THE UNITED REPUBLIC OF TANZANIA

MINISTRY OF EDUCATION AND VOCATIONAL TRAINING

FORM TWO SECONDARY EDUCATION EXAMINATION, 2009

0034 **AGRICULTURAL SCIENCE**

Time: 2 Hours **ANSWERS** **.**

Instructions

1. This paper consists of Ten questions in section A, and B

2. Answer all questions.

3. All writings must be in **blue** or **black** ink.

4. Communication devices and any unauthorized materials are **not** allowed in the assessment room.

5. Write your **Examination Number** at the top right hand corner of every page.

1. Write TRUE for a correct statement or FALSE for a statement that is not correct.

i. Agricultural Science and Engineering Science are examples of Applied Sciences.
Answer: TRUE

ii. In subsistence production, land and labour are major factors of production.
Answer: TRUE

iii. Observation, data collection, hypothesis formulation, experimentation, and teaching are procedural methods used in the scientific process.
Answer: TRUE

iv. When properly used, First Aid can help the patient to recover from shock.
Answer: TRUE

v. Pipe fittings which are used to branch the main pipeline to other lines are known as elbows.
Answer: FALSE

vi. New castle disease in poultry is caused by bacteria.
Answer: FALSE

vii. Sand is a type of soil with good water-holding ability.
Answer: FALSE

viii. Pomology is a science and art of growing fruits.
Answer: TRUE

ix. Subsistence farming ensures high productivity and surplus earnings for the farmers.
Answer: FALSE

x. Mulching is a practice of spreading a layer of dried grass on the ground around root zones.
Answer: TRUE

2. Match the items in Set A with those in Set B by writing the correct letter in the table below.

Set A
i. All-purpose digging tool
ii. A special grain harvesting tool
iii. Checking egg fertility
iv. Makes horizontal cuts in the soil during plowing
v. Used for cutting metals
vi. Driving and removing nails in wood
vii. Drilling holes in metals or wood

viii. Smoothing metals

ix. Supports a metal piece in forging

x. Holding and turning nuts onto bolts

Set B

A. Anvil

B. Ball pein hammer

C. Claw hammer

D. Drilling tool

E. G-clamp

F. Hacksaw

G. Hand drill

H. Hand hoe

I. Lathe machine

J. Reciprocating coupling

K. Spanner

L. Spade

M. Tenon saw

N. Yoke harness

Answers

i	ii	iii	iv	v	vi	vii	viii	ix	x
H	C	E	L	F	C	G	F	A	K

3. Write down the letter of the correct answer in the box provided.

i. The system of keeping animals inside the house, feeding, and providing all care throughout their lifetime is known as:

A. Tethering

B. Stall feeding

C. Free-ranging

D. Paddocking

Answer: B. Stall feeding

Reason: Stall feeding involves confining animals indoors and providing all their food and care within the facility.

ii. The amount of feed given to a certain animal so as to fulfill the daily requirements is called:

A. Balanced ration

B. Complete ration

C. Production ration

D. Maintenance ration

Answer: A. Balanced ration

Reason: A balanced ration ensures that animals receive all the necessary nutrients for growth, reproduction, and maintenance.

iii. All of the following are breeds of poultry EXCEPT:
A. Black Australorp
B. Rhode Island Red
C. Leghorn
D. Holstein
Answer: D. Holstein
Reason: Holstein is a cattle breed, not a poultry breed.

iv. One of the problems associated with weeds in the farm or crops is:
A. Competing with crops in nutrient utilization
B. Increasing soil fertility
C. Preventing erosion
D. Adding organic matter to the soil
Answer: A. Competing with crops in nutrient utilization
Reason: Weeds compete with crops for nutrients, water, and light, reducing productivity.

v. A practice where two or more crops are grown together in a field is called:
A. Intercropping
B. Mixed farming
C. Monoculture
D. Relay planting
Answer: A. Intercropping
Reason: Intercropping involves growing multiple crops in the same field to maximize resource use and improve yield.

vi. A soil type which sticks when wet and cracks when dry is:
A. Sandy soil
B. Clay soil
C. Cultivated soil
D. Loam soil
Answer: B. Clay soil
Reason: Clay soil has fine particles that retain water, causing it to become sticky when wet and crack as it dries.

6. Mention ten classes of crops which are grown in Tanzania and give one example in each class.

i. Fruit crop – Example: Orange
ii. Cereal crop – Example: Maize
iii. Ornamental crop – Example: Groundnut flower
iv. Root crop – Example: Potato

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v. Fiber crop – Example: Sisal
vi. Leguminous crop – Example: Peas
vii. Oil crop – Example: Sunflower
viii. Sugar crop – Example: Sugarcane
ix. Banana crop – Example: Banana
x. Beverage crop – Example: Coffee

7. Suppose you are asked to prepare a dairy ration of 100 kg containing 20% protein. Livestock feeds which are available are maize bran containing 12% protein and groundnuts cake containing 32% protein.
(i) By using the Pearson's Square method, show how you will compound the required ration.
Solution using Pearson's Square Method:

- Draw a square and divide it into four parts.
- On the left side, write the protein content of the two available feeds (12% and 32%). In the center, write the target protein content (20%).
- Subtract diagonally to find the required proportions of each feed.

The calculation is as follows:
- (32% - 20%) = 12% (this is for maize bran).
- (20% - 12%) = 8% (this is for groundnuts cake).

This means that for every 12 parts of maize bran, 8 parts of groundnuts cake are required.

Now, to make a 100 kg ration:

- The total parts = 12 + 8 = 20 parts.
- For maize bran: (12/20) x 100 = 60 kg.
- For groundnuts cake: (8/20) x 100 = 40 kg.

Therefore, the required ration consists of 60 kg maize bran and 40 kg groundnuts cake.

(ii) Calculate the amount of maize bran and groundnuts cake that will be required in formulating the dairy ration.
Answer:
- Maize bran = 60 kg
- Groundnuts cake = 40 kg

8. (a) Define the following terms as used in Farming Business Economics:

(i) Price:
Price is the value of goods and services in the market, which is determined by various factors like supply and demand.

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(ii) Demand schedule:
A demand schedule is a table that shows the quantity of goods or services that consumers are willing to buy at different price levels.

(iii) Equilibrium price:
Equilibrium price is the price at which the quantity of goods supplied equals the quantity of goods demanded in the market.

(iv) Farm gate price:
Farm gate price is the price that farmers receive when they sell their products directly from the farm, excluding transportation and middlemen costs.

(v) Elasticity of supply:
Elasticity of supply refers to the responsiveness of the quantity supplied of a good to changes in its price. It measures how much the supply will increase or decrease as a result of price changes.

(b) The price of one tray of eggs raised from Tsh. 1000/- to Tsh. 1500/- per tray as a result the supply of eggs fell from 20,000 to 15,000 trays per week. Calculate the elasticity of supply of eggs.

Elasticity of Supply Calculation:
-Elasticity of supply (Es) = (% Change in quantity supplied) / (% Change in price)
- % Change in quantity supplied = (15,000 - 20,000) / 20,000 = -5,000 / 20,000 = -0.25 (a decrease of 25%)
- % Change in price = (1500 - 1000) / 1000 = 500 / 1000 = 0.5 (an increase of 50%)

$$\text{Elasticity of supply} = -0.25 / 0.5 = -0.5$$

The elasticity of supply is -0.5, meaning the supply of eggs is inelastic, as the change in supply is less than the change in price.

9. (a) What is horticulture?
Horticulture is a branch of agriculture that focuses on the cultivation of vegetables, fruits, flowers, and ornamental plants. It involves intensive use of small plots of land to grow high-value crops for human consumption, decoration, or trade. This practice includes techniques like pruning, grafting, and soil management to maximize yield and quality.

(b) Outline nine factors you will take into consideration when selecting a site for establishing a vegetable garden.

i. Soil characteristics: The soil should be fertile, well-drained, and rich in organic matter to support healthy vegetable growth. Poor soil conditions can lead to low yields or crop failure.

ii. Climate: The site should have favorable climatic conditions, such as optimal temperature, rainfall, and humidity, for the chosen vegetables. Some vegetables thrive in cool climates, while others require warmer conditions.

iii. Water availability: A reliable water source is essential for irrigation, especially during dry seasons. Vegetables require adequate water for proper growth and development.

iv. Topography: A gently sloping site is ideal to prevent waterlogging and soil erosion. Flat areas are also suitable, but proper drainage must be ensured.

v. Accessibility: The site should be easy to access for the transportation of farming inputs like seeds and fertilizers, as well as for transporting harvested produce to markets.

vi. Proximity to market: A site close to a market reduces transportation costs and ensures fresh produce reaches consumers quickly, maximizing profits.

vii. Pest and disease control: The site should have minimal history of pests and diseases to reduce the risk of crop damage. Proper pest control measures must be in place.

viii. Sunlight availability: Vegetables require adequate sunlight for photosynthesis. A site with sufficient exposure to sunlight ensures healthy crop growth.

ix. Legal ownership: Ensure the land is legally owned or leased to avoid disputes and guarantee long-term use for farming activities.

10. (a) Define the term "farm power" as used in agricultural mechanization and land utilization.
Farm power refers to the energy sources used in farming activities to operate machinery and tools. These power sources include human labor, animal power, and mechanical energy. Farm power enables farmers to perform tasks like plowing, harrowing, planting, irrigation, and harvesting efficiently. By using farm power, productivity increases, and the time required for labor-intensive activities is reduced.

(b) List six sources of farm power.

i. Human power: Human labor is used for manual tasks such as planting, weeding, and harvesting, especially in small-scale farming. This source is cost-effective but labor-intensive.

ii. Animal power: Draft animals like oxen, donkeys, and horses provide energy for plowing, carting, and transportation. This method is widely used in rural areas where machinery is unavailable.

iii. Mechanical power: Tractors, harvesters, and other machinery provide mechanical energy, increasing efficiency and reducing the time required for large-scale farming operations.

iv. Electrical power: Electricity is used to power equipment like water pumps, milking machines, and processing units, making it essential for modern farming practices.

v. Solar power: Solar energy is harnessed to operate solar-powered irrigation systems, greenhouses, and lighting for farms, providing a sustainable and eco-friendly option.

vi. Wind power: Wind energy is used to drive windmills for water pumping, particularly in areas with consistent wind patterns. It is a renewable energy source that supports irrigation.

(c) Differentiate between primary and secondary tillage equipment.

Primary tillage equipment: These tools are used to break up hard soil, loosen compact layers, and turn over the soil for aeration. They are essential for initial land preparation and removing large weeds. Examples include moldboard plows and disc plows. Primary tillage creates rough soil aggregates that need further refinement.

Secondary tillage equipment: These tools are used after primary tillage to break down soil clods into finer particles, level the field, and prepare the seedbed for planting. Secondary tillage also helps control weeds and conserve soil moisture. Examples include harrows, cultivators, and rollers.

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