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: 2012**

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) Explain the meaning of the following terms as used in plant pathology:
(i) Dieback
(ii) Cankers
(iii) Blackleg

Answer:
(i) Dieback: A condition in plants where the tips of branches or stems die due to disease, pest attack, or unfavorable environmental conditions.
(ii) Cankers: Localized dead areas on stems, branches, or twigs caused by fungal or bacterial infections, often resulting in sunken, discolored, or cracked lesions.
(iii) Blackleg: A bacterial disease affecting the stems and roots of plants, leading to blackened tissues, wilting, and eventual death of the plant.

(b) Explain in brief five effects caused by fungi on the stored crops.

Answer:
(i) Loss of quality: Fungi produce toxins like aflatoxins, which degrade the nutritional and market value of crops.
(ii) Loss of weight: Fungal infections consume stored nutrients, causing significant weight loss in stored crops.
(iii) Spoilage: Visible mold growth leads to spoilage, making the crops unfit for consumption.
(iv) Reduced germination: Fungal infections in seeds reduce their viability and germination rates.
(v) Economic loss: Infested crops lead to significant economic losses for farmers due to reduced marketability.

(c) Sorghum smut is the most important fungal disease of sorghum in Tanzania.
(i) What do you understand by the term smut?

Answer: Smut refers to a fungal disease characterized by the formation of black, powdery spore masses on infected plant parts, especially grains.

(ii) Name four types of sorghum smuts and their causative organisms.

Answer:
(i) Covered smut - Caused by Sporisorium sorghi.
(ii) Loose smut - Caused by Sporisorium cruenta.
(iii) Long smut - Caused by Tolyposporium ehrenbergii.
(iv) Head smut - Caused by Sphacelotheca reiliana.

(iii) Briefly describe one symptom for each type of sorghum smut.

Answer:
(i) Covered smut: Black spore masses replace the grains in the panicle.

(ii) Loose smut: Entire grain is replaced by a loose black powder of spores.
(iii) Long smut: Long, cylindrical galls form on the inflorescence.
(iv) Head smut: Large, black masses of spores develop at the base of the panicle.

(iv) Suggest three control measures which can be used to control sorghum smuts.

Answer:
(i) Use resistant varieties of sorghum.
(ii) Practice crop rotation to break the disease cycle.
(iii) Treat seeds with fungicides before planting.

2. (a) Weeds are both friends and enemies of Tanzanian farmers. Justify this statement by giving five reasons in each case.

Answer:
Weeds as friends:
(i) Serve as cover crops to prevent soil erosion.
(ii) Provide organic matter when decomposed.
(iii) Act as habitat for beneficial organisms.
(iv) Serve as indicators of soil fertility and health.
(v) Some weeds are used as food or medicine.

Weeds as enemies:
(i) Compete with crops for nutrients and water.
(ii) Reduce crop yields due to competition.
(iii) Harbor pests and diseases.
(iv) Increase the cost of weed control in farms.
(v) Reduce the quality of harvested crops.

(b) (i) Explain briefly six mechanisms that enable weeds to dominate farms quickly and suppress crops.
Answer:
(i) Rapid reproduction through seeds and vegetative propagation.
(ii) Long seed dormancy allows survival under unfavorable conditions.
(iii) Ability to produce large numbers of seeds.
(iv) Strong competitive ability for resources like light, water, and nutrients.
(v) Adaptation to a wide range of environmental conditions.
(vi) Resistance to herbicides.

(ii) Suggest two control methods that can be used to control 'witchweed.'

Answer:
(i) Use of resistant crop varieties.

(ii) Application of cultural practices like crop rotation and intercropping.

(c) Tillage is among the mechanical methods of weed control.
(i) What is the purpose of tillage in controlling weeds?

Answer: The purpose of tillage is to uproot and bury weeds, exposing their roots to sunlight and drying, which prevents regrowth.

(ii) Briefly explain four disadvantages of tillage in weed control.

Answer:
(i) Leads to soil erosion by exposing soil to wind and water.
(ii) Disrupts soil structure and organic matter.
(iii) High labor and energy requirements.
(iv) Encourages weed germination by bringing buried seeds to the surface.

3. (a) What is the role of each of the following filler materials as used in pesticide application?
(i) Stricker: Ensures pesticides adhere to plant surfaces.
(ii) Emulsifier: Helps mix oil-based pesticides with water.
(iii) Spreader: Enhances the distribution of pesticides over plant surfaces.
(iv) Deflocculator: Prevents clumping of solid particles in pesticide mixtures.

(b) State three advantages and three disadvantages of insecticide application in crop production.

Answer:
Advantages:
(i) Effective control of pests.
(ii) Increases crop yield and quality.
(iii) Reduces the risk of pest-transmitted diseases.

Disadvantages:
(i) Development of pesticide resistance in pests.
(ii) Harm to non-target organisms like pollinators.
(iii) Environmental pollution due to chemical residues.

(c) (i) By giving four reasons, explain briefly why storage pests are highly successful than field pests.

Answer:
(i) Stable environment in storage facilities promotes pest survival.
(ii) Lack of natural predators in storage areas.
(iii) Continuous food supply in stored crops.
(iv) Limited human intervention compared to field conditions.

(ii) Diparopsis castanea and Prostephanus truncatus are two pests which are difficult to control. Justify this statement by giving two reasons in each case.

Answer:
Diparopsis castanea:

- It has a high reproductive rate, making it difficult to eliminate completely.
- It can survive on alternative hosts, maintaining its population even when primary crops are unavailable.

Prostephanus truncatus:
1. It is resistant to many conventional pesticides.
2. It damages stored crops by boring into them, making detection and control harder.

(iii) State two control measures of Diparopsis castanea.

Answer:

- Use of insect-resistant crop varieties.
- Application of biological control methods, such as natural predators.

4. (a) (i) What do you understand by the term heterosis?

Answer: Heterosis, also known as hybrid vigor, refers to the phenomenon where offspring resulting from the crossbreeding of two genetically different parents exhibit superior qualities, such as higher yield, better growth, or increased resistance to diseases compared to their parents.

(ii) Giving an example, briefly explain the beneficial application of mutation in agriculture.

Answer: Mutation can create genetic variations that result in improved crop traits. For example, gamma radiation-induced mutation in rice has been used to develop semi-dwarf varieties with high yield potential and resistance to lodging.

(b) (i) In Mendel's experiment on crossing two varieties of beans, he chose round and wrinkled seeds with yellow and green colours respectively. R is a gene for round and r is a gene for wrinkled whereby Y is a gene for yellow and y is a gene for green. When homozygous round and yellow seeds were crossed to wrinkled green seeds, the resulting F_1 generation were all heterozygous round yellow seeds. Use punnett square to determine the phenotype in F_2 generation when F_1 individuals will breed among themselves.

Answer:
The F_2 generation results in the phenotypic ratio of:

Consider the table below:

	RY	Ry	rY	ry
RY	RRYY	RRYy	RrYY	RrYy
Ry	RRYy	RRyy	RrYy	Rryy
rY	RrYY	RrYy	rrYY	rrYy
ry	RrYy	Rryy	rrYy	rryy

- Round yellow (RY): 9
- Round green (Ry): 3
- Wrinkled yellow (rY): 3
- Wrinkled green (ry): 1

(ii) State four assumptions in genetic segregation.

Answer:
1. Each gene has two alleles, one inherited from each parent.
2. Alleles segregate randomly during gamete formation.
3. Fertilization occurs randomly between gametes.
4. There is no linkage or interaction between genes.

(c) Explain briefly two advantages and two disadvantages of progeny testing.

Answer:
Advantages:
- It helps in identifying superior traits for breeding purposes.
- It ensures that only high-performing individuals contribute to future generations.

Disadvantages:
- It is time-consuming as it requires multiple generations to evaluate traits.
- It can be costly due to the resources needed for testing and evaluation.

5. (a) Blast is a common disease that infects paddy. Account for the disease using the following guidelines:
(i) Causative agent.
Answer: The causative agent is the fungus *Magnaporthe oryzae*.
(ii) Symptoms.

Answer: Symptoms include:
- Leaf spots with gray centers and brown margins.
- Lesions on stems and panicles.
- Premature drying of affected plant parts.

(iii) Control measures.

Answer:

- Use resistant paddy varieties.
- Apply fungicides as preventive measures.
- Maintain proper field hygiene by removing infected debris.

(b) Briefly describe five symptoms of viral infections in plants.

Answer:

- Mosaic patterns on leaves.
- Stunted growth.
- Yellowing or chlorosis of leaves.
- Leaf curling or distortion.
- Reduced fruit or seed production.

(c) (i) Define the term epiphytology.

Answer: Epiphytology is the study of the occurrence, distribution, and spread of plant diseases within a population and the factors influencing these patterns.

(ii) Briefly explain four factors that influence the occurrence of epiphytotic diseases in the field.

Answer:

- Environmental factors such as temperature and humidity.
- Presence of susceptible host plants in the field.
- Availability of disease vectors like insects.
- Pathogen virulence and population density.

(d) Bemisia tabaci is the vector of several crop diseases in Tanzania. Name two diseases that are transmitted by the vector and suggest three control measures for the vector.

Answer:
Diseases:

- Tomato Yellow Leaf Curl Virus (TYLCV).
- Cassava Mosaic Virus (CMV).

Control measures:

- Use insect-resistant crop varieties.
- Apply insecticides to reduce vector populations.
- Practice crop rotation to disrupt the vector's lifecycle.

6. (a) Explain the meaning of each of the following terms as used in animal nutrition:
(i) Heat increment.
(ii) Digestible energy.
(iii) Biological value of protein.

Answer:
(i) Heat increment: The amount of heat produced in the body as a result of the digestion, absorption, and metabolism of nutrients.
(ii) Digestible energy: The portion of energy in the feed that is absorbed and utilized by the animal after accounting for energy lost in feces.
(iii) Biological value of protein: A measure of the proportion of absorbed protein from feed that is retained by the animal for growth, maintenance, or reproduction.

(b) Briefly explain why gross energy of a feed is of little importance to the farmer.

Answer: Gross energy is of little importance because it includes all energy in the feed, even portions that the animal cannot digest or utilize, such as energy lost in feces, urine, or gases.

(c) A goat ate 3 kg of grass containing 0.8 kg DM and excreted 0.5 kg of feces containing 0.12 kg DM. Calculate the digestibility coefficient of the grass.

Answer:
Digestibility coefficient = [(DM consumed - DM in feces) / DM consumed] × 100
= [(0.8 - 0.12) / 0.8] × 100 = 85%

(d) (i) Palatability of a feed depends on several factors. Explain briefly three factors that affect palatability of a feed.

Answer:
(i) Taste: Sweet or flavored feeds are more palatable.
(ii) Texture: Soft and less fibrous feeds are easier to chew and preferred.
(iii) Odor: Feeds with a pleasant smell are more attractive to animals.

(ii) Propose six factors to be considered when formulating rations for livestock.

Answer:
(i) Nutritional requirements of the animal.
(ii) Age and stage of production.
(iii) Availability of feed ingredients.
(iv) Cost of feed.
(v) Feed digestibility.
(vi) Presence of anti-nutritional factors.

7. (a) Management of pastures involves weeding:
(i) Briefly explain five effects of weeds on pastures.

Answer:
(i) Reduce the quality of forage available to livestock.
(ii) Compete with desirable grasses for nutrients and water.
(iii) Reduce the carrying capacity of the pasture.
(iv) Harbor pests and diseases.
(v) Cause injuries or poisoning to grazing animals.

(ii) Explain briefly four effective weed control methods on pastures.

Answer:
(i) Mechanical control: Mowing or slashing weeds.
(ii) Chemical control: Application of selective herbicides.
(iii) Biological control: Introducing natural weed predators.
(iv) Rotational grazing: Prevents overgrazing and weed dominance.

(b) (i) What do you understand by the term rotational grazing?

Answer: Rotational grazing involves dividing pastures into sections and allowing livestock to graze in one section at a time to allow other sections to recover.

(ii) State six advantages of rotational grazing.

Answer:
(i) Prevents overgrazing.
(ii) Improves pasture regrowth.
(iii) Reduces soil erosion.
(iv) Enhances nutrient cycling.
(v) Controls weeds naturally.
(vi) Reduces parasite infestation.

(c) Paddocking is one of the grazing systems and has its advantages and limitations. Explain two advantages and one limitation of paddocking.

Answer:
Advantages:
(i) Prevents overgrazing by restricting livestock movement.
(ii) Allows better pasture management and recovery.

Limitation:
(i) High initial cost of fencing and infrastructure.

8. (a) What do you understand by the following terms as used in animal health?
(i) Epidemiology.
(ii) Notifiable disease.
(iii) Zoonotic disease.
(iv) Etiology.

Answer:
(i) Epidemiology: The study of the distribution and determinants of diseases in animal populations.
(ii) Notifiable disease: A disease that must be reported to authorities due to its economic or public health significance.
(iii) Zoonotic disease: A disease that can be transmitted from animals to humans.
(iv) Etiology: The study of the cause or origin of a disease.

(b) The following parasites are causative agents of various diseases in livestock. Suggest two control measures for each parasite:
(i) Fasciola gigantica.
(ii) Taenia saginata.
(iii) Ascaris lumbricoides.

Answer:
(i) Fasciola gigantica: Use of flukicides, and avoiding grazing in wet areas.
(ii) Taenia saginata: Proper meat inspection and cooking meat thoroughly.
(iii) Ascaris lumbricoides: Deworming and maintaining proper hygiene in livestock housing.

(c) Explain briefly on the following methods used to control livestock diseases:
(i) Vaccination.
(ii) Good management of livestock.

Answer:
(i) Vaccination: Administering vaccines stimulates the animal's immune system to develop resistance against specific diseases.
(ii) Good management of livestock: Practices such as proper feeding, housing, and regular health checks to prevent disease outbreaks.

9. (a) Explain briefly the roles of the five hormones responsible in oestrus cycle of a cow.

Answer:
(i) Estrogen: Triggers heat behavior and prepares the reproductive tract for mating.
(ii) Progesterone: Maintains pregnancy by suppressing heat and supporting uterine lining.
(iii) Luteinizing hormone (LH): Stimulates ovulation.
(iv) Follicle-stimulating hormone (FSH): Promotes follicle growth and development.
(v) Oxytocin: Aids in uterine contractions and milk letdown during calving.

(b) (i) State three signs that may indicate that a given cow is not fertile.

Answer:
(i) Failure to conceive after multiple matings.
(ii) Irregular or absence of heat cycles.
(iii) Abnormal discharges from the reproductive tract.

(ii) Describe briefly three ways of carrying out pregnancy diagnosis in cows.

Answer:
(i) Rectal palpation: Feeling the reproductive tract for pregnancy signs.
(ii) Ultrasound: Imaging to confirm pregnancy.
(iii) Hormonal tests: Testing for pregnancy-specific hormones.

10. (a) Differentiate between carrying capacity and stocking rate.

Answer: Carrying capacity is the maximum number of animals that a pasture can support sustainably, while stocking rate is the actual number of animals placed on the pasture.

(b) (i) Examine three effects of overstocking in a given area of pasture.

Answer:
(i) Depletion of forage resources.
(ii) Increased soil erosion.
(iii) Spread of diseases due to overcrowding.

(ii) Explain briefly four advantages and three disadvantages of zero grazing (stall feeding) system.

Answer:
Advantages:
(i) Reduces pasture overgrazing.
(ii) Improves feed utilization.
(iii) Reduces disease transmission.
(iv) Easy manure collection.

Disadvantages:
(i) High labor requirements.
(ii) Costly infrastructure and feed.
(iii) Limited exercise for animals.

(c) Briefly explain six ways in which grass-legume mixture is important in a pasture.

Answer:

(i) Improves soil fertility through nitrogen fixation.
(ii) Increases forage quality.
(iii) Promotes diverse diet for livestock.
(iv) Prevents soil erosion.
(v) Enhances pasture regrowth.
(vi) Provides year-round feed availability.