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: 2013**

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. For each of the items (i)–(x), choose the correct answer among the given alternatives and write its letter beside the item number.

(i) In surveying, horizontal distances can easily be measured by using
A. odometer
B. hydrometer
C. metre ruler
D. micrometer
E. hygrometer

Answer: C. metre ruler
Explanation: Horizontal distances are measured using a metre ruler for short distances or a tape for longer distances.

(ii) Which graph among the following describes Elastic Demand curve?

Answer: B
Explanation: An elastic demand curve shows a significant change in quantity demanded with a small change in price, represented by a flatter curve.

(iii) Category of farmers that are regarded by members of their community as models of what a good farmer should be are called
A. early adopters
B. innovators
C. late majority
D. late adopters
E. early majority

Answer: E. early majority
Explanation: The early majority are respected farmers who adopt innovations early enough to set examples for others.

(iv) Iron injection is administered to piglets in order to control
A. swine fever
B. diarrhea
C. anemia
D. pneumonia
E. scours

Answer: C. anemia
Explanation: Piglets are prone to iron deficiency anemia because they lack access to iron-rich soil, making injections necessary.

(v) Maize streak in maize plant is caused by
A. Chilo suppressalis
B. Piricularia spp
C. Puccinia spp
D. Claudulina mbila
E. Quelea spp

Answer: D. Claudulina mbila
Explanation: Maize streak disease is caused by a virus transmitted by leafhoppers, including Claudulina mbila.

(vi) The organism which causes Rinderpest is
A. bacterium
B. virus
C. tick
D. mycoplasma
E. protozoan

Answer: B. virus
Explanation: Rinderpest is caused by a virus that affects cattle and other ruminants, leading to severe losses.

(vii) A system of artificial regeneration of trees involving growing of forest trees together with agricultural crops in early stages is known as
A. coppice
B. regrowth
C. taungya
D. silviculture
E. regeneration

Answer: C. taungya
Explanation: The taungya system integrates forestry and agriculture by planting trees alongside crops to maximize land use.

(viii) The tool used in wood work is
A. spirit level
B. jack plane
C. plumb bob
D. flat file
E. brick hammer

Answer: B. jack plane
Explanation: A jack plane is used for smoothing and leveling wood surfaces in carpentry.

(ix) The appropriate method for controlling gully erosion that has already occurred in an area is
A. ridging
B. stripping
C. terracing
D. fallowing
E. contouring

Answer: C. terracing
Explanation: Terracing involves constructing steps on slopes to reduce water runoff and control gully erosion.

(x) The raising and caring of forest trees is called
A. agriculture
B. pisciculture
C. apiculture
D. foreiculture
E. silviculture

Answer: E. silviculture
Explanation: Silviculture refers to the practice of growing and managing forest trees sustainably.

2. Match the items in List A with the responses in List B by writing the letter of the correct response beside the item number.

List A
(i) Incoordination, watery diarrhea and inflammation of cloaca.
(ii) Characteristic gurgling and low production of eggs that are small with rough thin shells.
(iii) Anorexia, depression, wasting and sudden death.
(iv) Nasal discharge, swelling of face and sneezing.
(v) Loss of voluntary muscle sensation in limbs and wings, blindness and cancer of internal organs.
(vi) Blackish warts on combs and wattles.
(vii) Discharge of mucous from mouth or nostrils and stand with the neck twisted.
(viii) Watery yellow and smelling diarrhea, fast and noisy breathing and sudden death.
(ix) Swollen wattles and combs, edematous head and ruffled feathers.
(x) Blood-stained faeces and high mortality.

List B
A. Fowl plague
B. Fowl flue
C. Infectious Bronchitis
D. Fowl pox
E. Bacillary White Diarrhea (BWD)
F. Coccidiosis

G. Fowl typhoid
H. Infectious coryza
I. Fowl paralysis
J. Salmonellosis
K. Pullorum
L. New castle
M. Gumboro
N. Fowl cholera
O. Avian leukosis

Answers
(i) E
(ii) C
(iii) I
(iv) H
(v) O
(vi) D
(vii) N
(viii) J
(ix) L
(x) F

3. (a) In what machines or implements are the following parts located?

i. Land side – Plough
ii. Scraper – Harrow
iii. Share – Plough
iv. Frail – Combine harvester
v. Furrow wheel – Plough
vi. Pitman arm – Mower
vii. Ledger plate – Reaper
viii. Chute – Combine harvester
ix. Swath board – Combine harvester
x. Swath stick – Mower

(b) State the function of each part in (a).

i. Land side – Provides stability and balances the plough during operation.
ii. Scraper – Clears debris and smoothens the soil surface after ploughing.
iii. Share – Cuts and turns over the soil during ploughing.
iv. Frail – Separates grains from straw in combine harvesters.
v. Furrow wheel – Guides the plough along a straight path.
vi. Pitman arm – Converts rotary motion to reciprocating motion in mowers.

vii. Ledger plate – Holds and supports the cutting blade of a reaper.
viii. Chute – Directs grain into the collection tank in a combine harvester.
ix. Swath board – Arranges cut crops into rows for collection.
x. Swath stick – Guides the mower to cut evenly across the field.

4. (a) Tilapia melanopleura is recommended for fish culture in fresh warm water ecology. Explain briefly six reasons for their suitability.

i. High reproduction rate – Ensures a sustainable fish population.
ii. Fast growth – Provides quicker harvests and profitability.
iii. Disease resistance – Reduces mortality and production costs.
iv. Wide diet – Can feed on a variety of food, including plankton and algae.
v. Tolerance to warm temperatures – Thrives in tropical climates.
vi. Market demand – Highly preferred for its taste and nutritional value.

(b) (i) State two criteria used for selecting a good site for fish pond.

i. Availability of a reliable water source – Ensures a consistent water supply.
ii. Soil type – Clay or loamy soil is ideal to hold water and prevent seepage.

(ii) Give three points to show the role of fish industry in Tanzania.

i. Provides employment – Offers jobs in fishing, processing, and marketing.
ii. Improves nutrition – Supplies protein-rich food to the population.
iii. Generates income – Contributes to national income through exports.

5. (a) Elaborate the statements:

(i) Agricultural extension is a continuous out-of-class educational process.

This statement means that agricultural extension involves ongoing education provided outside formal classrooms. It includes practical demonstrations, field visits, and training sessions to equip farmers with skills and knowledge.

(ii) Agricultural extension is a partnership between the farmer, the government, and the agricultural institutions.

This statement highlights that extension services require collaboration among farmers, government bodies, and institutions. Farmers implement the knowledge, governments provide funding and policies, and institutions offer research and technical support.

(b) Outline two limitations of individual methods of teaching in extension.

i. Time-consuming – Requires more time to train individuals than groups.
ii. Expensive – Demands higher costs for extension workers to reach individual farmers.

6. (a) What system of poultry rearing does Mr. Mtegwa use in keeping his birds?

Deep litter system.

(b) Account for six disadvantages of the system used by Mr. Mtegwa in rearing his poultry.

i. High risk of disease – Birds confined together are more susceptible to infections.
ii. Odor management – Accumulated waste leads to unpleasant smells.
iii. High feed costs – Requires continuous feeding to maintain production.
iv. Labor-intensive – Demands regular cleaning and maintenance.
v. Space requirements – Needs adequate space to prevent overcrowding.
vi. Initial investment – High setup costs for equipment like feeders, waterers, and ventilation systems.
7. (a) (i) Identify the pest in Figure 2B by its common and scientific names.

Common name: Maize stalk borer
Scientific name: Busseola fusca

(ii) Suggest two control measures for the pest in Figure 2B.

i. Use of resistant maize varieties.
ii. Application of biological control agents such as Trichogramma wasps.

(iii) Elaborate four rules which the farmer has to observe before applying pesticide in a field.

i. Read and follow the pesticide label instructions.
ii. Use the correct dosage as recommended.
iii. Ensure protective gear is worn during application.
iv. Avoid spraying during windy conditions to prevent drift.

(b) Calculate the plant population in a one-hectare maize farm in which maize plants are planted at a spacing of 90 cm x 30 cm with one plant per hill.

Area of one plant = 0.9 m x 0.3 m = 0.27 m^2
Number of plants per hectare = 10,000 m^2 / 0.27 m^2 = 37,037 plants

Plant population = 37,037 plants per hectare.

8. (a) What do you understand by "change in demand" as used in Rural Economy?

Change in demand refers to a shift in the quantity of a good demanded due to factors such as price changes, consumer preferences, or income variations, while other factors remain constant.

(b) Explain briefly five factors that cause change in demand of an agricultural good.

i. Price of the good – An increase in price may reduce demand, while a decrease may increase it.
ii. Consumer income – Higher income increases purchasing power, boosting demand.
iii. Substitutes – Availability of cheaper substitutes reduces demand for the original good.
iv. Taste and preferences – Shifts in consumer preferences affect demand.
v. Population growth – A larger population increases the demand for food and agricultural goods.

9. (a) (i) What is meant by agricultural mechanization?

Agricultural mechanization refers to the use of machinery and equipment to perform farming activities, such as ploughing, planting, and harvesting, to improve efficiency and productivity.

(ii) Explain briefly four ways in which agricultural mechanization is important in bringing about more intensive production.

i. Saves labor – Reduces the need for manual labor, enabling large-scale farming.
ii. Enhances timeliness – Speeds up farming operations, ensuring timely planting and harvesting.
iii. Increases productivity – Machinery improves output per unit area.
iv. Reduces drudgery – Simplifies heavy tasks, making farming less physically demanding.

(b) Examine three advantages of using animal power over tractors.

i. Cost-effective – Cheaper to maintain and operate compared to tractors.
ii. Accessible – More affordable for small-scale farmers in rural areas.
iii. Multifunctional – Can be used for ploughing, transport, and manure production.

10. (a) With the aid of illustrations, show how calcium carbonate chemically neutralizes soil acidity.

Calcium carbonate reacts with hydrogen ions in the soil, forming water and reducing acidity. The reaction releases calcium ions, which replace acidic ions like aluminum and hydrogen on soil particles.

(b) Outline five beneficial effects of liming in agriculture.

i. Neutralizes soil acidity – Improves pH for better crop growth.
ii. Enhances nutrient availability – Increases availability of essential nutrients like phosphorus.
iii. Improves soil structure – Promotes aggregation of soil particles.

iv. Reduces toxic elements – Neutralizes harmful ions like aluminum.
v. Boosts microbial activity – Creates a conducive environment for beneficial microbes.

11. Explain the process of paddy production until the time the crop is ready for harvest.

Paddy production involves a series of steps to ensure optimal yield and quality. The process includes the following:

i. Land preparation – The field is ploughed and leveled to ensure proper water distribution. Weeds are removed, and bunds are constructed to retain water.

ii. Seed selection – Farmers select high-yielding and disease-resistant paddy varieties suitable for the region's climatic and soil conditions.

iii. Seed treatment – Paddy seeds are treated with fungicides or bio-agents to prevent diseases and improve germination rates.

iv. Nursery establishment – Seeds are sown in a well-prepared nursery bed. The seedlings are irrigated and protected until they reach a suitable transplanting size (usually 25–30 days old).

v. Transplanting – Seedlings are uprooted from the nursery and transplanted into the main field with appropriate spacing (e.g., 20 cm x 20 cm).

vi. Water management – The field is flooded with water to a depth of 5–10 cm during most of the growth period. Proper drainage is ensured during maturity to prevent waterlogging.

vii. Fertilizer application – Fertilizers are applied in stages to meet the nutritional requirements of the crop. Nitrogen, phosphorus, and potassium are commonly used fertilizers.

viii. Weed control – Manual weeding or the use of herbicides ensures the paddy crop is not outcompeted by weeds.

ix. Pest and disease management – Regular monitoring and the application of pesticides or biocontrol agents help prevent losses due to pests and diseases.

x. Harvesting – When 80–90% of the grains turn golden yellow, the crop is harvested manually or using a combine harvester. Proper drying and threshing are done to ensure high grain quality.

12. One of the limitations to the dairy industry in Tanzania is inadequate animal nutrition. Explain seven qualities of pastures and ten ways of managing pastures.

Qualities of good pastures:

i. High nutritional value – Rich in proteins, carbohydrates, and minerals to meet the dietary needs of livestock.
ii. Palatability – Tasty and acceptable to animals to encourage high intake.
iii. Resistance to drought – Ability to survive dry conditions and provide forage throughout the year.
iv. Fast regrowth – Quick recovery after grazing or cutting ensures consistent forage availability.
v. High yield – Produces a large quantity of biomass per unit area.
vi. Disease resistance – Tolerant to pests and diseases to minimize losses.
vii. Adaptability – Suitable for the local climate and soil conditions.

Ways of managing pastures:

i. Rotational grazing – Dividing the pasture into sections and grazing one section at a time to allow others to regenerate.
ii. Controlled stocking – Maintaining an appropriate number of animals per unit area to prevent overgrazing.
iii. Fertilization – Applying organic manure or chemical fertilizers to boost grass growth and quality.
iv. Weed control – Regularly removing weeds that compete with pasture grasses.
v. Reseeding – Planting new grass seeds to replace bare or unproductive areas.
vi. Irrigation – Ensuring water availability during dry seasons to maintain growth.
vii. Fencing – Protecting pastures from unauthorized grazing and wildlife damage.
viii. Avoiding overgrazing – Monitoring grazing intensity to prevent soil erosion and pasture degradation.
ix. Intercropping – Growing legumes with grasses to enhance nitrogen fixation and forage quality.
x. Harvesting and storage – Cutting and preserving pasture as hay or silage for use during scarce periods.
13. Account for the seven factors influencing soil erosion, its effects in crop production, and suggest eight ways in which soil erosion can be controlled.

Factors influencing soil erosion:

i. Slope of the land – Steeper slopes result in faster water runoff and greater soil loss.
ii. Vegetative cover – Areas with sparse vegetation are more prone to erosion.
iii. Rainfall intensity – Heavy rains accelerate soil detachment and transportation.
iv. Soil texture – Sandy soils are more erodible than clay or loamy soils.
v. Farming practices – Improper tillage and mono-cropping increase erosion risk.
vi. Overgrazing – Livestock remove protective vegetation, exposing soil to erosion.
vii. Deforestation – Cutting down trees reduces root support and increases soil exposure.

Effects of soil erosion in crop production:

i. Loss of topsoil – Reduces soil fertility, affecting crop yields.

ii. Nutrient depletion – Washes away essential nutrients needed for plant growth.
iii. Sedimentation – Deposits eroded soil in water bodies, disrupting irrigation and aquatic ecosystems.
iv. Reduced water infiltration – Leads to waterlogging or drought stress for crops.
v. Increased need for fertilizers – To compensate for nutrient loss, increasing production costs.

Ways to control soil erosion:

i. Terracing – Constructing steps on slopes to reduce water runoff.
ii. Contour farming – Ploughing along contour lines to slow down water flow.
iii. Planting cover crops – Protects soil from direct impact of raindrops.
iv. Agro-forestry – Combining trees with crops to stabilize soil.
v. Strip cropping – Alternating strips of crops and grasses to reduce runoff.
vi. Mulching – Covering soil with organic or synthetic materials to prevent erosion.
vii. Gully plugging – Filling gullies with stones or vegetation to stop further erosion.
viii. Reduced tillage – Minimizing soil disturbance to maintain its structure and reduce erosion risks.