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A+ QUICK REVISION

AGRICULTURE

For More Simplified Eresources – 0705525657

FORM ONE TOPICS.

1. a). What is Agriculture?

The art and Science of crop and livestock production.

b). **State the roles played by agriculture in national development**

- Food supply
- Source of raw materials for industries
- Employment opportunities
- Foreign exchange earnings
- Source of capital for development
- Market for industrial goods.

c). **State the forms of employment in Agriculture**

i. Primary employment
   - Working on farms

ii. Secondary employment
   - In agriculture – based industries

iii. Tertiary employment
   - In distribution of farm produce.

d). i) **Briefly outline the problems that have hindered agricultural development in Kenya.**

- Lack of capital for investment
- Pests and diseases of crops and livestock
- Unpredictable climatic conditions
- Fluctuation of market prices
- Inadequate or poor storage structure leading to heavy lose
- Inadequate technical know-how
- Population pressure hence over-use of land
- Poor communication
- Perishability
- Bulky commodity prices

ii) **Suggest ways in which these problems can be alleviated**

- Proper food preservation
- Improved communication network
- Industries located near bulky products
- Extension services/ advice
- Provide good seeds
- Credit facilities
- Pest and disease control
- Irrigation
- Proper storage facilities
- Government price control.

2. a) i) **What are the characteristics of shifting cultivation?**

- Limited capital for investment
- Use of rudimentary tools and equipment
- Small land usually cultivated
- Slash and burn technique of clearing
- Crops not properly managed.

ii) **State the problems associated with shifting cultivation**.

- A wasteful method of farming
- Slow rate of regeneration of vegetation allowing soil erosion to take place
- No incentive to develop land
- No permanent structures are put up hence a lot of time wasted in moving or travelling to the homestead
- A lot of time wasted in moving from one place to another.

b) What is pastoralism?

- A major system of keeping livestock and moving with them from place of search of better pasture and water for livestock.

c) State the factors to consider in choosing a type of farm

- Type of enterprise itself
- Environmental factors
- Knowledge and skills of the farmer about the enterprise
- Available resources e.g labour and capital
- Cultural factors/ social factors
- Governmental policy
- Type of market he is producing for.

d) What is arable farming?

- Growing of crops only.

e) i) **State the limitations of mixed farming**

- The farmer will obtain sustainable income throughout the year
- The farmer will never experience total loss
- Animals contribute manure to crops while crops contribute/ provide crop residues fed to animals.
- Labour is utilized efficiently throughout the year

- Animals can be used to do work in the farm e.g oxen ploughing

ii) **State the limitations of mixed farming**
- Lack of enough land for more enterprises
- Lack of enough capital
- Lack of specialisation.

f) i) **Give the types of farming practised by small scale farmers**
- Arable farming
- Pastoralism
- Mixed farming

ii) Name the types of large scale farming
- Plantations
- Ranching

iii) Why does the Kenya government put a lot of emphasis on ranching?
- Because arable land is becoming smaller
- Ranching will lead to higher production of livestock to meet the high demand for meat

iv) State the common features of ranching as a farming system:
- Done in marginal areas with poor pasture
- System is extensive
- Extension services provided
- Improved pastures
- Selective livestock breeding
- High level livestock management.

g) i) **State the advantages of plantation farming**
- Provision of employment
- Revenue to government
- High outputs
- Foreign exchange earner
- Economies of large scale production
- Other activities done e.g processing.

ii) State the disadvantages of plantations.
- Overdependence on one enterprise
- High initial capital required.

iii) State the major characteristics of plantation farming.
- Most of the work is mechanised
- Requires skilled and qualified personnel
- Large tracts of land used
- Sometimes run by a company or the government or individuals
- The aim is to produce enough for local consumption and export market.

- Provides a lot of employment
- High output and quality of products
- Enjoys the economies of large scale production
- Scientific methods of farming used
- High investments of capital.

3. **a) List the ecological factors affecting agriculture.**
   - Rainfall
   - Humidity
   - Soil
   - Temperature
   - Wind
   - Light
   - Topography

   b) **Mention the aspects of rainfall which are important in crop production**
   - Reliability
   - Distribution
   - Intensity of rainfall
   - Amount of rainfall

   c) i) **What is optimal temperature?**
   - Temperature at which plant growth is at its best.

   ii) **State the effects of temperature on crop production.**
   - Photosynthesis
   - Respiration
   - Flowering and ripening
   - Quality of the products.

   d) State the effects of wind to crops.
   - Physical damage
   - Stress through evaporation / chilling
   - Spread of pests, weeds, diseases
   - Soil erosion
   - Increase of water and mineral uptake by increasing transpiration.

4. a). i. **Define the term soil.**
   - A collection of natural unconsolidated body covering the earth's crust, where plants grow

   ii). **Name the ways in which soil is important to growing plants.**
   - Provides enchorage/ support for the plant
   - Provides nutrients
   - Provides moisture

   b). i) **State the factors which influence the soil forming process**
   - Climatic factors e.g rainfall
   - Biotic factors e.g plants
   - Type of parent materials

- Topography of land
- Time taken by the process.

ii). **What biological agents influence the speed of the soil forming process?**

- Movement of animals in large groups
- Man's activities e.g cultivation, mining, road and railway construction.
- Micro-organisms ie. Decomposing plant and animal remains and adding to soil
- Earth worms, termites, moles etc mix up soil
- Roots of higher plants force their way through the rock cracks and further break them physically.

c) i) **Define the term soil Profile**

- The vertical arrangement of soil layers

ii) **How does soil profile influence plant growth?**

- Availability of plant nutrients
- Anchorage of plant
- Root penetration into soil
- How long soil moisture/ its availability
- Type of crop to be grown

d) i) **List the constituents of a fertile soil**

- Soil water
- Soil air
- Organic matter
- Mineral salts
- Living organisms.

ii) **What role do micro-organisms play in soil?**

- Decompose dead organic remains and convert them into humus, a source of plant nutrients
- Add nitrogen through nitrogen fixation.

e) i) **What is soil structure?**

- Aggregation of soil particles.

ii) **State the farming practices that improve soil structure.**

- Addition of organic matter
- Fallowing
- Mixed cropping including cereals and legumes
- Minimum tillage
- Good crop rotation programme
- Cultivation at right moisture content of soil
- Liming.

iii) **Why is a good soil structure desireable for growing crops.**

- Improves drainage and water infiltration.
- Improves aeration

- Minimises buildup of carbondioxide in the soil which becomes toxic to crops and micro-organisms.
- Facilitates better root penetration
- Creates favourable conditions for activity of micro-organisms
- Ensures adequate water retention for growing crops
- It makes tillage easier.

f) i) **What is soil texture?**
- Proportion of different sizes of soil particles.

ii) State the properties of soil that are influenced by its texture.
- Aeration/ porosity
- Drainage
- Water holding capacity/ capillarity
- Stickiness/ consistency
- Cation exchange capacity / PH/ availability of nutrients

iii) Give the types of soil based on texture.
- Sandy soils
- Clay soils
- Loam soils

5. a) **State the advantages of using farm tools.**
- They make work easier i.e increase working efficiency
- Help to avoid drudgery
- Timeliness of operations is achieved
- Operations e.g spraying to control pests and diseases are more exact hence effective

b) List the factors that determine a farmer's choice of tools and equipment.
- Nature of work to be done
- The financial status
- Type of power used on the farm
- Condition of land where the tool will be used.

c) i) **Why should tools and equipment to maintained well?**
- To reduce cost of repair/ replacement
- To increase their durability/ last long
- To increase work efficiency
- Ensure safety of the user
- To remain in good working order.

ii) **How should tools and equipment be maintained?**
- Store in sheds and racks
- Clean and oil moving parts
- Regularly sharpen cutting edges
- Clean tools thoroughly after use
- Keep metal parts rust free

- Replace or repair broken/ wornout parts
- Ensure there are no loose parts
- Use tool for its intended purpose
- Buy good quality tools and equipment
- Always keep tools in good working condition

d) List the safety precautions necessary for tools and equipment
- Use the tool for its intended purpose
- Sharp points should always point away from user/ people
- Use protective clothing when working with tools
- Always replace/ repair broken parts/ keep handles smooth
- Handle delicate tools carefully/ store them safely.

e) How is friction reduces in moving parts?
- Apply oil
- Apply grease
- Generally lubricate moving parts

f) Name the categories of farm tools and equipment.
- Garden tools
- Workshop tools
- Livestock production tools
- Masonery and plumbing tools

6. a) **State the importance of land preparation.**
- Removal of weeds
- Breaking the soil into smaller pieces
- Mixing organic matter into soil/ bury crop aeration
- Improve drainage/ water holding capacity
- Destroy pests and disease causing organisms.

b) i) **What is primary cultivation?**
- All operations carried cut in opening up land for crop promotion.

ii) **Which factors influence choice of tools for primary cultivation.**
- Type of soil
- Availability of implements
- Depth of ploughing
- Type of tilth required
- Condition of the land
- Type of crop to be growth
- Topography of the area
- Financial ability of the farmer
- Time remaining before planting

c) i) **What is secondary cultivation?**
- Subsequent cultivation after primary cultivation to make seedbed fine and ready for planting.

ii) **Give reasons for secondary cultivation?**
- Removing weeds which have just germinated break soil into small clods
- Make the field level
- Mixing organic matter with soil
- Make land ready for planting.

d) i) **Define minimum tillage**
- To maintain soil structure
- To reduce soil erosion
- To reduce cost of seedbed preparation
- To conserve soil moisture
- To avoid damage to roots.

iii) **State reasons for practising minimum tillage.**
- Saves time
- Reduces cost of production
- Maintains soil structure/ controls soil erosion
- Maintains soil moisture

e) Name the factors that determine the number of tillage operations during seedbed preparation.
- Implement used/ type of machinery used
- The crop to be planted
- Soil moisture
- Initial condition of the land
- Soil type/ soil condition
- Skill of operator
- Liability of soil to erosion/ topography
- Capital available/ cost of operation
- Time available for other operations.

7. a) **List the sources of water on the farm.**
- Surface water
- Rain water/ rainfall
- Underground/ ground water

b) How is water conveyed from one point to another?
- Transporting in containers by vehicles/ animals/ human
- Piping
- Use of channels

c) State how water is stored on a farm
- Use of water tank/ container
- Use of dam/ pond

d) i) **Name the types of water pipes.**
- Metal pipes
- Plastic pipes
- Hose pipe

ii) **Mention the types of metal pipe**
- Aluminium pipes
- Galvanised iron pipes.

iii) **What features are considered when buying plastic pipes?**
- Quality of material used for making the pipes
- Size of the pipes i.e diameter/ length
- Working pressure of the pipes.

e) Name the types of water pumps to be used on the farm.
- Centrifugal / rotodynamic
- Semi-rotary
- Piston/ reciprocating pumps
- Hydram.

f) i) **Why should water be treated before use?**
- Kill disease causing organisms
- Remove chemical impurities
- Remove bad smell and taste
- Remove sediments and other solids.

ii) **State the methods of treating water on the farm.**
- Boiling
- Chlorination/ chemicals
- Aeration
- Sedimentation/ decanting
- Filtration

iii) **How is water used on the farm?**
- Domestic use e.g drinking, washing, cooking
- Processing farm produce
- Cooling farm engines
- Solution of chemicals e.g
- Livestock drinking
- Washing animals and farm structures
- Mixing with building materials e.g concrete, mud
- Irrigation purposes
- Operating grinding mill
- Generating hydro-electric power

8. a) i) **What is irrigation?**
- Artificial application of water to the soil for the purpose of supplying sufficient amount to crops.

ii) **List the factors to consider in deciding to irrigate crops.**
- Type of soil
- Capital availability
- Types of crops to be grown
- Source of water/ water availability/ rainfall pattern
- Size o land to be irrigated

- Profitability of irrigation.

b) **List the major types of irrigation**
- Overhead/ sprinkler
- Sub-surface
- Surface
- Drip/ trickle

9. a) **What is land reclamation?**
   - The practice of putting unusable land into a form that can be used for agricultural production.

   b) State the importance of land reclamation
   - To make land agriculturally productive
   - To increase food production
   - To reduce population pressure/ pressure on land
   - To make uninhabitable areas habitable

   c) List the methods re
   - Draining swampy land
   - Irrigating dry land
   - Terracing steep land/ soil erosion
   - Afforestation/ reafforestation/ planting trees in wasteland
   - Control of tsetseflies
   - Deforestation/ bush clearance/ clearing forests.

10. a) i) **What are farm**
   - For planning and making decision
   - Provide information for income tax assessment
   - To determine farmer's credit worthiness/ for loans
   - Compare performance at different times
   - Compare performance of different enterprises
   - Compare performance of different farms
   - To solve disputes when farmer dies without a will
   - Provide history of the farm
   - Determine profits and losses
   - For partners to share profit losses or bonuses.

   b) List types of records kept on mixed farms.
   - Production records
   - Health records
   - Field operations
   - Feeding
   - Inventory
   - Breeding records

   c) List types of records kept by crop farmers.
   - Field operations
   - Marketing
   - Production

- Labour
- Inventory.

11. a) i) **What are livestock**
- domesticated animals

ii) **Give examples of livestock**
- Cattle, poultry, sheep, goat, pigs, bees, fish, donkey, camel

b) i) **Explain the role of livestock in human life food supply.**
- Source of income
- Raw materials for industry
- Source of employment
- Cultural uses e.g dowry, sacrifices, etc
- Biological cooks e.g cocks
- For sports and recreation.

ii) **List factors that affect livestock industry in Kenya.**
- Tradition and belief
- Product/ input prices
- Management
- Capital
- Selling prices marketing
- Climatic conditions
- Communication/ transport
- Diseases and parasites.

c) i) **List dairy breeds of cattle**
- Friesian, Ayrshire, Guernsey, Jersey

ii) **State their characteristics.**
- Triangular shaped
  Well attached udder
- Little flesh on the body
  Short, well set legs
- Ling, thin neck
  Feminine appearance
- Wide spring of ribs
  Long, thin tail.

d) i) **Name beef cattle breeds.**
- Boran, Aberdean Angus, Hereford, Galloway, Charolais.

ii) **What are the characteristics of beef cattle.**
- Blocky/ squared/ rectangular shape
- Low set/ have short legs
- Have a fleshy body
- Have short, thin necks
- Smaller udders.

e) Name the important rabbit breeds in Kenya.

- Chinchilla, earlops, New Zealand, White, Kenya white, Californian Angora, Flemish giant.

f) i) **Which is the common species of camel in Kenya?**

- Single humped/ dromedary

ii) **State the uses of camels**

- Milk production
- Meat production
- Provide leather, wool and
- Transport people/ loads

ii) **State the general characteristics of camels.**

- Beast of burden
- Provides meat, wool, milk and leather
- Adapted to life in dry regions
- Drink a lot of water
- Resistant to most diseases.

g) i) **What is the reasons for keeping poultry?**

- For meat and egg production.

ii) List the characteristics of broilers.

- Have red waxy combs and wattles
- Beak free from yellow pigmentation
- Abdomen soft and pliable to touch
- Good distance between pelvic bones and breastbone
- Well developed bones
- Bent is crescent shaped, moist and white in colour
- Body is light

iii) List the characteristics of broilers.

- Heavier and bigger than layer
- Grow very fast
- Females lay very few eggs.

h) Name the major breeds of sheep in Kenya and indicate the purpose they are kept for

- Hampshire down for meat
- Corriadace for multon and wool/ dual purpose
- Romney Marsh which is dual purpose
- Merino kept for wool
- South Down for mutton
- Locals e.g Black headed persia, Maasai sheep are kept for meat and skin production.

i) Name important goat breeds and their uses

- Dairy breeds are Toggenberg and saanen
- Dual purpose are Boer, Nubian
- Meat is Jamnapar

- Meat and skin is small E. A goat
- Wool/ fur is the Angora goat.

j) Name important pig breeds kept in Kenya.

- Large white
- Saddleback
- Landrace
- Hampshire

k) i) **Give the meanings of exotic and to indigenous breeds.**

- Exotic means imported breeds while indigenous means local breeds.

ii) State the characteristics of exotic cattle that make them better suited to marginal areas than exotic cattle breeds.

- Able to walk long distances in search of pasture and water
- Tolerate high ambient temperatures
- Tolerate tick-borne diseases.

iii) What are the advantages of keeping a Jersey cow instead of Friesian for production of milk?

- Can tolerate high temperatures
- High butter fat content
- Small size hence less food required
- Can utilize poor pasture well.

l) i) **State the general characteristics of exotic cattle breeds**.

- No humps
- Produce more milk
- Easily attacked by tropical diseases
- Susceptible to tropical heat
- Cannot tolerate hardy areas
- Early maturing

ii) **Give the characteristics of indigenous cattle**

- Are humped
- Produce less milk
- Good resistance to tropical diseases like East Coast Fever
- Tolerate hardy areas
- Can withstand tropical heat
- Late maturing

1. a) i) **What is soil fertility?**
   - The ability of a soil to provide all the required plant nutrients thereby producing and sustaining high crop yields.

ii) State the characteristics of a fertile soil.
- Suitable PH
- Good aeration
- Deep soil
- Good water holding capacity
- Good drainage
- Free from pests and diseases.

iii) How can a fertile soil loss its fertility
- Soil erosion
- Weed infestation
- Leaching of nutrients
- Alteration of soil PH
- Monocropping
- Accumulation of undesirable salts/ salination
- Burning the land
- Soil capping/ formation of impervious layer.

iv). **State the ways of maintaining or improving soil fertility**
- Improving water retention
- Crops rotation
- Maintain right PH value
- Erosion control
- Drainage to remove water logging
- Maintain adequate nutrient level
- Weed control
- Irrigation to add water

b) i) **What are plant nutrients?**
   - Minerals which constitute plant food and help to sustain plant life
   - Mainly got from the soil

ii) Na**me the major plant nutrients (macro-nutrients)**
- Nitrogen, phosphorous, potassium, calcium, magnesium, sulphur.

c) State the roles and deficiency of the following nutrients in plants.
i) **Nitrogen uses.**
- Formation of proteins
- Part of chlorophyll
- Vegetative growth
- Increase grain size.

Deficiency.

- Chlorosis/ yellowing
- Stunted growth
- Premature leaf fall
- Very short roots

Excessive supply
- Excessive succulency in grains
- Lodging
- Weak stems
- Delayed maturity

ii) **Phosphorous used.**
- Protein and enzyme formation
- Shoot growth
- Root development
- Synthesis of sugar
- Seed formation

Deficiency
- Purplish leaves
- Less fruit/ grain/ low yield
- Stunted/ slow growth
- Delayed maturity
- Poor root development
- Weak/ slender stems

iii) **Potassium uses.**
- Carbohydrate formation
- Uptake of nutrients
- Resistance against diseases
- Strengthen straw/ cell wall
- Development of chlorophyll
- Neutralise organic acids.

Deficiency.
- Lodging/ weak stems
- Chlorotic leaf surface
- Scorching at tips and margin
- Premature defoliation
- Mottling/ brown spots on leaves
- Stunted growth.

d) i) **What is soil sampling?**
- Taking a small representative quantity of soil from an area for testing.

ii) **List the methods of soil sampling.**
- Traverse/ diagonal pattern
- Zigzag / random collection.

iii) State the reasons for soil testing:
- To determine nutrient status of the soil
- To determine soil PH.

iv) Explain the procedure of soil sampling:
- Clear all vegetation
- Make a vertical cut and scoop soil at 15-25 cm depth
- Take soil from many places/ take representative sample
- Mix all soils thoroughly
- Break up soil clods.
- Get a small representative sample by quartering.

v) State precautions necessary during soils sampling
- Avoid contamination e.g by cigarette ash
- Avoid unused areas like ant-hill manure heaps etc
- Avoid mixing top – soil with sub-soil.

vi) Name the methods of detecting nutrient deficiency in crops:
- Soil analysis
- Leaf analysis
- Observation of deficiency symptoms

iv) State the importance of soil PH to a crop:
- Determines availability of nutrients in a place
- Determines presence / activity of micro-organisms in soil
- Influences soil structure.

1. a) i) **Differentiate between manure and fertilizer:**
   - Manures are organic substances which contain plant nutrients
   - Fertilizers are inorganic manures usually prepared artificially and sold commercially.

   ii) List the common organic manures
   - Farm yard manure
   - Green manure
   - Compost manure
   - Organic mulches.

   b). i) **What is organic matter?**
   - Part of soil formed from dead and decomposed plant and animal remains.

   ii) State the importance of organic matter
   - Improves soil aeration
   - Improves soil structure
   - Improves water infiltration and retention in soil
   - Adds nutrients after decomposition
   - Reduces soil erosion
   - Modify soil temperature

   iii) How can organic matter be added to soil?
   - Incorporating crop remains, weeds, etc

- Adding organic manure
- Mulching using organic materials

c) i) **Describe how to make farm Yard manure:**

- Place plant materials in inside a shed on the floor
- Animals defecate on it and mix it with urine and dung
- Remove it from pen and heap it outside for 6 months
- Cover the heap with soil and polythene sheet to prevent leaching of nutrients
- Consolidate heap to prevent entry of water
- Allow it to rot completely before being used.

ii) **State the factors determining quality of farm yard manure**

- Age of Farm Yard Manure
- Age of animal producing the waste
- Materials used for bedding
- Methods of storage
- Species of animal/ type
- Type of feed given to animals

iii) **Give the advantages of using Farm Yard Manure over fertilizer**:

- Improves soil structure
- Has longer residual effect
- Supplies more than one plant nutrient
- Promotes microbial activity in the soil
- It is locally available
- Imparts dark colour to the soil which raises / moderates soil temperature
- It buffers soil PH increases cation exchange capacity

iv) Give the disadvantages of using farm yard manure

- Is bulky hence difficult to apply / laborious
- Has less nutrients for given volume
- May spread weeds
- Releases nutrients slowly
- May spread diseases e.g black scurf disease in potatoes

d) i) **State the factors to consider when citing a compost pit.**

- Nearness to the place where compost will be used
- Distance to the place where compost will be used
- Direction of prevailing winds in relation to the position of homestead/ milking shed
- In a well drained place
- In a sheltered place
- Accessibility to the site

ii) Describe how to make compost manure

- Materials are put in a pit or pits 1.2 x 1.2 x 60cm depth
- Chop large pieces into small pieces
- Keep compost well moistened and well aerated
- Add organic materials in layers
- Add some soil to provide micro-organisms
- Add ash to provide potash and sulphure

- Insert a stick to allow free air circulation, test temperature and to test degree of decomposition.
- Turn compost every two to three weeks to facilitate air
- Add water whenever compost becomes dry
- Keep the center warm
- Avoid contraction or waterlogging
- Do not use material infested with pests or disease
- Protect from rain and sun
- Materials include crop residues, animal waste, old manure, farm yard manure, inorganic fertilizers and top soil.

e) i) **How is green manuring done on the farm?**
- A crop is grown and then ploughed under to be incorporated in the soil while it is still green.

ii) List the characteristics of green manure crops:
- Fast growth rate
- Preferably a legume
- Leafy / high foliage ratio
- Ability to rot rapidly

iii) **What are the advantages of green manuring?**
- Fixation of atmospheric nitrogen into the soil
- Improves soil aeration, water infiltration and absorption
- Increases organic matter and humus content of the soil
- Increases crop yields.

2. a) **Classify fertilizers by nutrient content.**
- Straight fertilizers contain one type of nutrient e.g nitrogenous, potassic or phosphatic
- Compound contains two or more e.g DAP, MAP and NPK

b) i) **Name the common nitrogenous fertilizers.**
- They supply nitrogen and include sulphate of ammonia, ammonium sulphate nitrate, ammonium nitrate, urea and calcium ammonium nitrate.

ii) State properties of nitrogenous fertilizers/ (characteristics)
- Highly soluble in water/ easily leached/ no residual effect
- Have a scorching / burning effect on plants
- They are volatile/ change into gaseous form
- Hygroscopic/ absorb moisture from the atmosphere/ cake easily.

iii) When are they applied and why at that time?
- When the crop is already growing e.g for maize at 30–45 cm height
- At this stage the crop has well developed roots to absorb dissolved nitrogen fertilizer.
- The crop has well developed leaves for foliar feed
- Crop is growing fast and required a lot of nitrogen.

c) i) **Name the common phosphatic fertilizers:**

- They supply phosphorous and include DSP, SSP and TSP

ii) When are they applied and why at the time?
- Applied at planting time
- Applied for formation, development and early establishment of roots.
- Has long residual effect/ stays long in the soil
- Have low mobility
- Rather insoluble

d) i) **Name the common potassic fertilizers**
- supply potassium and include potassium chloride (kcl) and muriate of potash.

ii) Characteristics:
- Easily soluble
- Mobile
- No fixation hence
- Easily absorbed
- Easily leached
- Have searching effect.

e) i) **What is fertilizer application?**
- Restoring soil fertility by supplying growing plants with nutrients that may be lacking in the soil.

ii) List the methods of fertilizer application:
- Broadcasting
- Row application
- Top dressing
- Side dressing
- Foliar spraying

iii) What is top dressing?

f) i) Calculate the amount of K_2O (potassium chloride) contained in 400 kg of a compound fertilizer 25:10:5 – 5kg of K_2O is contained in 100kg of 25:10:5

Therefore: 400kg of fertilizer contains $\frac{400 \times 5}{100}$ = 20kg of K_2O

ii) A farmer is to apply a compound fertilizer 20:30:10 on a vegetable plot measuring 5 metres long by 4 metres wide, at the rate of 200kg per hectare.

a) Calculate the amount of the fertilizer the farmer would require for the plot. (show your working)
- 10,000 sq. m require 200kg of fertilizer
- therefore 5 x 4 sq. m would require
- $\frac{20 \times 200}{10,000}$ = 0.4 kg / 400gm

b) What do the figures 20, 30 and 10 in the fertilizer stand for
- 20 stands for the ratio of N_2 (Nitrogen)
- 30 stands for the ratio for phosphorous
- 10 stands for the ratio of potassium

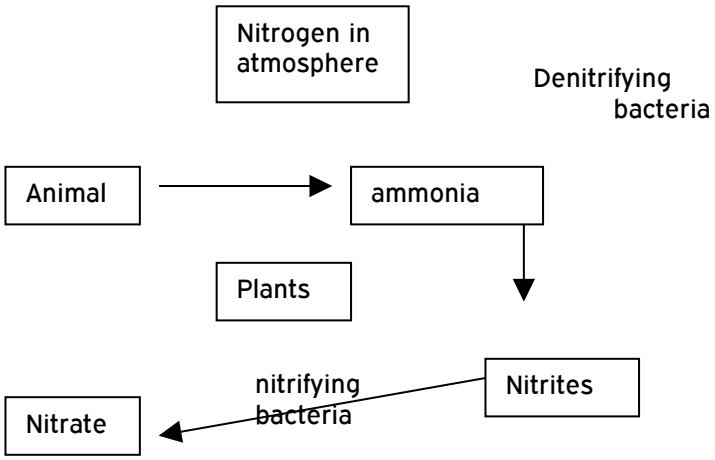
iii) **How much of a fertilizer labeled (20:20:10) should be applied to a plot which requires 30 kg P_2O_5?**

- 20 kg P_2O_5 are contained in 100 kg NPK (20:20:10)
- 30 kg P_2O_5 contain $\frac{100 \times 30}{20}$ = 150 kg NPK

4. **a) i) State the importance of the nitrogen cycle**

- Makes available compound nitrogen for use by plants
- Improves soil fertility

ii) Describe the nitrogen cycle:



- Nitrogen is fixed by electrical charge into nitrates
- Nitrogen dissolve and is absorbed by plants
- Plants are fed on by animals and release ammonium compounds
- Nitrifying bacteria/ nitrosmonas change ammonia into nitrite then into nitrate
- Nitrite then into nitrate
- The nitrate releases nitrogen into the air or is used up by plants.

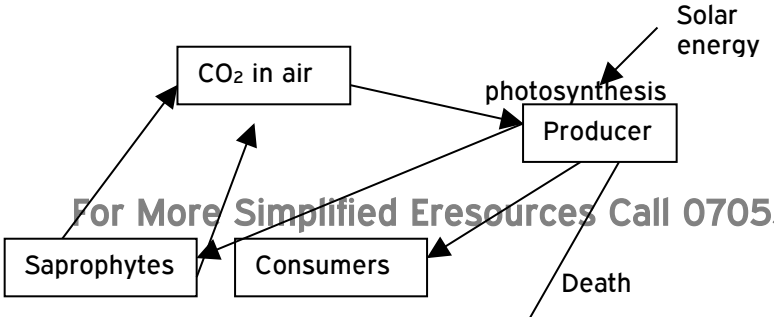
iii) What happens to nitrogen in the soil?

- May evaporate / volatilize
- Used up by micro-organisms
- May be used up by plants
- May be released into atmosphere by bacteria
- In the process of denitrification
- May be leached
- May be eroded.

b) i) State the importance of carbon cycle

- Provides carbon dioxide for photosynthesis
- Production of energy for plant and animal use.

ii) Describe the carbon



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- Compounds in plant residues digested/ oxidised to release carbon dioxide
- Carbon dioxide in the soil produces carbonic acid, carbonates and bicarbonates.
- Animals release carbon dioxide to the atmosphere during respiration
- Plants also release carbon dioxide to the atmosphere during respiration.

iii) How is carbon lost?
- Leaching
- Used by higher plants

iv) How can carbon be restored to the atmosphere?
- Enhancing process of photosynthesis
- Burning hydrocarbons
- During plant and animal respiration.

5. a) i) Define crop propagation.
- Development and multiplication of new individual crops from existing ones.

ii) **What are the methods of crop propagation?**
- Seeds
- Vegetative materials

b) i) List the different methods of vegetative propagation:
- Use of cuttings
- Layering
- Grafting
- Budding/ bud grafting
- Use of storage organs

ii) State advantages of vegetative propagation.
- Desirable characteristics reserved
- Disease resistance imported from some crops
- Short period to maturity
- Quick way of multiplication of low viability plants
- Gives more than one variety on one crop
- Short period to maturity
- Quick way of multiplication of low viability plants
- Gives more than one variety on one crop.

iii) State its disadvantages.
- Cannot produce new varieties
- Difficult to keep materials free from diseases
- Vegetative materials cannot be stored for long.

c) i) What are the advantages of seed propagation
- Easy to store large number of seeds
- Plant can produce large number of seeds
- Can produce new plant varieties

ii) State the disadvantages of seed propagation
- Do not breed true to type
- Some seeds have long dormancy periods
- Seed may spread undesirable genes quickly
- Crops may take too long to produce fruits
- Seeds may be attacked by pests/ diseases

d) i) Give the advantages of early planting
- Crops make good use of available rainfall
- Establishment is early hence withstand competition from weeds
- Crops escape attack by pests and diseases
- Crops use nutrients well before leaching e.g nitrogen
- Crops reach market early hence get good market
- Reduces labour competition for various operations

ii) State the factors to consider when selecting seeds or other planting materials for planting
- Quality of parent plant e.g high yielding, vigorous growth
- Disease and pest resistance
- Free from weeds and pest/ disease damage
- Early maturing/ suitable to the area
- High quality products/ good size and grade
- Should be viable

iii) What are the reasons for seed selection?
- To obtain high crop yields
- Reducing chances of disease / pest attack
- Obtain viable seeds
- Obtain high quality produce
- To get seeds suitable to the area

iv) What practices are carried out for seeds to ensure that they germinate?
- Proper seed selection
- Planting at same depth
- Proper seedbed preparation
- Planting at proper moisture content
- Treating seeds to break dormancy
- Treating soil against pests and diseases
- Plant at correct depth.

e) i) List the methods of planting

- Dibbling
- Broadcasting
- Row planting
- Drilling

ii) State the advantages of row planting.
- Saves on seeds/ economy on seeds
- Easy to get correct spacing
- Makes subsequent operations easier

iii) State the factors which influence planting depth.
- Soil moisture
- Soil type
- Size of seeds.

iv) What factors determine crop spacing?
- Fertility status of soil
- Moisture content of soil
- Use to which crop is to be put
- Machinery to be used in subsequent operations
- Growth habit of crop
- Number of seeds per hole
- Prevalence of certain diseases/ pests
- Method of planting

v) State the advantages of correct spacing
- Avoid competition for nutrients, light, water, space
- Obtain adequate plant population
- Controls spread of pests and diseases
- Easy to carry out subsequent operations/ easy to mechanics

vi) Why is correct plant population necessary?
- To obtain high quality crops
- Helps a farmer to control weeds / pest/ diseases
- Helps in soil and water conservation
- To obtain high yields

f) Name the treatments necessary on planting materials before planting?
- Legume seed inoculation
- Seed dressing
- Breaking dormancy of seeds
- Pre-conditioning seeds

g) List the field practices on crops;
- Thinning
- Gapping
- Pruning
- Roguing
- Staking/ training/ propping
- Earthing

h) i) What is crop rotation?
- Growing of different crops in an orderly sequence on the same field/ seedbed

ii) Why is crop rotation important?
- Maintains soil fertility/ improves soil structure, aeration, water infiltration, addition of nitrogen by legumes
- Controls pests/ diseases
- Makes maximum use of soil nutrients
- Reduces chance of erosion
- Controls weeds.

iii) State the factors to consider when planning a crop rotation system:
- Nutrient requirement of different crops in the sequence
- The need to include grass loys in the programme
- Prevalent pests and diseases
- Types of crops in the sequence
- Growth habit of the different crops included.

iv) Why is it important to include a grass loy in a rotation programme?
- Grass loy improves soil structure/ maintains it
- They add organic matter in the soil/ increase fertility.

i) i) What factors influence the time and stage at which crops are harvested?
- Purpose of the crop / intended use
- Kind of storage facilities available
- Method of harvesting the crop
- Type of crop to be harvested
- Moisture content e.g grains

ii) Mention the harvesting methods
- Manual / by hand
- Mechanical / using machines

iii) How can crops be prepared before storage?
- Processing / to put in usable/ acceptable form
- Inspection and sorting out into grades
- Hardening of fruits and root crops
- Drying or freezing to reduce spoilage rate
- Chemical treatment
- Adding preservatives.

iv) Why dry grains before storage?
- Prevents germination/ sprouting in storage
- Reduces pests/ disease attack
- Reduces attack by fungi.

v) What factors are considered when grading crops for market?
- Size
- Colour

- Shape
- Dryness
- Damages on crops

j) i) List the various storage structures on farms

- Traditional granaries
- Maize crib
- Bags
- Bulk storage e.g silos

ii) **State the problems farmers face in storage of produce from farms**.

- Vermin's, insects and fungi
- Dampness in stores causes rot
- Storage facilities are poor
- Little knowledge on treatment before storage
- Lack of capital to construct good structures and buy chemicals.

iii) List the features a good crop storage structure has

- Raised from the ground adequately
- Leak-proof roof/ water proof roof
- Clean or easy to clean
- Vermin proof
- Strong enough to support the produce in store
- Strong enough to keep away thieves
- Well ventilated
- Easy to load/ unload

6. a) What is a nursery?

- A place where seeds are grown to get special attention before being transferred into the main field/ seedbed

b) State the reasons for using a nursery.

- When seeds are too small
- Easy to handle/ take care of seedlings
- Easy to select seedlings
- Some seeds are delicate hence not viable and require proper care
- Pest control is easy
- It is possible to carry out watering
- Uniformity of plants in the field
- For bulking up as in the case of sugarcane planting.

c) State the nurseries management practices.

- Proper watering
- Hardening off
- Controlling pests and diseases
- Thinning or pricking out

d) Explain the following nursery practices.

i) **Pricking out.**
- Done to enable seedling to grow vigorously and healthy/avoid overcrowding

ii) Hardening off.
- Carried out to make the seedlings to get used to the actual field conditions.

iii) Rogueing.
- Removal of diseased crop plants

7. a) i) What is health and diseases
- Health is the state of the body in which all body organs and systems are functioning normally and are normal.
- Disease is any alteration in the state of the body or any organs or systems which would interfere with or interrupt the proper functioning.

ii) State the importance of keeping livestock healthy
- To increase quantity of livestock products
- To increase quality of livestock products
- To increase profit level/ reduce cost of production
- To prevent the spread of diseases
- To increase productive life of an animal
- To enable them to breed regularly.

iii) State the signs of illness in cattle
- Dullness
- Abnormal urination e.g red water
- Rough hair-coat / hair falls off
- Abnormal respiration rate
- Dry mucus membrane
- Abnormally low or high temperature
- Loss of appetite
- Abnormal pulse rate
- Decline in production
- Abnormal defalcation e.g diarrhoea/ constipation
- Aggressive when approached.

iv) List the causes of animal diseases:
- nutritional cause
- chemical causes
- physical cause
- living organisms.

v) What are the categories of diseases?
- Bacterial
- Viral
- Ricketsial
- Fungal
- Protozoan

b) State the general methods of disease control.

- Use of prophylactic drugs e.g antibiotics/ prophylaxis
- Proper sanitation/ farm hygiene
- Use of antiseptics and disinfectants for cleaning
- Quarantine and isolation to reduce spread
- Slaughtering, culling or killing affected animals
- Routine vaccination to prevent infection
- Killing vectors e.g ticks, tsetsefly, etc
- Proper nutrition/ feed properly
- Use proper technique of milking to control mastitis
- Artificial insemination to avoid breeding disease e.g contagious abortion
- Proper disposal of carcass e.g for Anthrax
- Proper housing / avoid overcrowding
- Treat affected animals to avoid infecting others
- Avoid injuring animals
- Rotational grazing to control parasites / internal parasites
- Prevent / avoid factors causing stress.

8. a) What is a parasite?

- Any organism that depends on another organism, called host, for nutritional and protective purposes.

b) i) **What are external parasites?**

- Live on the host at lease for part of its life cycle.

ii) State examples of external parasites:

- Ticks, tsetsefly, mites, lice, fleas, keds

iii) State the signs of infestation by external parasites:

- Anaemia
- Irritation/ scratching
- Loss of hair
- Sores/ wounds on skin
- Presence of parasites on animals body

iv) List the harmful effects of external parasites.

- Transmit diseases/ cause diseases
- Suck blood and cause anaemia
- Irritation and discomfort
- Poor quality hides and skins
- Increase production costs.

c) i) State the categories of tick.

- One-host
- Two-host
- Three-host

ii) **Give the stage of tick's life cycle in proper order**

- Egg, larva, nymph, adult.

iii) **How are ticks controlled?**

- Use of chemicals/ acarioides
- Ploughing the pastures or crop
- Burning infested pasture
- Hand picking and killing
- Rotational grazing
- Fencing the farm

d) i) **What are internal parasites?**
- Stay inside body of host.

ii) Give examples of internal parasites
- Round worms
- Flukes/ liver fluke
- Tapeworms

iii) List the harmful effects of internal parasites:
- Retarded growth/ malnutrition/ emaciation
- Lower production rate
- Diarrhoea/ constipation
- Damage to the organs/ blindness/ pneumonia
- Blockage of organs
- Irritation / coughing
- Anaemia
- Death

iv) State the methods of controlling internal parasites of livestock.
- Regular drenching / deworming
- Rotational grazing
- Draining of swampy areas
- Proper sanitation in livestock houses
- Spraying swampy areas with appropriate chemicals
- Burning pastures t kill eggs
- Plough the pastures to bury eggs

e) a) Name intermediate hosts for:
i) Tape worm
- Pig/ cattle

ii) Liver fluke
- Snail/ mud or vaster snail

f) Why should drenching alone not be an affective control measure for livestock
- It does not destroy intermediate hosts
- It does not destroy other stages of the parasites

9. a) **What is nutrition?**
- Process by which an animal takes in, digests and assimilates food

b) Describe the various nutritional elements:
i) Carbohydrates
- Are energy foods
- Produces heat for all body processes

- Produces energy for maintaining animal alive
- Crude fibre in carbohydrates prevents constipation
- Excess converted to fats and stored
- Source includes roughage, cereals, tubers, lactose from milk.

ii) Proteins

- Are body building feeds
- Provides raw materials for synthesis of animal
- Products e.g milk, eggs, etc
- Used in synthesis/ growth of cells
- Used to produce energy
- For formation of enzymes and antibodies
- Maintain body tissues/ repair and replacement
- Deficiency leads to stunted growth, low fertility, low production, wearing out of body tissues and poor resistance to diseases.

iii) Fats

- Source of energy
- Sources include sunflower, fish meal, seeds, etc

iv) Vitamins.

- Classified as water soluble or fat soluble
- Functions are to promote growth, help in blood clotting, bone formation, muscular activities, prevent diseases and act as catalysts.
- Sources are most food eaten.

v) Minerals.

- Maintain osmotic pressure, regulate metabolism, bone formation and development, teeth development, increase food conversion, increase in appetite.
- Deficiency leads to reduced appetite, loss of weight, decrease in production, poor growth and loss of condition.
- Sources include mineral supplements.

vi) Water

Functions:

- Regulation of body temperature
- Make cells turgid and maintain body shape
- Transport of nutrients
- Biochemical reactions
- As a lubricant

vii) Factors influencing intake.

- Size of animal
- Productivity e.g milk
- Type of food given to animal
- Physiological status of animal e.g pregnant
- Ambient temperature
- Species/ kind of animal

c) Explain what the following means:

i) Concentrates

- A feed with high protein and/ or energy content but low in fibre
- Have high available nutrients per unit weight
- Compact in form mashes/ powder, granules, salt and mineral blocks, etc
- Fed in small amounts.

ii) Roughage

- A feed with high fibre contents and / or low energy
- Are bulky, of low digestibility, low in protein, and of plant origin e.g pasture, hay, silage, fodder.

d) What is a ration?

- Amount of food that will produce essential nutrients to an animal to enable animal nest its nutritional requirements.

e) Explain the meaning and importance of.

i) Balanced ration

- Contains all nutritional requirements of animals

ii) Production ration:

- Feed given to an animal over and above the maintenance ration to produce a given product
- Used for production of products like milk, meat, also for foetal development, work and growth of young animals.

iii) Maintenance ration.

- The portion of a feed required by an animal to continue with the vital body processes

f) State the desirable characteristics of a livestock ration:

- Balanced in terms of nutrients
- Palatable to the animals
- Highly digestible
- Free from poisonous materials/ free of contamination

10. a) i) **Outline the main differences between ruminants and non-ruminants**

- Ruminants have four stomach compartments while non-ruminants have only one.
- Ruminants chew cud while non-ruminants do not chew cud
- Absence of ptyalin in ruminant saliva and presence in non-ruminant saliva
- Ruminant digest a lot of cellulose while non-ruminants digest only a little cellulose.

ii) Draw a ruminant stomach e.g cow and explain the functions of the four chambers.

Rumen:
- First chamber
- Stores and softens food
- Microbial action of food takes places here

Reticulum
- Separates coarse food from fine food particles

Omasum
- Grinds food and reduces water content

Abomasum
- Has enzymes which act on food thus causing food digestion

b) How is grass digested in the rumen of an adult ruminant?
- Food is stored in the rumen
- Coarse grass is regurgitated from the rumen for further chewing in the mouth i.e chewing cud.
- Saliva that is mixed with feed when chewing cud creates alkaline PH suitable for bacterial action in the rumen.
- Food undergoes microbial fermentation in the rumen
- In the rumen carbohydrates are broken down into volatile fatty acids/ acetic acid and butyric acid.
- Gases like methane, carbon dioxide and hydrogen are released.
- Proteins are broken down into peptides/ amino acids
- Amino acids/ essential amino acids are synthesized from ammonia and other non-protein nitrogen by micro-organisms.
- Micro-organisms also synthesize certain vitamins e.g vitamin B complex, vitamin K.
- Much of the volatile fatty acids and ammonia are absorbed through bolching i.e carbon dioxide and methane.

c) **State the functions of the following parts of poultry digestive system**.

i) ***Crop***
- Softening food
- Storage of food

ii) Gizzard
- Contains small stones which help to grind food and break down cellulose.

11. a) **i) Draw the reproductive system of a hen and explain the stage taken during the formation of an egg.**

Ovary

- Produces ova

Infindibulum

- Site of fertilization and storage of sperm calls
- Yolk takes 15 minutes here

Magnum

- Albumen is added
- Egg takes 3 hours here

Isthmus

- Secretes the shell membrane
- Water, minerals and vitamins
- Process takes 1 ¼ hours

Uterus/ shell gland

- Has calcium deposits
- Shell added round eggs
- Completes the addition of albumen
- Process takes 18 – 22 hours

Vagina

- Pigmentation of egg takes place here
- Socrates mucus which reduces friction and facilitates expulsion of the egg
- Takes 1. 10 minutes

Cloaca

- Delivers the egg out gently.

(ii) Draw a clearly labeled diagram to show the reproductive system of a cow and state the functions of the labeled parts.

Fallopian tube.
- This is a passage through which ova pass from the ovary.
- This is where fertilization takes place as the ovum passes to the uterus.

Ovary.
- Produce ova
- Produce sex hormones e.g oestrogen, progesterone

Uterus
- After fertilization foetus develops until birth here.

Vagina and Vulva.
- Receive male's sperms
- Aid in expulsion of young from the womb during birth

b) i) **What is selection in animal breeding?**
- The process of allowing certain animals to be parents of future generations.

ii) State the factors to consider during selection.
- Increase in yield
- Improved quality of products
- Resistance against diseases
- Resistance to heat or dry conditions
- Reduced maturity age.

c) i) **What is breeding?**
- It involves mating of desirable males and females

ii) **State the importance of breeding.**
- To obtain high quality products
- Increase production capacity
- Import disease resistance
- Increase tolerance to high ambient temperature
- To reduce maturity age.

iii) Give the methods of mating cattle
- Artificial insemination / AI
- Natural method

d) i) What is natural mating?
- Taking a bull to serve cow

ii) State its advantages
- Heat detection by bull
- Bull stays with cow on heat
- No need for harder to detect heat.

iii) State the disadvantages of natural mating?

- May cause inbreeding if bull is not controlled
- Expensive/ uneconomical to keep a bull
- There is a risk of transmission of breeding diseases
- A bull may cause physical injury to a cow/ handler
- Only a limited number/ few cows can be mated by one bull within a given period of time.

e) Explain the main systems of breeding.

i) Grading up

- The process of crossing until an animal having desirable characteristics is obtained.
- Example is mating Boran bull to Friesian cow to obtain increased production and disease resistance.

ii) Line breeding

- Is the mating of two individuals originating from one ancestor or same line of breeding.

iii) Cross breeding

Meaning:

- Mating two pure breeds belonging to different breeds/ mating a pure bred sire of one breed to a high quality grade female of another breed.

Reasons:

- To produce a hybrid with hybrid vigour
- Imparts desirable genes from either of the parents.

What is hybrid vigour?

- The increased ability and performance of the offspring above the average of the two unrelated parents.

iv) Outcrossing

- Mating two unrelated animals of the same breed

v) Inbreeding.

Meaning.

- Mating of closely related animals

Aim

- To retain/ preserve certain desirable qualities

Disadvantages

- Increases embryonic mortality/ abortion
- Reduces disease resistance ability
- Reduces the vigour of the animal / causes weakness/ abnormality
- Reduces yield.

f) **i) What is artificial insemination?**

- Obtaining semen from males and depositing it in female's reproductive canal by

artificial means.

ii) State its advantages.
- Cheap / can be afforded by many farmers
- Controls breeding diseases /
- One male can serve many females
- Makes use of good bulls/ quick way of improvement
- Young/ small females not injured
- Used to prevent inbreeding
- Semen can be used in distant places

iii) Give the disadvantages.
- Can quickly spread undesirable genetic traits
- Requires special equipment and good communication network
- Timing of optimum period is difficult
- Not readily available to small scale farmers.

12. a) **Discuss sheep management from selection of breeding stock to lambing.**

i) Selection of breeding stock.
- High fertility and regular breeding
- Good quality products
- Fast growing/ early maturing
- Healthy stock
- Good mothering instinct
- Good body conformation/ not physically deformed.

ii) Breeding
- Flush owes by giving extra concentrates/ high plant nutrition
- Flushing should be started about 3 weeks before mating and continued for three weeks after mating
- Clip wool around vulva for easy mating/ do crouching
- Raddling of rams before mating
- Use one ram for 35 – 60 owes
- Mating time for lambing to coincide with the season when there is enough pasture.
- If more than one ram used, use different colour of paste for each ram.
- Remove rams from owes after mating.

iii) Management during gestation
- Food owes on good pasture / concentrates 3 – 4 weeks before lambing / steam up
- Move owes to clean pasture three weeks before lambing
- Deworm owes 2 –3 weeks before lambing
- Vaccinate owes 2 –3 weeks before lambing against common diseases
- Provide clean water.

iv) Lambing management.
- Observe signs of lambing and supervise/ assist when necessary
- Disinfect navel cord immediately after lambing
- Ensure lambs suckle within first 1-2 hours
- Dagging / clipping of wool around teats after lambing
- Owes that give birth to more than one lamb should be given extra feeding.

b) Disease the management of lambs from birth upto and including weaning.
- Weak lambs should be artificially reared
- Rejected/ orphaned lambs should be given to faster mothers
- Keep lambs and the owe on good pastures
- Dock the lambs within the first 2 weeks
- Castrate male lambs not needed for breeding within the first two weeks
- Introduce creep feed to the lambs from 6 weeks
- Dip/ spray / dust sheep as necessary against octoparasites
- Treat sick animals
- Wean lambs between 4 – 5 months or when 22kg live weight
- Put identification marks before weaning
- Trim hooves before mating
- Deworm lambs before weaning
- Keep records

13. a) i) **Describe the factors to consider when selecting a gilt for breeding.**
- Maturity ie. Proper age / 12 months or 90 –100 kg live weight
- Good mothering instinct
- Fast growth rate
- Lack of physical defects
- Healthy i.e lacking history of many diseases

ii) **What characteristics should be considered when selecting a breeding boar?**
- Docile/ good temperament
- Good body conformation for the breed
- Lack of physical deformities
- Strong back and legs
- Fast growing/ early maturing

b) What preparations should be carried out for a sow one weak before she farrows?
- Clean and disinfect the farrowing pen
- Wash / clean and disinfect the sow
- Treat the sow against external parasites
- Move the sow to farrowing pen/ orate within a week/ separate from the rest
- Reduce sow's ration a day before farrowing
- Provide heat in the farrowing pen/ creep area
- Provide clean bedding material
- Provide bran to the sow as a laxative.

c) Discuss the management of piglets from farrowing to weaning time.
- Keep watch over farrowing process/ help in the farrowing process
- Remove mucus and any foreign materials around piglet's nostrils
- Put piglet in a safe warm place
- Tie/ out and disinfect umbilical cord
- Dispose of afterbirth/ stillborns
- Ensure piglets suckle colestrum/ piglets suckle immediately after birth
- Got rid of excess piglets/ rear excess piglets artificially/ give excess piglets to a foster mother

- Clip off the needle tooth
- Give piglets iron injection or iron paste to control anaemia
- Provide croop food to the piglets
- Give sow extra food according to the number of piglets sucking it
- Castrate male piglets not intended for breeding at about 3 weeks of age
- Put identification marks on piglet/ identify piglets using appropriate method
- Weigh piglets regularly weekly and later monthly
- Remove sow from farrowing pen to wean piglets
- Select the piglets to be used for breeding
- Provide piglets with extra food and water at weaning
- Keep farrowing pen clean throughout the rearing period
- Wean between 4 – 8 weeks of age
- Keep appropriate records
- Deworm piglets at weaning time
- Provide adequate water
- Control diseases as necessary/ vaccination
- Control external parasites

d) How would you rear a gilt from weaning time to the time it farrows?

- Food gilt on atleast 3 kg of sow and weaner meal daily
- Provide clean drinking water
- Vaccinate the gilt to control common diseases
- Control external parasites by dusting with pesticides
- Treat gilt of sick
- House the gilt next to a boar at age of 12 months
- Ready to be served/ serve it at right age and weight
- Keep the pen clean by maintaining clean litter
- Flush gilt 3-4 weeks before service by feed on high quality diet
- Take gilt to the boars pen for service and let it stay for at least 12 hours.
- Observe the return to heat, if any, after three weeks, and repeat the service if necessary.
- Steaming up should start 1 ½ months before farrowing by giving 3-4 kg of feed
- 7-10 days before farrowing, the gilt should be washed and moved into a clean and disinfected farrowing pen.
- Sow and weaner meal should be reduced three days before farrowing
- Observe the signs of farrowing, and supervise the farrowing process.
- Deworm the gilt 7-10 days before farrowing.

e) i) Give the reasons for culling a breeding boar.

- When the boar is old
- When the health of the boar is poor/ injury
- When the offsprings are being used as replacement stock/ to stop inbreeding
- When the bear is too fat and lazy/ back leg weakness
- When the performance of offsprings is poor
- When the bear lacks libido / infertile

ii) Why should a breeding sow be culled?

- Goats are browsers/ require less food
- They can do with little water
- They are easy to manage

- Less attack by diseases
- Good walkers/ good climbers.

14. a) Why are goats suited to most parts of Kenya?

- Goats are browsers/ require less food
- They can do with little water
- They are easy to manage
- Less attack by diseases
- Good walkers/ good climbers

b) What are the various management practices a goat farmer should carry out?

- If goats are kept for milk, the kids should be removed from their mother and fed from a bucket or a bottle
- The kid should be fed three times a day
- Solid food should be introduces at 2-3 weeks old
- Regular vaccination should be carried out after weaning
- Hoof trimming
- Confined meat producing goats may be fed on out forage
- Food on sweet potato vines, napier grass or green maize
- In addition to grazing, dairy goats food on roughage such as silage
- Concentrates must be fed to lactating goats to correct any mineral deficiency in roughage / provide mineral lick
- Proper records on various operations should be kept
- Spraying against external parasites/ farm hygiene
- Identification operations e.g tagging, branding, ear-notching tatooing
- Castrate males not required for breeding

c) Give the methods of improving dairy goats.

- Proper selection/ bulling
- Proper breeding upgrading/ cross breeding
- Maintaining good health
- Proper feeding
- Proper milking methods
- Proper housing.

15. a) **State the factors that should be considered when selecting rabbits for breeding.**

- Good body size
- Breeding efficiency
- Good body conformation
- Growth rate
- Good health
- Freedom from physical deformities.

b) Why is it important that rabbits are fed on a balanced diet?

- For quick growth
- To prevent mineral deficiency
- To give good quality products
- To give maximum yield
- Prevention from diseases

c) List the heat signs in a doe.
- Restlessness
- Rubs itself against any object
- Vulva swells
- Interested in other rabbits
- May lie on her side

d) Name the types of rabbits keeping.
- Rabbitry and hutches
- Mordant i.e movable rabbit house built of light materials
- Warren
- Colony system.

e) State the general routine management practices necessary to protect rabbits from diseases and parasites.
- Cleanliness in the housing units
- Do not feed on contaminated food
- Isolation and treatment of sick ones
- Disinfect cages, water and feed troughs
- Impose quarantine of two weeks on new rabbits.

16. a) **State the uses of bees on the farm.**
- Pollination of flowers
- Production of honey and wax

b) Give the functions of the various classes of bees found in a beehive.
- Queen is fertile and lays egg
- Drones are fertile males and mate with queen to fertilize the eggs
- Works are sterile male who take care of all other bees and the hive, and also offer protection to the hive.

c) How can bees be attracted to a hive?
- Using honey
- Smear sugar syrup on hive
- Use of molasses.

d) **i) When is it recommended to harvest honey?**
- Late in the evening
- Early in the morning

ii) State why smoke should be used when harvesting honey, but not fire.
- Smoke makes bees loss aggressive/ less active
- It does not kill bees/ breed
- Quality of honey obtained is sufficiently high

iii) **What precautions are necessary when harvesting honey?**
- Avoid excess smoke getting into the hive

- Prevent rain water from getting into hive
- Use clean utensils to avoid contamination
- Use of protective clothes

e) **i) Name diseases of bees.**
- Acorive disease
- Foul breath disease

ii) Give examples of pests of bees.
- Safari ants
- Bee lose
- Private wasps
- Wax moth
- Birds
- Honey badger
- Beetles
- Robber bees

17. What makes the camel suited to living and working in desert conditions?
- Can tolerate high temperature
- A browser which survives well on scanty vegetation
- Travels long distance and for several days without water
- Hooves are suited to walk on sand

18. Mention the uses of donkeys.
- Transportation
- Work e.g pulling ox-ploughs for cultivation.

b) What management practices are necessary to enable a donkey work efficiently?
- Proper harnessing to avoid injuries
- Foot care and hoof trimming when necessary
- Proper feeding
- Enough rest after work
- Treat when sick
- Drenching using horse dewormer.

19. a) **i) Explain cropping in fish farming.**
- The removal of marketable size of fish from the pond to provide more food for those left behind.

ii) What is fish harvesting?
- Removal of all fish from the pond

b) List the features that are necessary in fish-pond construction.
- Inlet for fresh water
- Spillway to remove excess/ overflow water
- Outlet for drainage e.g when harvesting fish or replacing water
- Fence to keep away predators/ thieves

- Screen to prevent fish from escaping.

c) Explain the maintenance practices necessary for a fish pond.

- Maintain optimum level of water by regulating inflow and outflow of water
- Immediate blockage of water leakages
- Remove any debris
- Out weeds or grass growing around pond
- Fertilize pond regularly
- Provide enough food to fish

20.a) i) How can skin of an animal be damaged while animal is still alive?

- Poor branding
- Scratching by sharp objects such as wires / whipping/ injury by other animals
- Skin diseases
- Bites by parasites.

ii) State the treatment given to hides and skins after flaying.

- Washing
- Trimming
- Tanning
- Draining and fleshing
- Preserving by salting

iii) What are the uses of hides and skins?

- Source of revenue
- Used to make items e.g shoes, etc

b) i) **Give reasons why honey harvesting at night is not encouraged.**

- To avoid bush fires
- Because one may not distinguish between honey combs and brood combs
- Loss damage to combs
- Little contamination of honey
- To avoid killing bees.

ii) Describe the procedure of harvesting honey.

- Wear protective clothing
- Approach beehive from behind
- Move smoothly
- Puff smoke, using smoker, into entrance holes
- Inspect combs thoroughly
- Harvest only where scaled combs
- Leave enough combs with honey, especially in dry season, to avoid starving bees
- Brush out bees from honey combs
- Avoid crushing bees.

iii) State the methods of extracting honey from honey combs

- Using heat method
- Crush and strain
- Using of extraction.

iv) **What factors influence the quality of honey?**
- Presence of impurities/ foreign materials
- Source of nectar / food type
- Stage of ripening/ maturity / under 17% moisture content
- Season of the year/ rainy season/ flowering
- Method of extraction.

c) **Describe hoe to kill and prepare a rabbit carcass**
- Kill by dislocating the neck
- Hold by back legs in the hand
- Strike a sharp blow with edge of hand, at base of skull behind the ears
- This causes bone separation and breaks blood vessels of the neck
- Hook up rabbit immediately by one leg
- Remove head to assist bleeding
- Slit abdominal wall and eviscerate / remove visceran/ remove internal organs
- Dry the skin using appropriate method
- Sell meat locally.

d) i) State the difference between wool and hair.
- Wool is outer coat of sheep made of many fibres with crimp
- Appearance that make the fibres elastic
- Hair is smooth, lacks waviness and is inelastic

ii) What is fleece?
- Wool which has been shorn/ out from sheep

iii) Give the qualities of good wool.
- Clean / loss
- Long
- Fine/soft/wool count
- Be of pure colour/white
- Strong
- Elasticity/ crimpy.

iv) **List the precautions to be taken during the sheep shearing process to ensure good quality wool**
- Shearing on dry and fine weather/ season
- Use clean floor to avoid fouling of wool
- Avoid half cut wool as this lowers quality

e) How are fish processed before cooking?
- Scaling
- Removal of offal's/ eviscerating
- Sun drying or smoking to slow down deterioration

ii) List the methods of preserving fish before sale to consumers
- Splitting then drying in the sun
- Smoking
- Salting.

FORM THREE TOPICS

1. a) **Define farm layout**
   - refers to how land on the farm is allocated to various uses.

   b) What is a good layout
   - One which allows easy management of various enterprises on the farm
   - One which satisfies the farmer and give him comfort.

   c) **State the factors to consider when planning the layout of a mixed farm**.
   - Slope of land/ drainage / topography
   - Direction of prevailing winds
   - Type of soil
   - Type of enterprises required/ other enterprises on farm
   - Infrastructure/ accessibility/ other enterprises on farm
   - Government regulation
   - Existing permanent structures on the farm
   - Land size
   - Security of enterprises
   - Existing ammonites e.g electricity, water
   - Panoramic view

2. **a) List the common structures found on the farm.**
   - Nursery beds
   - Crushes
   - Calf pens
   - Fish ponds
   - Dairy shed / milking parlour
   - Fences
   - Dips
   - Pig sty
   - Beehives
   - silo
   - Compost heap/ pit
   - Store
   - rabbitry and hutches

   b) Explain the factors to be considered in constructing a farm structure

   i) Sitting
   - Sitting the structure in rotation to other buildings/ farm activities/ considering security/ accessibility/ topography/ drainage

   ii) Orientation.
   - Orientation of the building in relation to wind direction/ light/ topography

   iii) Design / purpose
   - Design of the structure to fit the intended purpose or use/ to fit the climate of the area/ size of enterprise.

   iv) Materials

- Choice of building materials considering type/ cost/ durability/ availability.

v) Capital.
- Cost of structure/ finances available to put up the structure.

vi) Flexibility.
- Alternative uses of the structure

vii) Construction skills
- Availability of needed skills

viii) Governments regulations
- I.e follow the legal government regulations

ix) Type of building
- Permanent or temporary

x) Future expansion
- Should consider space for future expansion.

c) **State the factors to consider when selecting materials to construct farm structures**.
- Durability of materials
- Cost of materials
- Availability of skilled labour for construction
- Capital available
- Availability of materials
- Strength of materials

d) i) Name the types of fences used on farms.
- Barbed wire fence
- Wooven wire/ wire knotting/ chicken wire fence
- Electric fence
- Pole fence/ timber / wooden/ post and rail fence
- Wall fence/ stone fence
- Plain wire fence
- Hedges/ live fence.

ii) State the advantages of barbed wire fence and any of its disadvantages in livestock farming.

Advantages
- Effective in stopping animals from forcing their way out.

Disadvantages.
- May injure animals
- Expensive per unit weight or per given gauge

iii) How are fences constructed?
- Locate the corners
- Clear the fencing area
- Make corners, strainers and passes
- Dig holes to specified depths

- Firm the posts by use of concrete mixtures
- Drill holes on the posts and fix the wires
- Strain the wires and fix onto the posts
- Fix the droppers to reinforce the wires.

iv) **Describe the uses of farm fences.**

- Provide security from thieves, wildlife/ control trespassers
- Enable paddocking/ rotational grazing/ mixed farming
- Control pests and diseases by keeping away other animals from the farm
- Demarcate boundaries
- Live fences act as windbreaks/shelter belts
- Provide aesthotic value to the farm
- Increase farm/ land value
- Help n soil and water observation in case of hedges
- Hedges may be a source of fruits and their trimmings may be a source of fodder or firewood or compost manure
- Isolate animals for different purposes e.g sick, bulls, calves, pregnant etc.
- Provide privacy.

v) What maintenance practices are carried out on farm fences?

- Replacing broken posts, droppers etc
- Replacing / tightening loose wires
- Control termites and fungi from causing damage
- Replace struts if broken.

e) State the uses of a crush.

- Hand spraying or hand dressing to control ticks
- Drenching or deworming against internal parasites
- Artificial insemination
- Applying identification marks
- Taking temperature
- Pregnancy diagnosis
- Milking
- Dehorning
- Castration

f) (i) Name the main sections of a cattle dip stating its functions.

- Assembly yard is a waiting area for holding the animals before dipping
- Footbath for washing mud from cattle hooves to prevent dip contamination's
- Dip tank which contains dip wash into which cattle got immersed
- Draining race/ drying race for holding animals after dipping to let the dip wash drip.

ii) State the main use of a dip.

- Where animals are immersed in a solution of acaricide and water/ dipwash to control external parasites e.g ticks.

g) **State the factors to consider when planning to construct a grain store**.

- Sited on a well-drained ground
- Free ventilation without draughts

- Rainproof/ leakproof
- Adequate floor space
- Easy to clean
- Vermin/ pest proof/ have rat guards
- Keep away thieves/ predators.

h) i) State the features of an ideal calf porn

- Well ventilated
- Leakproof
- Well drained floor
- Clean
- Draught free
- Enough space for calf

ii) What facts influence siting of calf pens?

- Topography / drainage of land
- Accessibility of pen
- Location of existing farm structures/ amenities
- Wind direction
- security

iii) Give the maintenance practices of a permanent calf pen.

- Repair / replace worn-out parts
- Whitewash walls of calf pens
- Regularly clean and disinfect the calf pen
- Ensure that the drainage system is working.

iv) Name the types of calf pens.

- Movable pen
- Permanent

I) i) What are the requirements for constructing a poultry house for deep litter system?

- Roof to discourage insects
- Properly managed litter
- Enough space at food and water troughs
- Provide nests
- Provide perch.

ii) **Give the maintenance practices necessary in a dip litter poultry house**.

- Repair broken parts of the house
- Clean and remove the cobwebs and any dirt
- Improve drainage
- Fumigate against pests and diseases
- Paint some parts of the house.

J) i) State the factors to consider in siting a rabbit hutch.

- The site should be safe and secure especially in or near a homestead
- It should be sized in an accessible place

- The place should be sheltered from strong prevailing winds
- The area should be well drained
- It should be located on the leeward side of the farm to avoid bad smell

ii) **What factors should be considered in selecting the construction materials**?
- Consider availability or materials
- Durable materials are preferred
- Consider cost of the material to use
- Select roofing materials that can keep off rain
- Some materials for the walls should allow enough light and ventilation
- Select some materials for the floor that will allow drainage of urine and from passage of droppings.

iii) Give the environment of a rabbit hutch.
- Lack proof
- Easy to clean
- Free from strong wind/ draught
- Safe from prodiors/ raised above ground level
- Floor to allow from drainage of urine and droppings
- Well ventilated
- Adequate space.

iv) State the reasons for raising rabbit hutches above ground level.
- To ensure security from attack by dogs, cats, etc
- To hasten drying of bedding
- To avoid dampness from the ground

K) i) **State the factors to consider when designing a piggery to ensure good health of pigs.**
- Ventilation
- Space requirements according to recommended stocking rate
- Basking/ exercise area
- Security of piglets e.g constructing guard rails
- Drainage
- Position of food troughs and water troughs in relation to dunging area.

L) a) State the reasons why maintenance of farm structures is important.
- Avoid accidents when using them
- Ensure efficiency of usage of structure
- Prolong the life of the structure/ farm

3. a) i) What is land tenure?
- Ownership of rights to the use of land

ii) List the land tenure
- Collective e.g communal and cooperative tenure
- Individual e.g owner-occupier, company and tenancy and landlordism/ lease held system

b) i) What is land refers?

- Any organised action taken to improve the structure of land tenure and land use/ deliberate change in the land tenure system

ii) State the methods of land refers.
- Land consolidation
- Land subdivision/ fragmentation
- Land adjudication and registration/ demarcation
- Settlement and resettlement

c) i) Distinguish between settlement and resettlement.
- Settlement is planned transfer of population from one area to another
- Resettlement is transferring population from more densely populated area to less populated one.

ii) State the objectives of settlement and resettlement
- To settle the land lost
- To make use of idle land
- To create self employment
- To relieve population pressure
- To increase agricultural population.

iii) What were the contributions of settlement schemes?
- Have increased production
- Better use of extension services
- Increased agricultural credit
- Marketing cooperatives are being used
- There are more improved livestock
- Acceleration in development of infrastructure

4. a) i) What is soil erosion?
- Detachment and carrying away of top soil by wind and water.

ii) Name the types of soil erosion.
- Splash/ raindrop erosion
- Gully erosion
- Streambank erosion
- Rill erosion
- Shoot erosion

iii) State the factors which influence the rate of soil erosion.
- Amount and intensity of rainfall
- Slope/ topography
- Vegetation cover
- Ploughing up and down the slope
- Soil type
- Soil depth

b) i) What is soil conservation
- The use of resource without rendering them unproductive due to erosion or

depletion of plant nutrients.

ii) State the reasons for soil conservation
- Prevent loss of plant nutrients from the soil/ to maintain the soil fertility
- Maintain soil structure.

c) List the methods of soil and water conservation.
- Filter strips
- Out-off drains
- Grassed waterways
- Mulching
- Trash/ stone lines
- Ridging
- Terraces
- Diversion waterways
- Contour farming
- Forests/ afforestation
- Gabbions/ check dams/ porous dams
- Dams and reservoirs
- Bunds

5. a) What is a weed?
- Any plant growing where it is not required and has more disadvantages than advantages

b) How are weed classified?
- Life cycle
- Morphology
- Habitat

c) List the economic classes caused by weeds.
- Compete with crops are nutrients, space, light, water
- Reduce quality of products
- Some are
- Some block irrigation channels and deprive fish of oxygen
- Some lower quality of pasture
- They increase production costs

d) Describe the wed control methods

i) Cultural

Includes mulching, cover cropping, field hygiene, timely planting, crop rotation, using clean planting materials, etc.

ii) Mechanical:
- By use of tillage, cultivation, slashing / defoliation and uprooting weeds

iii) Biological
- Deliberate use of a biological agent e.g insect, virus, fungi animal to reduce the population of a target weed.

iv) Chemicals.
- Use of herbicides to kill weeds
- Herbicides are chemicals which kill plants.

6. a) i) What is a crop pest?
- Any organism that destroys/ is a nuisance to crops, either directly xxxxx, by feeding on tem or introducing disease causing

ii) Name the categories of crop pest?
- Insects
- Micro-organisms
- Mites
- Higher animals
- Birds
- Molasses
- Nematodes
- Rodents

iii) How can pests be controlled on the farm?
- By use of chemical e.g pesticides
- Early planting of crops
- Field hygiene e.g destruction of affected crop residues
- Use of trap crops, trap cropping
- Close season
- Crop rotation
- Growing resistant varieties
- Trapping and killing pest.

iv) What is integrated pest management?
- The use of a combination of various control methods

b) i) What is a plant disease.
- Any alteration in the state of a plant or of its parts, which interrupts or disturbs the proper performance of functions of its parts.

ii) Name the disease causing factors in crops.
- Viruses
- Mineral deficiency / nutritional in balance
- Bacterial
- Fungi
- Physiological disorders

iii) **List the various practices carried out in the field to control crop diseases**.
- Crop rotation
- Close season
- Roguing/ destroying infected
- Planting disease free plants/ use of certified seeds
- Early planting/ timely planting
- Pruning/ proper spacing
- Weed control
- Use of resistance varieties
- Quarantine
- Application of appropriate chemicals
- Use of clean equipment
- Heat treatment.

7. Discuss the growing of the following crops.

a) Sorghum

i) Seedbed preparation

- Clearing land
- Cultivating the land to get rid of perennial weeds
- Harrow the land to fine tilth

ii) Planting

- Planting at beginning of rains
- Plant in rows/ broadcast seeds
- Spacing 60 x 1 cm
- 3 – 5 seeds per hole
- depth 2-5-5 cm
- seedrate 2-15 kg per hectare
- apply phosphatic fertilizers at planting at a rate of 20-40 kg per hectare

iii) Weeding

- Keep them weed free from early stages
- Cultivate regularly to control weeds
- Apply herbicides especially on breed leafed weeds

iv) Field management practices

- Thinning/ thin and leave two vigorous plants
- Thin when 5 cm long/ tall

v) Pests and diseases.

- Scare the birds
- Apply appropriate insecticides to control stalk bearer
- Fungal disease control/ use resistant varieties, plant certified seeds

vi) Harvesting

- Ready 3-9 months depending on variety
- Cut head/ panicle

b) Maize

i) Seedbed preparation

- Clear land early before the rains
- Harrow the land to medium tilth
- Cultivate land to get rid of parannial weeds and allow vegetation to rot.

ii) Planting

- Done at the beginning of rains
- Dry planting is recommended
- Spacing varies with variety i.e 23-30 cm x 57 – 90 cm
- Plant seed at 2.5 – 10 cm deep
- Planting manually or mechanically
- Apply DAP at 100 – 150 kg/ hectare in planting hole
- Top dress with CAN at 200kg / hectare

iii) Weeding
- Weed at early stage to reduce competition for moisture
- Hand weeding done
- Herbicides sometimes used e.g simazine/ artrazine before germination and MCPA / 2,40 after germination.

iv) Field management
- Thinning done early to get consistent growth
- Gapping done early

v) Pests control
- Scare birds e.g quellea and weaver birds
- Use appropriate control of pests e.g aphids, army worm e.g insecticides.

vi) Disease control
- Use appropriate control e.g fungicides for smut, rust and maize stork

vii) Harvesting
- Depending on altitude and variety
- Stock out maize or harvest cabs when dry in field

c) Cassava

i) Basic requirements
- Requires altitude of below 1500m.
- Moderate rainfall/ drought resistant
- Sandy soils / free draining soils

ii) Seedbed preparation and planting
- Deep ploughing recommended/ prepare ridges
- Plant stem cuttings 40cm long at 45^{o} or less
- Spacing is 1.5m x 0.9m
- Bury half stem in soil.

iii) Field management
- Control weeds at early stages of growth.

iv) Pest control
- White scale controlled by clean planting materials.

v) Diseases.
- Mosaic disease causes melting of leaves and deformed tubers
- Control by planting resistant varieties.

vi) Harvesting
- Remove individual tubers or uproot whole plant
- Use stick or forked jembes to harvest
- Yields about 7-10 tons per hectare

d) Millet

i) Basic requirements
- Altitude from 0-1200m
- Rainfall of 500-600mm per annum
- Light sandy soils

ii) Seedbed preparation and planting
- Prepare seedbed of fine tilth
- Spacing is 60 x 30 cm
- Sometimes interplanted with other crops

iii) Field management
- Top dress with nitrogenous fertilizer when 30cm long
- Weeding done upto tillering stage

iv) Pest control
- Quelea birds cat seeds at miling stage
- Controlled by scaring

v) Disease control
- Dowry mildow control using fungicides and crop rotation

vi) Harvesting
- Individual heads out using knife or sickle

e) Sweet potatoes

i) Basic requirements
- Altitude of C-2400m
- 750 mm of rainfall per year / drought resistant
- wide variety of soils
- warm to cool climate

ii) Seedbed preparation and planting
- Prepare flat seedbed/ ridges
- Plant cutting in form of apical pieces of vines
- Bury atleast half of vine.

iii) Field management
- Gives good yield with farm yard manure
- Weeding in early stages only as later covers soil

iv) Pest and disease control
- Control sweet potato weevils with insecticides and crop rotation
- Virus B transmitted by white flies causes stunting
- Control by planting resistant varieties

v) Harvesting.
- Harvest few tubers at a time because of storage problem
- Use sticks for harvesting
- Good yield is 38 tones per hectare.

f) Rice.

i) Areas where grown

- Kano plains (Ahero), Mwea Tabere, Bunyala Irrigation Scheme.

ii) Conditions necessary for growing rice.

- Availability of water for irrigation
- Topography flat land
- Good soil type – with good water holding
- Favourable temperature/ warm and humid
- Availability of labour.

iii) Planting / transplanting.

- In flooded field
- Flood 1/3 of height of seedlings
- Spacing 10 x 10 cm or 10 x 20 cm or 20 x 10cm
- Seedlings 15 – 20cm in height/ after 1 – 1 ½ months

iv) Fertilizers

- Phosphates at planting at 55kg/ ha P_2O_5
- Nitrogen at planting at 15 kg/ha N
- Top dress 3 weeks after applying N at rate of 15kg/ ha N.

v) Weeds

- Uproot woods
- Use chemical herbicides (2,4 – N)
- Start with clean field
- Flooding.

vi)

Pests	Control
- Birds	- Scaring
- Rice hispid, stem	- Spray with BHC, DDT dimention
- Field rats	- Field rat poison

vii)

Diseases	Control
- Rice blast	- Use loss nitrogen
-	- Use resistant varieties
- yellow mottling	- Quarantine.

viii) Water regulation.

- Maintain water depth at 1/3 height of plant throughout growing period
- Ensure fresh water supply
- Drain off water 3 weeks before harvesting.

ix) Harvesting
- Rice reaches maturity at 4-5 months/ harvest when dry
- Out stem at base/ any correct method
- Dry to 12-14% moisture content
- Bag for dispatch.

8. a) **What do the following terms mean?**

i) Pasture
- A cover of grass or legume or grass and legume used for feeding livestock.

ii) Forage Crop
- A plant which either grows naturally or is cultivated by farmers and used for feeding livestock.

iii) A forage plant that is grown, harvested and given to livestock when ready.

b) **Outline the methods that can be used to improve permanent potatoes**.
- Irrigation
- Control weeds
- Top dress with N-fertilizers to avoid denudation
- Reseeding
- Out back dry and unpalatable atoms with tractor mower to encourage fresh regrowth after grazing cycle
- Controlled grazing.

c) **What factors determine the forage crop species to be established at a place**?
- Yield of forage species in terms of herbage is quantity per unit of land
- Resistance to pests and diseases
- Adaptability to the area where it is established
- Ease with which it can be established and eradicated
- Whether pure or mixed stand
- Growth rate and fast establishment

d) i) In which form can pasture be considered?
- Silage
- Hay
- Standing hay

ii) Why is it important to conserve pasture?
- To distribute available forage for livestock throughout the year
- To provide feed for dry season
- To ensure better and full utilization of the available land
- Conserved forage can be sold for money.

9. **a) List the routes though which pathogens can enter the body of an animal**.
- Skin, eye, nose, mouth, anus, ear, genital organs, mammary glands, navel cord.

b) i) What is immunity?
- The ability of an animal to resist infection by disease

ii) Name the types of immunity.
- Natural immunity
- Artificial immunity

iii) What is a vector?
- A carrier of disease from one organism to another. It does not cause disease itself.

iv) Explain the term incubation in livestock diseases
- Period between infection by pathogen and showing of symptoms of the disease.

10. Discuss the following diseases under appropriate sub-headings.

a) Red water

i) Causal agent
- Protozoa / bibesia bigomina

ii) Symptoms
- Red urine
- Fever/ high temperature
- Loss of appetite
- Anaemia
- Loss of production
- Jaundice
- Swollen lymph glands
- Licking soil
- Increased breathing

iii) Control measures
- Tick control e.g spraying, dipping, fencing, etc

b) Anthrax

i) Causal agent
- Bacteria / bacillus enthracis

ii) Symptoms
- Sudden death
- Bleeding form external crifices
- Bleated carcass
- High temperature/ shivering
- Dullness
- Bloody diarrhoea / milk ha blood stains
- Non-clotting blood
- Lack of rigor nortis
- Loss of appetite

iii) Control measures
- Vaccination
- Quarantine/ isolation
- Treatment of the herd/ tread early with antibiotics
- Proper disposal/ burying/ burning
- Public education

c) Newcastle

i) Causal agent

- Virus

ii) Symptoms

- Watery diarrhoea
- Staggering with dreeping wings and bent neck
- Soft-shelled eggs
- Sneezing
- Sudden death
- Nervousness/ restlessness
- Loss of production
- Thick mucus discharge from nostrils/ difficulty in breathing.

iii) Control measures.

- Vaccination
- Disinfection/ proper hygiene
- Quarantine
- Proper disposal / killing the flock
- Use birds that are certified to be clean
- Examination and treatment of suspected birds.

d) East Cost Fever (ECF)

i) Causal organism

- Protozoa/ theilleria parva

ii) Symptoms

- Loss of appetite
- Fever/ high temperature
- Loss of production
- Loss of condition
- Small hemorrhages in vulva
- Oral mucus discharge
- Swelling of lymph glands/ nodes
- Coughing
- Dullness
- Lachrimation/ running eyes/ tears
- Diarrhoae
- Partial blindness

iii) Control

- Use appropriate drugs e.g clexen
- Control ticks

e) Foot and Mouth Disease (FMD)

i) Causal agent

- Virus

ii) Symptoms

- Dullness

- Loss of appetite / difficulty in eating
- Profuse and continous salivation
- Lameness / wounds on heaves
- Loss of milk
- Wounds/ blisters on tongue, gums and udder
- Snacking of mouth
- Loss of condition

iii) Control

- Slaughter affected animals
- Quarantine/ isolation
- Regular vaccination

f) Foot rot disease

i) Cause

- A bacterium or virus/ fusifermis SPP

ii) Symptoms

- Lameness/ inability to walk
- Selling of affected feet
- Wound and ulcers/ pus/ foul smelling in affected feet
- Anorexia/ loss of appetite
- Loss of weight/ emaciation

iii) Control

- Trim heaves regularly
- Keep grazing land free from sharp objects
- Avoid grazing sheep in swampy areas
- Apply feet bath using a disinfectant e.g copper sulphate solution
- Isolate sick ones from healthy ones
- Treat affected sheep to avoid spread

g) Brucellesis (contagious abortion)

i) Cause

- Bacterial (Brucella abortus)

ii) Symptoms

- Premature birth of young
- Abortion at 5-7 months
- Retained placenta
- Placenta when left will show aedema, necrosis and appears bloody
- Barrenness
- Yellow and brown sticky odourless discharge from vulva

iii) Control

- Use of artificial insemination
- Vaccination
- Test culling and slaughter infected females
- Clean animal dwelling houses
- Boil milk
- Aborted foetuses should not be touched using bare hands

11. a) i) Name the sources of farm power

- Human power
- Wind power
- Animal power
- Oil/ fuel power/ gas/ paraffin
- Electricity
- Solar energy
- Wood/ charcoal
- Biogas power
- Nuclear energy

ii) Mention the ways in which solar energy is used on the farm.

- Production of electric energy by use of photo-electric cell panel
- Electricity used for lighting, pumping water, healing etc
- Direct drying of crops
- Water heating
- Cooking

iii) Give the disadvantages of using wood fuel or charcoal as a source of power.

- Inefficient use of energy
- Leads to destruction of environment through indiscriminate felling of trees
- Snake produced pollutes environment
- Exhaustible source of power

b) i) What are the requirements for animals used as a source of farm power?

- Good health/ healthy
- Fully grown/ maturing
- Well fed.

ii) Give the benefits of using animal power on the farm.

- Cheaper t buy than machines
- Loss time used than using human power
- Wider range of relief than tractor e.g hills
- Loss maintenance cost e.g no fuel needed
- Does more work than human power
- Not much skill and training needed to operate them
- Animals can provide manure

iii) State the limitations of using animal power

- Low work output than tractor power
- Extra piece of land required to grow forage for them
- Animals cannot be used in use tsetsefly infested areas
- Animals tire quickly
- Tiresome since it also requires two handlers
- Requires time to train animals and handlers
- Theft and production problems
- Slower rate of work therefore not suitable in large scale farming
- Cause damage to crops when used in weeding.

c) i) State the advantages of farm mechanization.

- The rate at which a job can be completed is increased/ improves efficiency
- Number of man-days involved is reduces/ labour saving
- Products harvested mechanically are more uniform
- Uniformly harvested products are more acceptable to consumers
- Timeliness of operations
- Contributes to increased farm production
- Contributes to increased farm productivity
- Uniformity of operations e.g ploughing, planting
- Less labour / easy

ii) What are its disadvantages?
- Capital outlay on machinery is high
- May lead to problem of soil capping
- Mechanization is more worthwhile in large scale farming enterprises
- Maintenance is expensive
- May create an unemployment problem
- Requires skilled manpower
- Requires uniform produce
- Tractors and ox-ploughs can not be used on steep land

iii) Why is mechanisation on small scale farming not worthwhile?
- Low level of capital investment
- Use of machinery is uneconomical
- No efficiency in farm operations.

d) i) Name the tractor drawn implements.
- Trailers, ploughs (disc and mouldboard), harrows and mowers

ii) Name the animal drawn implements.
- Ox – plough, ox-time cultivator, ex-cart

e) State the functions of the following parts of a mouldboard plough.
i) Landside
- Stabilises the plough/ absorbs side thrust caused by furrow slice

ii) Mouldboard
- Inverts furrow slice/ buries woods/ trash

iii) Coulter
- Vertically cuts the soil or trash

iv) Share point.
- Digs/ opens/ cuts or breaks the ground

v) Frog
- Holds the frame onto the moldboard, landslide and share.

f) State the functions of the following principal parts of a disc plough.
i) Beam.
- Part of the plough on which all parts are joined

ii) Hitch most.
- Point at which the top link is connected to tractor

iii) Scrapper
- Inverting furrow slice/ cleans disc

iv) Disc.
- Cutting the ground/ ploughing/ inverting/ overturning

v) Hub
- Contains roller bearings that allow the disc to roll while in operation.

vi) Standard
- Holds the discs

vii) Springs
- Absorbs vertical shock of plough

viii) Furrow wheel
- Absorbs side thrust/ used for adjusting the depth of ploughing.

ix) Crossbar
- Attachment for left and right arm

x) Hitch point
- Where plough is attached to tractor.

g) i) State the sources of tractor hire services
- Government hire services
- Private contractors
- Individual farmers
- Some cooperatives

ii) Give the advantages of tractor hire services.
- A farmer does not incur cost of buying tractor
- No cost of maintenance by farmer
- No risks of owning a tractor
- The farmer is able to carry out the task faster

iii) What are its disadvantages?
- May not be available when required
- May be very expensive to hire
- Some operators can produce poor quality work.

FORM FOUR TOPICS.

1. **a) Discuss the management of dairy cattle to ensure high milk production.**

i) Selection

- Select good animals on the basis of high yield
- Select healthy animals
- Select animals with good body conformation
- Should be of high fertility level
- To have good temperament it docile cattle
- Poor animals should be coulled
- Selecting and culling should be a continous exercise

ii) Breeding management

- Use superior bulls or semen from superior bulls
- Breed heifers when fully mature i.e right age and size
- Breed cows 60-90 days after calving to maintain a calving internal of 1 year.

iii) Feeding management.

- Feed on a balanced diet, water, minerals, vitamins
- Give adequate fee
- Feed should be clean and free from contamination.

iv) Housing

- Provide proper housing i.e well drained, clean, well ventilated, well lit
- Avoid overcrowding it provide enough space.

v) Disease and parasite control

- Keep animals healthy by routine vaccination
- Control external parasites by spraying using appropriate drugs e.g acaricides
- Control internal parasites by routines drenching using appropriate drugs
- Treat sick animals
- Isolate and put new animals under quarantine
- Avoid physical injuries to animals by avoiding sharp objects or holes and using plain wires, not barbed
- Improve sanitation i.e hygiene or cleanliness in the farm

vi) General management practices.

- Milk at regular intervals
- Use proper milking techniques
- Observe heat signs and signs of disease closely
- Handle animals properly
- Keep proper and good records and use them to evaluate the herd.

b) Describe the management of a dairy cow from the time of conception until calving (gestation period)

- Small breeds like Jersey and Guernsey should be served at 15-18 months of age

having attained 250-270 kgs
- Large breeds at 18-20 months of age or 280 –320kg live weight
- Milking is done for 7 months after conception
- Pregnancy diagnosis ie. Checking conception is carried out in the fourth month after insemination.
- Drying off of incalf cow at 2 months before calving i.e in 7th month of gestation by skip milking or partial milking
- Mastities control antibiotics applied into feat canal i.e carry out dry cow therapy
- Drying up build body reserves hence increases milk production in the next location period
- The foetus also gets sufficient food hence born strong and healthy
- Food reserves are used to synthesize colostrum
- Initiate steaming up in order to give dam enough energy during calving
- Steaming up should include high quality pastures, concentrates and minerals
- Do not dip incalf cow in plunge dip to avoid abortion due to shock.
- Spraying the incalf cow
- Avoid drenching toward the end of gestation as this may be dangerous to foetus
- In preparation for parturition, the incalf should be taken to a parturition pen next to homestead and wait for parturition signs
- Parturition signs include disterned udder, enlarged vulva, clear mucus discharge from vulva, slackening of pelvic girdle muscles i.e relaxing of hip muscles, sometimes colostrum drips out of teats and dam frequently bellows
- Leave the cow to calve undisturbed
- Watch for malpresention, if present seek assistance of veterinarian
- Allow the dam to lick its calf clean of mucus or wipe mucus from nostril and mouth to allow it breath
- Artificial respiration may be performed when breathing is delayed
- The naval cord is out and tied and wound sterilized using iodine or methylated spirit to avoid infection.
- Separate the calf from the dam after it has been licked and take to a warm calf pen
- Check and ensure that the placenta comes out a few hours after birth but if not, consult a veterinarian.

c) Explain the management practices of a dairy calf from birth until it is ready for the first service.
- Clean mucus from the calf as soon as it is born or ensure cow licks its calf dry
- Ensure the calf is breathing or administer artificial respiration if necessary
- Cut and disinfect umbilical cord
- Ensure the calf suckles the mother within the first 8 hours to get colostrum
- Feed the calf on colostrum for the first 4-7days
- Keep records on the performance of the calf
- Introduce feeding of whole milk or milk replacer from the 4th day
- Feed the calf with warm milk upto weaning time
- Observe strict hygiene in the calf pen
- Protect the calf against adverse weather conditions e.g wind by providing housing
- Provide adequate clean water from the third week
- Introduce palatable dry foods e.g concentrates and good quality out grass from the third week
- Provide mineral supplements
- Keep calf in individual pens until it is 3-4 months

- Spray or dip the calf against external parasites
- Release the calf occasionally for exercise
- Wean the calf at 8 weeks or late weaning at 16 weeks
- Drench or deworm the calf against internal parasites
- Vaccinate calf against prevalent diseases
- Release the calf occasionally for exercise
- Wean the calf at 8 weeks or late weaning at 16 weeks
- Dehorn the calf using appropriate method
- Graze the calf on good quality pasture, preferably ahead of mature animals
- Separate heifer calves from bull calves at puberty to avoid inbreeding
- Remove extra teats if necessary
- Any change of feeding should be done gradually to avoid feeding disorders
- Serve at the right age i.e at 15-20 months of 250-280 kg live weight
- Treat against disease when sick
- Weigh the calf regularly

d) Describe the procedure of training a calf to drink milk from a bucked after separating it from its mother.

- Put 3 –4 fingers in the calf's mouth]
- Let the calf suck the fingers
- Place a bucket of milk at a convenient raised position
- Gently lower the fingers into the bucket of milk while the calf is still sucking the milk
- Repeat the procedure until the calf is able to drink from the bucket on its own.

e) What is zero grazing?

- The practice of rearing animals under confinement in stalls whereby food and water are brought to the animals.

ii) State the advantages of zero grazing

- Easy to control livestock diseases
- High production per unit area of land
- Proper utilization of pasture i.e no trampling or fouling
- Animals do not waste a lot of energy in walking
- Good method of accumulation and collection of farm yard manure for plant and dung for biogas
- Possible to keep livestock where there is bad terrain eg. Swampy, stony or steep slopes.
- Possible to keep livestock where land is limited
- High level of stocking rate achieved.

iii) List the limitation of zero grazing

- Expensive as it requires high initial capital
- Labour intensive i.e a lot of labour required
- May not be possible where there is in adequate water
- Requires a lot of technical sills to manage well.

2. Discuss the management of beef cattle from birth until it is ready to be sold as steer.

- As soon as the calf is born ensure that it is breathing e.g by tickling the nose with straw

- If not, help the calf to start breathing by applying artificial respiration method
- Remove any foreign bodies from the mouth and nostrils e.g mucus and phlegm
- Disinfect to avoid infection
- Ensure that the calf is licked dry by mother or wipe the calf clean
- Ensure that the suckles colostrum within the first 12 hours of birth by helping weak ones
- Leave the calf to stay with its dam to suckle milk at will
- Ensure that disowned calves are given to foster mothers or prepare artificial colostrum where a foster mother is not producing colostrum
- Wean the calf when 6-8 months old
- Separate weaners to graze on good quality pasture after weaning
- Spray calves up to weaning time after which they can be dipped to control external parasites
- Dehorn calves within first two weeks to 4 months
- Castrate bull calves not intended for breeding at weaning time i.e 6-8 months age
- Identify calves as early as possible after birth
- Separate castrated bulls from heifers at weaning time
- Give mineral supplements when necessary
- Deworm ewaners regularly to control internal parasites
- Give supplementary feed in dry seasons
- Provide adequate clean water
- Vaccinate calves and weaners against prevalent diseases
- Observe and treat sick animals
- Animals should be ready for market between 12-30 months depending on breed
- Keep appropriate records.

3. a) Describe the preparations one would make before the arrival of day old chicks on the farm.

- A poultry house should be constructed
- The house should be well ventilated and should not allow draught inside
- A brooder should be ready 2-3 days before chicks arrive
- A coccidiostat should be bought ready for use in case acoccidiosis attacks chicks
- Put newspapers on the floor of the brooder to prevent chicks from eating litter e.g saw dust.
- Spread food on the newspapers and some on feeders
- Avail proteins (DCP) and vitamins A and B.
- The protein and vitamin A encourage faster growth rate/ provide chick starter mash
- Provide feeders and waterers
- The farmer should ensure that the poultry house has a door to keep of predators like wild cats, jackals and foxes
- The door also keeps of cold wind entering the house.

b) Discuss the artificial rearing of layer chicks from day old upto the end of brooding.

- This is between hatching time upto 3 weeks old
- Ensure brooder corners are rounded
- Provide enough brooding space according to the number and age of the chicks
- Clean and disinfect the brooder and house
- Provide proper litter on the floor e.g wood shavings
- Maintain appropriate range of temperatures according to the age of the chicks
- Temperature during the first week should be 32 – 35^{o}C then reduce accordingly

- Provide fresh, adequate and quality feed e.g chick mash
- Provide brood with reliable and appropriate lighting
- Provide adequate and appropriate waterers according to age.
- Control diseases using appropriate methods e.g vaccination against Newcastle, fowl pox and marcocks diseases.
- Isolate and treat the sick chicks immediately
- Keep proper records
- Debeaking should be done 8 – 10 days towards the end of breeding

c) i) What are growers?

- These are chicks that are between 9 – 22 weeks old

ii) Discuss briefly the rearing of growers upto the point of lay

- Provide adequate floor space i.e 18 – 20 cm sq per 100 birds
- Provide enough space at water and feed throughs and at roosts
- The house should be disinfected
- Provide enough clean litter on the floor
- Provide growers mash (16 – 17% protein)
- Provide insoluble grit for digestion
- Hang green vegetables e.g cabbage leaves to keep birds busy
- Provide plenty of clean water
- Vaccinate against fowl typhoid, newcastle diseases when necessary
- Keep a high level of hygiene
- Keep litter dry to avoid disease out break and change as necessary
- Control external parasites

d) Describe the management of layers in deep litter system starting from the point of lay.

- The space in the house should be adequate for the number of layers kept
- This should range from 0.3 – 0.5 sq. m per layer or at least 0.2 – 0.3m 1 ½
- The litter should be kept dry i.e avoid dampness and dust by turning the litter adding unhydrated lime and providing movable perches
- Perches or roosters should be adequate and well spaced in the house
- Provide enough waterers which should be well distributed in the house
- Always provide clean and adequate water
- Keep the waterers and all the other equipment clean
- Replenish soft litter in the nests to prevent egg breakages
- Ensure the nest is dark enough to avoid cannibalism.
- Collect eggs frequently, atleast twice a day
- Provide atleast 20g of layers mash per bird per day
- Ensure the birds have enough calcium by providing oyster shell
- Supply some grits to help in digestion
- Ensure enough supply of grits or vitamins
- Cull poor layers and diseased birds
- Debeak birds to prevent cannibalism or egg eating if necessary
- Vaccinate birds regularly against predominant diseases or give prophylactic drugs
- Check birds for disease symptoms
- Check for occurrence of pests and apply appropriate pesticides.
- Avoid stress factors e.g noise, disturbance, etc

- Discourage broodiness among a the layers
- Maintain and repair the house and equipment as the need arises
- Provide enough feed throughs
- Provide grains in the litter to keep birds busy
- Isolate and treat sick birds
- Keep appropriate records
- Dispose off the dead birds by burying or burning and also dispose off broken eggs or shells
- Maintain correct concentration of disinfectant at foot bath.

4. a) State the tests that should be carried out to determine the quality of fresh eggs.

- Candling
- Physical observation
- Floatation
- Shaking lightly.

b) **List the factors that should be considered when grading eggs for marketing**.

- Size, weight or volume of egg
- Colour
- Shell quality e.g rough or broken
- Shape of egg

c) i) What is candling?

- Examining an egg for abnormalities by looking at it against a strong source of light.

ii) Describe how to candle an egg

- Put a strong light under the egg and look at it contents
- Look at the external and internal contents
- If abnormalities are seen discord the egg

iii) State the reasons for candling an egg

- To check for fertility
- To confirm presence of chick during incubation

d) Explain the occurrence of double yolked eggs

- A yolk delays in the infindibulum and is joined by the next yolk
- The two yolks travel together to the magnum
- They are then enclosed by one albumen and one shell

5. a) What is milk?

- The white substance secreted in the mammary system of female mammals.

b) Draw a well labelled diagram of a mammary glad.

c) What is milk let-down?

- The flow of milk from the upper region of the udder (alveolar region) to the gland and test cistern.

ii) State the essentials of clean milk production.

- The milkmen should be clean
- Test for mastitis before milking
- Ensure clean milking utensils and equipment
- Have a clean milking parlour i.e shed
- Ensure the cows are free from diseases e.g T.B.
- Cows with mastitis should be milked last
- Clean the udder
- Sieve the milk

iii) Explain the procedure of hand milking

- Collect all milking equipment around so that you do not need to move unnecessarily once milking has started
- Restrain the cow
- Give some feeds
- Clean the udder with a clean towel
- Squeeze test to extract milk within 7 –8 minutes
- Strip the udder dry
- Apply milking jelly
- Dip the test in anti-mastitis solution
- Release the cow
- Weigh the milk
- Filtering and sieving
- Cooling or storage in cool place.

e) **State the factors which influence the amount of milk produced by a cow.**

- Breed of animal
- Age of animal
- Period of lactation
- Health of the animal
- Temperament of the cow
- Feed and water supply
- Season of the year
- Animal handling during milking

6. Discuss the field production of the following crops.

a) Tea

i) Biological requirements

- At least 1400mm rainfall per annum
- Altitude of 1900 – 2200m
- Soils should be well drained, fertile, deep slighly acidic.

ii) Land preparation

- Clear land well
- Remove all tree stumps to prevent almillaria
- Remove all parannial weeds
- Make cut off drains to divert storm water
- Terrace where land is steep
- Ring back trees six months before cutting

iii) Transplanting

- Dig holes 30 x 45cm
- Spacing of 1.2 x 0.9 m or 1.5 x 0.75m or 1.2 x 0.7m
- Plant when there is enough moisture in soil
- Apply phosphatic fertilizer in planting hole
- Apply shade when necessary
- Water when necessary
- Avoid planting in unusual places.

iv) Field management.

- Establish plucking table by frame formation or pegging
- Cutting back done after 4 years

v) Pests and diseases control

- Control pests e.g. black tea thrips using insecticides
- Control armillaria root not by proper seedbed preparation

vi) Harvesting

- By plucking two leaves and a bud every 10 days
- Keep plucked tea in the shade
- Take to factory on the same day.

b) Cotton

i) Ecological requirements

- Requires 500 – 100mm, well distributed rainfall
- Altitude of 0-1500m
- Temperature above 15.5c^{o} but below 30^{o}c
- Soils well drained with PH above 5 i.e alkalinic
- Black cotton soil or clay soil preferable

ii) Land preparation

- Clear the site of vegetation
- Remove all stumps and roots
- Remove all perennial or grass weeds
- Planting holes spaced at 30 x 90cm or 45 x 90cm-

iii) Planting.
- Plant early in the main rainy season
- Put one seed in spacing of 30 x 90 cm or two seeds in a spacing of 45 x 90 cm
- Apply DAP fertilizer at planting time at the recommended rate
- Initially plant 20 seeds per hole.

iv) Field management
- Keep field weed free
- Thin out plants not required

v) Pests include cotton stainers, American Bellworm, pink bellworms and cotton lygus.
- They are controlled by using insecticides
- Control bacterial blight by using cultural means and jusarium with disease by using appropriate fungicides.

vi) Harvesting.
- Pick cotton in dry season when lint is dry
- Sort out into grade A and B
- Use clean hands when harvesting
- Pick only clean cotton
- Avoid sisal bags and any form of contamination.

c) Coffee.
- Ecological requirements
- Rainfall of 1500 – 2000 mm per year, which is well distributed
- Well drained, fertile, deep volcanic soils having 5.3 – 6.0 PH
- Altitude of 1400 – 2000m
- Prefers cloudy conditions so provide shade trees

ii) Land Preparation.
- Prepare land six months early
- Remove roots to prevent armillarial disease
- Carry out soil conservation e.g terracing
- Holes dug 3 months early
- Dimensions of holes are 60 x 60 x 60 cm
- Spacing at 2. X 2.7m or 1.3 x 1.3 m depending on a variety

iii) Transplanting
- Coffee is first planted in nurseries
- Transplant at onset of rains
- Holes reopened immediately before transplanting
- Spread roots well and place at same depth like in nursery or sleeves
- Apply mulch and fertilizers
- Water well after planting
- Provide shade.

iv) Field management
- Mulching at all stages to control weeds and water conservation
- Proper weed control by slashing, mechanically and use of herbicides
- Pruning by single or multiple stem facilitates picking, disease and pest disease and pest control, spraying of chemicals, avoids overbearing and die – back of roots and

lateral buds.

v) Pests and diseases
- Major pests are leaf miner and antestia bug both controlled chemically and culturally
- Major coffee diseases are coffee berry disease (CBD) and leaf rust both controlled by applying fungicides and planting resistant varieties.

vi) Harvesting.
- Done by hand
- Pick only crops berries or cherries
- Deliver to factory some day
- Harvest early to avoid loss of fruit through pests and over-ripening (overripe as" MBUNI")

d) Phyrethrum.

i) Biological factors
- At least 1000mm rainfall yearly
- Short period of dry weather for high quality
- Altitude of 1500 – 3000m
- Temperature of 15.5^{o}C
- Fertile, well drained soils with good water retention and PH of 5.6

ii) Land preparation
- Early land preparation
- Eradication of perennial weeds e.g grasses
- Dig deep
- Make ridges 60 – 90cm apart
- Spacing of 90 x 60cm on ridges

iii) Selection of planting materials
- From high yielding mother plant
- Pest free
- Disease free
- Vigorous
- Use splits instead of roots

iv) Transplanting
- At the onset of the rains
- Dig holes 10 – 15 cm deep
- Add 1 teaspoonful of TSP i.e 15gm or 30g DSP
- Mix fertiliser with soil
- Place splits as they were in the nursery
- Fill soil bit by bit
- Firm the soil around the roots

v) Field practices.
- Weed using forked jembe
- Cutting back at end of dry period using sickle

- Crop rotation improves yield and prevents diseases

vi) Pests and diseases control
- Control root knot nematodes by crop rotation, soil fumigation, field hygiene and use of clean planting materials.
- Control pyrethrum thrips by insecticide spray
- Control red spider mites using appropriate chemicals

vii) Harvesting
- Starts 3 –4 months after transplanting
- Pick only flowers with horizontal ray forests
- Pick at intervals of 14-21 days
- Twist the flowers with fingers
- Use open or wooven baskets which are well ventilated to avoid fermentation
- Wet heads should not be picked
- Pick when the weather is dry
- Dry immediately after picking
- Do not press in the basket

e) Coconut

i) Ecology
- Altitude of 0-1000
- 1250mm – 2500mm annual rainfall
- deep, fertile, well drained soils with 5.0 – 8.0 PH

ii) Land preparation and planting
- Seeds first planted in nursery for 9 – 12 months
- Transplanting at ouset of rains
- Dig holes 60 x 60 x 60 cm in advance
- Plant nuts 30 – 40cm deep
- Spacing is 8 x 8m or 9 x 9m depending on variety

iii) Field Management
- Good fertilizer application to encourage growth
- Weeding in the first few years

iv) Pests and Diseases
- Rhinocerous beetle destroys growing points and can be controlled by field hygiene
- Bole rot causes wilting and is controlled by careful cultivation to avoid root damage.
- Coveid bug attacks young nuts and has no effective control
- Termites controlled by applying insecticides

v) Harvesting
- Matures from 5 – 10 years after transplanting
- Nuts picked 7 – 10 months after flowering

f) Citrus

i) Ecology
- Altitude of 0 – 2000m
- Atleast 900mm, well distributed rainfall annually

- Deep, well drained soils with PH 5.0 – 7.0

ii) Land preparation and planting
- Plant by budding
- Buds mature early, are less thorny, seedless
- Rough lemon commonly used as root stock
- Nursery managed for 12 – 18 months before transplanting
- Holes are 60 x 60 x 60cm
- Refill holes with top soil, farm yard manure, and add phosphate fertilizer
- Spacing is 6 x 4 m

iii) Field Management
- Control weeds by mulching, chemicals, mechanically
- Apply compound fertilizers at recommended rate
- Mulch young plants
- Remove any flower appearing upto 2 yars
- After transplanting
- Remove suckers.

iv) Pests and Diseases
- Citrus aphids, false codling moth, fruit flies, scale, insects and mites are controlled using appropriate chemicals
- Gummosis and citrus tristeza controlled by use of resistant rootstock

v) Harvesting
- Harvest by picking the fruits by hand
- Harvesting starts after 2 ½ years
- Avoid damage by bruising
- Pack fruits well.

7. a) What do the following terms mean?

i) Total digestible nutrients (T.D.N)
- The sum of all digestible organic nutrients i.e carbohydrates, proteins and fats in a feed.

ii) Starch Equivalent (S.E)
- Amount of pure starch which has the same energy as 100kg of that feed

iii) Digestible crude protein (DCP)
- Sum of all nitrogenous compounds in feed or total amount of proteins in a feed

iv) Dry matter (DM)
- Also called digestible matter
- This is the actual percentage of proteins, carbohydrates and minerals in a feed

v) Crude fibre
- Cellulose and other carbohydrates resistant and insoluble that are not dissolved by weak acids and alkalis

b) State the factors that would affect the degree to which a given foodstuff would be

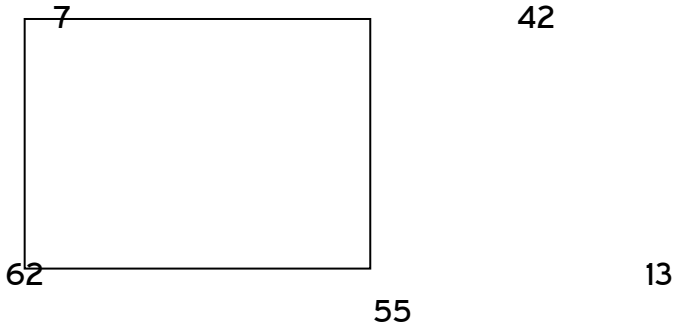
digested by a

- Chemical composition of feed e.g celluse, lignin
- Physical form of food e.g crushing of food, etc
- Amount of food an animal has eaten
- Rate of feeding
- Method of preparing the food i.e quality of food ratio of energy to protein (more energy loss digestibility)

c) State the factors to consider when preparing foodstuffs for livestock

- Weight of the animals
- Age of the animal
- Level of production
- Availability of various food components
- Species of animals
- Cost of food
- Physical and processing characteristics.

d) A foodstuff contains 7% digestible crude protein (DCP) while another contains 62% D.C.P. Calculate the amount of foodstuff, in kilograms required to prepare 100kg of poultry feed containing 20% D.C.P by using the pearson square method



Quantity of first foodstuff – 42/55 x 100 = 76.4kg
Quantity of second foodstuff = 13/55 x 100 = 23.6 kg
Total = 76.4 + 23.6 = 100kg.

8. a) i) What is agricultural economics?

- The art and science of organising limited resources to achieve maximum returns

ii) Explain the meaning of scarcity and chice

- Productive resources are scarce in relation to demand i.e goods and services produced are not enough to satisfy human wants
- Therefore, a choice has to be made on which goods and services should be produced using the limited resources.

b) **Explain how the house hold and firm are both producers and consumers**.

- The household demands goods and services and supplies labour and raw materials to firms
- Firms convert the raw materials and supplies finished goods to households.

- The relationship generates money to both sides therefore both are producers and consumers.

c) What do the following terms mean?

i) Gross domestic product (G.D.P)

- The sum total of goods and services produced by a country within one year.

ii) Gross national product (GNP)

- Total output from resources owned by the nationals of a country both within and outside the country within a year.

iii) Per capital income

- Gross national income divided by total population

d) i) What does the term opportunity cost in farming mean?

- Cost of the foregone alternative when we make a choice.
- Example is choosing to grow maize instead of wheat.
- Opportunity cost is the value of wheat
- Opportunity cost only exists where there are alternatives.

ii) State the main implications of opportunity cost in farming.

- Poor decision leads to losses
- Correct decision leads to good profits

iii) When is opportunity cost nil or zero?

- When supply is unlimited
- When goods are free
- When there are no alternatives

9. a) i) What is production?

- The process of transforming productive resources e.g land, labour and capital into consumption resources e.g potatoes, maize and milk over a period of time.

ii) State the factors of production.

- Land (provides space for production)
- Labour (human effort)
- Capital (man made to assist other factors)
- Management (organises other factors)

b) i) Name the sources of capital for farming.

- Leading a genoies
- Personal savings and earnings
- Inherited property.

ii) How is labour classified?

- Permanent
- Casual
- Family

iii) State the functions of farm manager
- Planning
- Gathering information
- Comparing levels of production with those of neighbouring farms
- Detecting weaknesses and constraints and finding ways and means of overcoming them
- Keeping up to date farm records
- Implementing farm management decisions
- Taking responsibilities

c) i) State the law of diminishing returns
- In a production process, if variable additional units of an input are increased while all other factors are held constant, there will be an increase in additional output until a point is reached when the additional output per additional units of input declines.

ii) State agricultural examples of this law.
- Use of varying units of labour on a fixed unit of land
- Feeding dairy cattle with varying units of feed for milk production
- Using varying units of fertilizer in the production of a given crop

d) i) What is production function?
- The relationship between the units of input that a farmer employs in production and the corresponding units of output
- The out put depends on inputs hence output is a function inputs.

ii) Name the types of production function?
- Increasing returns
- Constant returns
- Decreasing returns

iii) What is a decreasing returns to a production function?
- A production function where each additional unit of input results into a smaller increase in output than the proceeding unit of input.

e) State the ways in which farmers may improve the production efficiency in farming.
- Following proper livestock production practices
- Efficient use of labour
- Following proper crop rotation practices e.g spacing and control of pests and diseases
- Mechanization of farm operations
- Adoption of new techniques and methods of production
- Organising marketing activities to realize high prices as possible
- Revising farm plans when necessary
- Proper enterprise selection

f) i) State the risks and uncertainties in farming

- Weather changes
- Disease and pest outbreaks
- Natural calamities e.g earthquakes
- Obsolescence (becoming out of date) e.g farm machinery
- New production techniques
- Changing prices of commodities
- Low or high yields of production
- Theft cases
- Change in government policy
- Fire outbreaks
- Sickness, injury or death.

ii) **Give the ways through which farmers may adjust to risks and uncertainties**.
- Diversification
- Selecting a more certain (promising) enterprise
- Contracting (giving contracts)
- Insurance e.g crops and livestock
- Input rationing
- Adopting modern methods of production
- Flexibility in production methods

iii) State how the government helps farmers to overcome risks and uncertainties
- Weather forecasts
- Providing extension services and advice
- Adjusting future commodity prices
- Giving farmers loans
- Price stabilization to avoid price fluctuation
- Research in crops and livestock
- Provide and subsidise agricultural inputs

g) i) What is gross margin?
- Total output (income) less variable costs

ii) Use the information provided below to calculate the gross margin of beans per hectare.

- Crop yields	20 bags
- Price per bag	Shs. 2000
- Casual labour	Shs. 1,000
- Purchase of seeds	Shs. 3,000
- Purchase of fertilizers	Shs. 1,200
- Ploughing	Shs. 1,000
- Purchase of gunny bags	Shs. 300

Gross margin = gross output – variable costs

Gross output = yield x price
20 bags x shs. 2000/=
= shs. 40,000

Total variable costs = shs. (1000 + 3000 + 1200 + 1000 + 300 = 6,500)
Gross margin = shs. 40,000 – 6,500 = 33,500/=

iii) What are the uses of gross margin analysis?
- To compare performance of one farm and another
- To compare the performance of the farm between one season and another
- To compare the contribution of one enterprise and another in the same farm
- To act as a measure of profit in a farm.

h) i) What is budgeting?
- The estimation of inputs and outputs both physically and financially, in a production process.

ii) Name the types of farm budgets.
- Complete budget prepared for each enterprise on the farm
- Partial budget prepared for specific enterprises when there is a minor change required.

iii) State the importance of budgeting in farming
- Assists the farmer to estimate the required production resources e.g labour, capital etc
- Assists in making farm management decisions when comparing alternative
- Helps to reduce uncertainty in the farming process
- Encourage farmers to be efficient with the hope of meeting the project targets
- Show progress or lack of progress in the farm business i.e focus profit or foresee losses

iv) What factors should be considered when selecting a farm enterprise?
- Availability of market for the produce
- Prevailing climate
- Size of land available for the enterprise
- Common pests and diseases that may hinder implementation
- Technical skills that may be required to manage the enterprise
- Profit margin in relation to price fluctuation at different times of the season
- Availability of infrastructure to allow good communication
- Availability of labour according to requirements of the enterprise
- Availability of enough security
- Suitability of soil to the enterprise
- Socio-cultural factors.

l) **Name the sources of agricultural support services available to farmers**.
- Extension services
- Research services
- Training services
- Veterinary services
- Artificial insemination services / bull camps
- Credit services
- Marketing services
- Tractor hire services

- Banking
- Farm input supplies
- Insurance services

J) i) What is agricultural credit?

- Borrowed capital resources to be invested in agricultural projects

ii) Name types of agricultural credit and state their uses.

SHORT TERM

- A credit for seasonal purchases of seed, fertilizers, chemicals, livestock feeds, fuel, etc
- Usually repaid within one year.

MEDIUM TERM.

- Used for the purpose of minor land improvement e.g fencing and purchase of machinery
- Repaid in 2-5 years

LONG TERM

- Used for long lasting projects like land purchase, and major improvement within the farm e.g soil conservation and irrigation.
- Repaid in 6-15 or more years.

10. a) State the uses of the following financial documents

i) Invoices

- A document issued by a seller to a buyer for goods taken on credit

ii) Receipts

- A document issued as evidence when goods and services rendered are paid for

iii) Delivery notes

- A financial document given by the seller to the buyer as an evidence of goods supplied.

iv) Purchase order

- A document issued for requesting for the supply of goods or services on credit.

b) What are the uses of the following financial books?

i) Ledger

- The principal book of account where all entries contained in other books are recorded.

ii) Journal

- A financial book in which daily farm transactions are entered as they occur

iii) Inventory

- A financial book which shows all assets of the farm at a particular time
- It gives an estimated value of all farm assets and also enables him to know that is missing, stolen or lost

iv) Cash book

- A financial book where all transaction which involve cash receipts and payments are recorded.

c) List the financial statements which are usually prepared on a farm.

- Balance sheet
- Profit and loss account or a training account
- Cash analysis

d) i) What is a balance sheet?

- A statement which shows the financial position of the farm at a given date and is made at the end of the year.

ii) State the uses of a balance sheet

- **Shows farm assets and liabilities**
- Shows farm network and can therefore be used to negotiate for a loan or for correct income tax assessment.
- Can be used for decision making concerning the farm

e) i) State the uses of a profit and loss account

- It shows all purchases and receipts made during a particular accounting period

ii) What is opening valuation in profit and loss account?

- A financial statement showing the worth of all assets one has at the beginning of the accounting period.

f) Name the various columns that should be shown in a cash analysis.

- Sales and receipts
- Purchases and expenses
- Details or particulars
- Types of enterprises
- Money value

g) i) What is a statement in financial accounts

- Document issued by a supplier to a buyer which summarises all transactions that have taken place and not yet paid for in a certain period e.g end of month.

ii) Explain the meaning of solvent and insolvent in a farming situation

- Solvent means the farm is able to pay up all its debts
- Insolvent means the farm is unable to pay up all debts owed by it to other people or farms.

11. a) **Explain the following terms.**

i) Market

- Market is a place where buyers and sellers meet to sell and buy goods

ii) Marketing.

- Performance of business activities that direct the flow of goods and services from producers and consumers.

b) State the following laws.

i) **Law of demand**

- States that as price increases quantity of a good bought declines and as price decreases the quantity of goods bought increases.

ii) Law of supply

- At higher prices more quantity of goods are supplied and at lower prices less quantity is supplied.

c) State the factors which affect price of goods

- Demand
- Cost of production
- Supply
- Government control policies
- Quality of the produce

d) What is equilibrium price?

- A point at which quantity of demand equals quantity of supply

e) State the various marketing functions

- Buying
- Selling
- Assembling by traders or middlemen
- Transportation i.e distribution
- Standardization by grading and sorting out
- Storage facilities
- Processing
- Packing or packaging
- Advertising i.e sales promotion
- Financing i.e provide credit to farmers
- Risk bearing
- Market research

f) List the problems of marketing agricultural goods

- Perishability of agricultural products
- Bulkiness hence storage problems
- Poor transport network
- Seasonality of production
- Difficulty in storage and handling

g) Name the agents and institutions that are involved in marketing agricultural products.

- Itinerant traders or middlemen
- Processors or manufacturing companies buy produce to process
- Wholesalers buy produce in bulk from farmers or processors and resell
- Brokers or commission agents act on behalf of other businessmen for a fee called commission
- Cooperative societies and unions buy farm produce locally
- Marketing boards created by acts of parliament to promote production and marketing of agricultural produce i.e buy produce from farmers

12. a) i) what is a cooperative?

- An organisation of people with a common aim who pool their resources together to achieve a common objective e.g to market or purchase agricultural goods and services

ii) Outline the procedure of forming a cooperative society

- People or a person put the idea to others and they discuss
- Meetings are held and interim committee formed
- Committee draws up a constitution
- Committee registers cooperative with commissioner of cooperatives through local cooperative officer
- Minimum number is ten adult members.

iii) **State the principles that govern the operations of farmers cooperative societies**.

- Open membership which voluntary
- Equal rights e.g one person, one vote
- Share buying is limited
- Dividends distributed according to contribution
- Withdrawal is voluntary
- Sale of produce only through cooperative
- Total loyalty of members to the cooperative
- Education to members
- Non-profit motive by cooperative
- Cooperation with other cooperative organizations
- Only cash sale of produce
- Continous expansion
- Neutrality e.g in religion, politics or language

iv) State the functions of cooperative societies

- Marketing facilities
- Provision of inputs on credits
- Provide expert advice
- Storage of inputs and produce
- Giving loans all credit to farmers
- Educating for fair prices of inputs and produce
- Keep proper records of all activities
- Provide banking services to members.

v) What problems are faced by cooperative societies?

- Poor management i.e administrative problems
- Shortage of capital
- Disloyalty of members
- Political interference.

13. i) **What is a statutory board?**
    - An organisation established by an act of parliament to run or manage an industry e.g KTDA, NCPB, CBK, etc

ii) State the functions of statutory boards

- Promote and regulate production of crops
- Carry out research
- Provide bulk planting materials
- Marketing i.e selling crops for farmers
- Represents government in international issues
- Provide licences for crops and processing factories
- Provide inputs
- Regulate prices of farm produce
- Quality control e.g inspect and maintain quality
- Provide storage facilities
- Risk bearing by sharing overhead costs
- Provide market information
- Provide credit to farmers
- Process farm produce
- Grade and standardize farm produce
- Storage of farm produce
- Packaging function
- Invest profits for benefit of farmers
- Advertisement i.e sales promotion

d) State the functions of each of the following farmers organisations

i) **Kenya farmers National Union (KNFU)**

- Better prices of farm produce
- Adequate supply of farm inputs at reasonable prices
- Better terms of loans
- Good roads and infrastructure to improve farming
- Adequate control of livestock and crop pests and diseases
- Education to farmers

ii) Agricultural society of Kenya (ASK)

- Organise agricultural shows and exhibitions
- Assist in administration of milk records schemes
- Publishes Kenya Study book and the Kenya Farmers magazine
- Organise national ploughing completion.

iii) 4 – K CLUBS

- Means Kuungana, Kuanya, Kusaidia Kenya
- Teaching youth to like agriculture
- Showing youth new techniques of farming

- Teaching youth on leadership qualities
- Participation in competitive shows

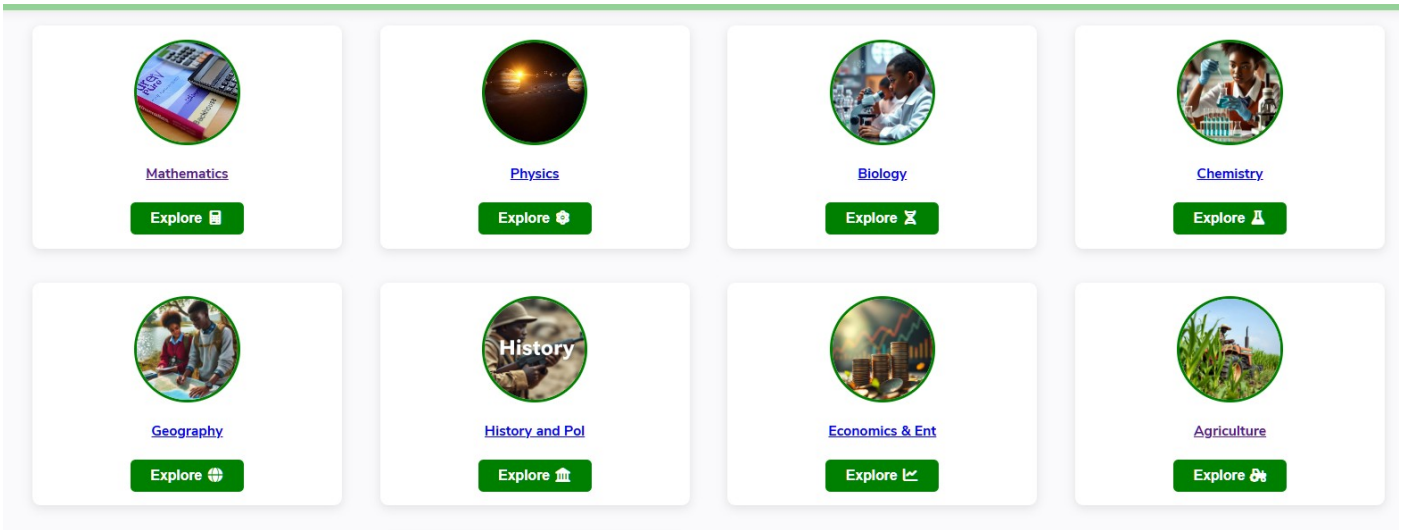
iv) Young farmers Clubs (YFC)

- Participating in shows and competitions
- Hold workshops and seminars in agriculture
- Organise youth exchange programmes
- Develop sense of self reliance and individual responsibility in the youth.

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