THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATION COUNCIL OF TANZANIA

ADVANCED CRTIFICATE OF SECONDARY EDUCATION EXAMINATION

134/1 **AGRICULTURE 1**

(For Both School and Private Candidates)

Time: 3 Hours. **ANSWER** **Year: 2020**

Instructions

1. This paper consists of sections A, B and C.
2. Answer **all** questions in sections A and **two (2)** questions from each of section B and C.
3. Section A carries **40** marks, section B and section C carries 30 marks each.
4. Cellular phones and unauthorized materials are **not allowed** in the examination room.
5. Write your **Examination Number** on every page of your answer booklet(s).

1. (a) State three major roles played by gear box and one role played by clutch in the power transmission system of a tractor. (b) (i) Identify two causes for sudden stopping and continuous running as a common fault in the ignition system of a tractor. (ii) Suggest two measures that can be taken to correct each fault.

The gearbox in a tractor performs three major roles. First, it regulates the speed of the tractor by providing different gear ratios, allowing the operator to select high or low speed depending on the task. Second, it provides torque multiplication, meaning it increases the turning force available at the wheels to perform heavy tasks like ploughing. Third, it allows the tractor to move both forward and backward by selecting the appropriate gear. The clutch plays the role of engaging and disengaging the engine from the transmission, which allows smooth starting, changing of gears, and stopping without damaging the system.

Sudden stopping in the ignition system can be caused by fuel supply interruption or a fault in the ignition coil. Continuous running may result from a sticking ignition switch or faulty wiring in the system. To correct sudden stopping, one measure is to ensure the fuel lines and filters are clean and functional, and another is to check and replace faulty ignition coils. For continuous running, one measure is replacing or repairing the faulty ignition switch, and another is checking and correcting any defective wiring connections.

2. (a) Summarize five important precautions to be taken when using jack plane as a workshop tool used in carpentry work. (b) Account for five features of a good calf pen as a part of dairy unit.

When using a jack plane, the user should always ensure the blade is sharp and properly adjusted to avoid rough surfaces and accidents. The plane should be used on stable work surfaces to prevent slipping. Hands and fingers should be kept clear of the blade to avoid injury. The tool should be pushed along the grain of the wood to achieve smooth finishes and prevent blade damage. Lastly, the jack plane should be stored safely with the blade retracted when not in use.

A good calf pen should have adequate ventilation to provide fresh air and reduce the spread of diseases. It should have proper drainage to prevent waterlogging and accumulation of waste. The floor should be made of non-slippery material to prevent calf injuries. It should be spacious enough to allow calves to move freely without stress. Lastly, it should be secure and easy to clean, ensuring calves are protected while maintaining hygiene.

3. (a) Give a brief description of a spike-tooth harrow as a tillage implement. (b) Point out three advantages and three disadvantages of trickle irrigation system.

A spike-tooth harrow is a tillage implement fitted with rows of long, pointed teeth or spikes attached to a frame, used for breaking soil clods, leveling the field surface, and controlling weeds after primary tillage. It is often pulled by a tractor.

Trickle irrigation has three advantages. It conserves water by delivering it directly to the plant root zone, reducing wastage. It minimizes weed growth because only the crop area is irrigated. It improves crop yields by providing uniform water supply. However, it has disadvantages such as high initial installation costs, making it expensive for small farmers. It requires regular maintenance to avoid clogging of emitters. It is less effective in providing water over large fields with widely spaced crops.

4. (a) Briefly explain how acid soil management can be achieved. (b) Briefly explain six points on the significance of knowing the reaction of the soil before growing any crop.

Acid soil management can be achieved through liming, which involves adding agricultural lime to neutralize soil acidity. Another method is practicing crop rotation with legumes to improve soil pH balance. Application of organic manure also helps buffer soil acidity and improve fertility.

Knowing soil reaction is significant because it determines the availability of nutrients to crops, as extreme acidity or alkalinity can lock up nutrients. It helps in selecting crops that are suitable for the soil pH, ensuring good yields. It guides farmers in deciding whether to apply lime or sulfur to correct soil pH. It helps in preventing toxicity problems such as aluminum or manganese toxicity in acidic soils. It influences the effectiveness of fertilizers applied. Finally, it helps in planning soil management practices to sustain long-term productivity.

5. (a) Differentiate infiltration from percolation. (b) Explain how one can classify soil water based on (i) The relative degree of retention giving five points (ii) The extent of utility by plant giving three points.

Infiltration is the process by which water enters the soil surface from rainfall or irrigation, while percolation is the downward movement of water through soil layers after infiltration.

Based on relative degree of retention, soil water can be classified as gravitational water, which drains quickly after rainfall, capillary water, which is held in soil pores and available to plants, hygroscopic water, which forms thin films around soil particles and is unavailable to plants, field capacity, which is the water content after excess water has drained, and permanent wilting point, which is the soil moisture level at which plants can no longer extract water.

Based on utility by plants, soil water can be useful as available water, which plants can absorb for growth, unavailable water, which is held too tightly by soil particles, and excess water, which saturates the soil, limiting oxygen supply and harming plant roots.

6. Account on five agronomic practices that can be used by the farmer to ensure that the fertility of the soil is maintained.

Crop rotation is one important practice, where different crops are planted in sequence on the same land. This helps to prevent nutrient depletion and reduce pest and disease build-up.

Green manuring is another practice, where leguminous plants are grown and then ploughed into the soil to improve its organic matter and nitrogen content.

Application of farmyard manure and compost enriches the soil with organic matter and essential nutrients, improving soil structure and fertility.

Proper use of chemical fertilizers according to recommended rates ensures the soil receives balanced nutrients without causing damage through overuse.

Contour farming and cover cropping help to minimize erosion, conserve soil, and retain fertility for longer periods.

7. (a) Justify the statement that “addition of organic matter to the soil improves soil characteristics” by giving five points. (b) Compare sand and clay soils based on the physical characteristics that are affected by compactness of the soil.

Addition of organic matter improves soil structure by binding particles together, creating good tilth for cultivation. It enhances water retention, especially in sandy soils, allowing crops to access water for longer. It supplies essential nutrients to plants as it decomposes, enriching the soil. Organic matter promotes microbial activity which aids in decomposition and nutrient cycling. It reduces soil compaction, making it easier for roots to penetrate.

Sand soils are light, loose, and well-aerated but retain little water or nutrients due to large pore spaces. Clay soils, on the other hand, are compact, poorly aerated, and hold water tightly, often leading to waterlogging but providing high nutrient retention due to fine particles.

8. (a) Use the data given on the table showing the yield per hectare of beans (Y1) which was obtained with varying levels of application of urea fertilizer (X1) to calculate the level of fertilizer application at which profit was at maximum given that, the price paid by co-operative society for beans was 700 shillings per kg and urea could be purchased at 140,000 shillings per 50 kg bag. (b) Calculate the marginal product and average product at the point when profit was at maximum.

   At 0 kg of urea, yield was 800 kg. At 50 kg, yield was 1100 kg. At 100 kg, yield was 1350 kg. At 150 kg, yield was 1550 kg. At 200 kg, yield was 1700 kg. At 250 kg, yield was 1800 kg.

   The revenue is yield multiplied by price. For example, at 200 kg of urea, yield was 1700 kg, giving 1,190,000 shillings. The cost of urea at 200 kg is 560,000 shillings (4 bags × 140,000). Profit = 1,190,000 − 560,000 = 630,000 shillings. At 250 kg, revenue = 1,260,000 shillings, cost = 700,000 shillings, profit = 560,000 shillings. Hence, maximum profit occurs at 200 kg of urea.

   At this point, marginal product = increase in yield ÷ increase in input = (1700 − 1550) ÷ (200 − 150) = 150 ÷ 50 = 3 kg beans per kg urea. Average product = total output ÷ input = 1700 ÷ 200 = 8.5 kg beans per kg urea.

9. (a) Briefly explain three measures that the government of Tanzania should take to encourage farmers to continue with production of the crop with which its world market price has fallen in the last season. (b) Use cobweb theorem to explain the phenomenon that “producers of cowpea have reduced production of crops this season as a result of low market price for the crop in the last season”.

   The government can provide subsidies on farm inputs to lower production costs, making farming more profitable even when prices fall. It can create guaranteed minimum prices or purchase surplus crops to stabilize farmer incomes. It can also support export promotion and value addition initiatives to expand markets for the crop.

The cobweb theorem explains that farmers base their current production on past prices. If cowpea prices were low last season, farmers reduce their production this season to avoid losses. This reduced supply may lead to higher prices in the next season, creating cyclical production fluctuations.

10. (a) Give five points on what would happen in the absence of international commodity agreements. (b) Explain why do we plan in the farm by giving three points. (c) Give two ways in which partial budget can be used as a tool of farm planning in the farm.

Without international commodity agreements, price fluctuations would be extreme, causing instability for farmers and traders. Overproduction in some countries could lead to gluts and wastage. Farmers in developing countries would face unfair competition from developed nations. There would be reduced coordination in supply and demand management globally. Lastly, poor farmers would be highly vulnerable to exploitation by middlemen.

Planning in the farm is important because it allows efficient allocation of resources like land, labor, and capital. It helps farmers set production targets and estimate costs and expected income. It also minimizes risks by preparing farmers for uncertainties such as droughts or market changes.

Partial budgeting can be used to evaluate changes in farm operations by comparing added costs and added benefits. It can also be used to assess the profitability of introducing a new enterprise or altering production methods before full adoption.

Do you want me to move on to the 2021 paper next?