THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

034/1 **AGRICULTURE SCIENCE 1**

(For Both School and Private Candidates)

Time: 3 Hours **ANSWERS** **Year: 2004**

Instructions

1. This paper consists of sections A, B and C with a total of **thirteen (13)** questions.

2. Answer **all** questions in sections A and B and **one (1)** question from section C.

3. Sections A and C carry **fifteen (15)** marks each and section B carries **seventy (70)** marks.

4. Cellular phones and any unauthorised materials are **not** allowed in the examination room.

5. Write your **Examination Number** on every page of your answer booklet(s).

1. (i) a wood preservative may be applied on wood by all the following non-pressure processes except
a brushing
b spraying
c dipping
d bettle
e steeping

the bettle process is a pressure method of applying wood preservatives, whereas the others are non-pressure methods.
d bettle

(ii) which of the following is a heavy breed of poultry?
a black leghorn
b minorea
c brown leghorn
d light sussex
e large white

light sussex is a heavy breed, known for its dual-purpose use in both meat and egg production.
d light sussex

(iii) camellia sinensis is a botanical name for
a coffee
b pyrethrum
c tobacco
d sisal
e tea

camellia sinensis is the scientific name for tea, a widely grown beverage crop.
e tea

(iv) a soil sample weighs 1.325 g and its volume is 0.7 cm^3. the volume of air and moisture in this soil sample is 0.2 cm^3. this means that its particle density (pd) in g/cm^3 is
a 1.325
b 1.470
c 1.61
d 1.89
e 2.65

particle density = mass of soil / volume of soil solids
= 1.325 g / (0.7 cm^3 - 0.2 cm^3)
= 1.325 / 0.5
= 2.65 g/cm^3

e 2.65

(v) the following are carpentry tools except
a chisel
b ripsaw
c hacksaw
d jack plane
e mallet

a hacksaw is a metal-cutting tool, whereas the others are used for woodworking.
c hacksaw

(vi) which of the following is the most effective way of controlling foot and mouth disease (fmd) in livestock?
a rotational grazing
b drenching
c paddocking
d dipping
e quarantine

quarantine prevents the spread of foot and mouth disease, which is highly contagious.
e quarantine

(vii) the following chemical is used for dusting cereals and legumes during storage:
a permethrin
b aldrin
c sevin
d thiram
e thiodan

sevin (carbaryl) is a common pesticide used for dusting stored cereals and legumes to prevent pest infestations.
c sevin

(viii) during the process of chain surveying, the lines which are measured perpendicular to the chain line are known as
a traverses
b coordinates
c diagonals
d off-sets
e triangulations

offsets are measurements taken at right angles from the main chain line to locate objects.

d off-sets

(ix) when there are several firms selling a similar product and each of such firms sells a large share of the total output, the competition and price formation which will result is known as
a monopsony
b monopoly
c oligopoly
d elasticity
e pure competitive price

an oligopoly occurs when a few large firms dominate the market, influencing prices.
c oligopoly

(x) the following type of irrigation is most suitable where land is too steep, soils very permeable and topography uneven:
a trickle irrigation
b surface irrigation
c furrow irrigation
d sprinkler irrigation
e drip irrigation

sprinkler irrigation is best for steep and uneven land because it distributes water evenly without requiring level ground.
d sprinkler irrigation

2. match the responses in list b with the words/phrases in list a by writing the letter of the correct response beside the item number.

i) essential element for the formation of chlorophyll in plants
k magnesium

ii) method of controlling price fluctuations of agricultural products
r buffer stock fund

iii) a variety of tomatoes
p roma vf

iv) survey instrument for levelling
s odometer

v) mechanical method of controlling soil erosion
n contour ridging

vi) ruminants
c sheep, goats, cattle

vii) a device fixed onto oxen to facilitate ox-ploughing
g skey

viii) a grass weed
a cyperus rotundus

ix) an acute infectious disease of ruminants
i blackquarter

x) lives in fresh water
e tilapia spp

3. a) what is a crop pest?

a crop pest is any organism that causes damage to crops by feeding on them, competing for nutrients, transmitting diseases, or affecting their growth and yield. pests can be insects, rodents, nematodes, birds, or fungi that lead to economic losses for farmers.

b) state one of the most effective ways of controlling each of the following pests of the named crop in the field.

i) thrips on onions – use of insecticidal sprays
thrips are tiny, sap-sucking insects that damage onions by feeding on their leaves, leading to silvery streaks and reduced yield. insecticides such as dimethoate or imidacloprid can effectively eliminate thrips and prevent crop losses.

ii) citrus aphids on oranges – biological control using natural predators
citrus aphids are small insects that suck sap from orange leaves and stems, causing curling and yellowing of leaves. releasing natural predators such as ladybirds or parasitic wasps helps control aphid populations without using chemical pesticides.

iii) stalk borers on maize – crop rotation
stalk borers are larvae that tunnel into maize stems, weakening the plants and reducing yields. practicing crop rotation disrupts their life cycle by ensuring that maize is not planted in the same field consecutively, reducing pest infestation.

iv) mealy bugs on cassava – application of neem-based pesticides
mealy bugs are soft-bodied insects that suck sap from cassava stems and leaves, causing stunted growth and wilting. neem-based pesticides act as a natural repellent and help control mealy bug populations without harming beneficial insects.

4. a) i) what do you understand by the term 'surveying' as used in land planning?

surveying is the process of measuring and mapping land surfaces to determine boundaries, elevations, and features. it is essential in land planning, construction, and farm layout to ensure accurate land use and resource management.

ii) state three purposes of surveying.

i) determination of land boundaries – helps in defining land ownership and avoiding disputes.
ii) topographical mapping – provides information on land elevation, slopes, and drainage patterns.
iii) farm planning – assists in designing irrigation systems, roads, and land use strategies for effective farming operations.

b) mr. kalunde wants to know the elevation of his farm from sea level, the reference being a nearby benchmark.

i) what type of surveying technique will you advise for the farmer to use?

leveling – this technique measures differences in elevation between points on the land. it helps determine the height of mr. kalunde's farm above sea level using a known reference point (benchmark).

ii) suggest four surveying instruments to be used by mr. kalunde in the surveying technique named in 4. (b)(i) above.

i) leveling staff – a graduated rod used to measure height differences.
ii) dumpy level – an optical instrument used to measure elevation by focusing on a leveling staff.
iii) tripod – a stand that holds the dumpy level steady during measurements.
iv) measuring tape – used to determine horizontal distances between surveyed points.

5. the price of beans at mbuyuni market rises from shs 500.00 per kg in april to shs 800.00 per kg in december. the demand for beans remains constant at 5,000 kg per day.

a) i) calculate the elasticity of demand.

price elasticity of demand (ped) = percentage change in quantity demanded / percentage change in price

since the quantity demanded remains constant, the change in quantity is 0%.

ped = (0% / ((800 - 500) / 500) × 100)
ped = 0 / 60
ped = 0

ii) identify the elasticity calculated in 5. (a)(i) above.

the demand is perfectly inelastic because ped = 0, meaning that changes in price do not affect the quantity demanded.

b) sketch the graph for this type of demand elasticity.

a vertical demand curve should be drawn, showing that no matter how much the price changes, the quantity demanded remains unchanged.

6. the diagrams in figure 1 represent the engine strokes of a farm tractor.

a) give the name of each stroke in a, b, c, and d.

i) a – intake stroke: the piston moves downward, allowing the fuel-air mixture (in petrol engines) or air (in diesel engines) to enter the cylinder.
ii) b – compression stroke: the piston moves upward, compressing the air or fuel-air mixture, increasing pressure and temperature.
iii) c – power stroke: fuel combustion occurs, forcing the piston downward, generating power.
iv) d – exhaust stroke: the piston moves upward, expelling exhaust gases from the cylinder.

b) i) state whether the diagrams above represent diesel or petrol engine parts. give a reason.

the diagrams represent a diesel engine because diesel engines use air compression for ignition instead of spark plugs.

ii) a carburetor and injector pump are both sold in the nearby shop. which one will you buy for the tractor engine identified in 6. (b)(i) above?

an injector pump should be bought because diesel engines use fuel injectors to spray diesel fuel into compressed air for combustion.

7. a) the following diagrams (figure 2) show a top view of two types of cattle. which diagram represents:

i) dairy cattle – diagram a, as it has a more defined udder and a leaner body structure for milk production.
ii) beef cattle – diagram b, as it has a broader and more muscular body, suitable for meat production.

b) i) outline six desirable characteristics of dairy cattle.

i) high milk yield – produces large quantities of milk per lactation.
ii) large udder – well-developed with strong teats for efficient milking.
iii) good feed conversion – efficiently converts feed into milk.
iv) docile temperament – easy to handle during milking and management.
v) resistance to diseases – able to withstand common cattle diseases.

vi) long lactation period – produces milk consistently over a long time.

ii) give the name of a dairy cattle breed with the following characteristics: heavily built with short legs, weighs 400 kg when mature, has a large and pendulous udder with long thick teats, a difficult milker, and does not let its milk easily.

the breed described is the jersey breed, known for its rich milk content but sometimes challenging milking behavior.

8. the diagram below (figure 3) represents a soil profile with its horizons a, b, c, and d.

a) i) which horizon is referred to as the "layer of accumulation" of minerals?

horizon b – this layer accumulates minerals leached from the upper layers.

ii) which horizon is more subject to weathering?

horizon a – it is exposed to sunlight, water, and wind, making it prone to weathering.

iii) which horizon is referred to as the layer of "leaching"?

horizon e – although not labeled in some profiles, it is the layer where minerals dissolve and move downward.

b) i) why is horizon d referred to as the "impermeable layer"?

horizon d, also known as bedrock, is made of compacted rock material that does not allow water to pass through easily.

ii) a soil sample is taken from horizon a and another from horizon b for laboratory analysis. the density for each sample is determined. which sample will be denser than the other? give the most important reason for your answer.

horizon b will be denser than horizon a because it contains more compacted materials and accumulates leached minerals, making it heavier.

9. a) what do you understand by the term "marketing" as it is used in the farming business?

marketing in the farming business refers to the process of moving agricultural products from the farm to the final consumer. it includes various activities such as production planning, transportation, storage, processing, pricing, and selling. effective marketing ensures that farmers get fair prices for their produce and consumers receive quality products.

b) i) state seven problems of marketing agricultural products.

i) price fluctuations – agricultural prices are unstable due to seasonal supply variations and global market influences.
ii) poor storage facilities – lack of proper storage leads to post-harvest losses, reducing the quality and quantity of products available for sale.
iii) high transportation costs – poor road networks and expensive fuel increase the cost of moving farm produce to markets.
iv) perishability of farm products – fresh produce like fruits, vegetables, and milk spoil quickly if not marketed in time.
v) inadequate market information – many farmers lack access to information about market demand, prices, and buyers, leading to poor decision-making.
vi) exploitation by middlemen – traders buy products at low prices and sell them at high prices, reducing farmers' profits.
vii) lack of access to credit – farmers need financial support to improve production and marketing, but many struggle to secure loans.

ii) state seven marketing functions.

i) buying – involves purchasing agricultural products from farmers for further distribution.
ii) selling – farmers and traders engage in selling their products to consumers or processing industries.
iii) storage – keeping produce in warehouses or silos to ensure a steady supply and prevent spoilage.
iv) transportation – moving products from farms to markets using vehicles, motorcycles, or carts.
v) grading and standardization – classifying products based on size, quality, and weight to meet market standards.
vi) processing – converting raw farm produce into finished products, such as turning maize into flour.
vii) advertising and promotion – informing consumers about farm products through media, packaging, and word-of-mouth.

10. a) what do you understand by each of the following terms:

i) apiculture – the practice of beekeeping, where honeybees are reared to produce honey, beeswax, and other bee products. it involves setting up beehives in an apiary, managing colonies, and harvesting honey.
ii) an apiary – a designated area where multiple beehives are kept for commercial or subsistence honey production. a well-located apiary ensures that bees have access to flowers for nectar collection.

b) outline eight factors which have to be considered in selecting a good site for an apiary.

i) availability of flowers – the site should be near flowering plants to provide nectar and pollen for honey production.
ii) presence of a clean water source – bees require water for cooling the hive and processing honey.
iii) protection from strong winds – strong winds can disturb beehives, causing stress to the bees and reducing honey production.

iv) adequate shade – moderate shade protects the beehives from excessive heat while maintaining an optimal temperature.

v) distance from human settlements – apiaries should be located away from homes and busy areas to avoid bee attacks on people and animals.

vi) absence of predators – the site should be free from pests like ants, honey badgers, and birds that attack beehives.

vii) good drainage – the site should not be waterlogged to prevent hive rotting and colony collapse.

viii) accessibility – the apiary should be easy to reach for regular hive inspection, honey harvesting, and maintenance.

11. using the following headings, explain briefly how you would raise and finally store a crop of maize:

a) land preparation – plough and harrow the land to break clods and remove weeds. adding organic matter improves soil fertility and moisture retention.

b) propagation – maize is propagated through seeds, which should be planted directly into the soil at the onset of rains.

c) spacing – maintain a spacing of 75 cm between rows and 30 cm between plants to allow adequate air circulation and nutrient uptake.

d) weeding – weeds should be removed manually or with herbicides to reduce competition for nutrients, water, and sunlight.

e) manures and fertilizers – apply well-rotted manure before planting and supplement with nitrogen-based fertilizers such as urea during vegetative growth.

f) pest control – use pesticides, cultural practices, and biological control to prevent attack by pests like stalk borers and armyworms.

g) disease control – adopt resistant maize varieties, crop rotation, and fungicide application to manage diseases such as maize smut and rust.

h) harvesting – maize is ready for harvesting when the husks turn brown and kernels harden. drying before storage prevents spoilage.

i) storage – store maize in well-ventilated silos, cribs, or bags treated with preservatives to prevent weevil and mold infestation.

12. a) what do you understand by the term “vices” as used in poultry husbandry?

vices in poultry husbandry refer to abnormal and undesirable behaviors displayed by chickens due to stress, poor management, or overcrowding. these behaviors can lead to reduced productivity, injuries, or even death among birds.

b) explain six measures which can be taken to reduce the incidence of “vices” in poultry.

i) reducing stocking density – ensuring enough space per bird prevents stress and aggressive behavior.

ii) providing balanced nutrition – adequate protein, vitamins, and minerals help prevent pecking and cannibalism.

iii) using proper lighting – excessive light can trigger aggression, while controlled lighting reduces stress.

iv) adding enrichment – perches, dust baths, and scratching areas keep birds occupied and reduce boredom.
v) beak trimming – removing the tip of the beak in extreme cases minimizes damage from pecking.
vi) isolating aggressive birds – separating birds that display vices prevents them from influencing others.

c) explain six measures on how you would observe and maintain hygiene in a deep litter poultry house for broilers.

i) regular litter replacement – changing the litter material prevents the buildup of moisture and pathogens.
ii) cleaning feeders and drinkers – ensuring that food and water containers are clean reduces disease spread.
iii) proper ventilation – good airflow minimizes ammonia buildup and keeps birds healthy.
iv) controlling pests – eliminating rodents, flies, and parasites prevents disease transmission.
v) disinfecting the poultry house – using disinfectants before introducing new birds keeps the house disease-free.
vi) avoiding overcrowding – maintaining proper bird numbers ensures they remain healthy and stress-free.

13. a) explain briefly the meaning of the following terms as used in rural economy:

i) farm gate prices – the price a farmer receives for their produce before additional costs such as transportation and storage.
ii) wholesale prices – the price at which goods are sold in large quantities to retailers, usually lower than retail prices.
iii) retail prices – the final price at which consumers buy goods from shops or markets.

b) state five methods of reducing risks and uncertainty in agricultural production.

i) crop diversification – growing different crops reduces the impact of disease outbreaks and market fluctuations.
ii) irrigation – ensures crops receive enough water even during dry seasons.
iii) insurance – protects farmers from financial losses due to unpredictable events such as floods and droughts.
iv) contract farming – guarantees buyers for produce at predetermined prices.
v) proper record-keeping – helps farmers track income, expenses, and profitability to make informed decisions.

c) state four examples of risks which farmers face in their farming activities.

i) drought – prolonged dry periods reduce crop yields and water supply for livestock.
ii) pest infestations – locusts, armyworms, and other pests can destroy crops.
iii) price fluctuations – unpredictable changes in market prices affect profitability.
iv) disease outbreaks – livestock and crops are vulnerable to infections that can cause heavy losses.

d) using illustrations, explain the meaning of the following terms:

(i) complementary products

complementary products are two or more goods that are used together, meaning that the demand for one increases the demand for the other. in agriculture, these are products that work in combination to achieve a common goal.

- maize and fertilizer: when farmers grow maize, they also need fertilizer to improve yields. if the demand for maize increases, the demand for fertilizer also rises because farmers want to maximize production.
- dairy cattle and pasture: a dairy cow requires pasture to produce milk. the more dairy cows a farmer keeps, the more pasture or fodder is needed.

(ii) supplementary products

supplementary products are goods that can be used separately but provide additional benefits when used together. in agriculture, these products do not necessarily depend on each other, but their combined use increases efficiency or profitability.

- maize and beans: although maize and beans can be grown separately, intercropping them improves soil fertility (beans fix nitrogen in the soil), leading to better maize growth.
- poultry and fish farming: a farmer can keep chickens and raise fish separately, but integrating poultry with fish farming (where chicken droppings serve as fish feed) enhances productivity in both enterprises.