences, and producing toxins or enzymes that cause disease symptoms. A favourable environment completes the triangle because temperature, humidity and moisture determine whether the pathogen can survive, reproduce or infect successfully. Only when all three conditions occur together does disease appear, and the absence of any one component prevents its development.

3. It has been the habit of most peasant farmers to control bird pests by scaring them through making noises. Suggest five other ways that can be used to get rid of the bird pests.

Using protective nets is effective because they physically prevent birds from

accessing crops, reducing feeding damage without harming the birds.
Installing scarecrows helps by creating a false human presence, which discourages birds from landing in the field.
Hanging reflective tapes deters birds because the flashing light causes discomfort and fear, making them avoid the area.
Applying bird-repellent sprays reduces bird activity because the affected crops become unattractive in taste or smell, limiting feeding.
Introducing predator models such as artificial owls or hawks exploits natural bird behaviour by triggering fear responses that keep birds away from farms.

4. It has been noted that village farms are situated in an area which is highly infested with grass weeds, despite the potential of the soil in producing high-yield crops.
(a) How would you help the farmers in the village to identify the following weeds in the field?
(i) Couch grass
Couch grass can be identified by its creeping underground rhizomes that spread quickly across the field, forming dense mats and pointed leaves that arise from nodes on the stems.

(ii) Star grass
Star grass is recognised by its star-shaped leaf arrangement, where several leaves radiate from a central point, forming a dense ground cover with firm stolons.

(iii) Kikuyu grass
Kikuyu grass is identified by its thick stolons and vigorous growth, producing broad leaves with a light-green colour and forming a tightly knitted turf that spreads rapidly.

(iv) Sword grass

Sword grass can be identified by its long, narrow, blade-like leaves with sharp edges, growing in clumps and standing upright like small swords.

(v) Crows-foot grass

Crows-foot grass is recognised by its seed heads which resemble the shape of a crow's foot, with several finger-like branches spreading out from a single point.

4. (b) Suggest two effective control measures of the weeds in (a).

Applying herbicides is effective because chemical control targets the weeds' growth systems and kills them without damaging the crops.

Practising deep cultivation helps because it uproots the rhizomes and stolons, reducing their ability to regenerate and spread.

5. The plant breeder was observed performing the following procedures for 8 years:

(a) What breeding method did the plant breeder perform?

The breeding method performed is the mass selection method, which involves choosing superior plants from a base population, bulking their seeds and continually evaluating their performance until a stable variety is produced.

5. (b) Analyse five merits and four demerits of the breeding method performed by the plant breeder.

One merit of mass selection is that it is simple to conduct because it requires no complex technology and can be done using field observation and basic equipment.

Another merit is that it improves populations gradually, as superior traits accumulate through repeated selection cycles.

A third merit is that the resulting variety adapts well to local conditions because selection is based on performance in the actual environment where the crop will be

grown.
A fourth merit is that it maintains genetic diversity, reducing vulnerability to diseases and environmental stresses.
A fifth merit is that it is inexpensive, making it suitable for small breeding programmes with limited resources.

One demerit of mass selection is that genetic progress may be slow because selection is based only on appearance, which may not fully reflect genetic potential.
A second demerit is that environmental effects may influence selection, causing breeders to choose plants that appear good due to favourable weather rather than superior genetics.
A third demerit is that the method cannot easily improve traits controlled by many genes, reducing its effectiveness for complex traits.
A fourth demerit is that uniformity in the resulting variety may be low, making management and marketing more difficult.

6. (a) During post-mortem of the dead cattle, soft flattened leaf-like with a triangular head lobe organisms were found in the bile duct.
(i) Identify the organisms found in the bile duct and state three effects that can be caused by that organism.
The organisms are liver flukes, specifically Fasciola species, which infest the bile ducts of cattle.
One effect is liver damage caused by the flukes feeding on liver tissues and obstructing bile flow, reducing overall liver function.
A second effect is weight loss because the animal's metabolism becomes impaired, limiting nutrient utilisation and reducing productivity.
A third effect is anaemia, which results from blood loss and the animal's weakened physiological state due to parasite activity.

6. (a) (ii) Give three measures that can be used to control the organisms found.

Regular deworming with flukicides helps eliminate liver flukes and prevents severe infestations.

Controlling snail populations in grazing areas helps interrupt the parasite's life cycle because snails serve as intermediate hosts.

Providing clean, well-drained pastures reduces animal exposure to contaminated water sources where infection commonly occurs.

6. (b) (i) Argue for or against the statement that "it is possible to eradicate East Coast Fever completely by controlling ticks."

It is possible to support the statement because East Coast Fever is transmitted exclusively by ticks, and eliminating the vector would break the transmission cycle completely, preventing new infections.

However, one may argue against the statement because complete eradication of ticks is extremely difficult due to their wide distribution, resistance to acaricides and ability to survive in multiple environments, making total elimination unlikely.

6. (b) (ii) Suggest three control measures of East Coast Fever.

Regular tick control using acaricides reduces tick populations and lowers transmission rates.

Vaccination of cattle with approved ECF vaccines helps build immunity and protects them from severe disease.

Improving pasture management reduces animal contact with tick-infested areas, lowering the chance of infection.

7. (a) How would you differentiate digestion in the stomach of swine and sheep?

Digestion in swine occurs in a simple stomach where enzymes such as pepsin and hydrochloric acid break down food chemically, similar to human digestion.

Digestion in sheep occurs in a complex stomach with four compartments, where

microbial fermentation in the rumen breaks down cellulose before enzymatic digestion, allowing sheep to utilise fibrous feeds efficiently.

7. (b) The school that keeps pigs feeds the animals with stiff maize porridge and beans from students' food remains.

(i) Which nutrients are the animals basically being given?

The pigs are mainly receiving carbohydrates from the stiff maize porridge, which provides energy needed for maintenance and growth.

They are also receiving proteins from the beans, which support tissue development, repair and overall body functioning.

7. (b) (ii) Educate the piggery unit attendants in the school on the general classes of nutrients required by the animals.

Pigs require carbohydrates for energy to support walking, growth and daily body functions.

Proteins are required to build muscles, support tissue repair and improve reproductive performance.

Fats supply concentrated energy and assist in maintaining body temperature and healthy skin.

Vitamins are needed in small quantities to support immunity, growth and metabolic processes.

Minerals contribute to bone formation, enzyme activities and physiological balance essential for health.

8. (a) The school established alfalfa as pastures to feed the cattle.

(i) What is the nutritional status of the pastures?

Alfalfa has high nutritional value because it is rich in proteins, vitamins and minerals, making it highly suitable for supporting growth and milk production in cattle.

8. (a) (ii) Advice the school on the proper composition of pastures to be established for farm animals. Give three reasons to support your answer.

The school should establish mixed pastures combining legumes and grasses to balance nutritional quality and biomass production.

Mixed pastures improve protein supply because legumes contribute essential amino acids needed by livestock.

They also enhance soil fertility through nitrogen fixation by legumes, reducing fertiliser costs.

Mixed pastures provide better forage availability throughout the year because grasses and legumes grow optimally under different conditions.

8. (b) Assume the school has established suitable pastures for the farm animals. Giving four reasons, suggest the best grazing methods to be employed in the pastures.

Rotational grazing is ideal because it allows pastures to rest and regenerate, improving long-term productivity.

Rotational grazing also reduces overgrazing, which protects soil structure and prevents land degradation.

This method improves forage utilisation because animals consume pasture uniformly across paddocks.

Rotational grazing helps break parasite cycles because animals are moved before parasite eggs hatch in specific areas.

9. (a) A cow was seen facing difficulties during parturition due to excessive calf size. Briefly describe the assistance you would give to make the process successful. Give five points.

I would first restrain the cow calmly to prevent injury and allow safe handling during the delivery assistance.

I would then lubricate the birth canal thoroughly to reduce friction and ease calf

movement during extraction.
I would assess the calf's position to ensure it is aligned properly and gently correct any malpresentation that might hinder delivery.
I would apply controlled, even traction in rhythm with the cow's contractions to assist the calf's passage without causing tissue damage.
I would call a veterinarian if delivery remains difficult, ensuring professional intervention to prevent harm to both cow and calf.

9. (b) Analyse five disadvantages of not adopting artificial insemination in a piggery farm.

Failure to adopt artificial insemination limits genetic improvement because farmers rely on available boars that may not possess superior traits.
It increases disease transmission risk since natural mating exposes animals to reproductive infections carried by boars.
Keeping boars for mating increases production costs because boars require feeding, housing and healthcare without directly contributing to meat output.
Natural mating reduces breeding efficiency because each boar can serve fewer females compared to AI, limiting reproductive capacity.
It creates challenges in managing breeding schedules because natural heat detection and mating may occur irregularly, affecting productivity.

10. Land degradation is an environmental challenge in agricultural development that limits the sustainability of the sector. Prepare five management practices to maintain the quality of the soil as a means of combating the problem.

Contour farming helps maintain soil quality because it reduces runoff and prevents soil erosion on sloped land.
Planting cover crops protects the soil from erosion, adds organic matter and improves moisture retention.
Applying organic manure increases soil fertility by enhancing nutrient content and

improving soil structure.

Practising crop rotation diversifies root systems and nutrient use, reducing pest build-up and improving soil health.

Agroforestry strengthens soil conservation because tree roots stabilise the soil, reduce erosion and improve microclimates for crop growth.