UACE P515/2 Principles and practices of agriculture2 2007

3hours

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. The table below shows the yield of maize crop variety in kg per hectare planted at different times after the onset of rains.

Time of planting after onset of rain (days)	Yield (kg/hectare)
1	1900
10	1460
20	1040
30	920
40	700

(a) Plot a graph to represent the information in the table (05marks)
(b) Describe the trend of your graph (02marks)
(c) Give reasons for the trend of the graph. (08marks)
(d) Suggest additional operations that would be necessary on the crop (05marks)

SECTION B (20MARKS)

CROP PRODUCTION

Answer **one** question from this section

2. (a) Outline how you would carry out a viability test for a given seed lot. (10marks)
   (b) Describe the causes of seed dormancy. (06marks)
   (c) Explain the importance of dormancy in seeds (04marks)
3. (a) Explain the various factors that influence soil formation. (10marks)
   (b) Outline the importance of soil texture in crop production. (10marks)

SECTION C (20MARKS)

ANIMAL PRODUCTION

Answer **one** question from this section

4. (a) Outline the importance of water in the body of an animal. (10marks)
   (b) Explain the factors that influence the size of feed troughs. (10 marks)
5. (a) Explain the advantages of pig production. (08marks)
   (b) Suggest measures that can be taken to overcome the constraints to livestock production (12marks)

SECTION D (20MARKS)

AGRICULTURAL ENGINEERING

Answer **one** question from this section

6. (a) Describe the qualities of a good feed trough (10marks)
   (b) Explain the factors that influence the size of feed troughs. (10marks)
7. (a) Outline the problems associated with the use of human power on a farm (08marks)
   (b) Explain the factors to consider so as to obtain optimum output from animal power

SECTION D (20MARKS)

AGRICULTURAL ECONOMICS

Answer **one** question from this section

8. (a) Giving relevant examples, describe types of efficiency standards used in assessing the performance of a business. (08Marks)

   (b) Explain the factors affecting efficiency in farming. (12marks)

9. (a) Describe the different types of record that may be kept by a dairy farmer. (10marks)
   (b) Discuss the importance of keeping record in animal breeding. (10marks)
   END

Suggested answers

1. The table below shows the yield of maize crop variety in kg per hectare planted at different times after the onset of rains.

Time of planting after onset of rain (days)	Yield (kg/hectare)
1	1900
10	1460
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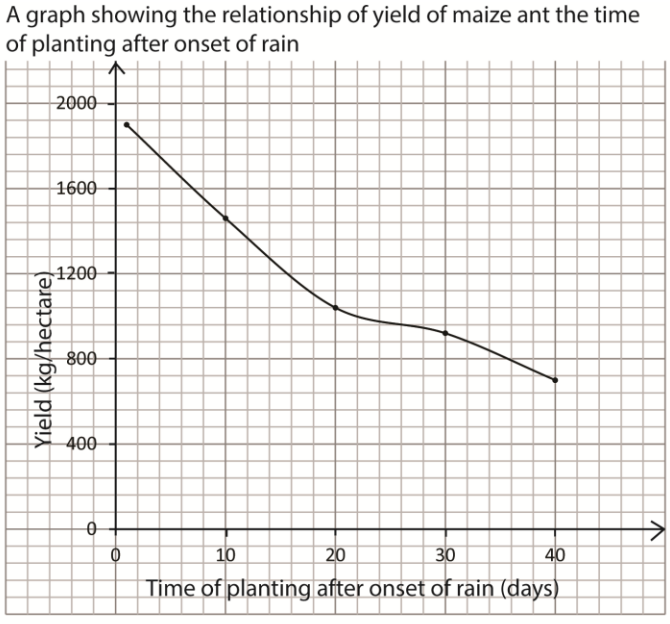
30	920
40	700

(a) Plot a graph to represent the information in the table (05marks)



(b) Describe the trend of your graph (02marks)

There is a general decrease in yield as the number of days of planting from onset of rain increase

(c) Give reasons for the trend of the graph. (08marks)

- Reduced rain at flowering and corn farming stage
- Hot conditions at pollination stage
- Accumulation pest
- Accumulation of disease
- Accumulation of weeds

(d) Suggest additional operations that would be necessary on the crop (05marks)

- Irrigation
- Spraying with pesticide
- Weeding
- Application of fertilizer
- Mulching to improve soil moisture
- Wide spacing of crop to prevent competition for moisture and plant nutrients
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SECTION B (20MARKS)

CROP PRODUCTION

Answer **one** question from this section

2. (a) Outline how you would carry out a viability test for a given seed lot. (10marks)
   - 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

   (b) Describe the causes of seed dormancy. (06marks)
   - **Seed coats impermeable to water:** The seed of certain family have very hard seed coats which are impermeable to water. This dormancy remains until the testa layer decay by soil microorganisms. The impermeable seed coats are found in the family leguminosae, Malvaceae, convolvulaceae.
   - **Seed coat impermeable to oxygen:** This type of dormancy is because of the impermeability of the seed coats to oxygen. But later seeds become more permeable to oxygen so that it germinates afterwards. This type of dormancy in found in the family compositae.

- **Mechanically resistant seed coat:** In certain seeds of weeds have hard seed coats that prevent the expansion of embryo.
- **Immaturity of the embryo:** In the seeds of plants like the Orchids, Ginkgo etc. The immaturity of the embryo is due to the failure of the embryo to develop when the seeds are shed.
- **Due to the effect of germination inhibitors:** The inhibition caused due to the presence of the inhibitor substances in the seed coat, endosperm, embryo or any structure. Some of the important germination inhibitors are; Coumarin, Phythalids, Ferulic acid, Abscisic acid, Dehydracetic acid and parasorbic acid.
- **Low temperature:** In certain plants the seeds remain dormant after harvest because they require low temperature for germination. The seeds germinate in the spring season.
- **Light sensitive seeds:** In certain seed the germination is affected by the light so the absence of light results in the seed dormancy. These seeds which are sensitive to sunlight are termed as the photoblastic seeds, where as in some other seeds the light inhibits the seed germination so they are negatively photoblastic.

(c) Explain the importance of dormancy in seeds (04marks)

- Seed are able to withstand adverse external conditions such as very cold or very dry weather.
- It allows seed and fruits to disperse
- Prevents pre-harvest germination
- Facilitate proper storage of seeds
- Allows time for the embryo to develop

3. (a) Explain the various factors that influence soil formation. (10marks)

- ***Nature of the parent rock.*** It provides the basis upon which soil forming processes operate. The soil formed possess similar characteristic as those of the parent rock in terms of structure , texture , minerology, porosity, colour etc.
- ***Biological weathering***
    - Living organisms like bacteria and fungi carry out decomposition of dead plants and animals remain leading to soil formation.
    - The termites are able to convert wood into soil because they have the cellulose enzymes in their guts which act on cellulose in wood.
    - The vegetative cover protects the soil surface from soil erosion hence minimizing soil loss.
    - Living organisms die and decompose to form soil
    - Leaves from trees fall and provide organic matter
    - Earth worms grind up mineral particles important in soil formation
    - Plant roots penetrate and breakup rocks into small particles
    - Moving animals break up rock into small particles using their hooves

- **Chemical weathering**
    - This includes hydrolysis, hydration, oxidation, carbonation, reduction, and solution weaken parent rocks leading it tis disintegration.
- **Physical weathering**
    - Temperature: When rocks are heated, they expand unevenly between their layers. A change in temperature will set up stresses which will result into breaking of rocks. The alternative heating and cooling results into rapturing of rocks.
    - Ice: When water cools to form ice, it expands. Therefore the presence of water in rocks cracks can lead to the breaking of rocks when it cools to form ice
    - Rain: Rainfall particularly that with hail stones falls on rocks surfaces crashing and removing some particles from them which are carried by the running water.
    - Wind: As strong wind, blows it carries away tinny rock particles to different places from the mother rock.
- ***Climate***
    - The development of soil profile is largely controlled by temperature and precipitation (rainfall). Enough moisture in the soil encourages microorganisms to carry out decomposition while in the soil.
    - It influences vegetation and therefore type of soils formed.
    - High temperatures discourage microbial activities of organism in the soil.
    - Varying environmental temperature alternative expansion and contractions of rocks that cause breaking up of rocks to form soil.
- ***Human influence***
    - Natural vegetation is destroyed in getting land for agriculture
    - Fertilizer application interferes with the chemical nature of soil
    - Topography is altered through constructions of roads and buildings
    - Application of pesticides changes chemical soil properties
    - Soil cultivation destroys soil structure

    Irrigation may interfere with soil nutrient composition and structures

(b) Outline the importance of soil texture in crop production. (10marks)

- Controls soil drainage
- It controls aeration of soil
- It controls soil temperature
- It regulate water holding capacity
- Controls soil pH by controlling air passage
- It controls workability of the soil; single, loose grained soil is easier to work than sticky heavy soils.

- It control root soil penetration
- Control soil erosion; loose soil is easily eroded.
- Controls the ability of soil to hold nutrients

SECTION C (20MARKS)

ANIMAL PRODUCTION

Answer **one** question from this section

4. (a) Outline the importance of water in the body of an animal. (10marks)

- It makes up structures of animals
- It is a solvent for most biological chemicals
- It is a reagent in hydrolysis
- Is a medium of fertilization through which gametes swim.
- Medium for removal of waste products
- Temperature control
- Hearing and balance as endolymph
- A medium of transport
- Lubricates joints, eyes, lungs
- Constituent of protecting fluids such as tears, mucus.

(b) Explain the factors influencing the amount of water intake in animals. (10 marks)

- Temperature: water intake increase with ambient temperature.
- Type of diet: high protein and fat intake increase water intake
- Type of animal: big animals like cattle have higher water intake than small animals like chicken.
- Production level: animals that produce more milk require high water intake.
- Age of animal: young animals have high water requirement per unit kg than older animals
- Health: healthy animals usually drink more water than sick animals
- Moisture content of feed: feeds with low moisture content increase water intake
- Physical activity of animal increase water intake
- Salt content of the diet or water increase water intake
- Physiological state: Pregnancy increase water intake

5. (a) Explain the advantages of pig production. (08marks)

- 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

(b) Suggest measures that can be taken to overcome the constraints to livestock production (12marks)

- Vaccination to control diseases
- Treatment of sick animals with effective drugs
- Quarantine of sick animals to prevent spread of diseases
- Keep pest and disease resistant varieties of animals
- Cross breeding to increase animal yields
- Demystifying social beliefs against some animal production like pigs and some fish species
- Provision of security against theft
- Fencing to prevent animals from destroying crops
- Liberalization to increase investment
- Provision for credit facilities at low interest
- Improvement of transport system to enable distributing of products to the market
- Processing to add value and prolong shelf life of the products
- Improvement of land tenure system to allocate land for animal production
- Provide extension services to improve farmers' education in animal production

SECTION D (20MARKS)

AGRICULTURAL ENGINEERING

Answer **one** question from this section

6. (a) Describe the qualities of a good feed trough (10marks)

- Have appropriate size for the intended animals
- Easy to clean
- Durable
- Smooth inside that no feed remain stuck after cleaning

- Affordable
- Rust and corrosive
- Readily available
- Should not inflict damage to feeding animals

(b) Explain the factors that influence the size of feed troughs. (10marks)

- Type of animal big animals such require big feed trough while small animals such as chicken requires small feeding troughs
- Age of animals: young animals use smaller feed troughs than adults
- Type of feeds
- Number of animals to feed from a given feed trough, the bigger the number of animals the bigger the size of feed trough
- Affordability: farmers will buy feed trough they can afford
- Farmers' preference

7. (a) Outline the problems associated with the use of human power on a farm (08marks)

- Slow in operation
- Efficiency decrease with number of hours
- Efficiency affected healthy and maturity
- Requires a lot of motivation
- Provide low power and machines
- Expensive to train
- Affected by weather conditions and season
- expensive
- affected by disease

(b) Explain the factors to consider so as obtaining optimum output from animal power

- Give the oxen enough water
- Feed the animals so that it does not eat crops
- Yoke the animals properly
- Hold the animals for a while in the dressing room to allow them to settle and calm down
- Cheek the feet of the animals and ensure that the hooves are sound and if necessary pair them
- Fix a muzzle on their mouth to prevent animals from browsing crops.
- Ensure that the implements e.g. a plough is in proper order by sharpening the share and tightening all loose nuts and bolts.
- Pairing of draught animals to increase traction
- Properly maintaining and servicing the ploughs
- Use correct share for a given soil condition
- Ensure proper hitching of plough on the yoke

- Drive the oxen at constant speed
- Clear the field of tall grass and tree stamps before using the animals
- Provide good housing to protect the animal from bad weather.
- Timely treatment of animals.
- Control parasites
- Avoid over working the animals
- Work the animal during good weather
- During off season the animals should be made to pull carts to ensure that they do not forget

SECTION D (20MARKS)

AGRICULTURAL ECONOMICS

Answer **one** question from this section

8. (a) Giving relevant examples, describe types of efficiency standards used in assessing the performance of a business. (08Marks)

The term efficiency refers to the peak level of performance that uses the least amount of inputs to achieve the highest amount of output. Efficiency requires reducing the number of unnecessary resources used to produce a given output including personal time and energy.

- Economic efficiency refers to how effectively a society's scare resources are used to produce goods it includes
  - Productive efficiency is a situation where firms seek the best combination of inputs to lower their costs of production
  - Allocative efficiency means that economic resources are distributed in a way that produces the highest consumer satisfaction relative to the cost of inputs.
  - Pareto efficiency refers to a situation where it is impossible to improve one person's situation without harming another person's situation
- Market efficiency describe how well prices intergrade available information. This means that all information is already incorporated into prices
- Operation efficiency measure how well profits are earned as a function of operating costs. The greater the operation efficiency, the more profitable the firm
- Energy efficiency occurs when less energy s used to achieve the same results.

(b) Explain the factors affecting efficiency in farming. (12marks)

- Good management through proper decision making
- Selecting proper and marketability
- Application of fertilizers to increase plant yield.
- Planting early maturing crop varieties
- Irrigation to produce crops throughout the year
- Pest control to reduce farm losses
- Use of skilled labor to produce quality products
- Use of specialized extension service

- Fencing to ensure safety of the farm
- Proper record keeping to enable proper farming
- Proper feeding of farm animals.
- Proper housing of farm animals
- Timely weeding
- Proper spacing of crops
- Castration, dehorning, and debeaking to improve farm production
- Processing of farm product/value addition

9. (a) Describe the different types of record that may be kept by a dairy farmer. (10marks)

- Documents on daily activities: records all things that happen on a farm on daily basis such as cash transactions, labor used, quantity of milk and so on
- Order forms, invoices and Receipts show orders made, invoices and receipts received
- Cash book and payment receipt record book shows receipts issued from the farm
- Statement book contains a list of invoices indicating the things a farm has bought to enable payment at the end of the month.
- Inventory record which shows a list of items present on a dairy farm at a particular time
- Yield and production record milk of the farm are recorded
- Employment /worker records including general records, pay and hours worked, leave, superannuation and tax
- Safety reporting procedures - any incidents and injuries, including near misses. This will help you determine actions to improve and prevent reoccurrences.
- Training and induction for workers and contractors

(b) Discuss the importance of keeping record in animal breeding. (10marks)

- Tracking animal and worker healthy
- Ensuring tax compliance
- Tracking revenue and expenses
- Financial requirements for lenders, government agencies and insurance
- Farm planning and forecasting based on previous performance
- Enable improvements on the farming methods
- Help detect fraudulent practices on a farm
- To show economic status of a farm

END