UGANDA NATIONAL AGRICULTURE TEACHERS' ASSOCIATION (UNATA)

UNATA SEMINAR HAND OUT / MARKING GUIDE, 2023
PRINCIPLES AND PRACTICES OF AGRICULTURE
(PAPER ONE AND TWO)

Name: …… **Sign:** ……

School: ……..

NO.	ANIMAL PRODUCTION
1	**(a) What are the signs of liver fluke infestation in cattle? (08 marks)** • Death of the animals without prior signs. • Emaciation / loss of weight / loss of condition. • Rough hair coat / staring hair • Liver fluke eggs in faeces • Skin and mucus membrane become pale. • Loss of appetite • Disturbed rumination • Post mortem – show thickened bile duct with liver flukes • Anaemia • Damaged liver • Diarrhoea • Animal becomes weak • Coughing • Swollen jaws / oedema **(b) How can liver fluke infestation be controlled/ (12 marks)** • Avoid grazing animals in swampy areas where animals can get flukes / fence off water logged areas • Provide animals with clean drinking water to avoid animal staking in flukes

	• Apply copper Sulphate in water to kill the snails • Animals should never be grazed in flooded areas that are likely to have snails. • Draining swampy areas; this denies snails a suitable habitat • Drench the animals with recommended drugs to kill flukes • Introduce ducks / geese into the pastures to eat the snails • Carrying out rotational grazing to interrupt the life cycle of flukes • Burning swampy areas during dry seasons to kill the snails and flukes
2	**(a) Describe the procedure for dehorning an animal using the chemical method. (10 marks)** • Restrain the calf using ropes • cast the animal down • Clip the hair around the horn bud to expose it • Rub the caustic sticks or pencils are against the horn bud until bleeding occurs • Apply fly repellants on the wound created • Apply antibiotics on the wound created • Release the calf after the operation • Do not allow the calf into rain for a few days for faster healing of the wounds. **(b) What are the benefits of dehorning farm animals? (10 marks)** • Makes the handling of the animals easy especially during drenching, castration e.t.c. • Allows more animals to fit in space during transportation / kraal • Reduces injury which is may be caused by horned cattle to others. • Prevents the destruction of farm structure like fences • Makes animals look beautiful / good hence making them more appealing. • It introduces uniformity in a herd • Makes animals to grow faster
3	**(a) Give reasons why farmers carry out the following livestock management practices.** **(i) Drying off. (05 marks)** • Allow animal udder tissues to return to normal before on set of next lactation • Allows animal's body to replenish itself with mineral reserves lost in milk production • Period allows the dam to meet nutrient demands for foetal growth • Allows the cow to gain weight • Allows increased milk production in the next lactation **(ii) Steaming up. (05 marks)** • Ensures healthy growth of the foetus for meeting nutrient demand of the foetus • Dam gets into a good physiological status in preparation for calving • This practice caters for increased milk yields after calving • Controls nutritional deficiency diseases e.g milk fever, anaemia • To accustom the animals particularly heifers to the milking parlour stall

	• Enables the dam to produce milk rich in colostrum **(b) Explain the methods a farmer can employ when drying off a cow. (10 marks)** • **Incomplete milking**; this is a method of drying off a cow where a cow is milked half way for 3-4 days after which milking is stopped completely • **Intermittent milking**; this is where a cow is milked on alternating days for 3-4 days after which milking is stopped completely. • **Secession**; this is complete stoppage of milking a cow • **Dry cow therapy**; this is where a cow is given antibiotics in the feeds to suppress milk production
4	**(a) State the benefits of giving artificial insemination in livestock breeding (08 marks)** • Semen from good quality breeds that are in accessible can be used • Enables controlled breeding • Eliminates cost of keeping a bull • Enables use from proven bull • Avoid breaking/ injuring small cows/ heifers • Semen can be stored and used in the future • Many animals can be served from single ejaculation • It is cheap to transport semen than a bull • Infertility/ sterility in animal can easily be detected • Rapid improvement of the herds **(b) Explain the factors limiting the use of artificial insemination in Uganda (12 marks)** • Scattered farm holdings, make it difficult for the inseminators to be reached • Poor communication make it difficult for farmers to get inseminators • Poor road network makes it difficult • Silent heat of some cows affect inseminations • There is general lack of skilled man power • There is poor extension services • Conservativeness of farmers • Dishonest inseminators discourage farmers • Lack of vehicles to facilitate A.I. activities • Some animals have short heat period • Many farmers are ignorant about A.I. • Semen storage equipment are expensive
5	**(a) Explain how calf mortality can be prevented (12 marks)** • Isolate and treat infected calves immediately • Vaccinate calves against contagious diseases • After birth, treat the navel with iodine to prevent infection • Deworm calves regularly to control/ get rid of internal parasites • Graze calves separately from adults to avoid worms/ tick infestation • Provide adequate clean water to calves • Provide calves from wild animals

- Feed calves on colostrums milk in the first week to impart immunity
- Spray/ hand dress/ smear with acaricides to control ticks
- Keep calves in individual pens to avoid navel suckling
- Ensure regular feeding
- Give the right amount of feeds consistently to avoid digestive disorders
- Give sufficient balanced ration to avoid malnutrition
- Use clean utensils to feed calves to avoid bacterial infection
- Feed milk at the correct temperature to avoid calf scours
- Maintain cleanliness in the calf pen to avoid disease spread
- Calf must be kept in warm/ dry/ protected places to avoid pneumonia
- Proper ventilation of calf pens/ house to allow fresh air

(b)Explain how newly born calves benefit from feeding on colostrum (04 marks)

- Calves obtain anti- bodies that impart immunity against diseases
- Calves get a rich supply of fats, proteins, sugar, vitamins and minerals
- Being a laxative, colostrum helps in removing the first faecal matter from the gut
- Colostrum is easily digested by the calves

(c)Outline the advantages of bucket feeding of calves over suckling them (06 marks)

- Easy to control the amount of milk given to the calves
- Allows early weaning of calves/ easier to introduce solid feeds
- Increases the amount of milk sold
- Reduces dependency on the dam for feeding
- Easy to determine the milk yield of the dam
- Reduces risks of disease transmission from the dam to the calf

6 **a) Explain the factors leading to low milk yield in lactating cow. (14 marks)**

- Breed of the animal; exotic breeds produce large amounts of milk than indigenous / local breeds produce less milk of high butter fat.
- Age of the cow; dams produce more milk than heifers
- Stage of lactation; Milk yield increases from the second week of lactation / until the 7th week then it starts declining up to drying off.
- Animal Health / diseases; sick animals give less milk which may also contain antibodies and drugs more especially after treatment which is poured away hence reducing yield
- Animal Temperament / excitement; docile animals give more milk than nervous ones
- Water Supply; Provision of enough water increases milk yield b'se water is needed for the good health of the cow and also in the manufacture of milk
- Food eaten / feeding; well fed / animals fed on concentrates will produce more milk which is of better quality than those poorly fed
- Stage of pregnancy; milk yield is higher during the early months of pregnancy and decline during drying off
- Season of the year / season; during the rainy season cows produce more milk than in dry

seasons.

- Method of milking; machine method gives more milk than hand milking
- Heat Period; this causes a slight decline in milk quality and production which may be due to the reduced feed intake / loss of appetite and hormonal changes
- Climate / Temperature; high temperatures reduce milk yield due to the increased evaporation of water of water from the animal's body.
- Handling of the animal; poor handling of cows during milking leads to less milk produced due to adrenaline hormone / Rough handling leads to the increase of adrenalin and hence milk hold up.
- Milking Interval / frequency of milking; the greater the number of milking times, the higher the amount of milk produced or the shorter the milking interval, the higher the yield

b) How can high quality milk production be lowered on a dairy farm? (06 marks)

- Milking from a dirty place
- Milking using dirty containers
- Milking using dirty hands
- Feeding animals on silage during milking
- Milking diseased animals / cows suffering from mastitis
- Leaving milk in open without covering it
- Failure to wash teats before milking
- Failure groom cows before milking
- Milking animals suffering from TB

7 (a) **What are the effects of diseases on livestock production? (05 marks)**

- Lead to loss of condition/ body weight/ emaciation
- Lead to death of animals
- Lower quality of animal products
- Reduce power output from work animals
- Increase cost of production
- Lead to condemnation of animal products
- Lead to loss of market for animals and animal product
- Lead to loss of revenue to the farmers
- Lowe quality of animal product
- Lower reproductive efficiency of the animals
- Lead to loss of appetite
- Lead to madness
- Lead to blindness
- Lead to lameness
- Lead to reduced growth

(b) Explain ways in which diseases are spread in livestock (15 marks)

- Introduction of diseased animals to the stock which transmit diseases to healthy animals
- Contaminated feeds transmit diseases to healthy animals

	• Carcasses of dead animals that are not disposed off well • Contaminated water which contain disease causing organisms from other places • Through blood sucking vectors which transmit diseases to healthy animals • Through excreta of affected animals which have not been disposed off well • Through contaminated soil e.g. anthrax • Through contaminated equipment e.g. syringes which are shared between sick and healthy animals • Through air e.g. respiratory diseases where animals inhale contaminated air • Through direct contact between sick and healthy animals • Inheritance from parents where diseases are passed onto off springs • Through animal products e.g. milk, eggs, meat • Through contaminated clothing/ shoes of visitors • Through wild animals/ birds/ vermin • Through contaminated dip wash, animals contract foot and mouth disease
8	**13 a) State the effects of ticks on cattle. (06 marks)** • Suck blood causing anemia • Damage hides • Transmit tick borne diseases which can lead to death • Cause loss of weight / emaciation • Reduce production in terms of meat / milk • Cause body irritation • Cause wounds which act as entry points for pathogens • Rob food nutrients from the host **(b) Describe the life cycle of a two host tick. (10 marks)** • Engorged female adult tick drops to the ground to lay eggs • Eggs hatch into larvae under favourable / suitable conditions • Larvae climb the first host • Larvae feed on a host's blood and get engorged • Larvae moult into the nymphs • Nymphs feed / suck blood of the same host and get engorged • Engorged nymphs drop to the ground • Nymphs moult and adult ticks emerge • Adult tick climbs the second host and suck blood / feed • The adult male and female mate on the second host **(c) State the non-chemical methods used to control ticks. (04 marks)** • Practicing rotational grazing • Double perimeter fencing • Hand picking ticks from the animal and burn them • Controlled bush burning • Ley farming • Biological control of ticks by Egrets that pick and eat ticks from animals
NO.	**AGRICULRURAL ECONOMICS**
1	**(a) Explain the challenges of marketing agricultural products. (10 marks)** • Inelastic demand; this makes it difficult to consume excess supply.

- Perishability; most agriculture products get spoilt easily and therefore cannot be stored for long.
- Seasonality; products are produced seasonally creating surplus in the market leading to low prices and wastage.
- Synthetic substitutes; some agricultural products face competition for market from cheap synthetic products
- Lack of cooperatives; to allow farmers have collective bargaining and search for market.
- Limited market information; leading to exploitation of farmers by middlemen
- Poor storage facilities; most farmers lack where to store their produce and end up selling at a low price
- Bulkiness: most agricultural products have low value in relation to their weight / volume, making transportation and storage difficult
- Variable quality of products; making marketing difficult
- Price fluctuation; unstable prices in the market make marketing difficult.
- High taxation; this reduces the profit margin for the farmers
- Long gestation period; crops take long to mature and this makes it difficult to adjust the quality / quality of output once planted
- Lack of processing plants; this makes farmers fail to add value and hence sell at low prices
- Poor transport; this makes it difficult to transport produce to the market.
- Large number of small scale producers; these cannot come together to determine the price making marketing difficult
- Unfavourable government policy; this makes marketing difficult
- Limited capital; this makes it difficult to finance marketing activities
- Insecurity; this makes it difficult for farmers to access the market
- **Divergence between planned and actual output; due to risks, it's difficult to plan exactly what to produce and get the same quantity**

(Award any 5pts @ 2mks) = 10mks

(b) Outline the ways of improving the marketing of agricultural products. (10 marks)

- Construction of proper storage facilities
- Establishment of processing industries
- Provision of credit facilities to farmers
- Contract farming
- Strengthening extension services to farmers
- Improving on market research and information
- Improving on security
- Price control by government
- Grading / standardization
- Advertising
- Packaging
- Branding
- Establishment of proper transport / infrastructure
- Construction of market centers

(Award any 10pts @ 1mk) = 10mks

2	**(a) What is meant by efficiency standards? (02 marks)** • This refers to the expected values or average figure of output already established with which the farmer will compare the performance of this farm enterprise **(b) Explain why it is important to access the efficiency standards (08 marks)** • To determine the profitability of the enterprise • To determine whether the production method used are appropriate • To enable the farmers to make decisions about certain production method • To enable the farmer compare performance of farm business with similar ones • To enable farmer make plans for future development of his farm **(c) Explain how the efficiency of a farm can be improved (10 marks)** • Through proper land preparation • Through timely planting • Through proper control of pests • Through timely weeding to reduce competition • Through proper control f diseases to reduce healthy varieties and breeds • Timely harvesting to reduce losses • Proper spacing • Proper storage • Carry out irrigation to reduce failure • Fertilizer application • Carry out drainage • Proper feeding of animals • Proper drying of crop produce • Use of extension services • Use of machines to do farm jobs • Use of skilled labour • Proper planning of farm enterprises
3	**(a) Outline the factors that influence the supply of Agricultural products. (10 marks)** • Price of the commodity. • Number of sellers on the market. • Seasonal effect • Level of demand. • Political stability. • Gestation period • Aims/goals of the producers. • Transport and communication. • Effect of weather and natural hazards. • Government policy. • Technology and management of production. • Cost and availability of factors of production. • Future price expectations/ speculation. **(b) Give reasons why Agricultural products have unstable prices. (10 marks)** • Bulkiness/poor transport

- Uncontrolled supply of Agricultural commodities due to poor government policy.
- Change in technology
- They are seasonal.
- Shortage of facilities e.g storage facilities.
- Long gestation period
- Inelastic demand of Agricultural products.
- Lack of alternative uses for the resources used in Agricultural production.
- Natural hazards
- Many producers.

4 **(a) Explain how farm records can be used to improve farming efficiency (08 marks)**

- Records enables farmer to know claim insurance in case of disaster
- Records make farmer to know his creditors and debtors
- Records are used to monitor efficiency of farm labour
- Records are used to monitor and follow routine operations on the farm
- Records help the farmer to know his/her assets and liabilities
- Farm records help to identify weakness I the farm enterprises
- They are used to correct tax assessment
- Records are used for planting and budgeting
- Records help in securing loans
- Records help in selecting animal for feeding
- It is used in culling animals that are less productive on the farm
- It helps the farmer to know whether he/ she is making profits or losses
- It enables farmers to make comparison in production
- It helps to share profits and losses in case of partnership or cooperatives

(b) Mr. Parker carried out the following transactions on his farm in the year ending 31st Dec 2005

Bought 2 heifers at shs. 150,000 each, 25kg of N.P.K fertilizer at shs.25,000. 100kg of animal feeds at shs.80,000 and drugs for animals at shs.100,000. He paid wages worth shs.200,000 and debts for which he got on credit worth shs.100,000. He sold milk at shs.350,000, tomatoes at shs.200,000, eggs at shs. 250,000 and off layers at shs.100,000. He received his debtor's shs.200,000. The value of the farm assets at the beginning of his business was shs.500,000 and he closed the trading period when the value of his farm was shs.650,000

(i) Prepare a trading account for Mr. Parker's farm (10 marks)

A TRADING ACCOUNT OF MR. PARKER'S FARM AS AT 31ST DECEMBER 2005.

PURCHASES AND EXPENSES	SALES AND RECEIPTS

Opening valuation	500,000		Milk sales	350,000
2 Heifers@150,000	300,000		Tomatoes sales	200,000
25kg of N.P.K	25,000		Egg sales	250,000
100kg of feeds	80,000		Debts recievable	200,000
Animal drugs	100,000		Off layers sales	100,000
Wages	200,000		Closing valuation	650,000
Debts payable	100,000			
Total purchases and			**Total sales and Receipts**	1,750,000
expenses	1,305,000			
Net profit	445,000			
	1,750,000			1,750,000

(ii) Did Mr. Parker make a profit or loss? Show your working (02 marks)

- Mr. Parker made a profit

1,750,000
-1,305,000
445,000

NO.	SOIL SCIENCE
1	**(a) Outline the benefits of draining water logged land. (10 marks)**

- Improves on the soil structure
- It helps to raise soil temperature
- Improves on soil aeration
- Ensures conducive conditions for soil organisms.
- Allow timely operations such as seed bed preparation
- Facilitates root growth
- Facilitates break down of organic matter by soil organisms to release plant nutrients.
- Facilitate control of water logging pests, parasites and vectors
- Facilitates growth of certain crops which cannot grow in water logged conditions.

	(b) Give four reasons why farmers are encouraged to adopt drip irrigation in farming.(06 marks) • It is suitable in areas where there is water shortage • water is directed to the root zone thus crops make use of it immediately • The amount and flow of water to the plant is regulated • Herbicides and fertilizers can be dissolved in irrigation water and applied at ago • It can be used on sloppy lands where other methods may be ineffective • It does not lead to erosion and massive leaching of nutrients • It does not require skilled labour to operate **(c) Give three factors that affect the efficiency of sprinkler irrigation. (04 marks)** • Type of soil, thus affects the rate of water infiltration • Quality of water, good quality water avoids blockage of nozzles • Weather conditions; high wind speed lowers efficiency of sprinkler irrigation. • Pump pressure; high pump pressure improves efficiency of sprinkler irrigation
2	**(a) Explain how soil sampling and testing may help in farm planning. (08 marks)** • Enable the farmer to determine the soil PH and carry out necessary amendments • Enable the farmer to determine the soil PH and be able to control soil borne disease and pests • To know the soil PH and guide the farmer on which fertilizers to use • To determine the organic matter content of the soil and if low more should be added • To determine physical condition of the soil and decide on the type of crop to grow • Enables farmers to establish the mineral content of the soil which determine the type of crop to grow • Enable farmers to determine the mineral content in order to decide on the fertilizer to apply • Enable farmers to determine the water content and retention of the soil • Enable the farmer to determine the soil PH of the soil and decide on the type of crop to grow **(b)Describe the procedure followed when sampling soil from a field. (12 marks)** • Determine the size of the land where sampling is to be carried out • Obtain the materials and equipment needed e.g. polythene bag, soil anger, hoes, shovel etc • Clean the equipment to be used • Determine the method to be used e.g. zig zag/ vandam/ traverse • Mark the points from which samples are to be obtained • Clear the vegetation from the spots where the samples will be got

	• Avoid getting samples from places like ant hills, pits, burnt area, etc since they will affect the results of the tests • Take soil slices using soil anger • Slice soil up to level of 15cm which is the root zones for most crops • Obtain a large number of samples to get a representative sample • Mix up soil samples from different spots • Get a representative sample from the composite sample • Dry the oil sample under controlled temperature/ in room temperature • Place the representative sample in a clean polythene bag/ suitable container • Label the bag inside and outside e.g. address, date etc • Do not contaminate the sample with chemical • Carry to the laboratory for testing
3	**(a) Explain how living organisms affect soil formation (04 marks)** • Plant roots have chemicals at their root tips which dissolve rocks materials leading to rock break down • Growth of plant roots in the rock crevices exert pressure and facilitate break down of rocks. • When living organisms die and decompose, they form organic matter which is added to the soil. • Some soil micro organisms for example termites help to mix up the top soil and sub soil. • Some soil micro organisms help to break down organic matter which is added to the soil. • Animals` hooves and animal `movement helps to break down rock particles in small ones. • Human activities such as quarrying, construction of roads mix up or remove soil layers or break down rocks particles into small ones. • Burrowing animal break down rock. • Burrowing animals make tunnels that improve aeration, drainage and infiltration. • Animal and plant waste decomposition giving rise to humus **(b)How does each of the following soil properties affect crop production?** **(i) Soil profile (4 marks)** • Top soil contains most nutrients • It determines which crop to grow , deep rooted crops cannot do well in shallow soils • Profile influences nutrient availability • It determines water holding capacity of the soil • It influences drainage of the soil • It determines workability of the soil and choice of implement to use in cultivation **(ii) Soil texture (4 marks)** • It determines water holding capacity of the soil • It determines aeration of the soil • It determines nutrient holding capacity of the soil • It influence the temperature of the soil • It determines the ease of root growth and penetration • It determines the drainage of the soil • It determines workability of the soil

- It determines capillarity of the soil
- It determines the PH of the soil
- It determines the type and population of microorganisms in the soil

(c) Explain the factors that influence crop response to a fertilizer (08 marks)

- Amount of fertilizer applied: too much/ little affect crop growth
- Fertility level of the soil: the crops will not use the fertilizer effectively if the fertilizer is applied to the soil which is already fertile
- Soil moisture: crops respond better to fertilizer in soil with high / adequate soil moisture
- Type of crop: crops respond differently to different fertilizers
- Weed infestation: weeds compete with crops for nutrients leading to poor crop response to fertilizer applied
- Plant population: optimum plant population ensures that plants get adequate nutrients
- Stage of plant growth: if the fertilizer is applied at the correct stage of plant growth, the response will be good
- Nature/ form of fertilizer: crops respond faster to fertilizer which are highly soluble
- Type/ kind of fertilizer: crops respond differently to different types of fertilizers
- Methods of fertilizer placement/ application: crops will respond well to the fertilizer applied correctly
- Pests and diseases: affected plants respond poorly to fertilizers applied
- Soil pH: suitable Soil pH encourages good crop response to fertilizer applied
- Type of soil: crops may not benefit much in fertilizer applied in more porous/ sandy soils because of leaching

4

(a) Give ways in which soil pH affects crop growth (10 marks)

- It affects the availability of nutrients in the soil
- It determines the type of crops to grow in the soil e.g. sugarcane and tea dwell in acidic soil
- It determines the availability of soil microorganisms
- It influences the activities of soil microorganisms
- It influences the existence of plant diseases in the soil
- It influences the toxicity of some nutrients to the crops
- It determines the type of fertilizer to add in the soil

(b) State six benefits of adding lime to the soil (10 marks)

- It supplies calcium to the soil
- It neutralizes excess acid in the soil
- It increase the availability of some nutrients in the soil
- It improves on soil structure especially c lay through flocculation
- It quickens/speeds up the decomposition of organic matters in the soil
- It improves legume nodulation (formation of nodules)
- It controls the prevalence of some diseases
- It improves on the drainage in clay soil
- It improves on aeration in clay soils

5

(a) Describe the various methods of applying fertilizers (08 marks)

- Broadcasting: fertilizer is randomly scattered over the field
- Drilling: fertilizers are placed in the soil as near the seed as possible at the time of planting
- Top dressing: fertilizer is placed on the soil surface after the crops have established
- Side dressing: fertilizer is placed at the side of the plants
- Band application: fertilizer is placed by hand along the row of the plants a few centimeters away from the plants
- Plough sole method: fertilize is placed in the furrow at the time of ploughing
- Ring placement/ perforation method: fertilizer is placed in ring form around the plant
- Foliar application: fertilizer is sprayed on the leaves of the crops
- Using irrigation water/ fertigation: fertilizer is mixed in irrigation water and applied together
- Injection method: fertilizer is injected in the bundles of the crop

(b) Explain the factors that affect the response of crops to fertilizers (12 marks)

- Amount of fertilizer applied: too much/ little affect crop growth
- Fertility level of the soil: the crops will not use the fertilizer effectively if the fertilizer is applied to the soil which is already fertile
- Soil moisture: crops respond to fertilizer in soil with high / adequate soil moisture
- Type of crop: crops respond differently to different fertilizers
- Weed infestation: weeds compete with crops for nutrients leading to poor crop response to fertilizer applied
- Plant population: optimum plant population ensures that plants get adequate nutrients
- Stage of plant growth: if the fertilizer is applied at the correct stage of plant growth, the response will be good
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- Soil pH: suitable Soil pH encourages good crop response to fertilizer applied
- Type of soil: crops may not benefit much in fertilizer applied in more porous/ sandy soils because of leaching

NO.	CROP PRODUCTION
1	**(a) Describe the characteristics of weeds that make them better competitors than crop plants. (10 marks)** • Weeds produce very many viable seeds which increases their chances of survival e.g. Black jack • Some weeds are allelopathic / poisonous which excludes crops growing with them. • Some weeds are less palatable to livestock than crop plants • Some weeds are parasitic to crops which makes them to survive on other crops • Short life cycle leading them to multiply very fast • Weeds have many efficient dispersal mechanisms • Some weed seeds germinate even when immature therefore increasing chances of

survival e.g. Black jack
- Weed seeds undergo dormancy enabling them to grow at one right time when conditions are favourable.
- Some vegetatively propagated weeds develop from small portions thereby increasing their chances for survival
- Weeds are resistant to pests and diseases than crop plant making them survive better
- Fast growth enabling them to colonize the area within a very short time
- Weeds withstand adverse climate conditions e.g. drought
- Weeds are more aggressive feeders than crops plants thereby out competing them
- weeds grow in a wide range of soils conditions
- Some weeds have perenating organs which increases their chances of survival e.g. Rhizomes for spear grass, Bulbils for Oxalis etc
- Some weeds have protective structures e.g. thorns that protect them from damage by animals
- Weeds are better adapted to competition for instance they have many roots and leaves that ease competition
- They have fewer pests and diseases that attack them

(Award any 10pts @ 1mk) = 10mks

(b) How can effective use of herbicides in weed control be ensured? (10 marks)
- Use the correct herbicides for the intended weed
- Use of non-expired herbicides ensures effective killing of weeds
- Apply the herbicide at the correct / right stage of weed growth
- Ensure proper / adequate wetting of the weeds during spraying
- Ensure that the spraying equipment is in good working condition
- Use the right herbicide on the right crop
- Use clean water for mixing herbicides
- Use surfactants which enhance sticking of herbicides onto the weeds / increase the absorption of herbicide
- Ensure adequate moisture availability in the soil especially for pre-emergence herbicides
- Ensure correct speed of operation while spraying
- Proper mixing of the herbicide before use.
- Avoid spraying herbicides when its likely to rain
- Avoid spraying in windy weather to prevent drift of herbicides
- Apply herbicides at the recommended rate
- Apply the herbicides at the right intervals
- Apply the herbicide at the correct stage of weed growth
- Apply herbicides in the afternoon to avoid dilution by dew
- Herbicides should be mixed in proper concentration

(Award any 10pts @ 1mk) = 10mks

2 **(a) Describe the different methods of vegetative propagation of crops. (10 marks)**
- **Use of cuttings**; this is where a portion of a plant is cut and used for multiplication
- **Layering**; this involves induction of a plant part to produce roots before its cut for multiplication

- **Grafting;** involves uniting the scion and root stock to produce a new plant
- **Budding;** involves the uniting of a bud to a root stock
- **Use of storage organs;** it involves the use of special storage organs to produce new plants
- **Use of Suckers,** young individual plants are detached from parent plant and planted
- **Use of splits;** it involves detaching a cluster of plants and they are planted like **guinea grass, pyrethrum**
- **Use of crowns;** it involves detaching a crown from the fruit and its planted **like** in **pineapples**
- **Use of Slips;** these are detached from the parent plant and planted
- **Use of tissue culture;** a piece of tissue is put into growth **medium** to produce new plants
- **Use of bulbils;** these are detached from the parent plant and are **planted**
- **Rhizomes,** a rhizome is an underground stem hat runs horizontally in the ground e.g. in bamboo, spear grass, couch grass, ginger etc
- **Corms,** a corm is an underground stem which **stores** food e.g. in coco yams
- **Stem tubers,** these are swollen underground stems that have **eyes** or buds that develop into new plants eg in Irish potatoes.
- **Bulbs;** a bulb is a plant that stores its food in the leaves. In between the leaves are axillary buds that grow into new plants e.g. in onions.
- **Root tubers,** root tubers can also be used in sweet potatoes.
- **Runners,** these are stems growing horizontally **above** the surface of the ground, have adventitious roots and develop new plants at the **nodes** e.g. in **commelina**.

(Award any 5pts @ 2mks) = 10mks – 1mk mention and 1mk explanation

(b) Outline the advantages and disadvantages of vegetative propagation in crop production. (10 marks)

Advantages Of Vegetative Propagation

- The offspring grows fast and mature early
- Young plants have more **chances** of survival in harsh environment
- Enables propagation of plants that don't produce viable seeds
- There **is less** risk of seedling diseases
- It avoid seed borne diseases
- There **is** faster establishment of the crop
- The offsprings / crops are genetically uniform to the parent plant.
- Land requires less preparation than for seeds / a fine seedbed is not required
- Multiplication of plant population is very fast.
- Maintains the desirable qualities of a plant since offsprings are similar to parent plant
- Enables production of many varieties of compatible crops on the same root stock.

(Award any 5pts @ 1mk) = 5mks

Disadvantages Of Vegetative Propagation

- Planting materials are bulky and difficult to transport.
- Planting materials are difficult to store
- There is little variation because there is no fertilization
- Pests or disease attack may wipe up the crop because of the genetic make up

- Its generally expensive than use of seeds
- Its difficult to mechanize planting
- Spreads parent diseases to the offsprings.
- Some methods require skilled labour.

(Award any 5pts @ 1mk) = 5mks

3 **(a) Outline the importance of the following agronomic practices**

(i) Pruning **(03 marks)**

- To maintain desired height for easy harvesting
- To give de plant a desired shape
- To increase yield in plants
- To avoid bearing which result in break age of branches
- To improve on circulation of air around the crop
- To reduce wastage of chemical
- To allow more sunlight penetration
- Easy to spray
- To remove unproductive branches and save plant nutrient for more productive ones
- To control pests
- To control diseases
- To stimulate production of new branches which are more productive
- Easy to weed
- Easy to harvest

(ii) Early planting **(04 marks)**

- Crops escape weed competition
- Crops benefit from good soil aeration
- Crops are able to use other nutrients before they are leached
- Farmer is able to plan and follow the cropping programme
- Early planting leads to high yields
- Leads to quality harvest
- Crops escape pest risk
- Crops escape disease attack
- Crops are able to utilize nitrogen flush
- Farmers harvest when prices are still high and solve problems of food shortage
- Crops are able to get enough rain water throughout the growth period

(iii) Staking **(03 marks)**

- Staking reduces condition that favor multiplication of pests and diseases
- It is easy to harvest
- It is easy to spray
- It is easy to weed
- Crop are supported against strong winds
- It allows free air circulation
- It improves crop yield
- It improves the quality of crop produce
- Crop produce is protected from soil pests

- Crop produce is protected from soil borne diseases
- Crop produces are not contaminated by soil
- Leaves are exposed to adequate sunlight

(b). Explain farming practices that will replace plant nutrients lost from the soil. (10 marks)

- Apply lime to correct soil PH and supply calcium
- Cary out crop rotation to enable legume fix nitrogen
- Control soil erosion to conserve nutrients
- Control weeds to reduce competition for nutrients
- Apply organic manure, to replace plant nutrients
- Apply inorganic fertilizers
- Allow the land to rest / carry out bush fallowing
- Improve on drainage
- Carry out mulching
- Practice agro forestry

4 **(a) Explain the factors to consider when deciding on which crops to grow. (12 marks)**

- Size of the land: particular crops need a large piece of land
- Rainfall received: some crops need plenty of rainfall than others
- Rainfall distribution: perennial crops require well distributed rainfall
- Temperature: some crops need cool temperature for proper growth
- Soil depth: deep rooted crops need deeper soils
- Culture/ tradition: some crops are grown in certain places because of tradition
- Availability of market: farmers tend to grow crops that have ready market
- Uses of crops: crops that have more uses are selected
- Costs of production: crops which are expensive to produce may not be selected
- Skill to produce: where the farmers do not have the skills, will not be selected
- Government policy: government may encourage / discourage production of certain crops
- Nutritive value of the crops: farmers will prefer crops with high nutrient value
- Availability of planting materials: a farmer will select crops whose planting materials will be readily available
- Type of soil: certain crops prefer particular type of soil
- Soil moisture content: some crops prefer high moisture content than others
- Fertility of the soil: some crops need more nutrients than others
- Prevalence of diseases: presence of certain diseases may prevent growing of certain crops e.g. tomato wilt disease
- Prevalence of parasitic weeds: discourage production of cereal crops
- Maturity/gestation period: farmers prefer crops which mature quickly

(b) Outline the activities carried out on a nursery bed from planting up to the time when seedlings are taken to the field. (08 marks)

- Make rows about 15cm apart.
- Apply fertilizers.
- Plant seeds at recommended depth to ensure even germination.
- Cover the seeds lightly with soil.
- Mulch the nursery bed.
- Water the nursery bed twice a day.

- Remove the mulch when seeds have germinated.
- Erect a shade over the nursery bed.
- Spray with recommended chemicals to control pests and diseases.
- Thin or prick out the seedlings to avoid overcrowding.
- Carryout hand weeding to control weeds.
- Harden off seedlings.
- Water the seedlings before transplanting.
- Scoop the seedlings using a suitable tool to reduce root damage.
- Transplant the seedlings during cool hours of the day.

5 **(a) Explain the considerations to be made in preparation of a nursery (09 marks)**

- Apply manure to improve soil nutrient content
- Choose a site that is near water source to ease watering
- Level or firm the surface of the bed to encourage uniform germination
- The bed should face north south direction to get adequate sunlight
- Put barriers or side logs or boards around the beds to control soil erosion
- Clear the site for nursery bed near the main garden for easy supervision
- Nursery bed should be protected against chicken and other animals by fencing
- Site chosen should be fertile or apply manure to promote growth of seedlings
- Choose a site with good drainage to avoid water logging
- The site chosen should be easy to access for easy supervision of seedlings
- The site should be away from big tree to avoid shading and ant hills
- Ensure the bed is free of notorious weeds and their roots to reduce competition between weeds and seedlings
- Raise the bed to avoid water logging or sink the bed to conserve moisture
- Make the bed fine to make it suitable for germination of small vegetable seeds
- The width of the bed should not be more than one meter and any length to allow easy operation in the bed
- Sterilize the soil to kill harmful organisms either by burning dry grass or soil fumigation

(b) Describe the operations carried out in caring for coffee seedlings raised from the seeds (04 marks)

- Spray against pests and diseases
- Harden off 7 to 14 days towards transplanting
- Root pruning to encourage development of lateral roots
- Capping (cutting) of terminal buds to encourage development of lateral branches
- Apply fertilizer to promote growth
- Remove the mulch if any as soon as seedlings emerge
- Irrigate coffee seedlings regularly
- Weed control to reduce competition
- Pricking out by transferring crowded seedlings to another nursery bed or thinning the weak and diseased seedlings

(c) What are the causes of death of seedlings in the nursery bed? (07 marks)

- Tramping by animals
- Insufficient shade causing scorching

- Mechanical damage during operations such as weeding, pricking out
- Natural disasters for example hail stones
- Over application of pesticides
- Poor use of fertilizers
- Low temperature
- Lack of water or drying up of the bed
- Flooding of the nursery bed
- Pests attack
- Diseases attack for example damping off
- Too much shade causing etiolating

6

(a) Describe the characteristics of a poor pasture (8 marks)

- Marshy plant in wet areas of the pasture
- There is plenty of pasture weeds and unpalatable pasture species
- There may be flooded areas in the pasture
- The animals have poor condition
- There is no balance in legumes and grass
- Animals hunt for palatable pasture species
- The pastures are stunted
- There is poor growth of pasture and unproductive pasture
- Over grown pasture
- There is plenty of undecayed plant residues in the pasture
- There is bareness of the ground in the pasture

(b)Outline factors to be considered when selecting pasture species for the establishment of a pasture (12 marks)

- Should be disease free
- High nutritive value of the pasture
- Should be able to rejuvenate fast
- Should have high leaf to stem ratio
- Should be able to grow year after year
- Should be pest free
- Fast growth rate
- Ability to withstand drought
- High palatable
- Resistance to grazing pressure and trampling
- Ease to establish should be disease resistant

(c) Outline four ways in which zero grazing is advantageous to a farmer (04 marks)

- It reduces destruction of pasture by grazing animals
- Animals under zero grazing tend to be docile
- Zero grazing allows backyard farming
- Zero grazing increases stocking rates
- It controls bloat since grasses are cut at the right stage
- It is easy to control breeding
- It controls destruction of crops and farm structure
- Water for farm use can be collected from the zero grazing shelter
- It controls straying of animals

- It allows re growth of pasture
- Zero grazing controls pests and diseases
- It protects animals from bad weather
- It protects animals from wild animals and thieves
- There is less wastage of feeds
- It is east to collect manure
- It is easy to determine the feed intake per animal
- It is easy to identify sick animals
- There is less wastage of energy by animals
- It is easy to collect animal wastes for biogas production

7 **(a) State the advantages and disadvantages of using seeds in crop propagation (10 marks)**

Advantages

- Seeds remain viable for long and can be stored for future planting
- Seeds are less bulky and easy to transport
- Crops raised from seeds have a longer life span
- It is a cheaper method of propagation
- Seeds are easy to mechanize
- Easy to control pests and diseases through seed dressing
- Seeds encourage genetic improvement through crop pollination

Disadvantages

- It is difficult to maintain good parent plant characteristics in off springs from seeds
- Some seeds take long to germinate because of seed dormancy
- Some seeds are not viable
- Crops raised from seeds are very delicate at young stage
- Seeds require proper seed bed preparation
- Seedlings from seeds are greatly affected by pests and diseases
- Crops take long to establish when seeds are used to propagate
- Crops raised from seed take long to reach maturity
- Seeds are eaten by pest

(b) Give the qualities of good seeds for crop propagation (05 marks)

- Free from foreign materials
- Should be mature
- Should be free from mechanical damage
- Should be viable / able to germinate
- Should be free from pest damage
- Free from disease damage
- The seed should be well filled or plump

(c)Suggest measures that can be taken to increase the percentage of seed germination (05 marks)

- Soaking seeds with hard coats in acid to break the testa
- Seed dressing to avoid pests and diseases attack
- Proper seed bed preparation
- Planting at correct depth

	• Heating the seeds for a short time to break the seed coat • Plant when there is adequate soil moisture • Storing seeds for some time to break dormancy • Proper drying of seeds • Harvest mature feeds • Carry out seed scarification to break hard seed coats • Soaking seeds in cold water before planting • Sorting seeds before planting
NO.	**FARM STRUCTURES**
1	**(a) State the features of a good crush (06 marks)** • The posts should be firm • The posts and rails should be smooth • The floor should be made of concrete • The posts should be slanting outwards/ the crush should be V- Shaped • The space between the row of posts should be narrow i.e. one meter (1m) apart on top • The rails/ guard rails should be close to each other • The rails should nailed from inside the posts • The posts should be strong • It should have sliding rails • The floor of the crush should be rough • The posts should have a suitable height **(b) Give four management practices that require the use of a crush (02 marks)** • Grooming/ clipping / shearing • Spraying animals within acaricide • Putting identification marks • Taking temperature • Carrying out pregnancy tests • Drenching • Milking • Vaccination • Carrying out artificial insemination • Dehorning • Treating animals/ injecting animals with antibiotics • Carrying out close examinations • Carrying out hoof trimming • Taking blood samples **(c) Describe briefly the procedure of constructing a cattle crush. (08 marks)** • Select a suitable site basing on factors like drainage, • Clear the selected area properly • Measure and mark the area using pegs and strings • Dig holes in the marked spots depending on the type of the crush • Measure and cut posts to the desired heights • Fix the posts into the ground and ram them properly to make them firm • Fix posts firmly on each other for holding animals

2	**(a) Why is a farm store important on the farm? (08 marks)** • Protect / minimize crop losses due to theft • Protect / minimize crop losses due to pests • Enables farmers to store produce until when prices are good/high • Protect / minimize crop losses due to bad weather / protect produce from rain • Enable sorting / grading of produce • Decrease labour requirements especially during drying **(b) Describe the features of a good crop store. (12 marks)** • A leak proof roof to prevent leakage into the produce • Rat proof guards to prevent rats from entering the store. • Ventilators/Wire mesh to allow ventilation and prevent dampness (prevent entry of insect pests) • Smooth walls to prevent pests from hiding there. • Lockable door to prevent theft of produce. • A cemented floor tor easy cleaning • Raised foundation above the ground to prevent dampness. /Seepage in the store. • Large floor space to accommodate enough harvest / Store different produce Separately. • Strong walls to prevent collapse of the structure. • Long over hang to prevent drift into the store.
3	**(a) List the types of structures found on a farm (04 marks)** • Fences • Cattle plunge dip • Spray race • Crush • Farm building • Water storage structures • Drainage channels • Farm roads • Milking parlour/ milking sheds • Fish ponds • Irrigation systems • Loading ramps • Weighing bridge **(b) Giving an example in each case, state why the structures are necessary on the farm (16 marks)**

- Dips/ spray races: help in the control of external parasites
- Crop stores protect produce from bad weather
- Machinery building: protect machines from bad weather
- Animal building: protect animals from bad weather
- Fences demarcate: farm boundaries
- Water storage structure: enable storage structures
- Crushes: enable to perform different farm operations
- Roads enable transportation of inputs and outputs on the farm
- Drainage channels lead away excess surface run off
- Fish pond facilitate rearing of fish
- Irrigation system facilitate provision of water to crops
- Loading ramps facilitate loading / offloading of livestock
- Weigh bridge facilitate determination of live weight of livestock

(c) **Outline the factors to be considered when siting farm structures** (08 marks)

- Topography/ terrain/ view/ panorama
- Type of soil
- Central location
- Nearness to source of power
- Nearness to source of water
- Security of the area
- Farmer's preferences
- Direction of sunrise/ sunset
- Space for future expansion
- Prevailing wind situation
- Purpose of the structure
- Relation with other structures
- Ease of access
- Drainage
- Slope of the land

4

(a) **Suggest factors to consider when locating a site for a piggery unit on a farm** (6 marks)

- Stable soil to provide firm foundation
- Near water source for easy supply of water
- Raised ground to allow free flow of rain water
- Lee ward side to avoid bad smell
- Should be located in a place where it is sheltered from direct sunshine to avoid heat stress
- Accessible for easy transportation
- Near power source for easy provision of heat to the piglets
- Adequate space for future expansion
- Should be located according to the farmers' preference

(b)Explain the desirable features of a pigsty (14 marks)

- The floor should be concrete for easy cleaning and to avoid destruction by pigs

- Adequate feed and water troughs to ensure accessibility to feed and water
- Floor slightly sloping on one side to allow easy drainage to water
- Trench for draining waste and dirty water flow
- Short wall with adequate open space between wall and roof to allow proper ventilation
- Have soaked away pit where wastes from the structure flow
- Have adequate flow space to allow enough exercise
- Have creep area where piglets are fed without interference from the soil
- Roof should be leak proof to avoid damping condition
- Wall should be strong enough to avoid destruction by pigs
- Should have strong and lockable doors to safe guard the animals
- Foundation should be raised to avoid surface run off flow into the structure
- Should have furrowing crate or guard rails to protect crushing of piglets by the sow
- Should have compartments to avoid competition for food

5 **(a) Why are farm buildings important? (14 marks)**

- Reduce crop losses by storing crop produce
- May help to increase profit margins by storing crops until when the prices are high
- Houses for farm workers
- Increases efficiency and ease of management
- Protect farm property against theft
- Farm tools and machinery are protected from damage from weather elements
- Provide space for repair and maintenance of tools, machines and equipment
- Protect animals from extreme weather conditions
- Protect animals from predators and intruders
- Control disease outbreak
- Easy collection of dung and urine/manure
- Reduces labour requirements on the farm
- They can be used as security when getting a loan
- For water harvesting on the farm
- For planting high value crops of mushrooms
- Confine farm animals to facilitate mixed farming
- Add value to farm

(Award any 7pts @ 2mks) = 14mks

(b) Explain the factors that determine the durability of farm buildings. (06 marks)

- **Type of farm building material used**; strong building materials make buildings last long
- **Foundation**; strong foundation make farm building last longer
- **Type of soil**; firm soil makes the building last longer
- **Drainage**; well-drained soil makes the building last longer
- **Maintenance**; proper maintenance makes buildings last longer
- **Workmanship**; well-constructed buildings last longer / level of **mixing** materials / **skills** used in the construction of the building

(Award any 3pts @ 2mks) = 6mks

6 **(a) Outline four factors that influence the choice of tillage equipment use on a field**

- Availability of skilled labor
- Availability of the equipment
- Availability of the spares
- Cost of the spares
- Cost of the equipment
- Nature of the vegetation
- Type of tillage to be carried out
- Topography of the land
- Type of soil
- Size of the field
- Type of crop to be planted
- Durability of the equipment
- Warranty of the equipment
- Cost of maintenance of the equipment
- Conservativeness of the farmers

(b) Explain the factors that have encouraged the continued use of hand tools in agricultural production in Uganda (12 marks)

- Soil condition: light soils favor use of hand tools
- Level of income: farmers with low income use hand tools
- Size of land: farmers with small acreage tend to use hand tools
- Fragmented land: this encourages the use of hand tools
- Cropping system: mixed cropping favors the use of hand tools
- Type of crops: some crops such as coffee, tomatoes encourage the use of hand tools
- Lack of skills to use machines: such farmers tend to use hand tools
- Topography: hilly areas encourage the use of hand tools
- Conservativeness: such farmers have continued to use hand tools
- Availability of hand tools: a variety of cheap hand tools are available for use
- Availability of labor: cheap human labor is readily available to use hand tools

7 **(a) State the essentials of a plunge dip? (08 marks)**

- It should have a leak proof roof to keep of rainwater and minimize evaporation.
- The draining race should be slanting (slope) in wards to direct the excess acaricide back to the dip tank.
- The dip tank should have enough capacity / large enough to hold enough acaricide to cover the animal.
- The foot baths, dip tank, draining race and collecting yard should be made of concrete.
- It should be sited on a well-drained land with adequate space for holding the cattle.
- It should have guard rails to enable the attendant guide animals through the dip tank.
- The floor of the dip should not be too slippery as to cause accidents.

- It should have a soak pit to enable easy and safe disposal of the used acaricide.
- The entrance race should have a footbath to wash the hooves of the animals and to enable control of foot rot.
- The jump off stage should be gently sloping to enable the animals gently slide into the dip tank.
- The rump should have gentle steps to enable the animals easily come out of the dip tank.
- The drainage race should be long enough to enable the animals dry before going out to the pastures.
- It should have a sump to filter the acaricide as it flows back into the dip tank from the draining or exit race.
- The walls of the dip tank should be smooth to enable the splashing acaricide flow back into the dip tank during dipping.
- The floor and the walls of the dip tank should be leak proof to avoid loss of acaricide by seepage into the soil.
- The collecting yard should have enough space to hold all the animals to be dipped.

(Award any 8pts @ 1mk) = 8mks

(b) Mention the advantages of using a plunge dip? (07 marks)

- Acaricide can be used again.
- Ensures proper coverage of animals with acaricide.
- It is quicker than hand spraying.
- Cheap in the long run
- Less labourious than hand spraying.
- It is more efficient where large herds of cattle are concerned.
- It requires less skill than the spray race.

(Award any 7pts @ 1mk) = 7mks

(c) What are the limitations of plunge dip?(05 marks)

- It is not used for dipping small animals e.g. goats and calves.
- Heavily pregnant animals cannot be dipped.
- It cannot be easily filled in areas of water scarcity.
- The initial cost of setting it up is very high.

	• The skilled labour required to test the acaricide strength is not readily available. • The maintenance costs are high because large amounts of acaricides are used. • It is only economical for large herds of animals. • Sick animals cannot be dipped. **(Award any 5pts @ 1mk) = 5mks**
NO.	**AGRICULTURAL ENGINEERING / MECHANIZATION**
1	**(a) Describe the working of a water cooling system in a tractor engine. (12 marks)** • When the engine is started, cool water is sucked from the bottom of the radiator by the impeller pump. • Cool water flows / enters the water jackets in the engine block • Water absorbs heat from the engine hence cooling it. • The heated water rises up; • When the temperature of the water is high enough (90^0), thermostat control valve opens; • Hot water moves through the top hose pipe to the radiator tank • it becomes lighter and begins to rise up to the top of the radiator • the hot water moves from the top tank downwards through the tubes; • as it moves / flows down the radiator tubes, heat is removed from the water by cool circulating air drwn by the fan • A s the water reaches the bottom of the radiator its cooled and its again flows through the bottom hose pipe **(Ignore diagram)** **(Award any 8pts @ $1^1/_2$mks) = 12mks** **(b) What are the causes of overheating in a water cooled tractor engine? (08 marks)** • Leaking radiators / faulty radiator • Leaking water pump / faulty water pump • Faulty thermostat • Loose fan belt • Lack of water in the radiator / low level of water in the radiator • Non-functioning of the fan / broken fan blades • Accumulation of dirt inside the radiator and radiator tubes / dirty water loose / broken hose pipes • Faulty radiator cap • Over loading of the tractor • Low level of oil in the sump • Faulty oil pump • Damaged gasket • Broken fan belt • Accumulation of dirt in radiator fins / grills • Leaking head tank

- Loose fan belt which fails to blow air for cooling water
- Chocked radiator fins
- Rusty water jackets

(Award any 8pts @ 1mk) = 8mks

2 **(a) Explain the factors that influence the number of tillage operations in seed bed. (10 marks)**

- Topography of the area: hilly area may not seed several tillage operations in order to control soil erosion
- Types of crops: certain crops may require several tillage operations
- Types of weeds: rhizomatous weeds may require several tillage operations
- Lack of capital: limits the number of tillage operations
- Type of vegetation: thick/ tall vegetation require more tillage operations
- Type of soil: areas with clay soils may need more tillage operations
- Type of planting materials: small seeds require more tillage operations
- Moisture content of the soil: wet soil may need more tillage operations
- Type of implements: disc plough require one tillage operation

(b) **Outline the maintenance practices that should be carried out on an ox – plough (10 marks)**

- Sharpen the shares
- Clean the plough after work
- Grease/ oil all moving parts to reduce friction
- Smear plough parts with oil during storage to reduce rusting
- Keep the plough under a dry shelter
- Replace worn out/ lost bolt and nuts
- Replace worn out mould board
- Replace broken handles
- Replace worn out land wheels
- Replace worn out shares
- Replace worn out land slides
- Straighten bent parts
- Tighten bolts and nuts

3 **(a) Describe how air is cleaned by the oil bath air cleaner (09 marks)**

- Dirty and dusty air enters the pre-cleaner through the louver
- The louver traps the large particles in air
- The vanes cause air swirling
- Large particles are thrown out through the ejection slots
- Air then moves down the stack/ central pipes to the oil bath
- The oil traps dust particles
- Air bubbles through the oil and moves through the wire mesh
- Wire mesh dries air and traps the remaining fine dust particles
- Dry clean air goes to the engine through the out let pipe

(b)Explain what may lead to improper functioning of the oil bath air cleaner (06 marks)

- High level of oil in the oil bath
- Low level of oil in the oil bath
- Wrong grade oil use
- Damaged wire mesh
- Damaged central pipe
- Damaged vanes
- Damaged outlet pipe
- Blocked louvers do not allow air to enter the pre-cleaner
- Blocked ejection slots prevent throwing the large particles in air
- Dirty oil in the oil bath

(c)Describe how the cleaner air is utilized in the running of diesel engine (05 marks)

- Clean air enters the diesel cylinder through the inlet valve
- Air in the cylinder is compressed raising its temperature
- Diesel is injected into the cylinder to compress air in the cylinder
- Combustion occurs
- Pressure created pushes down the piston
- This force is transmitted to the crank shaft through the connecting rod
- Crank shaft converts this reciprocating motion of the piston to rotary motion

4 **a) What is the importance of carrying out land cultivation before planting? (08 marks)**

- Provides a good seed bed for proper seed germination and growth.
- Provide sufficient depth of soil for good water percolation and retention.
- Destroy insect pest, eggs and their breeding places
- Control soil erosion as there is more water infiltration
- Kills weeds that are already in the field.
- It breaks the hard soil surface to encourage proper establishment of the crops.
- Turns vegetative material and crop residues and mix it with soil.
- Improve soil aeration
- Facilitate application of fertilizers by mixing it with soil.
- Level and firm top soil surface for easy planting.

b) What are the advantages of using a disc plough in land cultivation? (08 marks)

- It's faster at doing work
- Its discs ride over obstacles without damage due to their rolling action.
- It can be used in hard dry soils which are too difficult for the mould board ploughs.
- It works well in both light and sticky oils.
- It has low maintenance cost especially replacement of parts because most parts take long to be worn-out.
- It has a poor ability to cover trash, which is a good condition for soil and water conservation.
- It requires less tractor pull power as compared to mould board ploughs.
- It has got a heavy beam which allows for deep ploughing.

	c) Outline the maintenance practices that should be carried out on a disc plough. (04 marks) • Lubricate the bearing regularly to facilitate proper rolling of the discs • Check regularly and tighten loose bolts and nuts to reduce loss of parts. • Clean the discs every after work • Repair damaged parts • Replace worn out parts regularly to reduce further damage and improve efficiency. • Smear the implement with oil to prevent rusting when not in use.
5	**(a) What are the benefits of mechanizing farm operations? (06 marks)** • Leads to increased agriculture output / yields • Encourage diversification • Land reclamation is possible • Machines work for long hours • Increases acreage / size of land under cultivation • Makes it possible for jobs which would be impossible to do by hand • Releases / saves human labour for other un mechanized farm operations / jobs e.g. picking coffee • Ensures timely farm operations • Encourages quality production e.g. products harvested mechanically are more uniform • Saves time / large land can be cleared within a short time • Reduce human drudgery / fatigue / toil o hand labour • Farmers benefit from economies of large scale production • Improves efficiency of doing work **(b) State the factors that have limited the use of machines in agriculture (08 marks)** • Limited foreign exchange to purchase spare parts • Presence of thick and tall vegetation. • Steep topography of the land in some areas. • High cost of fuel. • Shortage of land. • Tractors are insufficient. • Little capital to purchase machines. • Land fragmentation / poor land tenure system. • Lack of skilled labour. • Growing perennial crops and inter cropping discourage use of tractors. • Conservativeness among farmers.

- Inadequate extension services.
- Little capital to maintain machines.
- Lack of servicing centers of spare parts.

(b) Suggest ways in which mechanization could be encouraged in Uganda. (06 marks)

- Educate the famers on the benefits of mechanization
- Encourage co-operative ownership of the machines
- Providing loan facilities to farmers
- Providing subsidies to farmers on inputs
- Provision of simple and adaptable machines
- By consolidating land
- By lowering costs of tractor hire services
- Obtaining enough facilities for hire.

6 **(a) Suggest the cause of following conditions in a tractor.**

(I) Excessive production of smoke at the exhaust (06 marks)

- Low gear engaged on bad road
- Heavy engaged to overcome load
- Worn out piston rings
- Adulterated fuel
- Incomplete combustion
- Too much engine oil in the sump
- Delay in charging the engine oil
- Faulty spark plugs
- Poor grade oil

(II) Excessive fuel consumption (06 marks)

- Faulty carburetor
- Faulty injector pump
- Faulty injector nozzle
- Faulty timing mechanism
- Overheating of the engine
- Over speeding
- Faulty air cleaner
- Over loading
- Slippery surface

(b) Explain factor that lead to the failure of tractor to start. (08 marks)

- Lack of fuel in the tank
- Air bubble or air lock in the fuel
- Low battery charge

	• Faulty injector • Faulty spark plug • Faulty injector pump • Poor setting of timing unit • Worn out compression rings • Worn out piston head • Faulty switch • Faulty ignition coil • Engine knock • Engaged gear • Loose battery connection • Faulty starter mortar • Dirty battery terminals • Faulty distributor • Broken electric cable • Burnt out fuses • Poor electrical wiring
7	**(a) What are the benefits of mechanizing farm operations? (08 marks)** • Leads to increased agriculture output / yields • Encourage diversification • Land reclamation is possible • Machines work for long hours • Increases acreage / size of land under cultivation • Makes it possible for jobs which would be impossible to do by hand • Releases / saves human labour for other un mechanized farm operations / jobs e.g. picking coffee • Ensures timely farm operations • Encourages quality production e.g. products harvested mechanically are more uniform • Saves time / large land can be cleared within a short time • Reduce human drudgery / fatigue / toil o hand labour • Farmers benefit from economies of large scale production • Improves efficiency of doing work **(b) Explain the causes of low level of farm mechanization in Uganda. (12 marks)** • Most farmers have small plots which make it uneconomical to mechanize • High cost of machines / few farmers can afford • \lack of skilled machine operators • High cost of maintenance • Topography which is hilly / mountainous does not favour the use of machines • Hick vegetation / forested areas does not encourage the use of machines lack of service centers for machines • Lack of spare parts / unavailability of spare parts • Poor land tenure system / land fragmentation resulting into small plots of land does not favour use of machines • Availability of cheap human / hand labour • Some farm operation cannot be mechanized such as coffee picking

	• High charges for machines • Lack of sufficient machines / low levels of technology • Conservativeness of some farmers