



Dr. Blosa Science

Sponsored by  
**The Science Foundation College**  
**Uganda East Africa**  
Senior one to senior six  
+256 778 633 682, 753 802709  
**Based On, best for science**

digitalteachers.co.ug



## UACE P515/2 Principles and practices of agriculture 2022

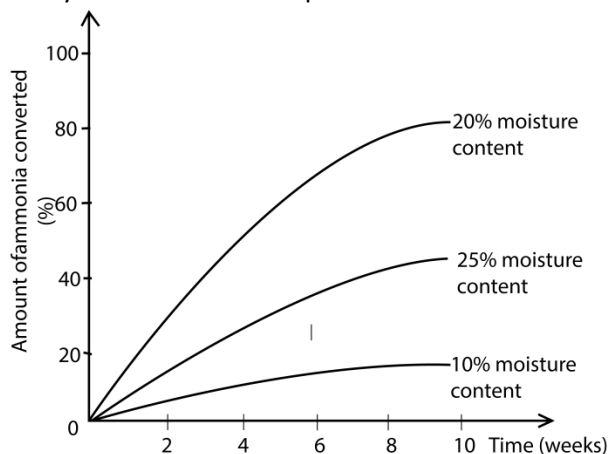
### Instructions

- This paper consists of sections: **A, B, C, D and E**
- Answer **question 1** in section A and four other questions, selecting **one** from each of the sections **C, D and E**.
- Write your answers in the answer booklets provided
- Any additional question(s) answered will not be marked

### SECTION A

#### Question 1 compulsory

1. Figure 1 shows the conversion of ammonia to nitrates in soil of different moisture content. Study it and answer the questions that follow.



- (a) From the graph, state the optimum moisture content for the conversion of ammonia to nitrates (02marks)
- (b) Explain why the process of conversion of ammonia to nitrates is slower when the soil contains 25% moisture than when it contains 20% moisture. (02marks)
- (c) Explain ammonia conversion rate at 10% moisture content. (02marks)
- (d) Relative to 10%, suggest the position of ammonia conversion curve if the soil moisture was 100%. Give reasons for your answer.
- (e) Apart from influencing the conversion of ammonia to nitrates, what other roles does soil water play in plant growth? (06marks)

## **SECTION B (20MARKS)**

### **CROP PRODUCTION**

Answer one question from this section

2. (a) Outline the general symptoms of diseases in crop plants (05marks)  
(b) Explain the ways in which diseases are spread from one plant to another. (12marks)  
(c) State the effects of diseases on crop plants. (03marks)
3. (a) Outline the benefits of soil organisms on crop production. (05 marks)  
(b) Explain the ways in which soil organisms may be harmful to crop growth. (05marks)  
(c) Explain the factors that influence the population of soil organisms. (10marks)

## **SECTION C (20MARKS)**

### **ANIMAL PRODUCTION**

Answer one question from this section

4. (a) Outline the measures that should be taken to ensure production of good quality eggs. (12marks)  
(b) State the defects that may make eggs unsuitable for incubation. (04marks)  
(c) Suggest ways of storing eggs to ensure their quality is maintained. (04 marks)
5. (a) Outline the difference between ruminant and non-ruminant digestion. (07marks)  
(b) State the conditions that predispose ruminants to bloat as digestive disorder. (04marks)  
(c) Suggest control measures for bloat. (09marks)

## **SECTION D (20MARKS)**

### **AGRICULTURAL ENGINEERING**

Answer one question from this section

6. (a) Outline the factors that determine a farmer's choice of tools and implements to buy for use on a farm. (10marks)  
(b) Explain the measures that should be taken to ensure efficient use of farm tools and equipment (10 marks)
7. (a) Outline the procedure of making a foundation for a farm building. (06marks)  
(b) Explain the factors that may cause foundation failures. (10marks)  
(c) Outline the characteristics of a good foundation for building. (04marks)

## SECTION E (20MARKS)

### AGRICULTURAL ECONOMICS

Answer one question from this section

8. (a) Explain the factors that affect the interest rate charged on agricultural credit. (10marks)  
(b) Suggest measures that should be put in place to make the use of agricultural credit more effective. (10marks)
9. (a) Discuss the factors that determine the availability of labour in production process. (12marks)  
(b) Suggest ways of improving labour efficiency on a farm. (08marks)

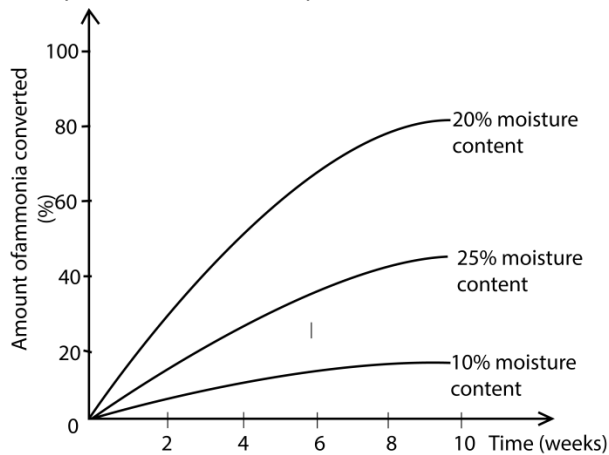
END

### Suggested answers

#### SECTION A

##### Question 1 compulsory

1. Figure 1 shows the conversion of ammonia to nitrates in soil of different moisture content. Study it and answer the questions that follow.



- (a) From the graph, state the optimum moisture content for the conversion on ammonia to nitrates (02marks)  
20% moisture content
- (b) Explain why the process of conversion of ammonia to nitrates is slower when the soil when the soil contains 25% moisture than when it contains 20% moisture. (02marks)  
Due to low soil air content.
- (c) Explain ammonia conversion rate at 10% moisture content. (02marks)  
  
The conversion rate at 10% is low due to insufficient soil water content
- (d) Relative to 10%, suggest the position of ammonia conversion curve if the soil moisture was 100%. Give reasons for your answer.

It will be below that of 10% because of lack oxygen necessary for nitrification, due to leaching and due to denitrification

(e) Apart from influencing the conversion of ammonia to nitrates, what other roles does soil water play in plant growth? (06marks)

- It a medium through which mineral nutrients are absorbed by the plant
- Promote weathering and soil formation
- Soil water is absorbed and used for photosynthesis,
- Absorbed soil water is used transpiration and cooling of the plant.
- Helps biological decomposition of dead plant remaining into humus
- Regulates soil temperature i.e. evaporation of water from
- Soften soil and ease root penetration
- Promote seed germination

## **SECTION B (20MARKS)**

### **CROP PRODUCTION**

Answer one question from this section

2. (a) Outline the general symptoms of diseases in crop plants (05marks)

- Mosaic:
- Rusts:
- Smuts
- Anthracnose
- Rots
- Rosette
- Galls
- Chlorosis
- Necrosis
- Wilts:
- Leaf spot and blights
- Dumping off is the rotting or collapse of the seedlings at the ground level. It is caused by fungi.
- Mildew
- Cankers
- Hypotrophy
- Hypertrophy
- Hyperplasia.
- Mottling

(b) Explain the ways in which diseases are spread from one plant to another. (12marks)

- Through wind/air current blow spores from one diseased crop to another
- Through rain splash
- Contact between health and diseased plant
- Infected planting materials/seedlings/cuttings
- Pruning knives, pangas carry disease causing organisms
- Transfer of disease causing organisms by pests and vectors
- Irrigation with contaminated water
- Application of infected mulches
- Through infected crop wastes/residues
- Through infected organic manure
- Through contact with infected animals

(c) State the effects of diseases on crop plants. (03marks)

- Stunted growth
- Malformation of plant
- cause plant death
- Reduced crop yield
- Reduced quality of crop yield

3. (a) Outline the benefits of soil organisms on crop production. (05 marks)

- They carry out decomposition of dead plants and animals remains to produce humus which is used by plants.
- Some bacteria like Rhizobia fix nitrogen into the soil
- After their death more especially the macro organisms decompose and add fertility to the soil.
- Mix soil with organic matter
- Bind soil particles together thereby improving soil texture.
- Other living organisms like earthworms, excrete urea which adds fertility to the soil by providing nitrogen.
- They aerate the soil by making tunnels. The more tunnels, the more the aeration.
- Some produce antibiotics that can be used to control harmful bacteria in the soil.

(b) Explain the ways in which soil organisms may be harmful to crop growth. (05marks)

- Infect and cause diseases to the plant
- Some transmit disease to plant (vectors)
- Some compete for nutrients with the plants (immobilization)
- Denitrifying bacteria lead to loss of nitrogen from the soil
- By decomposing root nodules.

- Some are plant parasites
- Damage crop roots

(c) Explain the factors that influence the population of soil organisms. (10marks)

- Temperature of the soil: different organisms prefer different temperature ranges
- pH influences enzyme activities in microorganisms; very high and very low pH hinder multiplication of microorganisms
- Aeration / oxygen for respiration
- Presence of organic matter in soil that act as food to microorganisms
- Presence of certain minerals such as iron II which provide respiratory energy.
- Presence of pollutants that poison microorganisms.
- Depth of the soil: deep soil provides space for microorganism to live.
- Soil moisture: soil organisms require moisture is essential for life and for enzyme activity and metabolism and, is a solvent for biological nutrients and other chemicals. Also moist soil facilitates movement of organisms in the soil.
- Light require by phototrophic microorganisms immediately below or on the surface of the soil. Light also warms the soil while some sunlight component (uv) kills microorganisms.
- Type of plant grown e.g. legumes house nitrogen fixing bacteria
- Tillage not only kill soil organisms but also destroy their microhabitats
- bulk density, dry weight, porosity affect burrowing of macro-organisms in the soil
- Soil salinity: high salinity reduces microbial growth

### **SECTION C (20MARKS)**

#### **ANIMAL PRODUCTION**

Answer one question from this section

4. (a) Outline the measures that should be taken to ensure production of good quality eggs. (12marks)

- Keep nest clean. Maintaining clean nesting material will reduce microbial exposure when the egg is first laid.
- Collect eggs regularly at least daily and preferably twice a day to prevent breakage and possible contamination from fecal material and dirt.
- Clean dirty with water and dried immediately
- Store eggs in clean packaging materials.
- Storage conditions temperature 4 – 12°C and humidity 60 – 80%
- Feed layers on proper feed rations
- Sell first laid egg first
- Cushion the nest box to prevent egg breakage
- Sell/eat before spoiled

(b) State the defects that may make eggs unsuitable for incubation. (04marks)

- Infertile eggs
- Dirty eggs
- Broken/cracked eggs
- Eggs with abnormalities like meat and blood spots
- Eggs with thin walls
- Eggs from sick birds

(c) Suggest ways of storing eggs to ensure their quality is maintained. (04 marks)

- Storage temperature 120 -130C
- Relative humidity 75%.
- Store the eggs with the small end pointed downward.
- Alter egg position periodically if not incubating within 4-6 days.
- Store eggs in clean packaging materials.
- Store eggs when dry

5. (a) Outline the difference between ruminant and non-ruminant digestion. (07marks)

Ruminants	Non-ruminants
Saliva contains lipase	Saliva lacks lipase
Have four stomach compartments	Have one stomach compartment
Saliva lacks amylase	Saliva contains amylase
Chew cud	Do not chew cud
Fermentation is possible due to the presence of rumen	Fermentation not possible
Contain bacteria that digest cellulose	Contain no bacteria for digestion of cellulose
Depend on volatile fatty acids for energy	Depend on glucose for energy
Most digestion and absorption occurs in the rumen	Most absorptions occur in the small intestines
Do not produce enzymes for protein digestion	Produce enzymes for protein digestion
Take long to digest to digest plant materials.	Take relatively short time to digest their food
Premolars and molars move lateral directions	Premolar and molars move in vertical direction
Have two blunt canines	Have four sharp canines
Long digestive canals	Short digestive canals
Have larger liver	Have smaller liver
Regurgitate.	Do not regurgitate.
<b>Examples:</b> Herbivores (e.g., cattle, sheep, goats).	<b>Examples</b> Omnivores and carnivores (e.g., humans, dogs, swine).

(b) State the conditions that predispose ruminants to bloat as digestive disorder. (04marks)

- feeding on mostly on forages that are low in fibre and high in protein
- Type of animals: some animals are susceptible to bloat

(c) Suggest control measures for bloat. (09marks)

- control the amount of succulent feeds and younger pastures fed to the animals
- carry out drench using any vegetable oil
- use stomach tube to release gas from the stomach
- drenching using anti-bloat drugs, cooking oil or beer to stop production of acids
- use of trocar or cannula to puncture the lumen to allow escape of gases
- exercising the animal
- Use of broom stick method i.e. wooden rod is inserted across the mouth to keep the mouth open to allow escape of gases from the rumen
- avoid giving the animal cassava, excess grain and protein concentrate

#### SECTION D (20MARKS)

#### AGRICULTURAL ENGINEERING

Answer one question from this section

6. (a) Outline the factors that determine a farmer's choice of tools and implements to buy for use on a farm. (10marks)

- **Adaptability:** farmers prefer implement that can work under the local conditions.
- **Availability of implement:** farmers select an implement from those available and those with available spare parts.
- **Cost of purchase and maintenance:** farm equipment should be cheap to buy and maintain.
- **Durability:** farmers prefer durable equipment
- **Number of uses:** farmers prefer a versatile machine that performs a number of tasks.
- **Size of the farm:** big farms require big machines
- **Presence of source of power:** some farm machines such as milking machines require electricity.
- **Presence and level of skilled manpower:** some machines require skilled manpower for example use of a tractor.
- **Topography:** for instance ragged terrain does not favor use of a tractor.
- **Level of production:** high level production requires large machines
- **Availability of capital** to purchase the equipment.
- **Efficiency of the machine.**



- (b) Explain the measures that should be taken to ensure efficient use of farm tools and equipment (10 marks)
- Sharpen the tool before and after use.
  - **Lubricate machines to reduce friction:**
  - Machines should be used for purpose intended for/according to manufacturer's recommendations
  - Store tools in a dry, well-ventilated area.
  - **Clear the field of** stones, tree stumps and other obstacles before using a machine.
  - **Regular maintenance:** machines should be used when in good mechanical conditions
  - Machine work well on gentle slope than on steep slopes.
  - Machine work well with little sparse vegetation than dense thick vegetation
  - **Soil type:** machines work efficiently in light soils than in heavy soils.

7. (a) Outline the procedure of making a foundation for a farm building. (06marks)

(b) Explain the factors that may cause foundation failures. (10marks)

- Poor soil that encourage sinking of the foundation
- Too small a foundation offering too little a surface area to handle weight
- Shallow foundation
- Poor mixing of building material
- Insufficient building material
- Poor grade building material
- Use of inexperienced mason and builder who lacks necessary knowledge.
- Poor draughtsman ship with inherent faults that are transmitted to the building.

(c) Outline the characteristics of a good foundation for building. (04marks)

- Should Strong and stable base for the superstructure.
- Should be weather resistant such as flood, decay-resistant materials (reinforced concrete or preservative treated wood).
- Elements sized for appropriate structure loads and local soil conditions.
- Proper connections and anchors to transfer loads between the foundation and the rest of the structure.
- Transfers structural loads evenly into the ground.
- Prevents cracks and settlement of the building.
- Should withstand the effects of ground movement/earth quakes.
- Extends below the frost line to prevent damage from freezing

## SECTION E (20MARKS)

### AGRICULTURAL ECONOMICS

Answer one question from this section

8. (a) Explain the factors that affect the interest rate charged on agricultural credit. (10marks)

- **Government policy:** The central bank of a country controls the money supply and the base rate of interest through its monetary policy.
- **Economic strength:** A strong economy tends to have higher interest rates to control inflation and attract foreign investment.
- **Inflation:** A high inflation rate reduces the purchasing power of a currency and increases the cost of borrowing.
- **Supply and demand:** The availability and demand of agricultural credit in the market influences the interest rates.
- **Credit risk:** The risk of default by the borrower affects the interest rate charged by the lender.
- **Government subsidies**
- **Size of a loan big loans attract smaller interest**
- **Duration of loan repayment**
- **Previous loan repayment history**

(b) Suggest measures that should be put in place to make the use of agricultural credit more effective. (10marks)

- Provision of extension services / education to farmers on how to use loans.
- Improvement of loan supervision to ensure prompt payment.
- Improving loan recovery program by encouraging part repayment over a period of time.
- Improving staff training for effective co-ordination with farmers.
- Provide farmers with inputs at fair prices for easy repayment.
- Provide farmers with loans in kinds like fertilizers, pesticides, improved seeds etc.
- Organize marketing of farmers produce at fair prices.
- Give loans to farmers in time or at the correct time to reduce risks.
- Give adequate grace period to allow loan payment to take place easily.
- Charge fair interest rates that can be met by the farmers.
- Help farmers to identify viable projects for investment.
- Lengthen repayment periods.

9. (a) Discuss the factors that determine the availability of labour in production process. (12marks)

- (i) Health conditions of the workers: healthy workers are able to work long hours compared to sickly worker
- (ii) Motivation in terms of salaries and allowances.
- (iii) Good working conditions such as housing, transport and health allowances attract many laborers.
- (iv) Population size: a high population leads to provision of labor e.g. china
- (v) Retirement age: high retirement age guarantees a high labor supply.
- (vi) Immigration and emigration (increases or decrease labor)
- (vii) Labor mobility: high labor mobility leads to high labor.
- (viii) Working time: as number of working time increases supply of labor also increases.
- (ix) Strength of trade unions: these can reduce the number of people employed by fixing a minimum wage.
- (x) Nature of work: heavy and risky work attracts fewer laborers.
- (xi) Level of education and skills: highly skilled jobs have fewer workers
- (xii) Political stability: a stable country has more people willing to work than unstable country.
- (xiii) Government policies such as minimum age of a laborer and minimum wage may reduce the number people employed
- (xiv) Attitude toward agriculture
- (xv) Level of advertisement of agricultural work
- (xvi) Rural-urban migration reduce supply of labor on the farms

(b) Suggest ways of improving labour efficiency on a farm. (08marks)

- on job training
- effective supervision/management
- encouraging specialization
- providing incentives such as attractive salary
- improving technology
- timely payment of wages
- provision of job security
- division labor among employees
- favorable climate/temperature
- maintaining good health of workers

**Please obtain free downloadable notes of general paper, biology, economics, geography etc. from [digitalteachers.co.ug](http://digitalteachers.co.ug) website**

**Thanks**

**Dr. Bbosa Science**