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: 1997**

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) the diagram below shows the size of mineral soil particle in mm (diameter). the soil particle in the diagram is

a coarse sand
b gravel
c silt
d clay

soil particles are classified based on their diameter. the smallest particles belong to clay, while silt is slightly larger.
d clay

(ii) if 50 kgn has to be applied per hectare in a rice field, how much sulphate of ammonia fertilizer containing 20% n should be applied on the farm?

a 100kg
b 750kg
c 500kg
d 250kg

required fertilizer = (50 kg n / 20%) × 100
= (50 / 20) × 100
= 250 kg
d 250kg

(iii) the process of deposition of soil materials which have been removed from one soil horizon to another horizon is called

a illuviation
b elluviation
c alluviation
d colluviation

illuviation is the accumulation of leached materials in a lower soil horizon.
a illuviation

(iv) the ph range 4.0 - 5.0 can be described as

a moderately acidic
b strongly acidic
c very strongly acidic
d slightly acidic

ph values below 5.0 indicate strong acidity, affecting nutrient availability.
b strongly acidic

(v) rabbits eat grass. they are animals which can be classified in the category of

a vegetarians
b ruminants
c non-ruminants
d none of the above

rabbits are herbivores but are not ruminants because they do not have a four-chambered stomach.
c non-ruminants

(vi) zinc in animal nutrition is used for:
a formation of skin and hair
b maintenance of normal body growth
c metabolic processes in the body
d formation of enzymes

zinc plays a vital role in enzyme formation and function in animals.
d formation of enzymes

(vii) in livestock, outcrossing means mating
a animals of the same breed
b animals of different breeds
c unrelated animals of the same breed
d unrelated animals of different breeds

outcrossing involves breeding unrelated animals within the same breed to improve genetic diversity.
c unrelated animals of the same breed

(viii) which of the following livestock diseases is not a bacterial disease?
a anthrax
b tuberculosis
c mastitis
d coccidiosis

coccidiosis is caused by protozoa, not bacteria.
d coccidiosis

(ix) which of the following diseases of tomatoes is a physiological disease?
a blossom end rot
b early blight
c late blight
d damping off

blossom end rot is caused by calcium deficiency and irregular watering, making it a physiological disorder rather than a disease.

a blossom end rot

(x) the most suitable sucker for planting bananas is called:
a water sucker
b sword sucker
c main sucker
d follower sucker

sword suckers are the best for planting because they develop strong root systems and grow into healthy banana plants.
b sword sucker

(xi) the pest responsible for the damage on young bean plants shown in the diagram above is:
a diopsis thoracica
b meloidogyne spp
c melanogromyza spp
d hover fly

melanogromyza spp (bean stem maggot) burrows into stems, causing stunted growth in bean plants.
c melanogromyza spp

(xii) in plant propagation, the part labeled x in the diagram above is known as the
a root stock
b head stock
c top graft
d scion

the scion is the upper part of a grafted plant, containing desired characteristics.
d scion

(xiii) the survey lines on the ground are aligned using
a ranging poles
b surveyor's chain
c surveyor's level
d leveling staff

ranging poles help in aligning survey lines during land measurement.
a ranging poles

(xiv) which part on a moldboard plough assists in the complete burial of crop residues and trash?
a the scraper
b the skin coulter
c the share

d the landside

the moldboard is designed to turn the soil completely, burying crop residues effectively.
a the scraper

(xv) the saw shown in the diagram above is known as:
a coping saw
b keyhole saw
c compass saw
d fretsaw

a keyhole saw is used for cutting curves and holes in wood or drywall.
b keyhole saw

(xvi) in a four-stroke cycle engine, when the engine completes the four strokes, the crankshaft and camshaft will have made
a two and one complete revolutions respectively
b one and two complete revolutions respectively
c four and one complete revolutions respectively
d two and four complete revolutions respectively

in a four-stroke engine, the crankshaft completes two revolutions for every full cycle, while the camshaft completes one.
a two and one complete revolutions respectively

(xvii) a middleman who travels from one place to another, buys goods from wholesalers, and distributes/sells to retailers is known as
a broker
b commission agent
c jobber
d prospective business man/woman

a jobber is a trader who purchases in bulk and sells to smaller retailers.
c jobber

(xviii) the demand curve dd in the diagram above shows
a unitary demand
b elastic demand
c unit elastic demand
d inelastic demand

the curve shown represents elastic demand, where quantity demanded changes significantly with price changes.

b elastic demand

(xix) beef and hides, cotton seed and cotton lint, sugar and molasses are good examples of which product-product relationship?
a joint products
b competitive products
c supplementary products
d complimentary products

these products are derived from the same raw materials, making them joint products.
a joint products

(xx) the direct benefits of forests are that they regulate
a water and charcoal supplies
b climate and water supplies
c timber supplies and soil erosion
d pulp and softwood supplies

forests play a crucial role in climate regulation and water conservation.
b climate and water supplies

2. the diagram above represents an approximate composition of a top soil sample of a certain mineral soil.

a) name the soil components labeled a, b, c, and d.

i) a – mineral particles
ii) b – organic matter
iii) c – air
iv) d – water

b) outline three important roles of component d in the soil.

i) essential for plant growth – provides moisture needed for seed germination and nutrient absorption
ii) aids in microbial activity – supports the survival of soil microorganisms that help in decomposition and nutrient cycling
iii) improves soil structure – facilitates chemical and physical reactions that help bind soil particles

3. a) define the term “soil productivity”.

soil productivity refers to the ability of a soil to sustain crop production and provide nutrients in sufficient quantity for plant growth.

b) mr. kwigema has a 10 ha farm on which he intends to grow wheat this year. laboratory analysis of soil samples showed that in order to obtain high crop yields, he should apply 150kg n, 40 kg p_2o_5 and 20kg k_2o per hectare. how many 50kg bags of each of the following fertilizers should he apply to the whole area of his farm?

i) sulphate of ammonia - 21%n
ii) triple super phosphate (tsp) - 46% p_2o_5
iii) muriate of potash (mop) - 60% k_2o

step 1: determine the total fertilizer required for 10 hectares

nitrogen: (150 kg/ha × 10 ha) = 1500 kg n
phosphorus: (40 kg/ha × 10 ha) = 400 kg p_2o_5
potassium: (20 kg/ha × 10 ha) = 200 kg k_2o

step 2: calculate the number of 50kg bags needed

sulphate of ammonia: (1500 kg ÷ 21%) = 7142.86 kg ÷ 50 kg/bag = 143 bags
triple super phosphate: (400 kg ÷ 46%) = 869.57 kg ÷ 50 kg/bag = 18 bags
muriate of potash: (200 kg ÷ 60%) = 333.33 kg ÷ 50 kg/bag = 7 bags

4. a) give the meaning of soil ph in words or by using a formula.

soil ph is a measure of the acidity or alkalinity of soil, expressed on a scale from 0 to 14, where values below 7 indicate acidity, 7 is neutral, and values above 7 indicate alkalinity.

b) the figure below represents a ph scale. name the ph conditions at locations marked a, b, and c on the ph scale.

i) a – strongly acidic
ii) b – neutral
iii) c – moderately alkaline

c) name a material which you could add to a soil with ph 3.5 so as to raise its ph to 6.5.

agricultural lime (calcium carbonate)

d) outline two important beneficial effects of adding to the soil the material you have named in (c) above.

i) improves nutrient availability – neutralizing soil acidity enhances nutrient uptake by plants
ii) promotes microbial activity – beneficial soil organisms thrive better in neutral soil conditions

5. the diagram below represents a digestive system of some farm livestock.

a) name the type of digestive system.

simple (monogastric) digestive system

b) name one type of farm livestock which possesses such a digestive system.

pig

c) name the parts labeled a, b, c, and d on the diagram.

i) a – esophagus
ii) b – stomach
iii) c – small intestine
iv) d – large intestine

d) state the main digestive function of each of the parts labeled a and b.

i) a – esophagus: transports food from the mouth to the stomach
ii) b – stomach: secretes digestive enzymes and acids to break down food

6. foot and mouth disease is a highly infectious disease of cattle in tanzania.

a) what is the causal organism of the disease?

foot and mouth disease virus (fmdv)

b) outline three outstanding symptoms of the disease.

i) blisters on the tongue, gums, and hooves
ii) excessive salivation and drooling
iii) lameness and reluctance to move

c) state two preventive measures of the disease.

i) vaccination of cattle to develop immunity
ii) quarantine and movement control of infected animals

7. a) define the term “vices” as it is used in poultry production.

vices in poultry production are abnormal and destructive behaviors exhibited by birds, such as feather pecking, cannibalism, and egg eating.

b) enumerate four vices which can occur in chicken kept in a deep litter house.

i) feather pecking
ii) cannibalism
iii) egg eating
iv) bullying

c) outline five poultry husbandry practices for controlling vices in a flock of poultry birds kept in a deep litter house.

i) ensure proper stocking density to reduce stress and overcrowding
ii) provide adequate balanced nutrition, including protein and minerals
iii) maintain proper lighting conditions to reduce aggressive behavior
iv) use beak trimming to minimize damage from pecking
v) provide environmental enrichment such as perches and dust baths

8. imagine that you have completed school and you are engaged in farming business with your parents at home. describe briefly how you could raise a crop of cassava under the following headings.

a) soil requirements – well-drained sandy loam soil with a ph of 5.5 to 7.0
b) land preparation – plough the land to loosen the soil and remove weeds
c) planting – use healthy cassava stem cuttings planted at a spacing of 1m × 1m
d) weeding – remove weeds regularly during the first three months to reduce competition
e) harvesting – cassava is harvested 8-12 months after planting by uprooting the tubers

9. a) although weeds are known to affect crop production seriously, they are also beneficial in some ways. state two outstanding benefits of weeds.

i) some weeds serve as cover crops, preventing soil erosion
ii) certain weeds provide medicinal value and can be used for herbal treatments

b) in the middle column of the table below are listed two types of weeds by their scientific names. complete the table by filling in columns one and three.

common name	scientific name	life span
couch grass	cynodon dactylon	perennial
witchweed	striga spp	annual

10. a) wood preservatives may be grouped into three types. name any two types of wood preservatives.

i) oil-based preservatives – these are preservatives that penetrate deep into the wood, providing long-term protection against decay and insect attacks. an example is creosote, which is used to treat railway sleepers and fence posts.
ii) water-based preservatives – these preservatives are dissolved in water and are absorbed by the wood to protect against fungi and termites. an example is copper sulfate solution, which is commonly used in treating construction wood.

b) explain briefly two advantages and two disadvantages of any one type of wood preservative among those you have mentioned in (a) above.

advantages of oil-based preservatives:
i) highly effective in preventing fungal decay and insect attacks – since oil-based preservatives penetrate deeply, they form a protective barrier that repels termites and fungi.
ii) long-lasting protection, especially for outdoor structures – wood treated with oil-based preservatives remains durable even in harsh environmental conditions such as heavy rainfall or extreme heat.

disadvantages of oil-based preservatives:
i) toxic to humans and the environment if not handled properly – creosote and other oil-based preservatives contain harmful chemicals that can cause skin irritation and pollution if they seep into the soil.
ii) strong odor, which may persist for a long time – the smell of oil-based preservatives remains in the wood for months, making them unsuitable for indoor use.

11. the various types of insecticides which are used for controlling crop pests are obtainable on the market in various formulations.

a) enumerate four common formulations of insecticides.

i) emulsifiable concentrates (ec) – these are liquid insecticides that can be mixed with water to form a spray. they are commonly used for spraying crops.
ii) wettable powders (wp) – these are powdered insecticides that are mixed with water before application. they are used to control pests on fruits and vegetables.
iii) dusts (d) – these are dry insecticides that are applied directly to plants or stored grains. they are useful in controlling insects like aphids and weevils.
iv) granules (g) – these are insecticides formulated as solid granules, which are applied to the soil to control pests such as termites and root-feeding insects.

b) outline six important rules which must be observed before and when applying insecticides on a growing crop.

i) read and follow label instructions carefully before application – ensures correct dosage and safe use of the insecticide.
ii) wear protective clothing, including gloves and masks – protects the applicator from direct contact with harmful chemicals.
iii) avoid spraying during strong winds to prevent drift – strong winds can carry the insecticide away from the target plants, leading to wastage and pollution.
iv) do not apply near water sources to prevent contamination – insecticides can poison fish and other aquatic life if they enter rivers or lakes.
v) apply insecticides at the recommended dosage to avoid resistance buildup – excessive use of insecticides can lead to pests developing resistance, making control difficult.
vi) wash hands and equipment thoroughly after use – prevents poisoning and ensures that tools remain in good condition for future use.

12. the two diagrams a and b below represent two different types of farm machinery cooling systems.

a) name each of the cooling systems.

i) diagram a – air cooling system – this system uses air to remove heat from the engine. it is commonly used in small engines such as motorcycles and portable generators.
ii) diagram b – water cooling system – this system uses liquid coolant to absorb and transfer heat away from the engine. it is used in tractors, cars, and other large machinery.

b) name the parts labeled (i) to (viii) on diagram b.

i) radiator – a heat exchanger that cools the engine by dissipating heat from the coolant.
ii) water pump – circulates coolant through the engine and radiator to prevent overheating.
iii) thermostat – regulates the temperature of the engine by controlling coolant flow.
iv) fan – blows air through the radiator to enhance cooling efficiency.
v) engine block – houses the cylinders and is the main part of the engine where combustion occurs.
vi) coolant reservoir – stores extra coolant that expands and contracts as temperature changes.
vii) cooling fins – increase the surface area for heat dissipation, helping to cool the engine faster.
viii) hoses – flexible tubes that transport coolant between the radiator and the engine.

13. the diagrams a, b, c, d, e, and f represent farm workshop tools.

a) name each type of working tool.

i) a – claw hammer – a tool used for driving and removing nails from wood.
ii) b – spanner – a tool used for tightening and loosening nuts and bolts.
iii) c – hacksaw – a saw used for cutting metal, plastic, and other hard materials.
iv) d – chisel – a tool used for shaping and carving wood or metal.
v) e – file – a tool used for smoothing rough edges on metal or wood.
vi) f – pliers – a tool used for gripping, twisting, and cutting wires or small objects.

14. state briefly the use of each of the following surveying instruments.

a) tripod level – supports leveling instruments for measuring elevation differences during land surveys.
b) compass – determines direction and bearings to help in mapping and navigation.
c) odometer – measures distances by counting the number of wheel rotations on a marked scale.
d) chain – measures horizontal distances accurately over long distances in land surveys.
e) leveling staff – measures vertical heights and is used with a level to determine land elevation.
f) ranging poles – help align and mark points in a straight line during surveying.

15. a) what do you understand by each of the following as they are used in agricultural economics?

i) market price – the current price at which goods or services are bought and sold in a competitive market.
ii) price at factor cost – the cost of producing a good, including wages, rent, and capital costs, but excluding taxes and subsidies.
iii) shadow price – an estimated value assigned to goods or services that do not have a direct market price, often used in cost-benefit analysis.

b) farmers in tanzania are faced with a problem of unstable prices for their produce.

i) briefly outline any three causes of such price instability.

i) seasonal fluctuations – agricultural production depends on weather conditions, leading to price changes between harvest and off-season periods.
ii) lack of proper storage facilities – poor storage leads to post-harvest losses, forcing farmers to sell their produce at low prices.
iii) international market dependency – tanzanian agricultural prices fluctuate due to changes in global demand and supply.

ii) outline any four ways by which the government and other institutions may use to regulate price fluctuations of agricultural products.

i) setting price floors and ceilings – ensures farmers get fair prices for their produce while keeping prices affordable for consumers.
ii) establishing buffer stock schemes – stores surplus products during high production periods and releases them when supply is low.
iii) improving market access – investing in transport and storage infrastructure to reduce losses and stabilize supply.
iv) providing subsidies – reduces production costs for farmers, helping them remain profitable even when market prices fluctuate.

16. a) outline three methods that can be used to calculate the depreciation of farm assets.

i) straight-line method – depreciation is calculated by dividing the asset's cost by its useful life, making it uniform each year.

ii) reducing balance method – depreciation is calculated as a fixed percentage of the asset's remaining value, decreasing over time.

iii) sum-of-years-digits method – depreciation is allocated based on the number of years an asset has been used, with higher depreciation in earlier years.

b) list three causes of depreciation of farm assets.

i) wear and tear – continuous usage leads to physical damage over time.

ii) obsolescence – new technologies make older equipment outdated and less useful.

iii) natural decay – exposure to weather conditions leads to rusting, rotting, or weakening of materials.