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UACE P515/2 Principles and practices of agriculture2 2014

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. Table 1 shows yield in kilograms per hectare in a ear, of two pasture species grown in pure and mixed stands. Study the information and answer the questions that follow.

Table 1

Types of stand	Pure	pure	Mixed	
Pasture plant species	Elephant grass	Lablab	Elephant grass	Lablab
Performance yield (kg/ha)	58,624	45,376	64,120	42,228

- (i) Compare the yield performance of each pasture plant species in pure and mixed stands. (02marks)
 - (ii) Suggest explanation for the performance of each pure pasture plant species when grown in mixed stand. (7 ½ marks)
- (b) What would be the effect on the nutritive value of each plant species when grown in a mixed stand? (4 ½ marks)
 - (c) What would be effect of feeding livestock on both elephant grass and lablab? (06marks)

SECTION B (20MARKS)

CROP PRODUCTION

Answer **one** question from this section

2. (a) Explain why farmers are encouraged to integrate trees in their crop gardens. (06marks)
- (b) Describe the characteristics of a tree species good for conserving soil. (08marks)
- (c) Outline the causes of deforestation in Uganda. (06 marks)
3. (a) Describe the various ways of improving water retention in the soil. (12marks)
- (b) Explain importance of adequate moisture in the soil. (04marks)
- (c) What dangers are associated with excess moisture in the soil? (04marks)

SECTION C (20MARKS)

ANIMAL PRODUCTION

Answer **one** question from this section

4. (a) Explain the procedure of milking a cow by hand with emphasis on the milking techniques. (09marks)
- (b) Outline the various stages in the processing of fluid milk for marketing. (09marks)
- (c) Outline the causes of the major off-flavors common in milk. (05marks)
5. (a) Outline the causes of infertility in cattle (04marks)
- (b) Describe how you would collect and process semen for breeding purposes. (12marks)
- (c) Explain the factors that determine the success of artificial insemination. (04marks)

SECTION D (20MARKS)

AGRICULTURAL ENGINEERING

Answer **one** question from this section

6. (a) Outline the imitations of using live fences on a farm. (06marks)
- (b) Explain the following methods of treating wooden posts for fencing?
 - (i) Hot and cold soaking (06marks)
 - (ii) End diffusion (06 marks)
- (c) Give four chemicals commonly used to preserve wooden posts. (02marks)
7. (a) Outline the uses of tractors on farms (08marks)
- (b) Explain why tractors drawn implements is not commonly Used in Uganda (12marks)

SECTION D (20MARKS)

AGRICULTURAL ECONOMICS

Answer **one** question from this section

8. (a) (i) Explain the role of an entrepreneur in farm production. (04 marks)
(ii) What are the decision that should be made in agricultural production? (04marks)
- (b) Using examples, explain the following product relationship (12mark)
- (i) Joint products
 - (ii) competitive products
 - (iii) supplementary products
 - (iv) complementary products
9. (a) What is meant by price elasticity of demand (02marks)
- (b) Using illustrations, describe the following types of elasticity of demand. (06marks)
- (i) elastic demand
 - (ii) inelastic demand
 - (iii) Unitary demand
- (c) Explain the factors that may lead to drop in demand for agricultural commodities. (12 marks)
- END

Suggested answers

1. Table 1 shows yield in kilograms per hectare in a year, of two pasture species grown in pure and mixed stands. Study the information and answer the questions that follow.

Table 1

Types of stand	Pure	pure	Mixed	
Pasture plant species	Elephant grass	Lablab	Elephant grass	Lablab
Performance yield (kg/ha)	58,624	45,376	64,120	42,228

- (a)(i) Compare the yield performance of each pasture plant species in pure and mixed stands. (02 marks)

There are high yields of elephant grass in mixed stand than in pure stand while the yield of lablab is higher in pure stand than in mixed stand.

- (ii) Suggest explanation for the performance of each pure pasture plant species when grown in mixed stand. (7 ½ marks)

- In the mixed stands elephant grass produces higher yield because lablab fixes nitrogen to the soil and acts as cover crop that conserves soil moisture thereby promoting growth of elephant grass.
- The yield of lablab decreases in mixed stand because of competition for light, water, nutrients and space with elephant grass.

- (b) What would be the effect on the nutritive value of each plant species when grown in a mixed stand? (4 ½ marks)

- The nutritive value of elephant grass increases due to added nitrogen in the soil by lablab
- The nutritive value of lablab decreases in the mixed stand due to competition for light and nutrients

- (c) What would be the effect of feeding livestock on both elephant grass and lablab? (06 marks)

- Nutritional balance i.e. proteins and vitamins from lablab and fibers from elephant grass
- improved weight gain
- the combination improves the overall digestibility of the feeds, making it easier for animals to absorb nutrients
- Improved palatability: animals tend to consume more when lablab is mixed with elephant grass, leading to higher feed intake.

SECTION B (20 MARKS)

CROP PRODUCTION

Answer **one** question from this section

2. (a) Explain why farmers are encouraged to integrate trees in their crop gardens. (06marks)
- Trees provide shades for animals.
 - Legumes planted fix nitrogen in the soil.
 - Trees are a source of fodder to livestock.
 - Some trees provide fruits that are food to man.
 - They are a source of firewood
 - Provide materials for construction
 - Leaves decomposed to form humus.
- (b) Describe the characteristics of a tree species good for conserving soil. (08marks)
- Should have deep and extensive root systems anchor the soil, reducing soil erosion and improving soil structure.
 - Should have dense canopy to reduce the impact of raindrops on the soil surface preventing splash erosion
 - Should have ability to fix nitrogen
 - Should have High Organic Matter Contribution in form i.e. lot of leaves and organic material contribute to the formation of humus, which improves soil fertility and structure.
 - Should resist strong winds and thus act as wind breakers to reduce wind erosion
 - Should be adaptable to local conditions to thrive and provide long-term conservation
- (c) Outline the causes of deforestation in Uganda. (06 marks)
- Increased demand for timber for paper, building and construction industry leads to cutting down trees and consequently deforestation. An example is the allocation of Namanve plantation forest to development of industries.
 - High energy demand especially wood fuel in domestic and industrial sector. Firewood constitutes over 80% energy requirement in Uganda for domestic cooking, firing bricks and preservation of fish at the fish landing sites such as Kasenyi fish landing site. In the rural areas such as Nakasongola firewood is almost the only source of fuel for cooking and light.
 - Extension of rural and urban settlements which have led to clearing of forests and conversion of green space into built up areas for example the expansion of Kampala has eaten up all wetlands around it such as Kyambogo-Kireka wetlands.
 - Increased demand for agricultural land, trees are cut to provide land for crop growth and rearing of animals. For instance there is massive deforestation in Kalangala district to grow palm oil trees; and part of Mabira forest has been cleared to grow sugarcane for commercial production of sugar.
 - Deforestation also occurs due to natural causes such as bush fires, pest and diseases, land slides, volcanic eruptions, earthquakes, climate changes, floods and droughts.

- Transport leads to massive forest clearance to make ways for roads, railway and airports for example Northern bypass.
 - Security concerns e.g. pest eradication in Mayuge district and removal of rebels hideouts.
 - Corruption by forest officers that fail to enforce forest protection laws.
 - Mining and quarrying is another cause of deforestation; for instance mining of copper at Kilembe mine led to massive deforestation in Kasese.
3. (a) Describe the various ways of improving water retention in the soil. (12marks)
- Increase organic matter like compost and peat moss in your soil.
 - Till less frequently.
 - Keep your soil covered or mulched.
 - Use soil amendments like perlite, vermiculite or biochar
 - Plant cover crops like clover or legume to improve soil structure and reduce soil erosion
 - Plant windbreaks to reduce wind erosion
 - Remove weeds that would compete with the plants for water
- (d) Explain importance of adequate moisture in the soil. (04marks)
- It is a medium/solvent 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 for transpiration and cooling of the plant.
 - Helps biological decomposition of dead plant remaining into humus
 - Regulates soil temperature i.e. evaporation of water from the soil cools it
 - Soften soil and ease root penetration and cultivation
 - Promote seed germination
- (e) What dangers are associated with excess moisture in the soil? (04marks)
- Insufficient supply of oxygen, which slows or stops plant growth.
 - Accumulation of carbon dioxide, which impedes the growth of plant roots.
 - Inhibition of aerobic respiration, limiting energy metabolism and restricting growth and developmental processes.
 - Promotes denitrification leading to loss of soil fertility
 - Leads to accumulation of toxins in the soil
 - Promotes rotting of roots
 - Photosynthesis decline due to closure of stomata, degradation of chlorophyll
 -

SECTION C (20MARKS)

ANIMAL PRODUCTION

Answer **one** question from this section

4. (a) Explain the procedure of milking a cow by hand with emphasis on the milking techniques. (09marks)

(i) Gather Your Equipment:

- Clean stainless steel bucket
- Clean rags
- Milking stool
- Iodine teat dip
- Warm water and anti-bacterial soap
- Nitrile or latex gloves (optional)

(ii) Position the Cow:

- Tie the cow securely to prevent movement.
- Ensure the cow is comfortable and calm.
- Clean the Teats:
- Wash the teats with warm water and anti-bacterial soap.
- Dry the teats with clean rags.

(iii) Start Milking:

- Sit on the milking stool beside the cow.
- Grasp the teat with your thumb and forefinger, then gently squeeze and pull down to express the milk.
- Continue this motion, alternating between teats, until the udder is empty.

(iv) Post-Milking Care:

- Dip the teats in iodine solution to disinfect them.
- Strain the milk through a clean cloth or filter into a storage container.
- Refrigerate the milk promptly.

- (b) Outline the various stages in the processing of fluid milk for marketing. (09marks)

- (i) milk is collected and transported to the processing plant
- (ii) at the processing plant milk is received and test for quality and safety
- (iii) milk clarified by filtering to remove solid impurities
- (iv) milk is standardized i.e. the fat content of the milk is adjusted to create different types of milk (e.g., whole, skim, low-fat).
- (v) Milk is pasteurized to kill bacteria without affecting nutritional value.

- (vi) Milk is homogenized or fat molecules are broken down so that they remain evenly distributed and cream is prevented from separating out
- (vii) Milk is cooled rapidly and stored in large refrigeration tanks until it is ready for packaging
- (viii) The milk is packaged into bottles, cartons and /or other containers in sterile environment to prevent contaminated
- (ix) Packaged milk is sent to the market for sale

(c) Outline the causes of the major off-flavors common in milk. (05marks)

- Bacterial contamination
- Poor sanitation or use poorly cleaned milk containers
- Animal diet such as that which contains wild onion or garlic
- Environmental factors such as poor ventilation in the barn can lead to a 'barny' odor in milk. Actually milk has ability absorb flavors from the environment
- Metabolic disorders such as ketosis can cause the milk to have unusual smell, like acetone while milk that contain lipase easily become rancid
- Oxidation: exposure to light or metals can cause the milk to oxidize, leading to cardboard-like or metallic smell.
- Sulfur compounds: Milk contains small amounts of sulfur-containing compounds, like methionine and cysteine, which can produce a slightly sulfurous or "eggy" smell when broken down.
- Milk can get bad odor due to treatment with some drugs

5. (a) Outline the causes of infertility in cattle (04marks)

- **Inheritance:** some families of animals inherit low fertility from their parents.
- **Twinning in cattle:** Although it's rare in cattle, but when it happens, heifers born co-twin with males (free martins) can be sterile.
- **White heifer's disease:** This is infertility which is caused when the hymen is too strong and thus preventing natural mating or artificial service of the cow.
- **Cryptorchidism:** This is when the male animals are born with both testes retained in the abdominal cavity making it unable to produce sperms.
- **Retained corpus luteum:** this prevents the development of the eggs in the ovary by continuous production of progesterone (maintains pregnancy)
- **Cystic ovaries:** This is when follicles fail to rupture in order to release the ova causing a condition called **Nymphomania** (excessive desire for sex) and the cow is set on prolonged heat.
- **Nutritional deficiency :** Lack of vitamin A which is responsible for the formation and maintenance of membranes in the reproductive system lowers the fertility of cattle

- **Excessive conditioning (fattening) animals:** Heavy fat deposits on the ovary affects its functioning and cause low fertility / infertility.
 - **Management:** Mating the animal too soon after calving, too early or late after onset of heat and failure to recognize heat signs will lead to infertility.
 - Venereal diseases like brucellosis and Trichomoniasis can also cause low fertility in farm animals.
 - Unfavorable conditions in the reproductive tract of a female can cause infertility
 - Use of defective sperms during service lowers animal fertility
- (b) Describe how you would collect and process semen for breeding purposes. (12marks)
- Semen are collected through clean artificial vagina
 - Semen are taken the laboratory for analysis for color, volume, sperm concentration, live /dead ratio and progressive motility of sperm
 - If found acceptable, Semen extenders are added to the semen; these protect sperm from cold shock, toxins and provide nutrients to the sperms
 - Semen is then processed as liquid extended semen packaged in straws or frozen semen stored in liquid nitrogen, frozen and stored indefinitely.
- (c) Explain the factors that determine the success of artificial insemination. (04marks)
- Age –younger individuals generally have higher success rates since fertility tends to decline with ages
 - Quality/health of sperms
 - Proper timing of insemination with ovulation
 - Proper introduction of semen into the female

SECTION D (20MARKS)

AGRICULTURAL ENGINEERING

Answer **one** question from this section

6. (a) Outline the imitations of using live fences on a farm. (06marks)
- Live fences require regular maintenance including pruning, watering and pest control
 - Live fences take time to establish
 - Live fences are susceptible to pests, diseases and weather vagaries
 - Live fences take up a big space
 - Live fences requires a big initial capital for planting and watering and care
 - Some fence species are invasive
 - Some fence species are eaten and destroyed by animals
- (b) Explain the following methods of treating wooden posts for fencing?
- (i) Hot and cold soaking (06marks)

- Select wood to be treated
- Use a suitable preservative that can be safely heated

Hot soaking

- Heat the preservative to a recommended temperature. This helps better penetration of the preservative into the wood
- Submerge the wood completely in the hot preservative for a specified period of time.
- Remove the wood from the preservative and dry completely before use

Cold Soaking:

- After hot soaking, immediately transfer the wood to a cold preservative bath. This sudden temperature change causes the wood to contract, creating a partial vacuum that draws more preservative into the wood.
- Leave the wood in the cold bath for an extended period, often several hours to a few days, to ensure deep penetration.

Drying:

- Take the wood out of the cold bath and allow it to drain.
- Let the wood dry completely before use. This can take several days to weeks, depending on the wood type and environmental conditions.

(ii) End diffusion (06 marks)

- The wood is cut to desired size and shape
- The ends of the wood pieces are dipped or brushed with a preservative solution
- The treated wood is then stacked and covered to allow the preservative to diffuse from the treated ends into the rest of the wood which can take several weeks depending on the type of wood and preservatives.
- After the diffusion process is complete, the wood is allowed to dry either naturally or in a kiln.
- The wood is inspected to ensure the preservative has penetrated adequately and that the wood is ready for use.

(c) Give four chemicals commonly used to preserve wooden posts. (02marks)

- Alkaline copper quaternary (ACQ)
- Borates
- Copper azole
- Copper naphthenate
- Copper-HDO (Bis- (Ncyclohexyldiazoniumdioxy-copper)

7. (a) Outline the uses of tractors on farms (08marks)

- Plowing and tilling
- Planting
- Harvesting
- Removing heavy objects like tree stumps and stones
- Transporting materials
- Spraying fertilizers
- Irrigating land
- Mowing and brush hogging

(b) Explain why tractors drawn implements is not commonly Used in Uganda (12marks)

- Unavailability of tractors
- High maintenance cost
- Poor land tenure system which discourage long term planning
- Land fragmentations that make it uneconomical to use tractors.
- Lack of adequate capital to purchase tractors.
- Presence of cheap human labour.
- Requires skilled manpower
- Ragged terrain prevents use of tractors
- Use of tractors may expose land to soil erosion
- High taxes on purchase of tractors
- High interest rate on money borrowed to purchase tractors

SECTION D (20MARKS)

AGRICULTURAL ECONOMICS

Answer **one** question from this section

8. (a) (i) Explain the role of an entrepreneur in farm production. (04 marks)

- provide required capital on the farm
- he bears all risks and losses
- Planning for the farm i.e. making decisions for running of a farm
- Manages the farm
- Purchase of inputs and machinery
- Marketing of produce
- Keeps farm records
- Identifies viable business opportunities

(ii) What are the decision that should be made in agricultural production? (04marks)

- What to produce
- When to produce
- How to produce
- How much to produce
- Number of enterprises
- How much to invest
- Source of finance

(b) Using examples, explain the following product relationship (12mark)

(i) Joint products

These are two or more separate commodities that are produced by the same process; examples include milk and butter, wool and mutton, and petrol and heavy oil. If the demand for one increases, the supply of the other will also increase, but its price will fall unless its demand also increases.

(ii) competitive products

These are products that offer the same or identical experience to a customer at similar price points to another organization e.g. sodas (Pepsi and coke).

(iii) supplementary products

Supplementary goods are goods that are used together. For example, phone and air time

(iv) complementary products

Complementary goods are products that are typically used together for example laptop and laptop bag

9. (a) What is meant by price elasticity of demand (02marks)

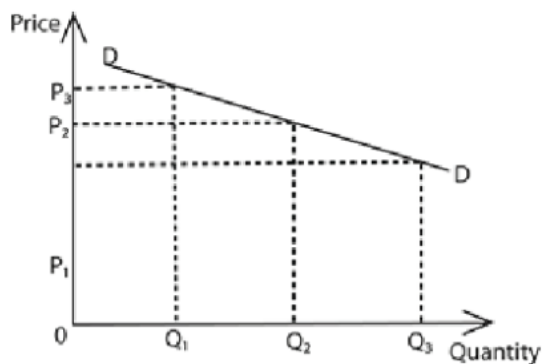
This is the measure of the degree of responsiveness of quantity demanded due to changes in the price of the commodity.

$$\text{Price elasticity of demand (PED)} = (-) \frac{\% \text{ change in quantity demanded}}{\% \text{ change in price}}$$

(b) Using illustrations, describe the following types of elasticity of demand. (06marks)

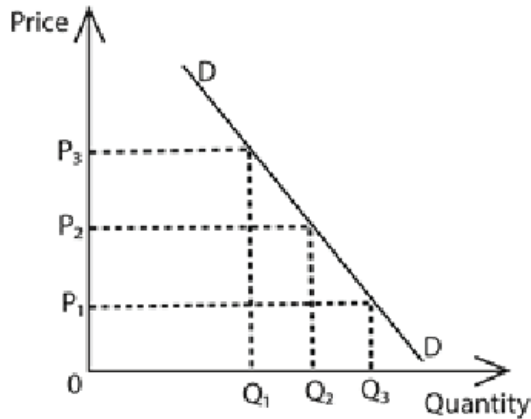
(i) elastic demand

In this case, the price elasticity of demand is greater than one but less than infinity or is between one and infinity. A big percentage change in quantity demanded is due to a small percentage change in price



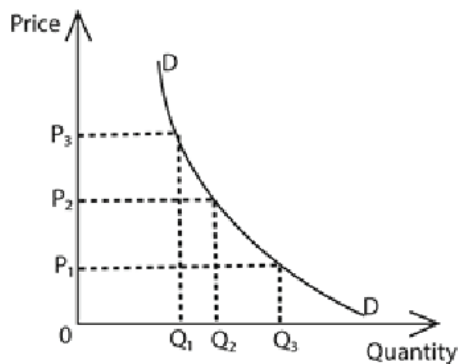
(ii) inelastic demand

In this case, the price elasticity of demand is greater than zero but less than one. A big proportionate change in price leads to a smaller percentage change in quantity demanded.



(iii) Unitary demand

In this case, the price elasticity of demand equals to one. The percentage change in quantity demanded equals to the percentage change in price. It is illustrated by a rectangular hyperbola.



(c) Explain the factors that may lead to drop in demand for agricultural commodities. (12 marks)

- Decrease in the consumer's disposable income
- Decrease in the price of the close substitute.
- An increase in the price of the complement.
- Unfavorable change in tastes and preferences of the consumer
- Expected fall in the future price of the commodity
- A decrease in the size of the population.
- Unfavorable season of the commodity
- Unfavorable government policy like increased taxation of consumers.

- Reduction in the advertisement of the commodity
- Withdrawal of credit facilities offered by the government to consumers
- Changes in extreme weather that disrupts supply chain
- Health concerns about the safety of the product
- Changes in trade policy that restrict export

END

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Thanks

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