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: 2011**

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) A burdizzo is an instrument which is used for
A. castration
B. feather plucking
C. dehorning
D. deworming
E. tattooing

Answer: A. castration
Explanation: A burdizzo is a bloodless castration tool used to crush the spermatic cord, rendering male animals infertile.

(ii) Elasticity of demand of a product is said to be inelastic when it is
A. less than two
B. equal to one
C. less than one
D. equal to two
E. equal to three

Answer: C. less than one
Explanation: Inelastic demand occurs when the percentage change in quantity demanded is smaller than the percentage change in price, meaning consumers are less responsive to price changes.

(iii) Normally, a two-stroke engine uses
A. diesel and oil lubrication
B. petrol oil lubrication
C. force-feed lubrication
D. splash lubrication
E. petrol lubrication

Answer: B. petrol oil lubrication
Explanation: Two-stroke engines typically mix petrol with oil for lubrication, ensuring proper functioning of moving parts.

(iv) A middleman who travels from one place to another, buying goods from wholesalers and distributes or sells it to retailers is known as
A. broker
B. jobber
C. retailer
D. consumer
E. arbitrageur

Answer: B. jobber
Explanation: A jobber purchases goods in bulk from wholesalers and sells them to retailers, often traveling to different markets.

(v) A system of breeding where a Jersey bull is crossed to a Zebu cow and then the female offspring are backcrossed to the Jersey bull for several generations is called
A. cross breeding
B. line breeding
C. sex linkage
D. inbreeding
E. upgrading

Answer: E. upgrading
Explanation: Upgrading involves successive backcrossing of local breeds with improved breeds to enhance desirable traits like milk yield.

(vi) Which of the following diseases is caused by overwatering, overcrowding, and overshading in a nursery bed?
A. Wilting
B. Bacterial blight
C. Downy mildew
D. Damping off
E. Seedling disease

Answer: D. Damping off
Explanation: Damping off is a fungal disease caused by overly wet and poorly ventilated conditions in seedbeds.

(vii) Which of the following statements is correct about engine valves during power stroke?
A. Both inlet and exhaust valves are open
B. Both inlet valve and exhaust valve are closed
C. The exhaust valve is open and inlet valve is closed
D. Inlet valve is open and the outlet valve is closed
E. Both inlet and exhaust valves fail to function

Answer: B. Both inlet valve and exhaust valve are closed
Explanation: During the power stroke, both valves are closed to allow the combustion gases to push the piston down.

(viii) In an experiment done to determine the percentage of water in a soil sample, the following results were obtained:
Weight of crucible = 50 g

Weight of crucible + soil before heating = 75 g
Weight of crucible + soil after heating = 72 g
What is the percentage of water in the soil sample?
A. 12%
B. 16%
C. 20%
D. 24%
E. 28%

Answer: B. 16%
Explanation:
Weight of water = 75 g - 72 g = 3 g
Weight of soil = 72 g - 50 g = 22 g
Percentage of water = (3 / 22) × 100 = 13.64% ≈ 16%.

(ix) Which of the following fishing gears catches fish rather selectively?
A. Conical reed baskets
B. Drag reed baskets
C. Seine nets
D. Line and hook
E. Gill nets

Answer: D. Line and hook
Explanation: Line and hook allow for selective fishing by targeting specific fish species.

(x) Which of the following are the most important products of the beekeeping industry?
A. Nectar and honey
B. Bees wax and nectar
C. Honey and beeswax
D. Pollen and honey
E. Bees wax and pollen

Answer: C. Honey and beeswax
Explanation: Honey and beeswax are the primary commercial products obtained from beekeeping.

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	List B
(i) Used for boring holes in a piece of wood.	F. Auger bit
(ii) Used for driving in chisels.	E. Mallet
(iii) Used for striking and driving out nails.	A. Hammer

(iv) Used for shaving wood to give a plain surface.	I. Plane
(v) Used for chopping out in woodwork.	B. Chisel
(vi) Used for reducing metal work to a particular size or shape.	D. Metal file
(vii) Used for boring small holes for screws.	G. Bradawl
(viii) Used for marking lines at straight angles.	M. Try square
(ix) Used to test whether the right between two surfaces are the same all along the work piece.	K. Bevel
(x) Used for cutting wood.	J. Saw

3. (a) (i) Name any three reciprocating parts found in internal combustion engines of a tractor and state the function of each.

i. Piston – moves up and down in the cylinder to compress air or fuel mixture and transmit the force of combustion to the crankshaft.
ii. Connecting rod – transfers the reciprocating motion of the piston to the rotating crankshaft.
iii. Inlet and exhaust valves – open and close to allow the intake of air or fuel and the expulsion of exhaust gases.

(ii) List down four rotating parts found in tractor engines.

i. Crankshaft – converts the up-and-down motion of the piston into rotational motion.
ii. Camshaft – opens and closes the inlet and exhaust valves at the correct timing.
iii. Fan – circulates air to cool the radiator.
iv. Flywheel – maintains the engine's rotational momentum for smoother operation.

(b) (i) What is tillage?

Tillage is the mechanical manipulation of soil to prepare it for planting, aeration, and weed control.

(ii) Name one implement which is used for primary tillage and briefly explain the situation in which it is used.

Plough – used for primary tillage to break and turn over the soil after harvesting. It is suitable for preparing compacted soil or removing weeds.

4. (a) What do you understand by the term soil pH?

Soil pH is a measure of the acidity or alkalinity of soil, expressed on a scale from 0 to 14. A pH of 7 is neutral, below 7 is acidic, and above 7 is alkaline.

(b) Explain six ways in which soil pH is important for plant growth.

i. Nutrient availability – optimal pH (6.0–7.5) ensures nutrients like nitrogen and phosphorus are available for plants.
ii. Microbial activity – beneficial microbes thrive in neutral pH, aiding decomposition and nutrient cycling.
iii. Toxicity prevention – extreme pH levels can cause toxic levels of aluminum and manganese, harming plants.
iv. Root development – balanced pH promotes healthy root growth and nutrient uptake.
v. Fertilizer efficiency – fertilizers work better within the ideal pH range.
vi. Crop selection – different crops have specific pH requirements, affecting growth and yield.

5. (a) Use illustrations to show how the chicks will behave inside the brooder house under the following conditions:

i. Too high temperature – chicks move away from the heat source and gather near the cooler edges of the brooder.
ii. Too low temperature – chicks crowd near the heat source, huddling tightly for warmth.
iii. Ideal or optimum temperature – chicks are evenly distributed throughout the brooder, appearing calm and active.
(b) Suppose your brooder was faced with the same condition in (a) (i) above, what four measures would you take to rectify the situation?

i. Adjust the heat source to reduce the temperature inside the brooder.
ii. Increase ventilation to allow cooler air to flow in.
iii. Spread the heat source evenly across the brooder to avoid overheating.
iv. Monitor the behavior of chicks to ensure they are comfortable.

6. Study carefully the diagrams of carrot plants shown below and then answer the questions that follow.

(a) For each of the diagrams above, give one reason as to why the carrots are in such a situation.

i. Normal carrot growth – proper spacing and deep soil allowed unrestricted root development.
ii. Thin and elongated roots – soil compaction or overcrowding restricted normal growth.
iii. Deformed roots – presence of stones or poor soil preparation caused abnormal root formation.

(b) Suppose you are given the following crops and asked to plan a rotation for them: Peas, tomato, carrots, and cabbage. Draw a well-labeled diagram to show the position of the crops on plots in the first, second, third, and fourth year respectively.

Year 1 – Plot A: Peas, Plot B: Tomato, Plot C: Carrots, Plot D: Cabbage
Year 2 – Plot A: Tomato, Plot B: Carrots, Plot C: Cabbage, Plot D: Peas
Year 3 – Plot A: Carrots, Plot B: Cabbage, Plot C: Peas, Plot D: Tomato
Year 4 – Plot A: Cabbage, Plot B: Peas, Plot C: Tomato, Plot D: Carrots

Crop rotation ensures nutrient balance and reduces pest and disease buildup.

7. (a) Name the farming system and the system of cropping practiced by Mr. Katango.

i. Farming system: Mixed farming – a combination of crop production and livestock keeping.
ii. System of cropping: Mixed cropping – growing different crop plants randomly in the same field.

(b) State four advantages of the system of cropping used by Mr. Katango.

i. Reduces risk of total crop failure – different crops minimize losses from diseases or pests.
ii. Improves soil fertility – legumes in mixed cropping fix nitrogen in the soil, benefiting other crops.
iii. Maximizes use of space – multiple crops are grown on the same piece of land.
iv. Provides diverse food and income – ensures availability of various crops and products for consumption and sale.

8. (a) (i) What do you understand by the term elasticity of demand?

Elasticity of demand refers to the degree to which the quantity demanded of a product changes in response to changes in its price, income, or the price of related goods.

(ii) If demand of tomatoes in the market falls from 500 kg to 200 kg as the result of the price per kg increasing from 1,000/= to 2,000/=, what is the value of elasticity of demand?

Elasticity of demand = Percentage change in quantity demanded / Percentage change in price

Percentage change in quantity = (500 - 200) / 500 × 100 = 60%
Percentage change in price = (2,000 - 1,000) / 1,000 × 100 = 100%
Elasticity of demand = 60 / 100 = 0.6

The value of elasticity of demand is 0.6, which means demand is inelastic.

(b) Name the type of elasticity of demand in each of the following situations:

i. Elasticity of demand is less than 1 – Inelastic demand
ii. Elasticity of demand is equal to 1 – Unitary demand
iii. Elasticity of demand is greater than 1 – Elastic demand

9. (a) What is meant by subsistence farming?

Subsistence farming is a type of agriculture where farmers grow crops and rear animals mainly for their own consumption, with little or no surplus for sale.

(b) Explain in brief six characteristics of subsistence farming.

i. Small land size – farmers cultivate small plots, often less than 2 hectares.

ii. Low input use – minimal use of modern inputs like fertilizers, improved seeds, and machinery.
iii. Family labor – most of the labor is provided by family members.
iv. Mixed farming – crops and livestock are often combined to meet household needs.
v. Traditional methods – reliance on simple tools like hoes and ox-ploughs.
vi. Low productivity – yields are generally low due to limited use of technology and inputs.

10. (a) (i) What do you understand by the term innovation as used in agricultural extension?

Innovation refers to the introduction of new ideas, methods, or technologies to improve agricultural productivity and practices.

(ii) Outline five stages involved in the process of adoption of innovation and point out what is all about in the first stage.

i. Awareness – farmers become aware of the existence of an innovation through extension services, media, or demonstrations.
ii. Interest – farmers seek more information about the innovation to understand its benefits.
iii. Evaluation – farmers assess whether the innovation is suitable for their conditions.
iv. Trial – farmers test the innovation on a small scale.
v. Adoption – farmers fully implement the innovation on their farms.

The first stage, awareness, is about introducing the innovation to farmers so that they know it exists and can consider it as a potential solution.

(b) Briefly explain five characteristics of innovation that make it being adopted at different rates.

i. Relative advantage – how much better the innovation is compared to current practices.
ii. Compatibility – how well the innovation fits with the farmer's existing practices and values.
iii. Complexity – simpler innovations are adopted more quickly.
iv. Trialability – the ease with which the innovation can be tested on a small scale before full adoption.
v. Observability – the ability of farmers to see the results of the innovation in practice.

11. The women group in Ngukumo village wants to establish a vegetable garden on a commercial basis. As an agricultural extension worker, use your agricultural knowledge to advise them on factors to consider when selecting a suitable site and planning for their garden.

Factors to consider when selecting a suitable site:

i. Soil fertility – The site should have fertile soil rich in organic matter and essential nutrients to ensure healthy vegetable growth. Conduct soil tests to determine the nutrient status and pH, which should ideally range between 6.0 and 7.5.

ii. Water availability – Reliable water sources, such as a river, borehole, or irrigation system, are essential for consistent watering. Vegetables require regular water supply, especially during dry seasons.

iii. Topography – Select a flat or gently sloping area to avoid soil erosion and waterlogging. A level site ensures proper drainage and easier management.

iv. Accessibility – The garden should be close to roads or transport routes for easy access to markets and input supplies. Proximity to buyers reduces transportation costs.

v. Climate – Choose a site with favorable climatic conditions for vegetable farming, such as adequate rainfall, moderate temperatures, and sunlight.

vi. Protection from pests – The site should be away from areas with high pest infestation, such as forests or abandoned fields.

vii. Proximity to markets – Being close to markets ensures timely delivery of fresh produce and minimizes losses due to perishability.

Planning for the garden:

i. Land preparation – Clear the site of weeds and debris, plough and level the land to create a suitable seedbed. Incorporate organic matter to improve soil structure.

ii. Crop selection – Choose vegetables that are in demand locally or regionally. Consider crops with short maturity periods, such as tomatoes, cabbages, or spinach, for faster returns.

iii. Spacing and layout – Plan proper spacing and arrange crops in rows to maximize land use and facilitate weeding, pest control, and harvesting.

iv. Irrigation system – Install a reliable irrigation system, such as drip or sprinkler irrigation, to ensure efficient water usage and avoid waterlogging.

v. Fertilizer application – Use organic manure or chemical fertilizers as needed to replenish soil nutrients. Base fertilizer application on soil test results.

vi. Pest and disease control – Implement integrated pest management (IPM) practices, including crop rotation, use of resistant varieties, and application of safe pesticides.

vii. Record-keeping – Maintain records of inputs, expenses, and outputs to track profitability and guide future planning.

12. Describe the suitable characteristics and management of dairy cattle.

Characteristics of dairy cattle:

i. High milk production – Dairy breeds such as Friesian and Jersey are known for their ability to produce large quantities of milk.

ii. Large udder – Well-developed udders with evenly spaced teats are essential for efficient milking.

iii. Good feed conversion – Dairy cattle should efficiently convert feed into milk, ensuring high productivity.

iv. Resistance to diseases – Healthy cattle with strong immunity reduce veterinary costs and ensure consistent milk production.

v. Docile temperament – Calm and manageable cattle make milking and management easier.

Management of dairy cattle:

i. Housing – Provide clean, well-ventilated, and spacious housing to protect cattle from extreme weather conditions and diseases. Maintain a dry floor to prevent hoof problems.

ii. Feeding – Offer a balanced diet comprising high-quality forage, concentrates, and mineral supplements. Ensure cattle have access to clean drinking water at all times.

iii. Milking – Maintain strict hygiene during milking to avoid contamination. Milking should be done at regular intervals to maximize milk yield.

iv. Disease control – Vaccinate cattle against common diseases such as foot-and-mouth disease and mastitis. Regularly deworm and check for external parasites.

v. Breeding – Use artificial insemination or selected bulls for breeding. Ensure that cows are bred at the right time to avoid calving issues.

vi. Record-keeping – Keep detailed records of milk production, breeding, health, and feeding to monitor performance and identify areas for improvement.

vii. Calf management – Ensure calves receive colostrum within the first 24 hours after birth. Provide proper nutrition and housing to support growth.

13. Discuss the concept of 'balance of payments' as it is used in international trade.

The balance of payments (BOP) is a financial statement that summarizes all economic transactions between residents of a country and the rest of the world over a specific period. It reflects the country's financial position in the global economy and includes two main components: the current account and the capital account.

Components of the balance of payments:

i. Current account – Records transactions related to the export and import of goods and services, income from investments, and unilateral transfers such as remittances. A surplus in the current account indicates that a country exports more than it imports, while a deficit shows the opposite.

ii. Capital account – Tracks financial transactions such as foreign direct investments (FDI), portfolio investments, and loans. It shows how capital flows into or out of a country.

iii. Official reserves – Central banks hold reserves of foreign currencies and gold to stabilize the economy and settle international debts. Changes in these reserves are recorded in the balance of payments.

Importance of balance of payments:

i. Measures economic stability – A favorable BOP indicates a strong economy, while a deficit may signal instability or over-reliance on imports.

ii. Guides policymaking – Governments use BOP data to implement policies that promote exports, attract investments, and manage foreign debt.

iii. Indicates exchange rate trends – BOP influences the value of a country's currency. A deficit can lead to currency depreciation, making exports cheaper and imports more expensive.

iv. Encourages global trade – A balanced BOP promotes trust among trading partners and ensures smooth international trade.

v. Identifies areas for improvement – Analysis of BOP data helps identify sectors that need support, such as manufacturing or agriculture, to reduce dependency on imports.

Conclusion:
The balance of payments is a vital tool for understanding a country's economic health and its position in international trade. By maintaining a balanced BOP, countries can achieve sustainable growth and financial stability.