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UACE P515/2 Principles and practices of agriculture2 2018

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 (20MARKS)

Question1 is compulsory

1. An experiment was carried out on maize seeds to find change in starch and sugar content of seeds during germination in darkness. The results of the experiment are shown in Table 1.
Study the table and answer questions that follow

Days from start of experiment	Sugar content (g)	Starch content (g)
2	5	35
4	10	30
6	20	20
8	35	15
10	34	5
12	31	2.5

- (a) On the same axes, plot a graph of changes in starch and sugar content against days from start of the experiment (04marks)
- (b) Describe the shape of each curve on the your graph (04marks)
- (c) Explain the relationship between the two curves (09marks)
- (d) What is the role of water in germination? (03marks)

SECTION B (20MARKS)

CROP PRODUCTION

Answer **one** question from this section

2. (a) Explain ways through which soil becomes acidic (04marks)
(b) What is the importance of limes to soil? (07marks)
(c) Explain factors considered before applying lime to soil. (09marks)
3. (a) What is meant by biological control of a crop pest? (02marks)
(b) Explain characteristics of good biological pest control agent. (09marks)
(c) Give the advantages of controlling pests using biological control method (09marks)

SECTION C (20MARKS)

ANIMAL PRODUCTION

Answer **one** question from this section

4. (a) Describe management practices carried out on a piglet during the first week of its life. (14marks)
(b) Give reasons for the popularity of pigs in Uganda. (06marks)
5. (a) What is digestibility (02marks)
(b) Explain factors that influence digestibility of feeds. (12 marks)
(c) Explain why allowance is given for extra ingredients during feed formulation. (06marks)

SECTION D (20MARKS)

AGRICULTURAL ENGINEERING

Answer **one** question from this section

6. (a) Explain the criteria used to select farm machines (08marks)
(b) Discuss ways of encouraging mechanization in agricultural production. (07marks)
(c) Outline farm operation that can be mechanized. (05marks)
7. (a) Explain factors that should be considered when choosing materials for construction on a farm. (10marks)
(b) Suggest possible causes of weakness in farm buildings. (06marks)
(c) What are the characteristics of a good farm store? (04marks)

SECTION D (20MARKS)

AGRICULTURAL ENGINEERING

Answer **one** question from this section

8. (a) Examine the consequences of a high population on agricultural production. (12 marks)
(b) Suggest measures that can be taken to meet the food demands of the growing population in Uganda (08 marks)
 9. (a) Outline the roles of agricultural research institution in Uganda. (05marks)
(b) Explain ways in which government can promote agricultural development in Uganda (15marks)
- END

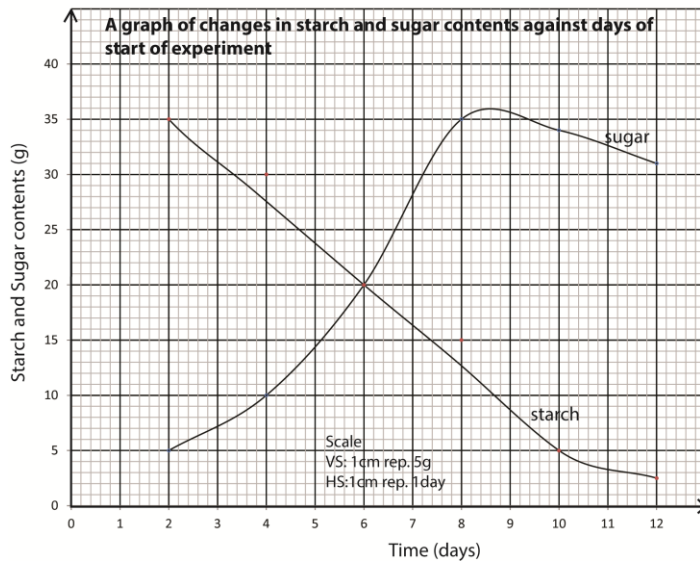
Suggested answers

1. An experiment was carried out on maize seeds to find change in starch and sugar content of seeds during germination in darkness. The results of the experiment are shown in Table 1.

Study the table and answer questions that follow

Days from start of experiment	Sugar content (g)	Starch content (g)
2	5	35
4	10	30
6	20	20
8	35	15
10	34	5
12	31	2.5

- (a) On the same axes, plot a graph of changes in starch and sugar content against days from start of the experiment (04marks)



- (b) Describe the shape of the shape of each on your graph
- The sugar content increase exponentially from 5g of the 2nd day of germination to 35g of sugar on the 8th of germination, then gradually decreased to 31g on the 12th day of germination
 - Starch content gradually decreased from 35g on the 2nd day of germination to 2.5g on the 12th day of germination
 - The starch and sugar contents are equal on the 6th day of germination.
- (c) Explain the relationships between the two curves
- Starch content decreased because it was being converted to sugars whose contents increased. From the 8th the sugar contents gradually decrease because respiration was faster than the rate of formation of sugars from starch.
- (d) What is the role of water in germination?
- Dissolves the stored substances in the endosperm
 - Hydrolyses starch to sugars
 - Is a medium of transport of sugars and dissolved nutrients

- Medium of cellular reactions
- Component of tissues formed.

SECTION B (20MARKS)

CROP PRODUCTION

Answer **one** question from this section

2. (a) Explain ways through which soil becomes acidic

- Application of organic manure: decomposition of organic manure produces acidic substances
- Application of Sulphur and nitrogen containing inorganic fertilizers
- Leaching of bases such as calcium, magnesium and potassium leaving aluminium ions.
- Water logging cause anaerobic respiration that produce carbon dioxide and lowers pH
- Acidic rain
- Acidic parent rock from which soil is formed
- Uptake of bases by the plant roots and replaced by hydrogen ions from the plants.
- Release of acidic industrial and domestic wastes.
- Water logging causes acidic hydrolysis of salts such aluminium salts.

(b) What is the importance of lime to the soil?

- Improve soil structure by binding soil particles
- Neutralizes acidic soils
- Supplies calcium to the soil
- Binds soil particle to make aggregates that improves soils aeration and drainage.
- Prevents some plant diseases such as fungal diseases
- Makes availability of plant nutrients such phosphorus and nitrogen
- Make clay soil less sticky and easy to till
- Promotes soil organism's activity and nitrogen fixation in root nodule
- Promotes decomposition of organic matter.
- Reduces toxicity of aluminium

(c) Explain factors to be considered before applying lime to the soil

- pH of the soil; the amount of lime required depends on the acidity of the soil
- size of particles of limestone or carbonates: this affects the solubility
- type of crops grown; different crops require different pH
- the amount of manganese and aluminium present
- The texture of the soil: fine textured soils have high cation adsorption capacity and less leached than coarse textured soil so more lime is applied.
- The amount of organic matter in the soil. Soil with much organic matter requires more lime because it has high cation adsorption capacity.

- Depth of the soil: deeper soil experiences high rate of leaching and thus requires larger amounts of lime.
- Frequency of application of lime; infrequent application of lime requires high amount per application.
- Fineness of limestone or carbonate used

3. (a) What is meant by biological control of a crop pest? (02marks)

This is the control of the pest population below the economical threshold using their natural enemies in form of predator, pathogen, parasite etc.

(b) Explain characteristics of good biological pest control agent. (09marks)

- Must have high searching ability
- Should be adaptable to wide range of environments
- Should be host specific
- Should have ability to multiply in order to control the target organism
- Should not cause a lot of damage to crops and animals
- Should be easily raised artificially
- Should be easy to distribute/apply

(c) Give the advantages of controlling pests using biological control method (09marks)

- It requires less labor
- It is selective to the target organism
- Long lasting from season to season
- Can be easily employed to remote areas
- cheap

SECTION C (20MARKS)

ANIMAL PRODUCTION

Answer **one** question from this section

4. (a) Describe management practices carried out on a piglet during the first week of its life. (14marks)

- Remove them from the birth place to a safe place in a sty and check whether they are fine.
- Provide them with warmth
- Label, Weigh and record the weight and sex of each
- Take care and treat the umbilical cord
- Allow the piglet to suckle colostrum from the sow
- Clip the needle teeth of the piglet using teeth clippers as they tend to damage the sows' teats.

- Around 2th – 4th days provide iron to the piglets either as injection or orally in form of iron pill.
- Dock of the tails to prevent tail biting in future.
- Castrate the male piglets at the end of the week.
- Vaccinate the piglets against common diseases
- Provide guard rails in the sty to protect piglets from accidental damage by the sow

(b) Give reasons for the popularity of pigs in Uganda. (06marks)

- Pigs require a small area since they can be confined under the intensive system of management and do not require a large area of grazing as ruminants do.
- Little initial capital is required as compared to dairying and fish farming.
- They consume most of the food remains reducing wastage of feeds on the farm and lowering feed costs.
- Pigs provide high returns fast
- It is adapted to specialized and diversified farming system
- They produce high quality manure which can be used in the gardens.
- Pig rearing creates extra employment for the family and the population especially in places with established pig industries.
- Pigs produce hard fat that can be used in the manufacture of soap.
- Pork is easily marketable
- Pigs are highly prolific which increases profits faster
- Pigs tolerate a wide range of environmental conditions
- Pig provide enjoyed and nutritious meat

5. (a) What is digestibility

It is the measure of the extent of feed is digested

Or

It is the proportion of food absorbed by the animal's body

Or

It is the oral-fecal difference of the feed

(b) Explain factors that influence digestibility of feeds

- the type and chemical composition of the feed for instance presence of trypsin inhibitor in soya bean.
- The level of processing subjected to the feed prior to serving. Highly processed feeds say by grinding increases digestibility.
- Health condition of the animal; healthy animals easily digest feed
- Type of animals; ruminants have advance digestive system to digest and absorb food
- Physiological state of the animal; this affects nutrient requirements for example lactating mothers and laying birds there is high digestibility of feed with high protein content.

- Age of animals; feed digestibility increases with and later decreases with age due to increase and then decrease with nutrient requirements with age
- The animal species; ruminants have high digestibility for roughages
- The ratio of energy to protein in the feed
- Quantity of food in alimentary canal of the animal
- Amount of water consumed

(c) Explain why allowance is given for extra ingredient during feed formulation

- To cater for variation of nutrient composition of feed stuff
- To cater for nutrient losses during feed processing and prolonged storage
- To provide label guarantee
- To cater for animals that may require higher than average nutrient requirements
- To cater for losses due to feed spillage during serving and feeding.

SECTION D (20MARKS)

AGRICULTURAL ENGINEERING

Answer **one** question from this section

2. (a) Explain the criteria used to select farm machines (08marks)

- **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) Discuss ways of encouraging mechanization in agricultural production. (07marks)

- Sensitize farmer about the benefits of mechanization
- Encourage group ownership since agricultural machines are expensive
- Provide incentives and subsidies on agricultural equipment
- Train machine operators and mechanics
- Encourage land consolidation to create commercial size pieces of land

- Create market for agricultural produce to encourage farmers to invest on the farm
- Creation of technical engineering workshops at the districts
- Provide agricultural credit and subsidies for purchase of machinery.

(c) Outline farm operation that can be mechanized. (05marks)

- Ploughing, tillage using tractor and ox plough, harrow and rotators used in secondary tillage.
- Planting using tractors or ox plough planter and seeders
- Fertilizer application using fertilizer broadcaster and drills
- Weeding using weeders that are powered by ox plough
- Irrigation using pressurized mechanisms
- Harvesting using tractors mounted harvester or combine harvesters
- Threshing and winnowing using motorized threshing machines
- Milking using milking machines

3. (a) Explain factors that should be considered when choosing materials for construction on a farm. (10marks)

- Cost of construction material, cheaper materials are preferred.
- The durability; durable materials are preferred
- Technology needed
- Availability of the material
- Capital to purchase building materials and pay labour.
- Farmers preference of the material
- The strength of the materials/ability to resist stress and strain
- The ease to work with the materials e.g. painting, vanishing, oiling
- The type/nature of the material e.g. plastic, wood, metal etc.

(b) Suggest possible causes of weakness in farm buildings. (06marks)

- 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) What are the characteristics of a good farm store? (04marks)

- Should well ventilated for proper aeration
- Should be lockable for security
- Should be fire proof.

- Should be protected from pests
- Should have leak free roof to keep inside dry
- Should have concrete floor to minimize dust
- Should have enough light

SECTION D (20MARKS)

AGRICULTURAL ECONOMICS

Answer **one** question from this section

4. (a) Examine the consequences of a high population on agricultural production. (12 marks)

Positive consequences

- It increases the size of the domestic market for both the manufactured and agricultural products.
- It encourages Labor mobility. This is because many young people can easily move to other areas in search of employment.
- It stimulates rapid economic growth. This is due to the expansion of investments as a result of increase in market size.
- It increases Labor supply and mobility in the country. **This increases output hence economic**
- The big population puts pressure on the government to provide social services so as to meet the basic needs of people.
- Stimulates investment
- increased exploitation and utilization of resources
- encourages innovations and inventions

Negative consequences

- It leads to low standards of living. This is due to high cost of living and low per capita income.
- It leads to over straining of the available social amenities like water supply, medical services, electricity, roads etc.
- It leads to food shortage in the economy. This results in famine and malnutrition hence poor health conditions.
- It leads to excessive demand for goods and services in the economy hence demand pull inflation.
- It leads to balance of payment problems. This is due to increased importation of commodities in the country.
- It encourages rural urban migration with its associated problems. This is because people leave the rural areas to come and enjoy the better services in urban areas.
- It increases the levels of unemployment and under employment in the economy as a result of excess population.
- It leads to over exploitation of natural resources hence environmental degradation in form of pollution.
- It reduces government tax revenue in case the majority of the people are poor.

- It encourages political instabilities in form of civil wars due to the excessive pressure on the government for social
- It increases dependence burdens in the economy. This discourages savings and investments due to high consumption expenditure.
- leads to income inequality
- High social costs in form of pollution
- it results in brain drainage
- Limited domestic market due to low income

(b) Suggest measures that can be taken to meet the food demands of the growing population in Uganda (08 marks)

- Intensive farming to produce food in small space
- Large scale farming to ensure large food production
- Mechanization of agricultural production
- Use of improved planting material and animals
- Use of improved production techniques such as use of fertilizers and pest control.
- Land reclamation to increase agricultural land
- Agro-processing to increase self-life of food and reduce wastage
- Importation of food to supplement local production
- Improved transport system to allow movement of food from where it is produced to where it is required.

5. (a) Outline the roles of agricultural research institution in Uganda. (05marks)

- They develop new farming machinery or improve existing ones e.g. Namalere research station.
- They develop new crop varieties through crop breeding.
- They conduct animal selection
- They train agricultural professions
- Produce and sell planting materials
- Work as demonstration farm to the farmer

(b) Explain ways in which government can promote agricultural development in Uganda (15marks)

- Liberalization of agriculture enabling private investors.
- Construction of dams and setting up irrigation schemes to enable cropping throughout the year.
- Provision of agricultural inputs such as fertilizers at subsidized prices.
- Development of improved planting materials.
- Provision of agricultural extension services.
- Provision of better tools equipment and cheap short and long-term credit.
- Encourage and assist farmers to form cooperative unions to source cheap inputs and market for the produce.
- Provision of water through valley dams and borehole to livestock in dry areas.
- Improvement of road network in rural area to enable marketing of produce and acquisition of inputs
- Construction of collection centres and modern storage facilities for produce.

- Promote agro-processing in order to add value to agricultural produce.
- Universal education to reduce illiteracy and ignorance
- Land reclamation to increase agricultural land

END

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Dr. Bbosa Science