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: 1993**

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. During soil formation, which factor is most important in influencing the amount of soil particles which are present in the soil profile?

A. Type of parent material
B. Time
C. Topography
D. Climate

The type of parent material determines the mineral composition of the soil and influences the soil particle sizes, affecting fertility and texture.

A. Type of parent material

2. Which of the following fertilizers would be suitable for application of nitrogen on a soil that has a pH of 5.0 and is deficient in nitrogen?

A. Calcium Ammonium Nitrate
B. Sulphate of Ammonia
C. Ammonium Sulphate Nitrate
D. Urea

Sulphate of Ammonia is an acidic fertilizer and can further lower the pH. Urea is neutral, while Ammonium Sulphate Nitrate is slightly acidic. Calcium Ammonium Nitrate is the best choice as it provides nitrogen while neutralizing soil acidity.

A. Calcium Ammonium Nitrate

3. Which of the following mineral elements has an influence on the availability of inorganic phosphorus in the soil?

A. Available boron
B. Available copper
C. Available calcium
D. Available potassium

Available calcium affects phosphorus solubility. When calcium levels are high, phosphorus may precipitate as insoluble phosphates, reducing availability.

C. Available calcium

4. In a four-stroke internal combustion engine, the compression stroke occurs immediately after:

A. Ignition stroke
B. Inlet stroke
C. Exhaust stroke
D. Power stroke

The compression stroke occurs right after the inlet stroke, where the air-fuel mixture is drawn into the cylinder.

B. Inlet stroke

5. A method of artificial regeneration of trees which involves the growing of forest trees together with agricultural crops in the early stages is known as:

A. Coppice system
B. Shelter system
C. Taungya system
D. Silvicultural system

The Taungya system integrates forestry and agriculture, ensuring land productivity before tree canopy closure.

C. Taungya system

6. At what stage of the following flowering seasons should harvesting of honey be done?

A. At the end
B. Just before
C. At the beginning
D. At the middle

Harvesting honey at the end of the flowering season ensures the highest yield of mature honey.

A. At the end

7. Using the formula LW = (L x G^2) / 300, what is the live weight of a bull which is 58 inches from the point of shoulder to the pinbone and has a girth of 60 inches?

A. 720 kg
B. 672 kg
C. 696 kg
D. 420 kg

LW = (58 x 60^2) / 300
= (58 x 3600) / 300
= 696 kg

C. 696 kg

8. One of the most effective ways of controlling Foot and Mouth Disease is:

A. Drenching
B. Quarantine
C. Dipping
D. Paddocking

Quarantine prevents the spread of the highly contagious disease.

B. Quarantine

9. The best method adopted for the control of red ball worm cotton pest in Tanzania is:
A. Spraying insecticides
B. Crop rotation
C. Closed season
D. Quarantine

The closed season method prevents pest infestation by ensuring no cotton plants are present to harbor the pest.
C. Closed season

10. The difference between the value of output and variable costs is known as the:
A. Gross margin
B. Gross profit
C. Net profit
D. Surplus

Gross margin represents revenue minus variable costs, excluding fixed costs.
A. Gross margin

11. When planning a rotation of growing vegetable crops in a garden, cabbages may be grouped as:
A. Medium feeders
B. Heavy feeders
C. Light feeders
D. Very light feeders

Cabbages are heavy feeders as they require large amounts of nutrients.
B. Heavy feeders

12. The measurement of vertical distances on a land area is known as:
A. Pacing
B. Taping
C. Levelling
D. Traversing

Levelling is used to measure elevation differences.
C. Levelling

13. The duration taken by an animal from the day of conception to the time of giving birth is known as:
A. Breeding period
B. Lactation period
C. Flushing period
D. Gestation period

Gestation period refers to pregnancy duration.
D. Gestation period

14. If the price of cabbages rises from 2/= per kg to 7/= per kg while supply decreases from 10,000 to 2,000 tonnes per week, what will be the elasticity of supply for cabbages?
A. 0.32
B. 0.50
C. 0.80
D. 1.00

Elasticity = % change in quantity supplied / % change in price
= [(2000 - 10000) / 10000] ÷ [(7 - 2) / 2]
= (-0.8) ÷ (2.5)
= 0.32
A. 0.32

15. A soil sample analyzed in the laboratory was found to weigh 150 gm. Its volume was 100 cm^3, the volume of soil particles was 50 cm^3 and the volume of pore space was 50 cm^3. What was its particle density?
A. 2 gm/cm^3
B. 3 gm/cm^3
C. 4 gm/cm^3
D. 5 gm/cm^3

Particle density = Mass of soil / Volume of soil particles
= 150 g / 50 cm^3
= 3 g/cm^3
B. 3 gm/cm^3

16. What is the approximate percentage base saturation of a soil which contains 2 m.e. Hydrogen ions and 6 m.e. Bases for 100 gm of oven-dry soil?
A. 6%
B. 25%
C. 33%
D. 75%

Base saturation = (Base cations / Total cations) × 100
= (6 / (6+2)) × 100
= 75%
D. 75%

17. A loam soil sample with maximum water retentive capacity of 45% was analyzed in the laboratory two days after it had rained. The water content of the sample was found to be 5% at 31 atmospheres, 6% at 15

atmosphere, and 33% at ⅓ atmosphere. What is the percentage moisture which could be available to plants growing from where the soil sample was taken?

A. 27%
B. 28%
C. 39%
D. 40%

Available moisture = Water content at field capacity - Water content at permanent wilting point
= 33% - 6%
= 27%
A. 27%

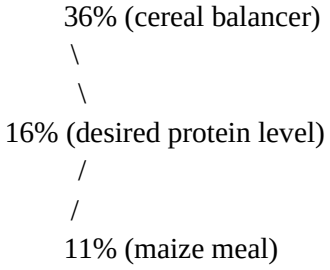
21. a farmer wants to mix a pig ration of 100 kg containing 16% protein. he has the following ingredients for use:

- maize meal containing 11% protein
- cereal balancer containing 36% protein

using the pearson square method, calculate the amount of maize meal and cereal balancer which he can mix up to make 100 kg of the ration.

the pearson square method is a simple way to calculate feed ratios when mixing two ingredients to obtain a required level of nutrients.

step 1: draw the pearson square



step 2: subtract diagonally

- 36 - 16 = 20 (parts of maize meal)
- 16 - 11 = 5 (parts of cereal balancer)

step 3: find the total parts

- total parts = 20 + 5 = 25

step 4: calculate the amounts of each ingredient

- maize meal = (20/25) x 100 = 80 kg
- cereal balancer = (5/25) x 100 = 20 kg

therefore, the farmer should mix 80 kg of maize meal and 20 kg of cereal balancer to obtain 100 kg of feed containing 16% protein.

22. when a sow was observed to be on heat, a boar was allowed to mate with it on june 30th. assuming that the sow became pregnant:

a) on approximately what date would the sow be expected to farrow (i.e., to give birth)?
b) on approximately what date will the piglets be weaned?
c) mention four ways which you could use to provide iron to the piglets as to prevent the occurrence of anemia.

a) the gestation period of a sow is approximately 114 days (3 months, 3 weeks, and 3 days).

- june 30 + 114 days = october 22

b) piglets are typically weaned at 6-8 weeks after birth.

- october 22 + 6 weeks = december 3 (if weaned at 6 weeks)

c) piglets require iron supplementation to prevent iron-deficiency anemia because milk from the sow is deficient in iron. methods of providing iron include:

i) iron injections – administering iron dextran injections within the first 3 days after birth.
ii) oral iron supplements – adding ferrous sulfate to drinking water.
iii) iron-rich soil access – allowing piglets to root in iron-rich soil.
iv) iron paste application – applying iron-rich paste to the sow's teats for piglets to ingest during suckling.

23. a) define the term depreciation.
b) mention three methods of calculating the depreciation of a farm asset.
c) a dairy building which had been depreciating at 3,000/= per annum was demolished in 1985 after being in use for 20 years. its remains were sold at 4,000/=. what was the original cost of the house?

a) depreciation is the gradual loss in the value of a fixed asset due to wear and tear, obsolescence, or passage of time.

b) three methods of calculating depreciation are:

i) straight-line method – depreciation is the same each year.
ii) reducing balance method – depreciation is charged as a percentage of the remaining value.
iii) sum of years' digits method – more depreciation is allocated in earlier years.

c) using the straight-line method:

original cost = (annual depreciation x years of use) + salvage value

= (3,000 x 20) + 4,000
= 60,000 + 4,000
= 64,000/=

24. before starting a tractor prior to performing farm operations, what servicing operations need to be done on the following tractor components?

a) battery – check electrolyte levels, ensure terminals are clean and well connected.
b) radiator – inspect coolant level, check for leaks, and clean debris from fins.
c) engine oil – verify oil level using a dipstick, check for leaks, and replace if dirty.
d) tyres' pressure – ensure the pressure is within the recommended range for proper traction and fuel efficiency.

25. using the following headings, describe how you would raise a crop of cabbage (prize drumhead variety):

a) land preparation – plough the land to a depth of 15-20 cm, harrow to break clods, and add compost.
b) fertilizers – apply farmyard manure before planting and npk fertilizer at intervals.
c) propagation – sow seeds in a nursery and transplant when seedlings have 4-5 leaves.
d) spacing – maintain a spacing of 45 cm x 60 cm for proper growth.
e) pest control – use insecticides to manage caterpillars and practice crop rotation to reduce disease incidence.

26. briefly explain any five good management requirements you will need in order to ensure that maximum power output can be obtained from a team of draught animals kept on the farm.

i) proper feeding – provide energy-rich food for strength.
ii) good health care – regular vaccinations and deworming.
iii) adequate rest – avoid overworking the animals.
iv) regular training – teach animals how to respond to commands.
v) proper harnessing – use well-fitted yokes to avoid discomfort and injury.

27. what is a crop pest? for each of the following insect pests, mention one crop which it attacks, one prominent symptom of attack on the crop, and one method of controlling the insect pest.

a) american bollworm – attacks cotton, causes boll damage, controlled by insecticides.
b) stalk borer – attacks maize, causes hollow stems, controlled by crop rotation.
c) antestia bug – attacks coffee, causes discolored beans, controlled by pruning.

28. explain briefly how the following become affected when the ph of the soil decreases to acidic levels:

i) availability of iron, aluminum, and manganese to plants – increases, leading to toxicity.
ii) availability of phosphorus to plants – decreases due to fixation with aluminum.
iii) availability of calcium and magnesium to plants – decreases due to leaching.
iv) availability of molybdenum to plants – decreases, leading to deficiencies.
v) growth and activity of soil bacteria – reduces, affecting nitrogen fixation.

29. a) define the word parasite as used in animal production.

a parasite is an organism that lives in or on another organism (host) and derives nutrients at the host's expense.

b) parasites can be categorized as ectoparasites and endoparasites. for each category, name two examples.

i) ectoparasites – ticks, lice.
ii) endoparasites – tapeworms, roundworms.

c) outline four effects of parasitic animals to livestock production.

i) reduced weight gain – parasites deprive animals of nutrients.
ii) lower milk production – infected animals produce less milk.
iii) disease transmission – ticks spread diseases like east coast fever.
iv) death – severe infestations can kill animals.

30. a) define the term vice as used in poultry production.

a vice in poultry production refers to an abnormal or destructive behavior exhibited by birds, often due to stress, overcrowding, poor management, or nutritional deficiencies.

b) mention four vices which might be encountered in a flock of poultry kept in a deep litter house.

i) cannibalism – pecking and injuring weaker birds
ii) egg eating – birds breaking and consuming eggs
iii) feather pecking – pulling and eating feathers from other birds
iv) bullying – aggressive behavior leading to injuries

c) mention any five ways of preventing such vices.

i) proper stocking density – avoid overcrowding
ii) balanced nutrition – provide sufficient protein and minerals
iii) adequate lighting – regulate light intensity to reduce stress
iv) provision of enrichment – add perches and scratching materials
v) beak trimming – carefully trim beaks to prevent pecking injuries

31. a) define the term colostrum as used in dairy production.

colostrum is the first milk produced by a cow after giving birth, rich in antibodies, nutrients, and essential growth factors.

b) why is colostrum very important to the newborn calf? give four reasons.

i) provides immunity – contains antibodies that protect against diseases
ii) rich in nutrients – high in proteins, vitamins, and minerals for rapid growth
iii) promotes digestion – contains enzymes that aid in nutrient absorption
iv) prevents infections – stimulates the development of the calf's immune system

32. a) name four types of hand saws commonly used in woodwork. explain the use of each type of saw.

i) crosscut saw – used for cutting wood across the grain
ii) rip saw – used for cutting wood along the grain
iii) tenon saw – used for precise and fine cutting in joinery work
iv) coping saw – used for cutting curves and intricate shapes in wood

b) name three types of planes used in woodwork and explain the use of each.

i) jack plane – used for general smoothing and shaping of wood
ii) smoothing plane – used for fine finishing of wooden surfaces
iii) rebate plane – used for making grooves and rebates in wood

33. a) what is soldering? name four basic soldering equipment and explain the use of each.

soldering is a process of joining two metal surfaces by melting a filler metal (solder) to create a strong bond.

i) soldering iron – heats and melts the solder
ii) flux – removes oxidation and improves adhesion of solder
iii) solder – a fusible metal alloy used to bond metal parts
iv) desoldering pump – removes excess solder from joints

b) list and describe four methods of surface irrigation used in agriculture.

i) furrow irrigation – water is channeled through shallow furrows between crop rows
ii) basin irrigation – water is applied to small, enclosed areas, suitable for rice fields
iii) border irrigation – water is distributed between leveled strips of land
iv) sprinkler irrigation – water is sprayed over crops using sprinklers

34. one 31st december 1980 a farmer had 5 bags of feedstuffs each worth shs.250/=, 4 bags of fertilizers each worth shs.120/=, a harrow that is 10 years old and was bought for shs.5000/= with an expectation that it would be used for 15 years when it would be written off with a salvage value of shs.200/=. in addition, there were:

- 3 milk cows @ shs 5,000/=
- 210 broilers @ shs 150/=
- 250 layers @ shs 200/=

write down an inventory and valuation as at 31st december 1980 for this farmer.

inventory and valuation:

i) feedstuffs: 5 x 250 = 1,250/=
ii) fertilizers: 4 x 120 = 480/=
iii) harrow value = 5000 - [(5000-200)/15] x 10 = 1,200/=
iv) 3 milk cows = 3 x 5,000 = 15,000/=
v) 210 broilers = 210 x 150 = 31,500/=
vi) 250 layers = 250 x 200 = 50,000/=

total inventory valuation = 1,250 + 480 + 1,200 + 15,000 + 31,500 + 50,000 = 99,430/=

35. a farmer with 10 hectares of maize farm wants to replace hired labour with a team of hired oxen and a plough.

use the data below to find out whether the change would be economically worthwhile. set out the calculation in the form of a partial budget.

alternatives output selling price

hired oxen 960 kg/ha shs.500/= @ kg
hired labour 600 kg/ha shs. 5/= @ kg

variable costs of growing cotton using oxen
hired oxen (2) and plough cost shs.200/= @ ha

supplementary feeds for oxen in each farming season cost shs.320/= @ oxen
picking costs using hired labour costs shs. 4 /= @ 30 kg

costs of growing cotton using hired labour
land preparation: 30 mandays @ ha at shs 14/= per manday
picking costs using hired labour is shs.4/= @ 30 kg

step 1: calculate total revenue for each option

- revenue using oxen: 960 kg/ha x 10 ha x 500 = 4,800,000/=
- revenue using hired labour: 600 kg/ha x 10 ha x 5 = 30,000/=

step 2: calculate total costs for each option

- costs using oxen: (200 x 10) + (320 x 2) + (4/30 x 9600) = 2000 + 640 + 1280 = 3,920/=
- costs using hired labour: (30 x 10 x 14) + (4/30 x 6000) = 4200 + 800 = 5,000/=

step 3: calculate net profit for each option

- profit using oxen = 4,800,000 - 3,920 = 4,796,080/=
- profit using hired labour = 30,000 - 5,000 = 25,000/=

since the net profit from using oxen is much higher than using hired labour, switching to oxen and a plough is economically worthwhile.