



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 agriculture2 2014

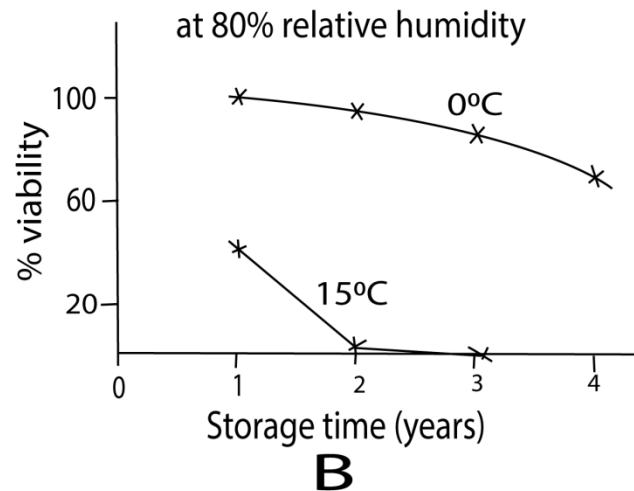
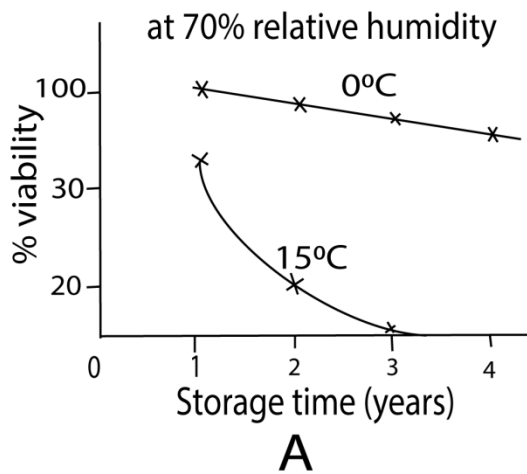
Instructions

- 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. Figure A and B below show the variation of viability of fescue grass seed at different conditions.



(a) From the figured state the factor that affect viability of fescue grass seed (03 marks)

- (b) Explain the shape of the curves in figure A (05marks)
- (c) Compare curves A and B (04 marks)
- (d) Explain the difference in curves of figure A and B (02marks)
- (e) Describe two ways how viability of a seed lot can be established (06marks)

SECTION B (20MARKS)

CROP PRODUCTION

Answer **one** question from this section

- 2. (a) Describe field practice that would promote the higher crop yields. (12marks)
- (b) Outline the effect of diseases on crop production. (08marks)
- 3. (a) Outline the benefits of processing farm produce. (06marks)
- (b) Explain the factors that affect shelf life of farm produce. (14marks)

SECTION C (20MARKS)

ANIMAL PRODUCTION

Answer **one** question from this section

- 4. (a) Explain the mutualistic relationship between microorganisms in the digestive tract of animals and their hosts. (12marks)
- (b) Outline ways in which digestion in ruminants differs from that in non-ruminants. (08 marks)
- 5. (a) Explain the factors that influence the choice of pasture species to be planted in an area. (12marks)
- (b) Outline the signs that indicate the need to improve pasture. (08marks)

SECTION D (20MARKS)

AGRICULTURAL ENGINEERING

Answer **one** question from this section

6. (a) Giving an example in each case, explain the following product-relationships
- (i) Joint products (02marks)
 - (ii) Competitive products (02marks)
 - (iii) Complementary products (02marks)
- (b) The following table shows production of maize at various levels of nitrogen fertilizer application.

Fixed factor	Variable input NPK fertilizer (kg bags)	Total maize production (No. of bags, 90kg each)
1	0	10
1	1	17
1	2	33
1	3	52
1	4	64
1	5	70
1	6	73
1	7	75
1	8	75
1	9	68

- (i) Using the data calculate the marginal product. (05marks)
 - (ii) Plot a graph of Total and Marginal Product against the variable input. (05marks)
 - (iii) Explain the relationship between the Total and Marginal product curves. (02marks)
 - (iv) Using your graph, state when the law of diminishing returns begins to operate. (01mark)
 - (v) What is the importance of the knowledge of diminishing return in agricultural production? (01mak)
7. (a) With the aid of a labeled diagram, describe how prices of agricultural commodities are determined in a free and competitive market. (10marks)
- (b) Illustrate how income of the consumer affects the amount of a commodity demanded other factors remaining constant. (10marks)

SECTION D (20MARKS)

AGRICULTURAL ECONOMICS

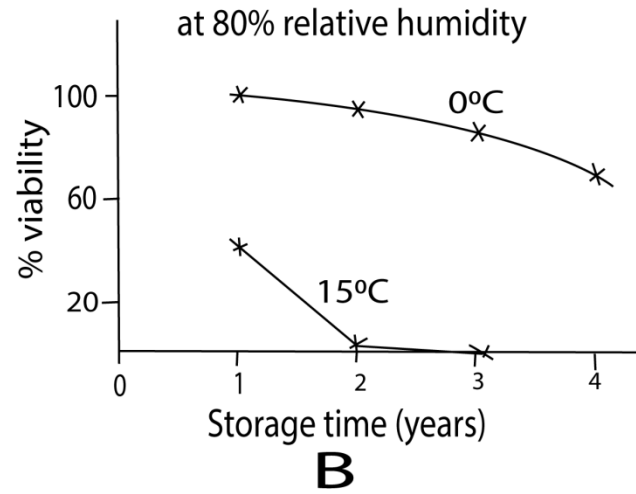
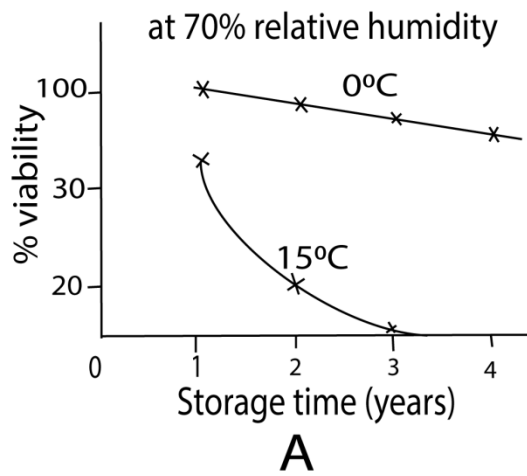
Answer **one** question from this section

8. (a) (i) Explain the meaning of seasoning in timber processing. (02marks)
(ii) Discuss the various methods of seasoning timber. (08marks)
(iii) State the advantages of seasoning wood. (06marks)
(b) Outline the qualities of a good preservative. (04marks)
9. (a) Describe the characteristics of a good livestock house (12marks)
(b) Outline the factors considered when designing a building for housing processing equipment.
(08marks)

END

Suggested answers

1. Figure A and B below show the variation of viability of fescue grass seed at different conditions.



- (a) From the figured state the factor that affect viability of fescue grass seed (03 marks)
humidity

Temperature

Storage time

- (b) Explain the shape of the curves in figure A (05marks)

At zero degrees, viability of seed decreases slowly as the years of storage time increases because of respiration and exhaustion of food reserves, and damage due to pests and moulds

At 15°C, viability of seeds decrease more rapidly as the years of storage time increases because the rate of respiration and exhaustion of food reserves is higher. Also pests and moulds are more active at destroying the seeds.

- (c) Compare curves A and B (04 marks)

The rates of loss of viability of seed in B are higher for both at 0°C and 15°C

- (d) Explain the difference in curves of figure A and B (02marks)

Increase in humidity from 70% in A to 80% in B promoted the rate of respiration and damage to the seed by pests and mould leading to faster loss of seed viability.

- (e) Describe two ways how viability of a seed lot can be established (06marks)

- Germination test: Place a known number of seeds in a moist cloth or paper and calculate the percentage of seeds that germinate.
- Floating test: place the given number of seeds in a container of water for 15 minute; viable seeds will sink while non-viable seeds will float.
- Embryo test: Embryos are removed from the seed and placed in a nutrient solution and then observed to see how many develop further.
- Tetrazolium Test: seeds are soaked in water and then placed in a tetrazolium solution; viable seeds will stain red, indicating active respiration

SECTION B (20MARKS)

CROP PRODUCTION

Answer **one** question from this section

2. (a) Describe field practice that would promote the higher crop yields. (12marks)

- motoring and regulation of soil pH
- crop rotation to maintain soil fertility
- weeding to remove plant competitor
- tillage to improve soil texture, water filtration and aeration
- pest control
- disease control
- Planting high quality seeds and planting materials
- Irrigation when necessary
- Proper spacing of plants to ensure adequate sunlight per plant
- Provide fertilizers as required
- Mulch to maintain soil moisture
- Control soil erosion to protect soil fertility
- Research into high yielding varieties
- Timely planting

(b) Outline the effect of diseases on crop production. (08marks)

- Lower crop yield
- Lower the quality of produce
- Make it difficult to harvest crops due to uneven ripening
- Reduce market value of crop yield
- Cause death of crops
- Stunted growth
- Increase cost of production

3. (a) Outline the benefits of processing farm produce. (06marks)
- Increased shelf life
 - Higher market value
 - Create a variety of products from the same raw material
 - Creates jobs
 - Enhances nutritional value
 - Eases storage
 - Eases marketability
 - Lessens transport costs
- (b) Explain the factors that affect shelf life of farm produce. (14marks)
- Genetic composition
 - Proper handling that minimize damage
 - Temperature: very high temperature enhance decay
 - Humidity: high humidity promote growth of pests and moulds
 - Ethylene gas accelerates ripening and spoilage
 - Poor hygiene promotes contamination and spoilage
 - Antimicrobial treatment lengthen shelf life
 - Pasteurization prolong shelf-life of milk
 - Processing prolong shelf life of produce
 - Refrigeration prolong shelf life
 - Drying promotes shelf life
 - Salting promotes shelf life

SECTION C (20MARKS)

ANIMAL PRODUCTION

Answer **one** question from this section

4. (a) Explain the mutualistic relationship between microorganisms in the digestive tract of animals and their hosts. (12marks)

In mutualistic relationship of herbivores and microorganisms; herbivores and hind gut fermenter benefit in the following ways:

- Microorganisms produce enzymes that break down cellulose to simple carbohydrates such as acetic acids which provide energy to herbivores.
- Microorganisms synthesize useful proteins from non-protein sources for the animals
- Microorganisms synthesize useful vitamins such as K, C and B complexes that are utilized by host animals
- Microorganisms protect ruminant against pathogens
- Microorganisms recycle ammonia gas into proteins

While herbivores provide the following favorable conditions for microorganisms

- Favorable pH (6.2 – 6.8) which maintained by saliva and continuous removal of volatile fatty acid.
- Low level of oxygen since most of these microbes are anaerobic.
- Enough moisture
- Macro minerals and some trace minerals in the rumen needed by microbe.
- Supply of readily fermentable carbohydrates such as sugar and starch
- Adequate supply of energy and nitrogen which enhances microbial activity
- Shelter

(b) Outline ways in which digestion in ruminants differs from that in non-ruminants. (08 marks)

The difference between ruminant and non-ruminant

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.
Produce a lot of fecal material	Produce little fecal material
Examples: Herbivores (e.g., cattle, sheep, goats).	Examples Omnivores and carnivores (e.g., humans, dogs, swine).

5. (a) Explain the factors that influence the choice of pasture species to be planted in an area. (12marks)

- Type of soil (pH, drainage, fertility) – different pasture species survive on different soil type
- Topography – different pasture species prefer different topography
- Climate – drought resistant pasture are preferred
- Pest and disease resistance
- Presence of planting materials and/or seeds
- Cost of production – The farmer should make sure that the expense involved in pasture establishment can be met from the income of the animals.
- Grazing tolerance: it is important to select a species that can withstand the grazing habits of livestock
- Ability of species to survive winter conditions
- The type of livestock and their nutritional needs influence the choice of pasture
- Legume percentage in mix: including legumes in the pasture mix can improve soil nitrogen levels and provide a more balanced diet for livestock.
- Digestibility of pasture
- Palatability of the pasture species to intended livestock
- Ability to produce enough herbage

(b) Outline the signs that indicate the need to improve pasture. (08marks)

- Presence of poor unproductive pasture plant
- Poor conditions of the livestock (emaciated) grazing on the pasture
- Presence of large and undecayed plant residues that prevent water entry
- Livestock hunting for palatable pasture
- Wet areas containing marshy plants e.g. nut grasses
- Over growth of pasture hence becoming fibrous
- The pasture become stunted
- Development of bare patches in pasture
- Accumulation of parasites in pastures.

SECTION D (20MARKS)

AGRICULTURAL ECONOMICS

Answer **one** question from this section

6. (a) Giving an example in each case, explain the following product-relationships
(i) Joint products (02marks)

Joint products are the products that are produced as a result of a single production process. E.g. In oil industry **kerosene, gasoline, fuel oil, lubricants** etc. are all produced from the same product, crude petroleum.

(ii) Competitive products (02marks)

Are products that serve same consumer needs e.g. sodas

(iii) Complementary products (02marks)

They are products that are used together or add value to one another; e.g. a DVD and a DVD player, computer and a mouse.

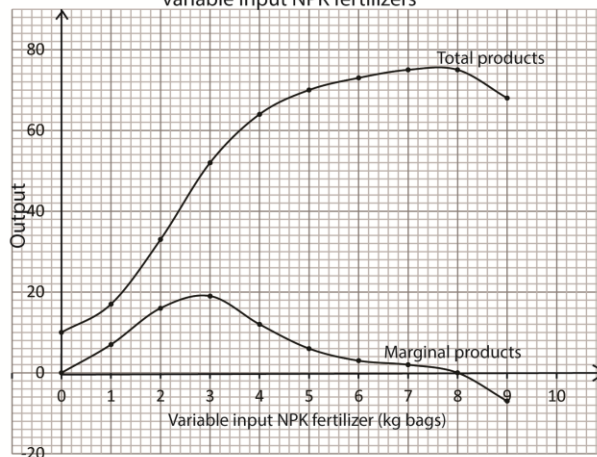
(b) The following table shows production of maize at various levels of nitrogen fertilizer application.

Fixed factor	Variable input NPK fertilizer (kg bags)	Total maize production (No. of bags, 90kg each)	Marginal product
1	0	10	0
1	1	17	7
1	2	33	16
1	3	52	19
1	4	64	12
1	5	70	6
1	6	73	3
1	7	75	2
1	8	75	0
1	9	68	-7

(i) Using the data calculate the marginal product. (05marks)

(ii) Plot a graph of Total and Marginal Product against the variable input. (05marks)

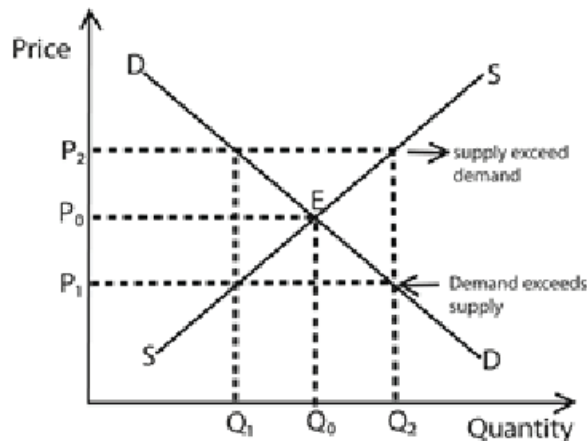
A graph of total and marginal products against variable input NPK fertilizers



- (iii) Explain the relationship between the Total and Marginal product curves. (02marks)
- From 0 to 3 bags both total and marginal product increase;
 - Beyond 3 bags marginal product decrease
 - Between 3 and 8 bags total product increase
 - Beyond 8 bags total product decreases.
- (iv) Using your graph, state when the law of diminishing returns begins to operate. (01mark)
At the 8th bag of NPK fertilizer
- (v) What is the importance of the knowledge of diminishing return in agricultural production? (01mak)
- To maximize labour and other factors of production to optimum level
 - To increase production efficiency by minimizing cost
 - To find out the most economical dose of nay variable resource to be applied

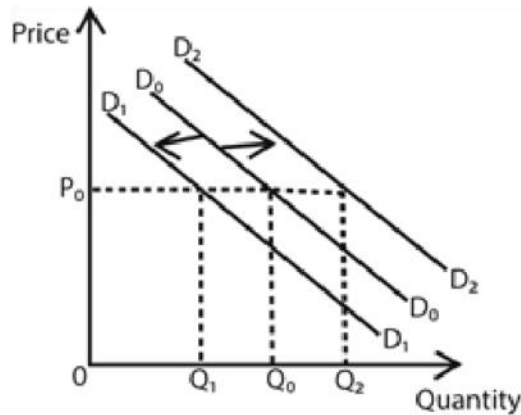
7. (a) With the aid of a labeled diagram, describe how prices of agricultural commodities are determined in a free and competitive market. (10marks)

Market price refers to the prevailing (ruling) price in the market at a given time. Market price is any price determined by the buyers and sellers in the market irrespective of whether quantity demanded is equal to quantity supplied at a given.



- .
- **Equilibrium price** (P_0) refers to the market price where quantity demanded is equal to quantity supplied.
- **Normal (natural) price** refers to the long run equilibrium price established in the market after a long period of price fluctuations.
- **Reserve price** refers to the minimum price set by the seller below which he is not willing to sell his commodity.

- (b) Illustrate how income of the consumer affects the amount of a commodity demanded other factors remaining constant. (10marks)



Provided the price remain unchanged, increase in consumer income increases the quantity demanded, i.e. the demand curve shifts to the right (from D_0D_0 to D_2D_2) and a decrease in customers' income lowers demand of commodity, i.e. the demand curve shifts to the left (from D_0D_0 to D_1D_1).

SECTION D (20MARKS)

AGRICULTURAL ENGINEERING

Answer **one** question from this section

8. (a) (i) Explain the meaning of seasoning in timber processing. (02marks)

Seasoning of timber is the process by which **moisture content in the timber is reduced to required level**

- (ii) Discuss the various methods of seasoning timber. (08marks)

- Air seasoning, which involves stacking the timber logs in layers in a shed and exposing them to air circulation.
- Kiln-drying, which uses a controlled temperature and humidity in a chamber to dry the timber quickly.
- Chemical treatment, which involves immersing the timber in water mixed with salt (urea, ammonium carbonate or other chemicals) to prevent decay and insect attack. And then dry them
- Heat treatment, which uses high temperature and low oxygen to modify the properties of the timber.

- Hot-air seasoning, which blows hot air over the timber to accelerate the drying process.
- Electrical seasoning that involves passing high-frequency alternating current through the logs of wood generating heat that dry timber.

(iii) State the advantages of seasoning wood. (06marks)

- Make timber easily workable and facilitate operations during conversion.
- Maintain the shape and size of the component of the timber article which is expected to remain unchanged in shape.
- Reduced weight, making it easier to carry
- Increased resistance to fungi and insects' damage
- Easy to polish and paint
- Increased strength and durability
- Easy to burn

(b) Outline the qualities of a good wood preservative. (04marks)

- Should be highly effective against fungi, insects and other damaging organisms
- Should have long lasting effects
- It should be compatible with other applications such as paint and vanishes
- Readily available
- Cheap
- Non-poisonous to people
- High penetrating power into wood to provide thorough protection

9. (a) Describe the characteristics of a good livestock house (12marks)

- Should have strong walls to reduce accidents to animals
- Should have concrete rough floor to reduce accidents of farmers from falling
- Should have a gently sloping floor for easy cleaning and draining.
- Should have a roof that is leak free to keep it dry
- Should have enough feed and water trough
- Should be well ventilated
- Should have walls high enough to accommodate animals
- Should be spacious to accommodate animals
- Should have a lockable door for security
- Should have enough litter to absorb moisture

(b) Outline the factors considered when designing a building for housing processing equipment. (08marks)

- It should be water proof to keep it dry and prevent damaging machines
- Should be well ventilated to facilitate aeration for easy cooling of machine
- Should have noise and temperature regulator
- It should be fitted with a fire extinguisher to safeguard it in case of fire outbreak.

- It should be spacious to accommodate the machinery and operator
- Should be strong enough to resist vibrations caused by the machine
- Should have stable power supply to run the machines
- Should have emergency exist in case of accident
- It should be easily accessible for transportation of produce

END

Please obtain free downloadable notes of general paper, biology, economics, geography etc. from digitalteachers.co.ug website

Thanks

Dr. Bbosa Science