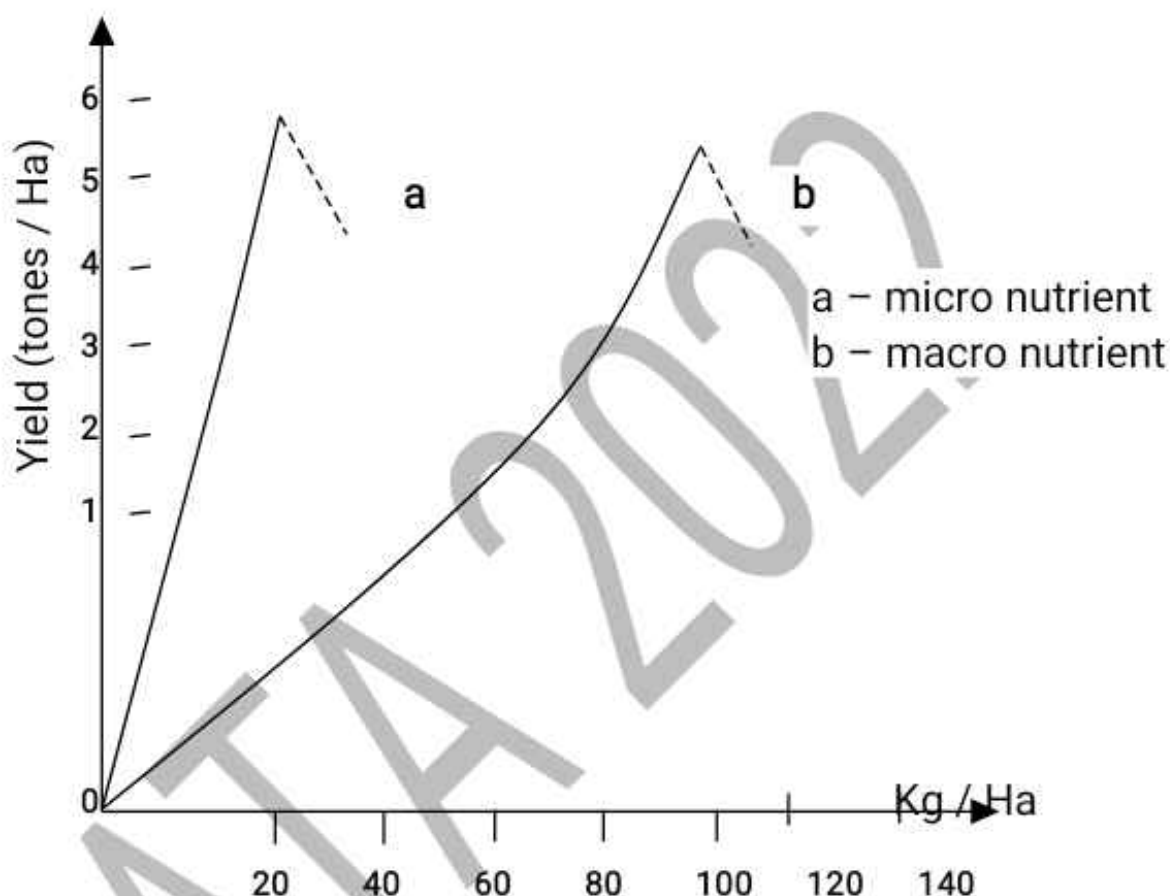


MARKING GUIDE – P515/2
UACE UNATA - 2022
PRINCIPLES AND PRACTICES OF AGRICULTURE

SECTION A (20 MARKS)

Question 1 is compulsory.

The graph below shows the relationship between nutrient supply (Kg / Ha) and yield of maize (tons per Ha)



a) Describe the relationship between the supply of each nutrient and yield of maize.

(03 marks)

- As the quantity of a increases slightly, the yield of maize increases rapidly and further increase in supply of a lowers the yield
- As the quantity of b increases gradually, the yield of maize also increases gradually; it then reaches the maximum, further increase in the supply of b lowers yields
- At low supply of a, maize yield is high, reaches maximum and declines
- At high supply of b, maize yield is high
- Yield is high at low supply of a and its high at high supply of b

(Award 1 mark for any 3 points, 1 × 3 = 03 marks)

b) Explain the effect of supplying each of the nutrients on the yield of maize.

(04 marks)

- Micro nutrient a is required in small amounts, it becomes toxic or harmful to maize when supplied in high quantities
- Macro nutrient b is needed in larger amounts to sustain high maize yields and it becomes toxic /harmful at very high quantities

(Award 1 mark for any 4 points, $1 \times 4 = 04$ marks) 1Mention: 1Explanation for each a and b

c) Name two nutrients in the category of: (02 marks)

(i) A (micro nutrients)

- Iron
- Molybdenum
- Manganese
- Boron etc

(Award $1/2$ mark for any 2, $1/2 \times 2 = 1$ mark)

(ii) B (macro nutrients)

- Magnesium
- Calcium
- Phosphorus
- Potassium nitrogen etc

(Award $1/2$ mark for any 2, $1/2 \times 2 = 1$ mark)

d) Identify the; (02 marks)

(i) Adequate nutrient level

- a - 30kg/ha
- b - 100kg/ha

(Award $1/2$ mark for any 2, $1/2 \times 2 = 1$ mark)

(ii) Toxicity level for each of the nutrients.

- a - 31kg/ha
- b - 102 kg/ha

(Award $1/2$ mark for any 2, $1/2 \times 2 = 1$ mark)

e) What conditions make a soil nutrient to be in the same level as b? (03 marks)

- Its actively involved in plant nutrition
- The plant cannot complete its lifecycle without the element
- No other elements can take its place in plant nutrition

(Award 1 mark for any 3 points, $1 \times 3 = 03$ marks)

f) Give ways of increasing the concentration of nutrients in the soil. (06 marks)

- Adding organic matter / organic fertilizers
- Addition / application of artificial fertilizers
- Bush fallowing to conserve nutrients
- Intercropping legumes
- Application of lime / liming
- Mulching / applying organic mulches

(Award 1 mark for any 6 points, $1 \times 6 = 06$ marks)

SECTION B (20 MARKS)

CROP PRODUCTION

Answer one question from this section.

a) Describe the features that suit organic matter to its role in soil. (08 marks)

- It has a high buffer capacity which enables it to resist change in pH
- Has a high nutrient holding capacity or adsorption capacity due to its colloidal nature hence retain nutrients long / prevent leaching
- Has a high Cation exchange capacity to release nutrients easily
- Dark colour to regulate soil temperature
- Is insoluble in water hence a long residual effect in the soil
- Spongy in nature to allow good air circulation and drainage
- High water holding capacity and adsorptive power hence retaining water for a long period
- It has a low plasticity hence the ability to improve soil structure by reducing on the sticky nature of clay soil
- Has a high level of nutrients required for better plant growth and bacteria nourishment
- Has a large surface area for adsorption of nutrients / ions

(Award 1 mark for any 8 points, $1 \times 8 = 08$ marks)

b) Explain ways of increasing soil aggregate stability. (12 marks)

- Minimum tillage which allows soil structure to recover and reduces break down of organic matter
- Afforestation / re-afforestation which helps to add organic matter and roots bind soil particles
- Mulching to soil erosion and add organic matter after decomposition
- By liming to bind soil particles together / application of agricultural lime / calcium carbonate
- Practicing crop rotation to ensure proper soil coverage / involving grass leys to bind soil particles together
- By growing cover crops to control erosion / cover cropping
- By carrying out controlled drainage to remove excess water in order to avoid dispersion of soil particles
- Manuring / application of manure to increase aggregate stability / to bind particles together
- Growing of cover crops to ensure good vegetation cover / control soil erosion
- Practicing controlled grazing to ensure good soil surface cover / avoid destroying surface cover
- Bush fallowing to ensure a good surface cover and increases organic matter content
- Carrying out controlled irrigation of the land to avoid destruction of the soil structure / particles
- Cultivation the soil at the correct moisture content to avoid dispersion of particles / destroying the soil structure \
- By practicing agroforestry to bind soil particles together by tree roots

(Award $1\frac{1}{2}$ mark for any 8 points, $1\frac{1}{2} \times 8 = 12$ marks)

a) Describe how a farmer would ensure high yields of Okra (12 marks)

- Selecting and Planting high yielding variety
- Application of fertilizers / Manuring to supply more nutrients and lighten the soil. This can be done by side dressing with compost / slow release fertilizers
- Proper seedbed preparation – ridged soil
- Choosing soils with favourable conditions like suitable temperature, loose and well

drained, moderately fertile

- Proper spacing to maximize plant size and yield – a seed rate of 4-6 kg per acre
- Adequate irrigation – at least once a week for consistent yields
- Carry out seed treatment to increase germination and protect plants from soil borne diseases
- Pest control to minimize losses like aphids, sting bugs. Bugs can be sprayed using soapy water to keep them away or handpicked and killed
- Disease control to reduce on crop losses
- Proper harvesting of okra pods i.e. harvest okra when pods are 2-3 inches long
- Mulching around the plant to prevent weed growth and also conserve soil moisture
- Liming to create a suitable pH for the plant to grow well e.g. 6.5 – 7.0
- Carry out thinning when the seeds you planted have germinated to ensure proper spacing of plants
- Proper weeding while okra is still young to avoid competition for nutrients

(Award 1 mark for any 12 points, 1 x 12 = 12 marks)

b) Outline the limitations involved in growing perennial crops.

(08 marks)

- Difficult to include in a crop rotation program
- Require large capital investment
- Reduction of the water table
- Create food scarcity problems
- Increase pest population
- Reduction in productivity over a few years
- Mainly need large acreage / large piece of land
- Require intense labour / more labour is required

(Award 1 mark for any 8 points, 1 x 8 = 08 marks)

SECTION C (20 MARKS)

ANIMAL PRODUCTION

Answer **one** question from this section.

4 a) Distinguish between digestibility and biological value as applied in animal nutrition. (04 marks)

- **Digestibility** is the measure of how much nutrients a feed provides in a given volume expressed as a percentage while **Biological value (BV)** refers to the proportion of nitrogen that is absorbed from food and used in the manufacture of body proteins.

(Award 2 marks for each correct definition, 2 x 2 = 04 marks)

b) Describe the main characteristics of an ideal ration for feeding farm animals.

(10 marks)

- Its attractive and palatable to the animals
- It contains enough water for metabolism and heat regulation
- Its non-toxic to the animals
- It provides sufficient nutrients to provide / supply energy necessary for proper functioning of the animal
- It contains enough quality proteins to ensure growth and maintenance of the animal
- It has a bulk in proper proportions to support nutritive value
- It contains vitamins / wholesome

(Award 2 marks for any 5 points, 2 x 5 = 10 marks)

c) State ways in which animals utilize digested and absorbed food materials. (06 marks)

- For manufacturing of chemical substances needed by the animal's body
- For synthesis of products, some nutrients are used to manufacture milk
- For production of energy especially from fats and carbohydrates
- For repair of worn out body tissues
- For body building / growth and development e.g. amino acids are used to build animal's body cells and tissues
- Build resistance against diseases.
- For reproduction to facilitate multiplication

(Award 1 mark for any 6 points, $1 \times 6 = 06$ marks)

a) Explain factors that predispose farm animals to diseases (08 marks)

- Age; Young animals have undeveloped immunity / low resistance while the old ones have a worn out immune system which exposes both more to disease easily.
- Climate; some diseases are common in tropical warm climate than in the temperate regions. - Also Very cold weather and humid conditions would expose the animals to respiratory infections like pneumonia.
- Pollution; Air and water pollution exposes the animals to many infections and may also cause poisoning.
- Hereditary; Inheritance of large and pendulous udders in dairy animals predisposes such animals to disease like mastitis.
- Breed; exotic breeds of cattle are more prone to tick borne diseases than indigenous cattle
- Communal grazing; this brings herds of cattle together with those that are diseased hence predisposing the health animals
- Mechanical injuries; these may act as entry points for the pathogens
- Skin coat colour, the skin coat colour may attract organisms that cause or transmit diseases
- Drainage, poor drainage in animal houses encourage breeding of pathogens and their spread
- Stress, this reduces immunity in animals making them susceptible to diseases
- Soil, this act as a hiding ground of some pathogens and spores that attack animals
- Presence of thick vegetation, this act as a hide out for vectors like tsetse flies that attack animals
- Sex; some diseases are more prevalent / common in one sex than the other
- Air circulation / ventilation / housing, poor ventilation in animal houses encourages the spread of air borne diseases
- Feeding, poor feeding deprives the animal's ability to fight against infections hence increasing susceptibility to diseases
- Poor hygiene; this encourages pathogens to contaminate feeds and water hence easy spread of disease
- Improper disposal of dead animals; animals that have died due to disease once disposed poorly may lead to easy disease outbreaks

(Award 1 mark for any 8 points, $1 \times 8 = 08$ marks) $\frac{1}{2}$ Mention: $\frac{1}{2}$ Explanation

b) Mention the various practices involved in the spread of animal diseases on the farm (08

marks)

- Use of contaminated equipment like vaccination equipment, drenching guns, insemination syringe may spread disease.
- Improper disposal of dead animals that have died due to a certain disease.
- Introduction of sick animals to the farm, which can transmit disease to the healthy ones by contact.
- Introduction of healthy animals that are carriers of certain diseases.
- Through use of contaminated water and feeds.
- Vectors like tsetse flies and ticks can also transmit disease.
- Wild birds and rodents may carry disease to the domestic animals through contaminating feeds and water.
- Shoes and clothing of any one who moves from flock to flock or in animal quarters can spread disease.
- Air borne organisms like bacteria spores may be spread through air and cause disease.
- The soil can harbour resting stages for anthrax spores which can survive for up to 40 years.
- Through infected animal products like eggs in birds can spread new castle to chicks
- Through blood sucking vectors like ticks that transmit pathogens

(Award any 8 points for 1 mark @, $8 \times 1 = 8$ marks)

c) Outline the relevancy of keeping farm animals healthy

(04 marks)

- Ensures long economic and productive life of animals
- Enables animals to produce quality produce like meat, milk
- High maximum production / high performance
- Controls the spread of diseases to other animals / human beings
- Animals grow faster and reach maturity early
- Reduces the cost of production / managing animals through buying drugs / treatment

(Award 1 mark for any 4 points, $1 \times 4 = 04$ marks)

SECTION D (20 MARKS) AGRICULTURAL ENGINEERING

Answer **one** question from this section.

a) Describe the characteristics of good livestock house.

(12 marks)

- Strong walls / firm walls to reduce chances of accidents to animals residing there after collapsing.
- Concrete floor which makes cleaning easy.
- Big enough / enough space for all the animals to be housed so as to avoid overcrowding
- Leak proof roof / water proof roof to prevent rain water from entering the building.
- Have walls that are high enough to keep animals in the house.
- Have enough windows to allow in light.
- Have enough litter to absorb moisture / provide warmth to animals
- Walls high enough and strong to keep the animal in and ensure security
- Adjacent dung heap down slope and down ward of the animal house / a proper waste disposal system
- Have a drainage channel
- Store for supplementary feeds

- Well ventilated for easy air circulation
- Strong lockable door
- Rough floor finish to prevent sliding of animals / accidents
- A feed trough for feeds
- A water trough for water
- A design that enables animals to see each other
- Having a provision for adequate light
- Large space between the top of walls and roof for good ventilation

(Award 1½ mark for any 8 points, 1½ x 8 = 12 marks)

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

- Power installation for running machines
- Good ventilation to allow easy air circulation
- Easy to access machine inside with consideration of movement of tools with in the building
- Accessibility, easy to transport of machinery / inputs / products
- Position of exit from the house in the event of fire outbreak
- Ease of cleaning the building
- Provision of water supply with in the building
- Ease of loading and off loading
- Temperature insulation
- Ease of future expansion
- Size of the building, large enough to accommodate machinery / equipment

(Award any 8 points for 1 mark @, 8 x 1 = 8 marks)

a) State reasons why wood is versatile among the construction materials. (06 marks)

- Wood is use for making doors
- Wood is use for making wooden foundations
- Wood is use for making ceilings
- Wood is use for making the roof
- Wood is use for making walls
- Wood is use for making columns
- Wood is use for making feed troughs
- Wood is use for making furniture
- Wood is use for fencing / used as fencing poles

(Award any 6 points for 1 mark @, 6 x 1 = 6 marks)

b) Describe factors that should be considered when selecting good quality wood. (14 marks)

- Strength of wood; which is dependent on species used and seasoning ability
- Presence of wood defects like fissures, knots etc should not be selected
- Cost of wood; choose that which is relatively cheaper to buy
- Workability; should be easy to saw, shape or nail
- Ability to hold paint, good wood should be able to hold paint especially where there is exposure to pest attack and rain water

- Warping ability; choose one which does not bend or warp / twist / bow for hard jobs
- Hardness; good wood selected should be resistant from wear
- Ability to hold nails; should have greater nail holding ability y

(Award 2 marks for any 6 points, $2 \times 6 = 12$ marks)

SECTION E (20 MARKS) AGRICULTURAL ECONOMICS

Answer **one** question from this section.

a) Explain the causes of price instability for agricultural commodities. (12 marks)

- Risks and uncertainties; these greatly affect the quality and quantity of production on farms
- Climate; the production of crop and animals is affected by rainfall, temperature / dependence on natural rainfall for production / change in supply
- Perishability of agricultural products and this makes them difficult to store hence must be sold soon after harvesting at any price.
- Agriculture products have inelastic demand so that excess production is difficult to absorb while maintaining price.
- Divergence between planned and actual output which at times is less than planned and at times, more than planned.
- Seasonality of production more especially crop products that are excess during harvesting period and scarce at planting.
- Stiff competition from synthetics like polyethene, plastics and other petroleum products for rubber and sisal.
- Long gestation period / biological lag; when prices for the products are high producers plan to produce more which takes a long time before production is affected.
- Bulkiness of the produce; most agriculture products are bulky which makes transportation difficult from places of plenty to scarcity.
- Agricultural products form a small part of manufactured production hence the excess supply cannot be absorbed in the manufacturing industry.
- Large number of producers; this makes it very difficult to plan and make actual productions giving room to peasant to sell at any price.
- Protectionism by developed nations; It's difficult to export surplus agricultural products to developed countries because of heavy regulations and tariffs imposed on agricultural imports.
- Low level of industrialization; Most LDC's don't process their agricultural products to final products which reduces the value of such items.
- Changing technologies; more technologies are being discovered which use less raw materials like cloth made of polyester and less
- Weak commodities agreements.
- Lack of alternative use for land.

(Award $1\frac{1}{2}$ mark for any 8 points, $1\frac{1}{2} \times 8 = 12$ marks)

b) Suggest measures to revert price instability in Uganda. (08 marks)

- Improving technology in agriculture production to increase production and reduces scarcity.
- International commodity agreements - these fix quotas and prices for both buyers and sellers of commodities to reduce exploitation.
- Improving transport to move produce to places where there is shortage to control price

fluctuations.

- Price support - the farmers sale their commodities at market price and present their receipts for government to top up to a realistic price.
- Buffer stocks - the surplus during plenty is bought by marketing boards and sold during scarcity.
- Forming farmers' organizations and commodity agreements to negotiate for better prices
- Barter trade which helps in disposing off the surplus
- Fixing prices by government - maximum or minimum price legislation so that the sellers are not exploited over price.
- Diversification which guards against total loss.
- Improving storage facilities more especially for the Perishables so that supply can be regulated to meet demand.
- Increase research so that good quality crops resistant to drought and pests, short gestation period are grown to reduce risks.
- Processing of agriculture products before being sold to increase their shelf life and value for higher prices.
- Fixing quotas for farmers so that over production is checked that can result into reduced prices.

(Award any 8 points for 1 mark @, $8 \times 1 = 8$ marks)

a) Define the term production function

(02 marks)

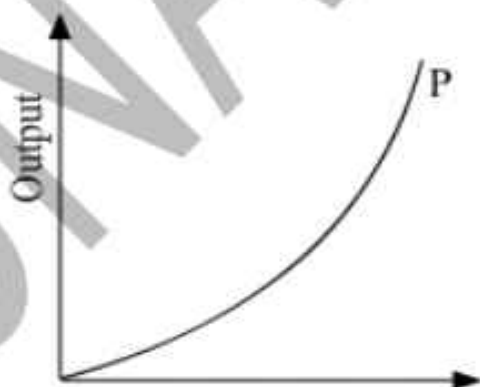
- This is the functional / physical relationship between the quantities of inputs (factors of production) and maximum amount of output Or This is the physical relationship between inputs and outputs.

(Award 2 marks for a correct definition $2 \times 1 = 02$ marks)

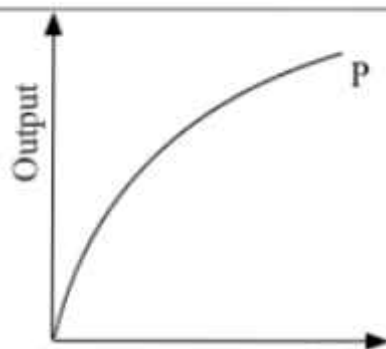
b) With aid of illustrations, describe the types of production functions experienced in farming.

(10 marks)

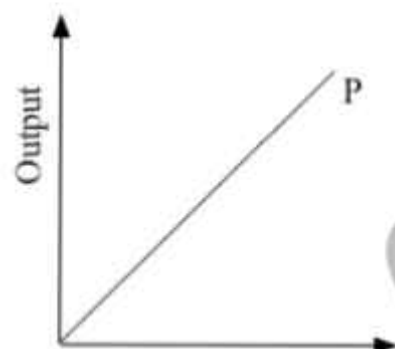
- Increasing returns to scale; this is when output increases more than proportional physical quantities of inputs used. i.e output doubles the input.



- Decreasing returns to scale; this is when a change in inputs brings a less than proportional change in output.



- Constant returns to scale; this is when output changes in the same proportion as inputs.



(Award any 3 forms for 3 marks @, 3 x 3 = 9 marks)

c) Suggest measures of increasing the profitability of a farming business (08 marks)

- Use of better techniques of production i.e. improved seeds, good breeds.
- Processing agriculture products so as to add value hence more profits.
- Advertising your produce so that buyers are aware
- Grading the produce to allow fair prices for each product.
- Packing of the produce so as to reduce transport costs and increase the profit margin.
- Proper control of pests and diseases i.e. increase quality.
- Proper allocation of resources to avoid over spending and under spending.
- Use technical skills in management of enterprises e.g fertilizer application, correct spacing, pests and disease control.
- Choosing correct business / farm enterprise with less risks and uncertainties
- Having good storage facilities to allow selling produce when prices are high
- Timely planting of crops so as to benefit from the high prices that are offered at the beginning of the harvesting season.
- Proper record keeping for assessing progress of the farm business
- Proper budgeting to reduce losses in business
- Specialization as proper management skills are developed as a result of specialization.
- Proper combination of farm enterprises which helps in reducing costs hence increasing profits in business. E.g poultry and horticulture.

- | | |
|--|---|
| | <ul style="list-style-type: none"> • Use of proper farming methods like crop rotation will increase on the yields • Use of machinery which increases efficiency i.e. ensures proper tillage which leads to high yields. |
|--|---|

(Award any 8 points for 1 mark @, 8 x 1 = 8 marks)

END

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