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: 2018**

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) What is a crop pest?
Answer: A crop pest is an organism, such as an insect, rodent, or microorganism, that attacks crops and causes damage, reducing yield and quality.

(b) Briefly explain five cultural methods that are used to control insects.
Answer:

- Crop rotation: Changing crops grown in a field disrupts the life cycle of pests.
- Proper planting time: Sowing crops at the right time avoids peak pest periods.
- Use of trap crops: Planting specific crops to attract and trap pests.
- Field hygiene: Removing plant debris and weeds eliminates pest habitats.
- Intercropping: Planting different crops together reduces pest attacks by confusion.

(c) (i) Account for the four common formulations of insecticides.
Answer:

- Dust: Dry formulations applied directly to plants.
- Liquid: Solutions or emulsions applied via spraying.
- Granules: Slow-release particles applied to the soil.
- Aerosols: Fine mist used for quick and even application.

(ii) Elaborate five different ways through which pests can arise.
Answer:

- Poor field sanitation encourages pest breeding.
- Continuous monocropping promotes specific pest infestations.
- Climate change creates suitable conditions for pests.
- Movement of infested plant materials spreads pests.
- Lack of pest-resistant crop varieties leads to outbreaks.

(d) (i) Name two crops which are attacked by Busseola fusca.
Answer: Maize and sorghum.

(ii) Outline two symptoms of the plants attacked by the pest in (d) (i).
Answer:

- Stem tunneling, weakening the plant structure.
- Yellowing and wilting of leaves.

(iii) State two cultural methods of minimizing the pest.
Answer:

- Early planting to avoid peak pest activity.
- Burning crop residues to destroy pest habitats.

2. (a) Identify six roles of plant breeding in crop production.
Answer:

- Development of high-yielding crop varieties.

- Breeding crops resistant to diseases.
- Improving crop tolerance to environmental stresses.
- Enhancing nutritional quality of crops.
- Producing pest-resistant crops.
- Shortening crop maturation periods.

(b) (i) What is Heterosis?
Answer: Heterosis, or hybrid vigor, refers to the phenomenon where hybrid offspring show superior qualities compared to their parents.

(ii) Describe five steps used in the production of hybrid seeds.
Answer:
- Selection of parent plants with desired traits.
- Controlled pollination to prevent unwanted crossing.
- Testing hybrids for performance and stability.
- Mass multiplication of superior hybrids.
- Packaging and distribution of hybrid seeds.

(c) Account for three purposes of plant introductions.
Answer:
- Introduction of new genetic material for breeding programs.
- Diversifying the range of crops grown in an area.
- Addressing specific agricultural challenges like pests or drought.

(d) (i) What does Pedigree selection mean?
Answer: Pedigree selection is the process of selecting plants based on the performance and characteristics of their ancestors.

(ii) Give three disadvantages of pedigree selection.
Answer:
- Time-consuming process.
- Requires detailed record-keeping.
- Limited to traits with strong genetic inheritance.

3. (a) Why is a volunteer plant classified as a weed? Give two reasons.
Answer:
- Competes with crops for nutrients, water, and sunlight.
- May harbor pests and diseases.

(b) Suggest nine agronomic ways of reducing the effects of weeds to crops.
Answer:
- Hand weeding.
- Proper spacing during planting.

- Mulching to suppress weed growth.
- Use of cover crops.
- Crop rotation to break weed cycles.
- Timely planting to outcompete weeds.
- Use of herbicides.
- Mechanical tillage.
- Proper water management to avoid encouraging weed growth.

(c) (i) Outline five merits of chemical application in weed control.
Answer:

- Provides quick results.
- Effective for large-scale operations.
- Targets specific weeds.
- Reduces labor requirements.
- Enhances crop productivity.

(ii) Assess four factors affecting the efficiency of this method.
Answer:

- Proper timing of application.
- Weather conditions during application.
- Correct dosage and formulation.
- Type and stage of weed growth.

4. (a) (i) Give four characteristics which make fungi important disease-causing agents.
Answer:

- Ability to produce spores that spread easily.
- Capability to survive in adverse conditions.
- Rapid reproduction and colonization of plants.
- Production of toxins that damage plant tissues.

(ii) Apart from causing diseases to plants, what are other economic importance of fungi? Give three points.
Answer:

- Decomposition and nutrient recycling.
- Production of antibiotics and other pharmaceuticals.
- Use in fermentation industries like baking and brewing.

(b) Describe the following:
(i) Localized symptoms: Restricted symptoms, such as spots or lesions, confined to specific parts of the plant.
(ii) Growth distortion: Abnormal growth patterns, such as stunted or malformed leaves.
(iii) Witches brooms: Dense, bushy growth of branches caused by infection.
(iv) Galls and knots: Swellings on plant tissues caused by fungi or other pathogens.
(v) Etiolation: Weak, pale growth due to lack of light.

5. (a) Explain the meaning of the following terms as they are used in plant diseases:
(i) Inoculation: The process of introducing pathogens to plants to study disease.
(ii) Signs: Physical evidence of a pathogen, like fungal mycelium or spores.
(iii) Toxicity: The degree to which a substance can harm plants.
(iv) Epidemiology: Study of the distribution and spread of plant diseases.
(v) Pellet: Compressed formulation of fungicides or pesticides.

(b) Describe damping off in tomatoes:
(i) Causative agent: Pythium or Fusarium species.
(ii) Two symptoms: Seedling collapse and stem rot.
(iii) Two control measures: Use of fungicide-treated seeds and proper drainage.

(c) How can the disease be controlled using the following methods?
(i) Avoidance: Planting in disease-free areas.
(ii) Exclusion: Preventing the entry of pathogens using quarantines.
(iii) Eradication: Destroying infected plants to eliminate the pathogen.
(iv) Immunization: Using resistant plant varieties.
(v) Protection: Applying protective fungicides.

6. (a). (i) Define the term animal disease as used in animal health.

Animal disease refers to any abnormal condition in animals that disrupts their normal physiological functions, caused by pathogens, genetic defects, nutritional deficiencies, or environmental factors.

(ii) Mention three causes of disease in livestock.

- Pathogens such as bacteria, viruses, and fungi.
- Poor nutrition or nutritional imbalances.
- Environmental stress, including extreme weather conditions or poor hygiene.

(b) Briefly describe six groups of micro-organisms which cause diseases in livestock.

- Bacteria: Single-celled organisms that can cause infections like mastitis and brucellosis.
- Viruses: Non-cellular pathogens causing diseases such as foot-and-mouth disease.
- Fungi: Causes conditions like ringworm and aspergillosis.
- Protozoa: Single-celled parasites responsible for diseases like coccidiosis.
- Rickettsia: Microorganisms causing diseases like anaplasmosis.
- Helminths: Parasitic worms like roundworms and liver flukes.

(c) Name three means of classifying animal diseases.

- Based on the causative agent (bacterial, viral, parasitic, etc.).
- Based on the organ system affected (respiratory, digestive, reproductive, etc.).

- Based on mode of transmission (contagious, non-contagious).

7. (a)(i) Differentiate between a feedstuff and a feed.

Feedstuff refers to raw materials or ingredients used to formulate animal feeds, such as maize or fishmeal. A feed is the final, prepared mixture provided to animals, such as pelleted or mixed feed.

(ii) What do you understand by the term maintenance ration?

Maintenance ration is the amount of feed supplied to an animal to sustain its basic bodily functions without contributing to production or growth.

(iii) Account for four factors that affect maintenance requirements of farm animals.

- Animal size: Larger animals require more feed.
- Environmental conditions: Extreme temperatures increase maintenance requirements.
- Activity levels: More active animals consume higher rations.
- Physiological stage: Pregnant or lactating animals need increased maintenance.

(b)(i) Briefly explain two roles played by reticulum in ruminant animals.

- Assists in sorting ingested food by size, trapping indigestible materials.
- Initiates regurgitation for re-chewing during rumination.

(ii) Analyze four microbial activities that take place in the rumen of ruminant animals.

- Cellulose digestion: Microbes break down cellulose into volatile fatty acids.
- Methanogenesis: Production of methane gas during fermentation.
- Protein synthesis: Microbes use nitrogen to form microbial proteins.
- Vitamin synthesis: Microbial activity produces B-complex vitamins.

(iii) Elaborate the functions of gizzard and caecae in the poultry digestive system.

- Gizzard: Mechanically grinds ingested feed using muscular contractions and grit.
- Caecae: Ferments undigested material, producing volatile fatty acids and absorbing water.

(c)(i) With two examples for each, give two categories of vitamins basing on their solubility.

- Fat-soluble vitamins: Vitamin A and Vitamin D.
- Water-soluble vitamins: Vitamin B and Vitamin C.

(ii) Identify two sources of vitamin E and one problem associated with its deficiency in animals.
Sources: Sunflower seeds and vegetable oils.
Deficiency problem: Muscular dystrophy or white muscle disease.

8. (a) Enumerate four factors affecting yield potential of a given species of pasture.

- Soil fertility: Nutrient-rich soils enhance pasture growth and yield.
- Climate conditions: Rainfall and temperature significantly impact pasture yield.
- Species genetics: High-yielding varieties have greater potential.
- Management practices: Proper grazing, fertilization, and weed control increase yield.

(b) Suggest three measures that can be taken in order to improve natural pasture in Tanzania.

- Application of fertilizers to enhance soil fertility.
- Introduction of high-yielding and drought-resistant grass species.
- Controlled grazing to prevent overgrazing and promote regrowth.

(c)(i) What is meant by top dressing as used in pasture management?

Top dressing refers to the application of fertilizers on established pastures to supply nutrients for sustained growth and productivity.

(ii) Why is it important to use top dressing in pasture? Give four reasons.

- Improves nutrient availability for plant growth.
- Enhances forage quality for better livestock nutrition.
- Promotes faster recovery of pastures after grazing.
- Increases the carrying capacity of pastures by boosting productivity.

(d)(i) Why are additives added in napier grass when making silage? Give a reason.

Additives are added to napier grass to improve fermentation and preservation during the silage-making process.

(ii) Explain one problem associated with poor forage compaction during silage making.

Poor compaction leads to air pockets, causing spoilage and reducing silage quality.

(iii) List five characteristics of good quality silage.

- Pleasant smell (sweet or acidic).
- Greenish color, indicating proper preservation.
- High moisture content (60–70%).
- Free from molds and spoilage.
- High nutrient retention, particularly energy and proteins.

9. (a) Define the following terms as used in livestock breeding and improvement:

(i) Runt: A small or undersized animal in a litter, often with poor growth potential.
(ii) Libido: The sexual drive or reproductive urge in breeding animals.
(iii) Free-martin: A sterile female calf born as a twin to a male calf in cattle.
(iv) Dystocia: Difficulty in giving birth, often requiring intervention.

(b) Outline four functions of inbreeding in livestock breeding.

- Preserves desirable traits within a breed.
- Improves uniformity in offspring for specific characteristics.
- Facilitates the identification of genetic defects.
- Strengthens adaptability to specific environmental conditions.

(c)(i) Mention two methods of semen collection from the bull.

- Artificial vagina method.
- Electro-ejaculation method.

(ii) Examine three semen parameters that have to be evaluated or tested in order to judge its quality before insemination or storage.

- Motility: The ability of sperm cells to move actively.
- Morphology: The structure and shape of sperm cells.
- Concentration: The number of sperm cells per milliliter of semen.

(iii) Enumerate four limitations of artificial insemination as opposed to natural mating.

- Requires skilled personnel for semen collection and insemination.
- High initial costs for equipment and semen storage.
- Risk of disease transmission through improperly handled semen.
- Limited success rates if timing is not optimal.

10(a) Outline five sustainable agricultural techniques used by farmers to achieve the key roles in protection of crop plants and soil quality.

- Crop rotation to disrupt pest cycles and improve soil fertility.
- Use of organic fertilizers to enhance soil structure.
- Conservation tillage to prevent soil erosion.
- Agroforestry to increase biodiversity and protect crops.
- Integrated pest management to minimize chemical use.

(b) Assess three contributions of cover crops in sustainable agriculture.

- Prevents soil erosion by providing ground cover.

- Enhances soil fertility through nitrogen fixation (leguminous crops).
- Suppresses weed growth, reducing the need for herbicides.

(c) Briefly explain four effects of crop rotation on agricultural production and sustainability.

- Enhances soil fertility by alternating crops with different nutrient needs.
- Reduces pest and disease buildup by disrupting their lifecycle.
- Improves soil structure through varied root systems.
- Increases overall productivity by optimizing land use.

(d) Why modern farming is not sustainable? Give three reasons.

- Overuse of synthetic chemicals leads to environmental degradation.
- Loss of biodiversity due to monocropping practices.
- Dependence on non-renewable resources like fossil fuels for machinery and fertilizers.