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 : 2005**

Instructions

1. This paper consists of sections **ten (10)** questions in sections A and B.
2. Answer **five (5)** questions choosing at least **two (2)** questions from each section.
3. Each question carries **twenty (20)** marks.
4. Cellular phones are **not** allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet(s).

SECTION A

CROP SCIENCE AND PRODUCTION

1. Explain four types of crop damage caused by insect pests, giving one example for each.
   Defoliation removes leaf area and reduces photosynthesis, example armyworm on maize.
   Boring into stems or cobs weakens structural support and disrupts transport, example maize stem borer.
   Sap-sucking causes wilting, chlorosis, and transmits viruses, example aphids on beans.
   Fruit and seed feeding reduce marketability and germination, example maize weevil in stored grain.

2. Differentiate between the following terms in plant breeding:
   (a) Genotype and Phenotype
   Genotype is the genetic makeup; phenotype is the observable traits resulting from genotype and environment.
   (b) Inbreeding and Outbreeding
   Inbreeding is mating of related individuals to fix traits; outbreeding is mating unrelated individuals to increase heterozygosity.
   (c) Homozygous and Heterozygous
   Homozygous means identical alleles at a locus; heterozygous means different alleles at a locus.
   (d) Selection and Hybridization
   Selection chooses superior individuals to propagate; hybridization crosses different parents to combine desirable traits.

3. Discuss five ways in which weeds are dispersed, giving a suitable example for each method.
   Wind dispersal carries light seeds like dandelion achenes.
   Water dispersal moves buoyant seeds like ricefield weeds along waterways.
   Animal dispersal attaches seeds to fur or is eaten and passed, example burrs sticking to livestock.
   Human-mediated dispersal spreads weed seeds in contaminated seed or machinery, example invasive grasses in crop seed lots.
   Explosive dispersal ejects seeds forcefully from pods, example wild lupins or some Euphorbia species.

4. Briefly explain the concept of Integrated Pest Management (IPM) and give five reasons for its importance in modern agriculture.
   IPM combines cultural, biological, mechanical, and chemical methods based on monitoring and thresholds to manage pests sustainably.

It reduces reliance on pesticides, lowering environmental and health risks.
It delays pest resistance development by rotating control methods.
It conserves natural enemies and biodiversity.
It can be cost-effective by applying controls only when needed.
It supports integrated farm management and market access where pesticide residues are regulated.

5. Describe the symptoms, causative agent, and control measures for three bacterial diseases of crops.
   Bacterial blight of rice: Xanthomonas oryzae; symptoms are water-soaked lesions on leaves that become yellow and necrotic; control with resistant varieties, clean seed, and seedling health monitoring.
   Bacterial wilt of tomato: Ralstonia solanacearum; symptoms are wilting, vascular browning, and plant collapse; control through crop rotation, clean transplants, and avoid infected soils.
   Fire blight of apple: Erwinia amylovora; symptoms are blossom and shoot blight with brown curled shoots and oozing; control with resistant rootstocks, pruning of infected parts, and bactericides where permitted.

SECTION B

LIVESTOCK SCIENCE AND PRODUCTION

6. Explain what is meant by epiphytology in relation to livestock diseases and state four factors that influence its occurrence.
   Epiphytology refers to the study of disease outbreaks in populations; in livestock it can be read as epidemiology of disease outbreaks and their spread dynamics.
   Factors: population density (crowding favors spread), climatic conditions (temperature and humidity affect pathogen survival), movement of animals (introduces new infections), and vector abundance (ticks, flies facilitating transmission).

7. Briefly explain the role of the following hormones in the estrous cycle of a cow:
   (a) Follicle-Stimulating Hormone (FSH)
   FSH stimulates follicle growth and development in the ovary.
   (b) Luteinizing Hormone (LH)
   LH triggers ovulation and supports corpus luteum formation.
   (c) Progesterone

Progesterone maintains pregnancy by preparing and sustaining the uterine environment and suppressing estrus.

(d) Oestrogen

Estrogen induces estrous behavior and coordinates the reproductive tract for mating and ovulation.

8. Discuss the importance of a well-designed livestock housing and enumerate six key features of a good house for dairy cattle.

   Good housing protects animals from extreme weather, reduces stress and disease, improves productivity, and facilitates management.

   Key features: adequate ventilation to remove moisture and ammonia; appropriate drainage to keep floors dry; comfortable bedding to prevent injuries; sufficient space per animal to reduce stress; easy access to feed and water; biosecurity features like controlled entry and cleaning areas.

9. Describe five signs that may indicate a cow is ready for calving.

   Swelling and relaxation of the vulva and pelvic ligaments.

   Udder enlargement and milk leakage or waxy teat ends.

   Restlessness and isolation from herd.

   Drop in appetite and changes in tail carriage.

   Appearance of the mucous plug or clear discharge.

10. Outline the process of semen collection using an artificial vagina and the process of freezing semen for long-term storage.

    Prepare and warm an artificial vagina to appropriate temperature and assemble collection apparatus; use a teaser or mount stimulus to induce ejaculation; collect semen into a pre-warmed, sterile container.

    Evaluate semen for volume, concentration, motility, and morphology; dilute with extender to required concentration; cool gradually to 5°C, equilibrate with cryoprotectant, load into straws, freeze progressively in liquid nitrogen vapor, then plunge and store in liquid nitrogen tanks.