THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL

ADVANCED CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

134/1 SCIENCE AND PRACTICE OF AGRICULTURE 1

(For Both School and Private Candidates)

Time: 2:30 Hours **ANSWERS** **Year: 2004**

Instructions

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

SECTION A

AGRICULTURAL ENGINEERING AND LAND PLANNING

1. (a) Describe the construction of a seed drill.

   A seed drill is constructed as a mechanical implement designed to place seeds uniformly in rows at a controlled depth and spacing. It consists of a strong metal frame that supports all other components and allows attachment to animal or tractor power.

   The seed drill has seed boxes or hoppers mounted on the frame, which store seeds before planting. These hoppers are usually made of metal or durable plastic to protect seeds from damage and moisture.

   Below the seed box is the seed metering mechanism, which regulates the amount of seed released. The drill also has furrow openers fixed beneath the frame to open grooves in the soil.

   At the rear, covering devices and press wheels are fitted to cover the seeds with soil and ensure proper seed to soil contact, which is essential for germination.

1. (b) Explain the function of the following parts.

   (i) Seed metering mechanism

   The seed metering mechanism controls the rate at which seeds are released from the seed box. It ensures uniform spacing of seeds along the row, which leads to even crop establishment and efficient use of seed.

   (ii) Furrow opener

   The furrow opener cuts into the soil and creates a groove of the required depth where the seeds are placed. This ensures that seeds are planted at a uniform depth suitable for proper germination.

   (iii) Covering device

   The covering device pushes soil back over the seeds after they have been dropped into the furrow. This protects seeds from birds, prevents moisture loss, and improves seed to soil contact.

1. (c) State two advantages of row planting over broadcasting.

   Row planting allows easier weed control since spaces between rows can be cultivated mechanically or manually.

   It also ensures uniform plant spacing, which improves crop growth, efficient use of nutrients, and higher yields.

2. (a) Explain the meaning of contour farming.

   Contour farming is an agricultural practice in which crops are planted along lines of equal height across a slope. These lines follow the natural contours of the land rather than running up and down the slope.

2. (b) Describe the procedure of laying contour lines using an A-frame.

   An A-frame is first constructed using three poles tied together in the shape of the letter A, with a plumb line suspended from the top.

   The A-frame is placed on the slope and adjusted until the plumb line rests at the central mark, indicating a level position.

   One leg of the A-frame is marked on the ground, then the frame is rotated by moving the other leg until the plumb line again aligns with the central mark.

   This process is repeated across the field to mark a continuous contour line along which farming activities are carried out.

2. (c) State two advantages of contour farming.

   Contour farming reduces soil erosion by slowing down surface runoff on sloping land.

   It also increases water infiltration into the soil, improving soil moisture conservation.

3. (a) Distinguish between manual and animal-drawn farm tools.

   Manual farm tools are operated solely by human effort and do not require animal or mechanical power.

   Animal-drawn farm tools are implements pulled or operated using animal power such as oxen or donkeys.

3. (b) Give two examples of each.

   Examples of manual farm tools include the hoe and the machete.

Examples of animal-drawn farm tools include the ox-plough and the animal-drawn harrow.

3. (c) State one limitation of each category.

   Manual farm tools are limited by low work output, making them unsuitable for large-scale farming.

   Animal-drawn tools depend on the availability and health of animals, which may limit timely farm operations.

4. (a) Explain the purpose of farm roads.

   Farm roads provide access to different parts of the farm, enabling easy movement of people, machinery, and farm inputs.

   They also facilitate transportation of harvested produce from the farm to storage areas or markets, reducing post-harvest losses.

4. (b) Describe two types of farm roads.

   Permanent farm roads are well-constructed roads used throughout the year for regular farm activities.

   Temporary farm roads are seasonal paths used during specific farming periods such as harvesting and may not be maintained permanently.

4. (c) State two factors considered when planning farm roads.

   Topography of the land is considered to avoid steep gradients and erosion problems.

   Drainage is considered to prevent waterlogging and road damage during rainy seasons.

5. (a) A rectangular field measures 120 m by 80 m.

   (i) Calculate the area in square metres.

   Area = length × width

   Area = 120 × 80

   Area = 9,600 square metres

   (ii) Convert the area into hectares.

1 hectare = 10,000 square metres

Area in hectares = 9,600 ÷ 10,000

Area = 0.96 hectares

5. (b) State two uses of farm maps.

Farm maps help in planning the layout of farm structures, fields, and roads.

They are used to guide efficient land use and farm management decisions.

SECTION B

SOIL SCIENCE

6. (a) Define soil pH.

Soil pH is a measure of the acidity or alkalinity of the soil solution, expressed on a scale from 0 to 14.

6. (b) Explain how soil pH affects nutrient availability.

Soil pH influences the solubility of nutrients in the soil. In strongly acidic soils, nutrients such as phosphorus become unavailable, while toxic elements like aluminum may increase.

In alkaline soils, micronutrients such as iron, manganese, and zinc become less available to plants, leading to nutrient deficiencies.

6. (c) State two methods of correcting acidic soils.

Application of lime raises soil pH by neutralizing excess acidity.

Adding organic matter improves buffering capacity and reduces soil acidity over time.

7. (a) Explain soil erosion.

Soil erosion is the removal and transportation of topsoil by agents such as water or wind.

7. (b) Describe four causes of soil erosion.

Heavy rainfall causes runoff that washes away unprotected topsoil.

Deforestation removes vegetation cover that holds soil particles together.

Overgrazing exposes soil by removing protective plant cover.

Poor farming practices such as ploughing up and down slopes increase runoff speed.

7. (c) State two effects of soil erosion on crop production.

   Soil erosion reduces soil fertility by removing nutrient-rich topsoil.

   It lowers crop yields due to poor soil structure and reduced water-holding capacity.

8. (a) Define soil air.

   Soil air is the mixture of gases found in the pore spaces between soil particles.

8. (b) Explain four functions of soil air in plant growth.

   Soil air supplies oxygen required for root respiration.

   It supports the activity of beneficial soil microorganisms involved in nutrient cycling.

   Proper soil aeration promotes healthy root development.

   It facilitates the removal of carbon dioxide produced during respiration.

SECTION C

RURAL ECONOMY

9. (a) Explain the meaning of farm records.

   Farm records are written documents that show detailed information about farm activities, inputs, outputs, and financial transactions.

9. (b) Describe four types of farm records.

   Production records show quantities of crops or livestock produced on the farm.

   Financial records show income, expenses, profits, and losses.

   Labour records document the use and cost of labour on the farm.

   Inventory records show the quantity and value of farm assets and inputs.

9. (c) Explain four advantages of keeping farm records.

   Farm records help farmers assess farm performance and profitability.

   They assist in planning and decision-making for future farm operations.

   Records help farmers access credit by providing financial evidence.

   They enable easy identification of strengths and weaknesses in farm management.

9. (d) A farmer recorded the following annual sales.

Maize Tshs 2,400,000

Beans Tshs 1,800,000

Sunflower Tshs 1,200,000

Total farm income = 2,400,000 + 1,800,000 + 1,200,000

Total farm income = Tshs 5,400,000

10.(a) Explain the term marketing margin.

Marketing margin is the difference between the price paid by consumers and the price received by producers for the same product.

10.(b) Describe four components of marketing costs.

Transportation costs are expenses incurred in moving produce from farm to market.

Storage costs cover expenses for keeping produce safely before sale.

Packaging costs involve materials and labour used to prepare produce for sale.

Handling costs include loading, unloading, and processing activities.

10.(c) Given the following data.

Farm gate price = Tshs 900 per kg

Retail price = Tshs 1,600 per kg

Marketing cost = Tshs 400 per kg

(i) Calculate the marketing margin.

Marketing margin = Retail price − Farm gate price

Marketing margin = 1,600 − 900

Marketing margin = Tshs 700 per kg

(ii) Calculate the trader's profit margin.

Trader's profit margin = Marketing margin − Marketing cost

Trader's profit margin = 700 − 400

Trader's profit margin = Tshs 300 per kg

10.(d) State two effects of high marketing margins on consumers.

High marketing margins lead to high consumer prices for agricultural products.

They reduce consumers' purchasing power and overall consumption levels.