

3.8 AGRICULTURE (443)

In the year 2012, K.C.S.E Agriculture Examination consisted of three papers; Paper 1, Paper 2 and Paper 3. The three papers tested the candidates' competence in understanding the agricultural principles, concepts and practices as stipulated in the syllabus. A wide range of knowledge and skills was tested in order to bring out the different abilities of the candidates. The format of the three papers is as follows:

- **Paper 1 (443/1):** This is a theory paper that covers General Agriculture, Crop Production, Agriculture Economics and Soil and Water Conservation. It has three sections, A, B and C, which are marked out of 30, 20 and 40 marks respectively.
- **Paper 2 (443/2):** It is also a theory paper but covers Livestock Production, Farm Power, Farm Machinery, Farm Structures and Farm Tools and Equipment. It has three sections, A, B and C, which are also marked out of 30, 20 and 40 marks respectively.
- **Paper 3 (443/3):** This is a project paper with two project questions, **Project A** and **B**. In 2012, Project A required candidates to **rear rabbits** while B was on production of **carrots or napier grass**. Candidates selected and carried out only one of the two projects. The paper is scored out of 100 marks.

3.8.1 CANDIDATES' OVERALL PERFORMANCE

The table below shows the general performance of candidates in the year 2012 KCSE Agriculture Examination. Performance in the previous five years has been included for comparison.

Table 15: Candidates overall performance in Agriculture for the last four years

YEAR	PAPER	CANDIDATURE	MAXIMUM MARK	MEAN SCORE	STANDARD DEVIATION
2012	1		90	38.87	15.15
	2		90	25.61	12.86
	Overall	178419	180	69.96	28.85
2011	1		90	26.33	13.73
	2		90	40.30	15.29
	Overall	167,709	180	74.33	29.62
2010	1		90	24.82	11.58
	2		90	36.07	15.07
	Overall	140,237	180	67.96	27.12
2009	1		90	33.54	15.10
	2		90	34.91	13.49
	Overall	137,217	180	77.67	29.12
2008	1		90	32.32	15.11
	2		90	25.59	11.64
	Overall	134,039	180	67.1	27.32
2007	1		90	26.94	12.04
	2		90	53.98	16.89
	Overall	121,193	180	87.34	28.00

The following observations can be made from the summary in the table:

- (i) Candidates' performance in Agriculture dropped. This is shown by the drop in the overall mean score from **74.33** in 2011 to **69.96** in 2012. **Paper 1 (443/1)** mean score improved from **26.33** in the year 2011 to **38.87** in the year 2012. The mean score for **Paper 2 (443/2)** dropped from **40.30** in the year 2011 to **25.61** in the year 2012.
- (ii) The overall standard deviation was **28.85**. The value of the standard deviation indicates that the two papers were able to adequately discriminate candidates of different abilities.
- (iii) The candidature increased from **167,709** in the year 2011 to **178,419** in 2012. A similar trend was also observed in the years **2011, 2010, 2009, 2008** and **2007**. This is a likely indication of increasing popularity of the subject in schools.

3.8.2 ANALYSIS OF POORLY PERFORMED QUESTIONS

The following is the analysis of the items that were poorly performed by candidates in the year 2012 KCSE Agriculture examination. This report highlights these questions and gives the expected responses. It also offers a general advice to teachers on the possible methodologies to emphasise during instruction.

3.8.3 Agriculture Paper 1 (443/1)

No difficult questions were reported in this paper.

3.8.4 Agriculture Paper 2 (443/2)

Questions 3

Name two nutritional diseases of cattle. (1 mark)

Weaknesses

- ☐ Most candidates were unable to name nutritional diseases.

Expected responses

- milk fever/*Parturient puresis*.
- bloat/*Ruminal tympany*
- Grass tetany/grass staggers

(2 x ½ = 1 marks)

Question 4

State two advantages of housing calves singly in cattle management. (1 mark)

Weaknesses

- ☐ Most candidates did not understand the importance of housing calves singly. This could be an indication that during instruction, teachers simply mention that calves should be housed singly without explaining the importance of doing it.

Expected responses

- control diseases.
- controls parasites.
- prevents formation of hair balls in the rumen.

(2 x ½ = 1 mark)

Question 6

Name three methods of harvesting fish in a pond.

(1½ marks)

Weaknesses

- ☐ Most candidates could not name the methods of harvesting fish. Some instead named the local tools used for fishing. This could be an indication that the content area may not have been adequately covered during instruction.

Expected responses

- use of seine nets
- use of scoop net
- draining the pond

(3 x ½ = 1½ marks)

Question 7

State five methods of dehorning in cattle management.

(2½ marks)

Weaknesses

- ☐ Most candidates were unable to state the methods of dehorning in cattle.

Expected responses

- Caustic potash stick/potassium hydroxide.
- Dehorning spoon.
- Elastrator and rubber ring.
- Dehorning iron
- Dehorning wire/saw
- Dehorning chemical collodion

(5 x ½ = 2½ marks)

Question 8

Give the appropriate term that refers to each of the following:

- | | | |
|-----|-----------------------|----------|
| (a) | castrated chicken | (½mark) |
| (b) | young one of a rabbit | (½ mark) |
| (c) | mature male goat. | (½ mark) |

Weaknesses

Most of the candidates were not able to give the correct identities of stages of livestock.

Expected responses

- (a) capon.
- (b) kindling.
- (c) Buck/billy.

(3 x ½ = 1½ marks)

Question 9

Give three ways in which farmers market beef cattle in Kenya.

(1½ marks)

Weaknesses

☐ Most candidates were not able to give the methods of marketing beef cattle in Kenya.

Expected responses

- Kenya Meat Commission.
- Livestock Marketing Division, Ministry of Livestock Development.
- Local slaughter houses/butcherries
- Licensed stock traders

(3 x ½ = 1½ marks)

Questions 11

Name two practices that are carried out when preparing ewes for mating.

(1 mark)

Weaknesses

Many candidates were unable to name the practices that prepare ewes for mating. Some may not have understood the meaning of ewes; a technical term used at this level.

Expected response

- Flushing.
- Crutching.
- Treatment against parasites/diseases

(2 x ½ = 1 marks)

Question 12

Give four reasons for identification in cattle management.

(2 marks)

Weaknesses

☐ Most candidates could not give the reasons for identification in cattle management.

Expected response

- Selection for breeding.
- Facilitates treatment of sick animals.
- Culling of poor animals.
- Identification for special feeding.
- For record keeping on an animal.
- Identification of lost/stolen animal.

(4 x ½ = 2 marks)

Question 13

State three advantages of fold system in poultry rearing.

(1½ marks)

Weaknesses

Many candidates did not know the advantages of the fold system of poultry rearing. May be an indication they may not have understood the fold system of poultry rearing.

Expected responses

- Uniformly spreads manure/dropping in the field.
- Requires less feeding.
- Reduces parasite/disease build up.
- Protects birds from predators.

(3 x ½ = 1½ marks)

Question 16

State three functions of a lubrication system on a tractor.

(1½ marks)

Weakness

Most candidates were unable to give the functions of a lubrication system on a tractor. This could be an indicator of inadequate coverage of farm machinery during instruction.

Expected responses

- Reduces friction between moving parts.
- Reduces heat produced by rubbing surfaces/cooling effect.
- Cleaning agent
- Prevents rusting.

(3 x ½ = 1½ marks)

Question 17

Distinguish between the following terms as used in livestock health:

- (a) isolation and quarantine;
- (b) curative drug and prophylactic drug.

(2 marks)

(2 marks)

Weaknesses

Most candidates were not able to distinguish the terminologies used in livestock health.

Expected responses

(a) Isolation and quarantine

Isolation is the separation of infected livestock from the rest of the herd to prevent spread of the disease.

Quarantine is preventing livestock from moving into or out of an area during an outbreak of a notifiable disease.

(2 marks)

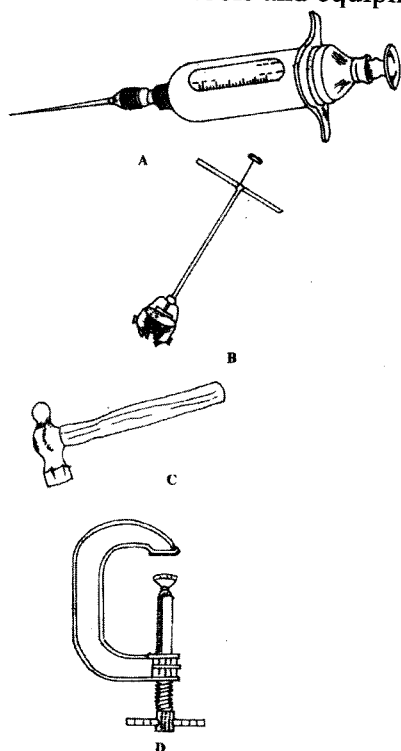
(b) Curative drug and prophylactic drug

- Curative drug is a drug administered when an animal is sick/already infected.
- Prophylactic drug is a routine drug administered to an animal to prevent infection.

(2 marks)

Question 18

Below are illustrations of farm tools and equipment.



- (a) Identify the tool/equipment labelled A and B.

A (1 mark)

B (1 mark)

- (b) State one appropriate use of the tool labelled C.

(1 mark)

- (c) Explain two maintenance practices for the tool labelled D.

(2 marks)

Weaknesses

The question was based on farm tools and equipment. The content area is covered in form one but most candidates were unable to identify, give the function and the maintenance practices of the tools presented.

Expected responses

- (a) A - Hypodermic syringe and needle
(Rej. Hypodermic syringe alone)
B - Soil auger (2 x 1 = 2 marks)
- (b) Straightening bent metal surfaces/riveting/striking head of cold chisel. (1 mark)
- (c) Cleaning after use to remove dirt.
Greasing/oiling to reduce friction.
Apply oil/painting to prevent rusting (2 x 1 = 2 marks)

Question 20 (b)

Explain three disadvantages of the identification method. (3 marks)

Weaknesses

Most candidates were unable to explain the disadvantages of branding. Some could only state the disadvantages. This could be an indication that instruction rarely goes beyond the statement of facts.

Expected responses

- (b) Reduces quality of hides/skins because the heat damages the skin/hide
Causes the animal a lot of pain because it uses heat
Causes wounds which can result in infections (3 x 1 = 3 marks)

Question 22 (a)

Describe the functions of the various types of pens in a piggery unit. (4 marks)

Weaknesses

The question was optional and it was rarely answered by candidates. This could be an indicator that pig rearing is not adequately covered during instruction.

Expected responses

- Farrowing pen for farrowing and rearing piglets.
- Boar's pen houses the boar and also used for mating.
- Weaners/Fatteners pen houses piglets from weaning to marketing stage
- Gilts pen houses young females upto service age/12 months.
- In-pig pen houses pregnant pigs before they are moved to the farrowing pen. (4 x 1 = 4 marks)

Question 23 (b)

Give the reasons why embryo transfer use should be encouraged in dairy cattle breeding. (8 marks)

Weaknesses

Many candidates could not give the reasons for embryo transfer. Embryo transfer is closely related to artificial insemination. Being a new technology in animal breeding, teachers may not be giving it adequate emphasis during instruction.

Expected responses

- The calf is born in the local surrounding to minimize effects of climatic changes.
- It is possible to screen and market sexed embryos to minimise the number of male calves.
- It controls sexually transmitted diseases
- Embryos can be stored for a long time awaiting for a recipient female.
- It allows faster multiplication of a superior animal/breed i.e a cow can produce 12 - 15 embryos per year.
- It stimulates production of milk in females that were not ready/able to produce milk.
- Can be used as a study / research tool on a given sire / dam because many offsprings can be produced within a short time for observation.
- It allows the embryo to obtain passive immunity from the surrogate mother.
- The use of embryo saves the cost of production on rearing bulls.
- Embryos are cheaper than animals of equal value.
- Embryo are easy and cheap to transport in test tubes compared to live animals.
- High yielding embryos can be implanted into less valuable females to improve production in the calves obtained.
- Easy to plan for breeding.
- Prevents injury of cows by heavy bulls.

(8 x 1 = 8 marks)

Question 24 (b)

Explain the importance of each of the functional differences between a disc plough and a mouldboard plough in land preparation.

(10 marks)

Weaknesses

The compound nature of the question may have disorganised the candidates. Some were simply stating the differences between disc and mouldboard ploughs. They were not able to isolate how the differences between the two ploughs are utilized in land preparation.

Expected responses

- (i) Disc plough rolls over obstacles hence good for areas with obstacles e.g. stones, roots, stumps, etc
- (ii) Disc plough works better in fields with trash on the surface due to rolling and cutting action of discs.
- (iii) Disc plough requires less draught power because of the rolling ability of the discs.
- (iv) Mould board plough is rigid hence ploughs at a uniform depth.
- (v) Mould board plough completely inverts the soil slices hence good for burying manure into the soil.
- (vi) Use of a mould board plough requires fewer secondary operations because it completely inverts soil slices.
- (vii) Disc plough can work on any soil condition this allows the farmer to work with it any time.

(5 x 2 = 10 marks)

3.8.5 Agriculture Paper 3 (443/3 – PROJECT)

The agriculture project paper is administered to provide an opportunity for the candidates to show and put into practice, the psychomotor skills acquired during the four years period in secondary school. Candidates are tested in practical skills in the growing of a selected crop from land preparation to harvesting, rearing selected livestock to maturity or constructing a farm structure such as beehive, feed trough, rabbit hutch, compost pit/heap, among others.

The instructions are taken to schools, which then provide the required inputs for candidates to carry out the project work independently. The project takes eight months, from February to September of the given year.

In the year 2012, candidates chose between rabbit rearing and production of carrots or napier grass. The agriculture teacher's duty was to objectively assess and evaluate each candidate's work at all the stages of project implementation. **The assessment by the teacher should be on the basis of the class such that there is an even distribution of scores from the lowest, average and finally the highest performers. Inflating project scores disadvantages the candidates when standardisation is done.**

3.8.6 GENERAL ADVICE TO TEACHERS

- (i) The whole syllabus should be effectively covered during instruction because examination items will be sampled from the entire syllabus. A topic should not be ignored because it was recently or is never tested. All the topics are tested.
- (ii) The teacher/school should acquire the relevant reference materials and assist candidates to obtain and use the recommended textbooks. The approved books are found in the orange book published by the Kenya Institute of Curriculum Development.
- (iii) The use of textbooks by teachers should always be guided by the syllabus. The specific objectives stipulated in the syllabus should be correctly interpreted to ensure the topics in question are taught adequately and effectively.
- (iv) A variety of teaching methods and resources should be utilised by teachers to ensure that the content is effectively delivered during instruction. Resource persons/guest speakers and field visits should be arranged and used in areas where the teacher and the school lack the resources to teach the topic/lesson effectively. Agriculture is a science and should be treated accordingly during instruction. The teaching and learning process should go beyond the mere statement of facts. The candidates should be able to explain and apply the knowledge acquired during instruction. Many candidates had problems in answering questions of high cognitive demand.
- (v) All the suggested practical activities in the syllabus should be carried out to prepare candidates adequately for questions that require application of psychomotor skills acquired during instruction.

4.7 AGRICULTURE (443)

4.7.1 Agriculture Paper 1 (443/1)



MANYAM FRANCHISE
Discover! Learn! Apply

SECTION A (30 marks)

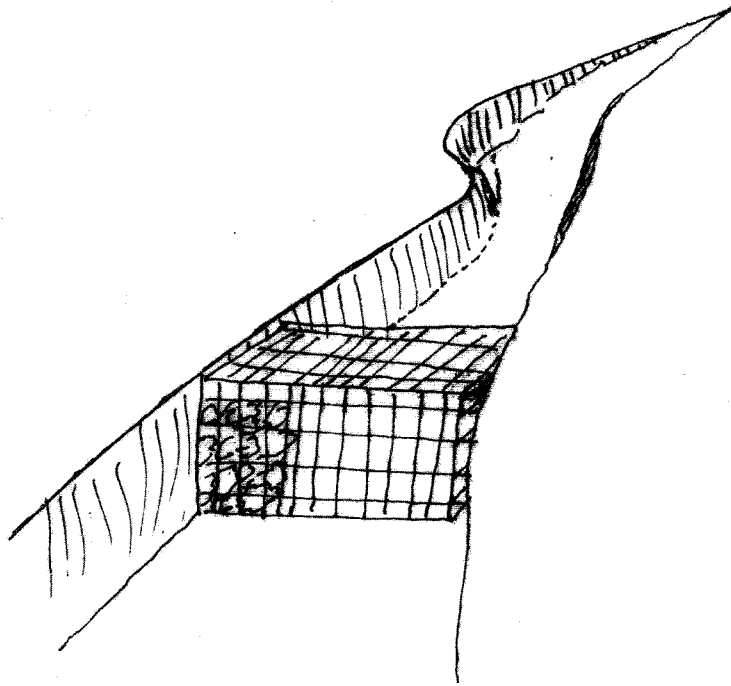
Answer ALL the questions in this section in the spaces provided.

- 1 Name the part harvested for each of the following crops:
 - (a) onions(½ mark)
 - (b) carrots.....(½ mark)
 - (c) coffee(½ mark)
- 2 State **four** biotic factors that influence crop production. (2 marks)
- 3 Name **four** methods of controlling crop pests. (2 marks)
- 4 State **four** ways of harvesting water on the farm. (2 marks)
- 5 Name **four** farm records that should be kept by a poultry farmer. (2 marks)
- 6 State **four** disadvantages of using organic manure in crop production. (2 marks)
- 7 Give **two** ways in which pastures are classified. (1 mark)
- 8 State **four** disadvantages of organic mulches. (2 marks)
- 9 Give **five** advantages of practising crop rotation. (2½ marks)
- 10 State **two** advantages of earthing up in crop production. (1 mark)
- 11 Give **four** harmful effects of weeds on crop production. (2 marks)
- 12 State **three** advantages of shifting cultivation. (1½ marks)
- 13 Give **five** advantages of zero grazing in dairy farming. (2½ marks)
- 14 State **four** factors that determine the stage at which a crop is harvested. (2 marks)
- 15 State **four** ways in which land reform can be implemented in Kenya. (2 marks)
- 16 Give **four** factors that influence the number of secondary cultivations in seedbed preparation. (2 marks)

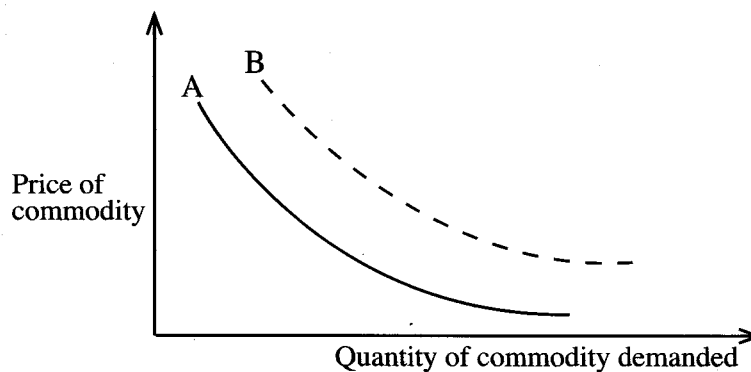
SECTION B (20 marks)

Answer **ALL** the questions in this section in the spaces provided.

- 17 The illustration below shows a structure used for controlling soil erosion. Study it carefully and answer the questions that follow.



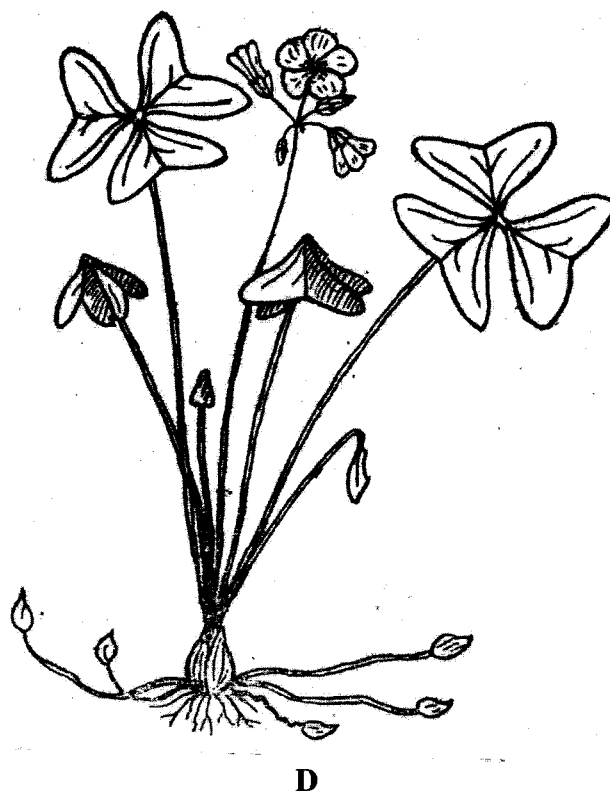
- (a) Identify the structure. (1 mark)
- (b) Explain **two** ways in which the structure helps to control soil erosion. (2 marks)
- 18 The diagram below illustrates the law of demand in agricultural marketing. Study it and answer the questions that follow.



- (a) Give a reason for the shape of the curve labelled A. (1 mark)
- (b) If the price of the commodity remains constant, explain **three** factors that can cause the curve to shift from A to B. (3 marks)

19

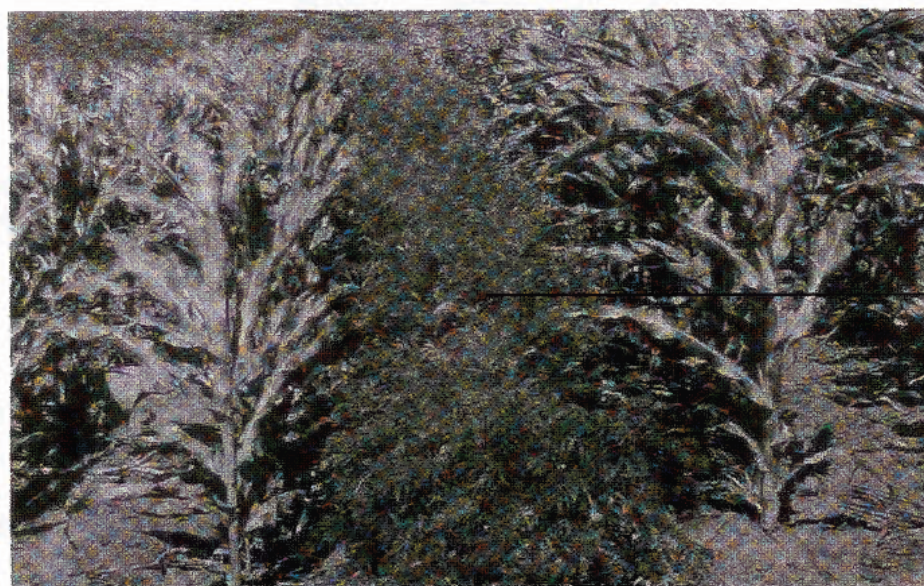
The diagrams below illustrate common weeds in arable land. Study them carefully and answer the questions that follow.



- (a) Identify the weed labelled D. (1 mark)
- (b) Classify the weed labelled C according to plant morphology. (1 mark)
- (c) Give **one** reason why it is difficult to control the weed labelled D. (1 mark)

20

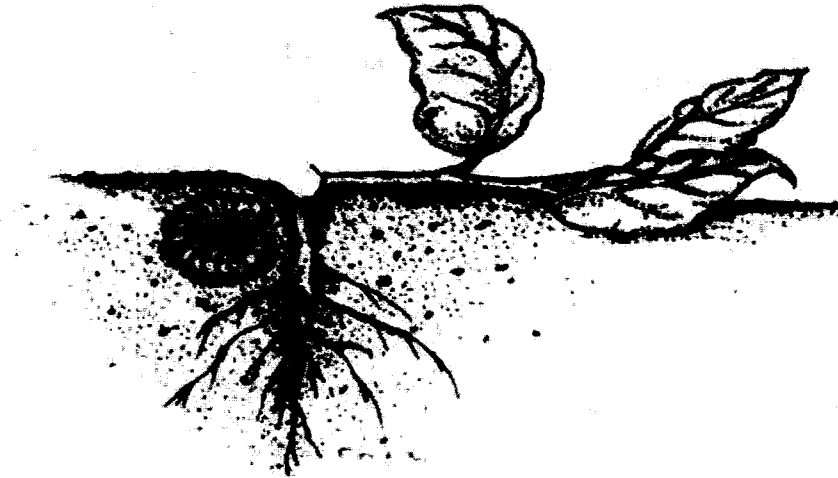
The diagram below illustrates an agroforestry practice. Study it and answer the questions that follow.



Calliandra

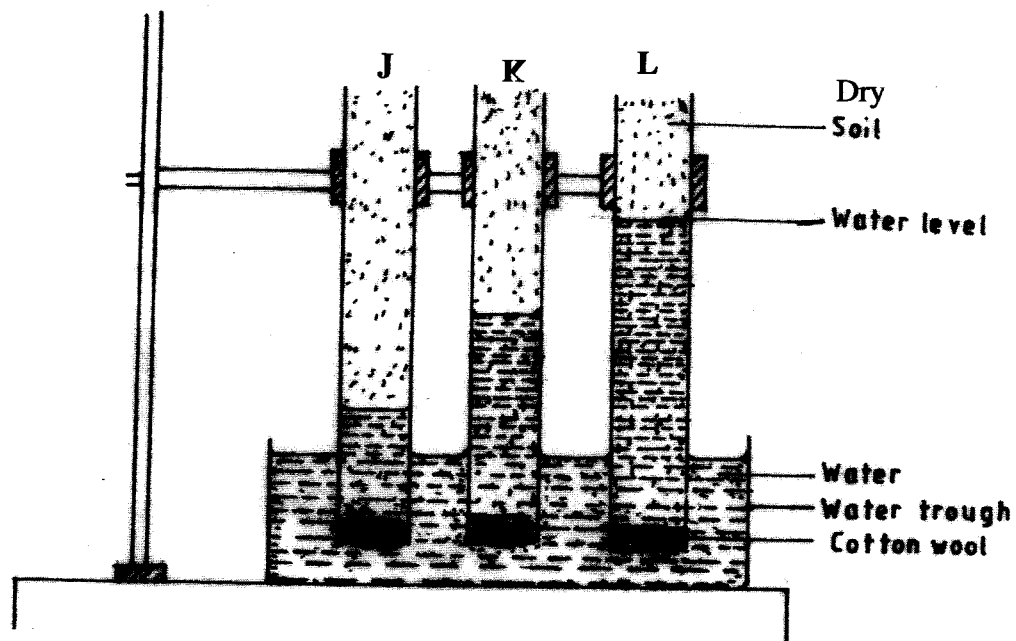
- (a) Identify the agroforestry practice illustrated above. (1 mark)
- (b) Explain **three** benefits of the practice illustrated above. (3 marks)

21 The diagram below shows a pest and the damaged crop. Study it and answer the questions that follow.



- (a) Identify the crop pest illustrated above. (1 mark)
- (b) Explain **two** ways of controlling the pest. (2 marks)

22 The diagram below illustrates an investigation on a property of soil using soil samples labelled J, K and L.



- (a) If the levels of water shown in the diagram were observed after three hours, name the property of soil being investigated. (1 mark)
- (b) What is the relationship between the soil property named in (a) above and the size of soil particles? (1 mark)
- (c) Which soil sample would be suitable for growing paddy rice? (1 mark)

SECTION C (40 marks)

Answer any TWO questions from this section in the spaces provided after question 25.

- 23** (a) Explain **five** factors that should be considered in farm planning. (10 marks)
- (b) Describe the transplanting of tomato seedlings. (10 marks)
- 24** (a) Explain **five** factors that should be considered when siting a vegetable nursery. (5 marks)
- (b) Explain **six** factors that should be considered when selecting seeds for planting. (6 marks)
- (c) Explain the different ways in which each of the following environmental factors influence crop production:
- (i) temperature; (4 marks)
- (ii) wind. (5 marks)
- 25** (a) Outline the information contained in a Purchase Order. (5 marks)
- (b) Describe the harvesting of tea. (6 marks)
- (c) Explain the importance of irrigation in crop production. (5 marks)
- (d) Describe the role of magnesium in crop production. (4 marks)

4.7.2 Agriculture Paper 2 (443/2)

SECTION A (30 marks)

Answer all the questions in this section in the spaces provided.

- 1 Apart from hides and skins, name the raw material obtained from each of the following livestock for the textile industry:
 - (a) goat(½ mark)
 - (b) sheep (½ mark)
 - (c) rabbit (½ mark)
- 2 Give three reasons for candling eggs in poultry production. (1½ marks)
- 3 Name two nutritional diseases of cattle. (1 mark)
- 4 State two advantages of housing calves singly in cattle management. (1 mark)
- 5 Give four features of housing that help to control livestock diseases. (2 marks)
- 6 Name three methods of harvesting fish in a pond. (1½ marks)
- 7 State five methods of dehorning in cattle management. (2½ marks)
- 8 Give the appropriate term that refers to each of the following:
 - (a) castrated chicken (½mark)
 - (b) young one of a rabbit (½ mark)
 - (c) mature male goat. (½ mark)
- 9 Give three ways in which farmers market beef cattle in Kenya. (1½ marks)
- 10 State four causes of egg eating in a flock of layers. (2 marks)
- 11 Name two practices that are carried out when preparing ewes for mating. (1 mark)
- 12 Give four reasons for identification in cattle management. (2 marks)
- 13 State three advantages of fold system in poultry rearing. (1½ marks)
- 14 State four practices that immediately come after complete milking in a milking shade. (2 marks)

15 The following is a list of livestock diseases.

- brucellosis
- trypanosomiasis
- newcastle
- anthrax
- african swine fever
- black quarter.

Which two diseases are

(a) both bacterial and zoonotic? (1 mark)

(b) caused by virus? (1 mark)

16 State three functions of a lubrication system on a tractor. (1½ marks)

17 Distinguish between the following terms as used in livestock health:

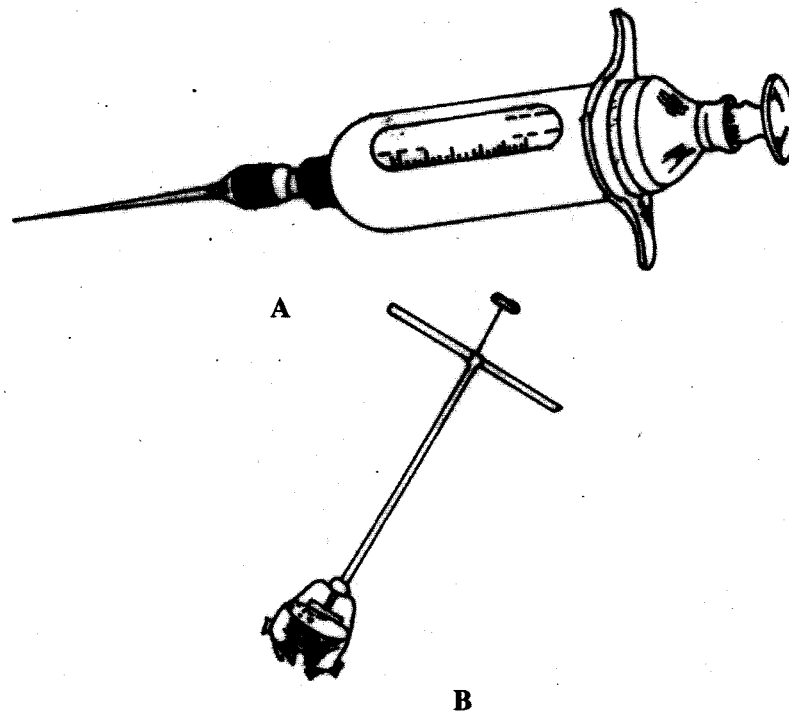
(a) isolation and quarantine; (2 marks)

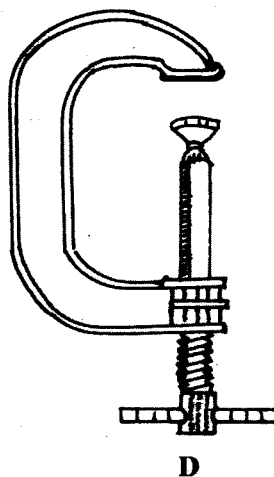
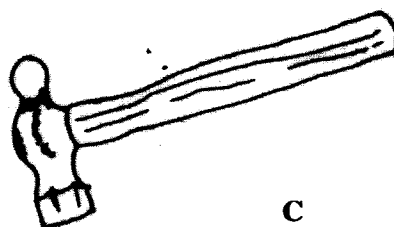
(b) curative drug and prophylactic drug. (2 marks)

SECTION B (20 marks)

Answer ALL the questions in this section in the spaces provided.

18 Below are illustrations of farm tools and equipment.





- (a) Identify the tool/equipment labelled A and B. (1 mark)
 A (1 mark)
 B (1 mark)
- (b) State one appropriate use of the tool labelled C: (1 mark)
- (c) Explain two maintenance practices for the tool labelled D. (2 marks)

19 The diagram below illustrates a livestock parasite.



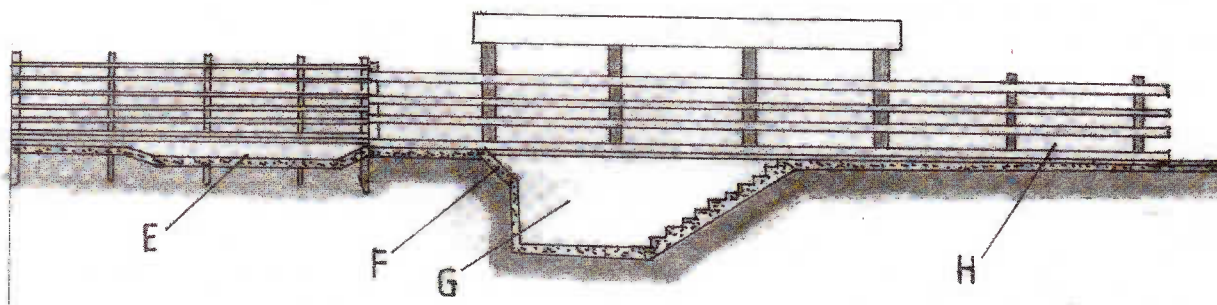
- (a) Identify the parasite illustrated above. (1 mark)
- (b) State the major harmful effect of the parasite. (1 mark)
- (c) Explain four control measures for the parasite. (4 marks)

- 20 The photograph below illustrates a method of identification labelled X in cattle.



- (a) Name the identification method. (1 mark)
- (b) Explain three disadvantages of the identification method. (3 marks)

- 21 The illustration below shows a cross section of a cattle dip.



- (a) Name the parts labelled E and G.

E(1 mark)

G(1 mark)

- (b) State one use for each of the parts labelled E, F, and H. (3 marks)

E

F

H

SECTION C (40 marks)

Answer any **TWO** questions from this section in the spaces provided after question 24.

- 22 (a) Describe the functions of the various types of pens in a piggery unit. (4 marks)
- (b) Describe the control measures for tapeworms(*Taenia* spp) in livestock. (6 marks)
- (c) Giving a relevant example in each case, describe the role of the various components of a balanced diet in livestock nutrition. (10 marks)
- 23 (a) Describe the management of one day old chicks in a brooder until they are eight weeks old. (12 marks)
- (b) Give the reasons why embryo transfer use should be encouraged in dairy cattle breeding. (8 marks)
- 24 (a) Describe foot rot disease under the following sub-headings:
- (i) causal organism; (1 mark)
- (ii) signs of infection; (5 marks)
- (ii) control measures. (4 marks)
- (b) Explain the importance of each of the functional differences between a disc plough and a mouldboard plough in land preparation. (10 marks)

5.7 AGRICULTURE (443)

5.7.1 Agriculture Paper 1 (443/1)

SECTION A (30 marks)



1. (a) - bulbs/leaves
(b) - roots
(c) - berry/berries/cherries/fruits

(3 × ½ = 1½ marks)

2. Biotic factors.
- Pests .
 - Decomposers.
 - Pathogens
 - Nitrogen fixing bacteria.
 - Pollinators
 - Weeds
 - Predators

(4 × ½ = 2 marks)

3. Methods for controlling Crop Pests.
- Chemical
 - Biological
 - Cultural
 - Physical/mechanical
 - Legislation.

(4 × ½ = 2 marks)

4. Methods of harvesting water.
- (a) roof catchment.
 - (b) rock catchment
 - (c) Weir/Dam
 - (d) Retention ditches/level terraces
 - (e) micro-catchment.
 - (f) water pans/ponds

(4 × ½ = 2 marks)

5. Records kept by poultry farmer.
- Egg production/ weight gain
 - Labour records
 - Feeding records
 - Health records
 - Marketing records
 - Inventory records

(4 × ½ = 2 marks)

6. Disadvantages of using organic manures.
- Low nutritive value per unit volume/weight.
 - Likelihood of spread of disease/pests/weeds.
 - Bulky/difficult to store/transport/apply.
 - Looses nutrients if poorly stored.
 - Difficult to quantify the amount of nutrient per unit volume/weight.

(4 × ½ = 2 marks)

7. Classification of pastures.
- Pasture stand: Pure/mixed.
 - Pasture establishment/natural/artificial.
 - Ecological zone/altitude.
- (2 x $\frac{1}{2}$ = 1 mark)
8. Disadvantages of organic mulch.
- Expensive to transport and apply/bulky.
 - Could be a fire risk.
 - Provides breeding ground/hiding place for pests.
 - Intercepts light showers of rainfall.
 - Can spread pests, weeds/diseases.
- (4 x $\frac{1}{2}$ = 2 marks)
9. Advantages of crop rotation
- Ensures maximum utilization of nutrients.
 - Controls build-up of pests/diseases/weeds
 - Controls weeds that are specific to particular crops.
 - Improves soil fertility when leguminous crops are included.
 - Controls soil erosion when cover crops are included.
 - Improves soil structure if grass lay included.
- (5 x $\frac{1}{2}$ = 2 $\frac{1}{2}$ mark)
10. Earthing up
- improves tuber formation/expansion/roots/pods formation
 - Improves drainage around the crop
 - Conserves water/soil
 - Facilitates harvesting of tuber crops
 - Root protection
- (2 x $\frac{1}{2}$ = 1 marks)
11. Harmful effects
- Lower crop yields.
 - Lower quality of crop products
 - Some harbour crop pests/diseases
 - Some reduce labour efficiency
 - Increase the cost of production.
 - Suppress growth of crops through competition for light, space, etc.
 - Some have allelopathic effects on crops
 - Some are parasitic to crops
 - Some weeds block irrigation canals/channels
- (4 x $\frac{1}{2}$ = 2 marks)
12. Advantages of shifting cultivation.
- No pest and disease build-up.
 - Low capital requirement.
 - No land disputes as land ownership is not individualised.
 - Soil structure is maintained
 - Gives time of land to regain fertility
- (3 x $\frac{1}{2}$ = 1 $\frac{1}{2}$ marks)
13. Advantages of Zero-grazing
- Quick accumulation of manure.
 - Animal produce high yield due to less wastage of energy.
 - Its easy to control diseases/parasites.

- Requires little land.
- Allows higher stocking rate.
- Animal use feeds without wastage.

(5 x $\frac{1}{2}$ = 2 $\frac{1}{2}$ marks)

14. Harvest time.

- Market price.
- Weather conditions.
- Market demand.
- Purpose/intended use.
- Concentration of required chemicals.
- Taste and preference/form required

(4 x $\frac{1}{2}$ = 2 marks)

15. Land Reforms.

- Land consolidation.
- Land adjudication and registration/issue of title deeds.
- Land settlement and resettlement.
- Tenancy reform.
- Redistribution of land.
- Improved land legislation.
- Sub-division of land

(4 x $\frac{1}{2}$ = 2 marks)

16. Number of Secondary cultivations

- Type of crop to be established/ size of seed.
- Moisture content of soil
- Type of soil
- Conditions of land after primary cultivation.
- Amount of organic matter on the surface.
- Vulnerability to soil erosion

(4 x $\frac{1}{2}$ = 2 marks)

SECTION B (20 marks)

17. (a) Gabion/porous dam

(1 mark)

- (b)
- Slows down the speed of water thus reducing its erosive power.
 - It traps the detached soil particles.

(2 x 1 = 2 marks)

18. (a) As the price of the commodity increases the quantity demanded decreases and vice versa.

(1 x 1 = 1 mark)

- (b)
- If there is an increase in the income of consumers.
 - Effective advertisement/sales promotion.
 - Increase in the price of a related/substitute.
 - If there is an increase in population.
 - Change in taste and preference.
 - If the quality of the commodity goes up.

(3 x 1 = 3 marks)

19. (a) Oxalis/oxalis latifolia. (1 mark)
 (b) Broad-leaved weed. (1 mark)
 (c) Presence of underground bulbs. (1 mark)
20. (a) Alley cropping/hedge row. (1 mark)
 (b) • Source of fodder when tree foliage is cut and fed to livestock.
 • Improves soil fertility through nitrogen fixation/nutrients cycling.
 • Facilitates soil and water conservation when roots bind soil particles.
 • Smothers weeds
 • Source of mulching material/wood fuel/compost manure
 (3 x 1 = 3 marks)
21. (a) Cutworm. (1 mark)
 (b) • Early planting for crop to establish early and outgrow the pest.
 • Application of appropriate pesticide to kill it.
 • Field hygiene to prevent transmission from previous crop residues.
 • Physical killing and destruction (2 marks)
22. (a) Soil capillarity (1 mark)
 (b) The smaller the size of the particles the greater the force of capillary. (1 x 1 = 1 mark)
 (c) Soil labelled L. (1 x 1 = 1 mark)

SECTION C (40 marks)

23. (a) Five factors to consider in farm planning.
- Environmental factors/climate/soil type; because these will determine the specific enterprises that are possible in an area.
 - Size of the farm; as this will determine the size/number of enterprises that are possible.
 - Farmer's objectives and preferences; so that the farmer will have a sense of ownership of the farm plan for motivation.
 - Government regulations or policy; to ensure that laws are not flouted.
 - Availability and cost of farm input/cost of labour/cost of production/capital availability; to select an enterprise that is affordable.
 - Security of enterprise so as to ensure safety.
 - Trends in the labour market; to ensure labour availability throughout.
 - Existing market conditions and price trends; so that whatever is produced is sold at appropriate prices.
 - Communication and transport; to ensure that produce reach markets and inputs are easily accessed.
 - Possible production enterprises; so as to choose the most profitable and convenient.
- (5 x 2 = 10 marks)
 (Factor 1 mark, Explanation 1 mark)

(b) Transplanting of tomato seedlings.

- Should be done when seedling are pencil size thick/ one month to one and half month old.
- Nursery should be watered before to ease lifting of seedlings.
- Use garden trowel/ensure that seedlings are lifted with lump of soil around roots.
- Apply appropriate pesticide in the planting holes to control pests and diseases.
- Apply phosphatic fertilizers/manures in the planting holes.
- Mix pesticides/manure/fertilizer with soil thoroughly
- Lift only healthy and vigorous seedlings from the nursery.
- Plant one seedling per hole at the same depth as was in the nursery.
- Transplanting is preferably done in the evening or on a cloudy day.
- Mulch the transplanted seedlings if necessary.
- Provide temporary shade to the transplanted seedlings.
- Water the seedlings as necessary.
- Place soil around the seedlings and firm
- Holes are dug at a spacing of 60 - 100 cm × 50 - 60 cm.
- Transplant at the onset of the rains/when soil has enough moisture.
- Transport seedlings carefully/use a wheelbarrow.
- Planting holes are dug at a depth of 15 cm.

(10 x 1 = 10 marks)

(Maximum 10 marks)

24. (a) **Siting a vegetable nursery.**

- Near a water source for easy watering.
- In a well sheltered place to prevent strong winds which can uproot seedlings and cause excessive evaporation.
- Security so as to protect from theft and destruction by animals/birds.
- On a gentle slope to prevent erosion through run-off and to prevent flooding.
- Type of soil, should be well drained and fertile.
- Previous cropping, avoid an area where same crop family had been planted to avoid pest and diseases attack/build up.
- Near the seedbed/main field to minimise damage to seedlings during transplanting.
- Accessibility for easy movement.
- Away from shading effect to allow proper access to light.

(5 x 1 = 5 marks)

(b) **Selecting seeds for planting.**

- Adaptability: should be adapted to local ecological condition.
- Physical deformities/damages: should be free from physical deformities/damages.
- Health - should be free from pests/disease.
- Viability/germination percentage: - should have high viability/germination percentage.
- Parent plant - should be from high yielding/healthy parents/high quality/early maturing/disease resistant.
- Purity - should be clean / free from impurities.
- Maturity - should be of correct maturity stage.
- Age/storage period: - seeds stored for long periods have low viability/germination percentage hence should not be selected.
- Size of the seed, should be of correct size.

(6 x 1 = 6 marks)

(c) **Environmental factors.**

(i) **Temperature**

- Affect quality of certain crops e.g. pineapples, pyrethrum.
- Influence rate of the physiological processes in a crop.
- Cause increase in incidences of diseases.
- Low temperatures cause frost injury.
- High temperature increase rate of evapotranspiration hence wilting.
- Influences distribution of crops.

(4 x 1 = 4 marks)

(ii) **Wind**

- Strong winds increase the rate of evaporation/evapotranspiration/wilting.
- Influences amount of rainfall in a given area.
- Help in pollination of crops.
- Strong winds have a cooling effect which influences rate of physiological processes.
- Strong winds may cause soil erosion.
- Strong winds may cause lodging of certain crops/destruction of crops/crop structures.
- Winds can spread diseases/pests/weeds.
- Wind helps in seed dispersal.
- Wind is used in cleaning/winnowing grains.

(5 x 1 = 5 marks)

25. (a) **Purchase Order.**

- Quantities of the goods.
- Type of goods required.
- Date of order
- Date within which the ordered goods should be delivered.
- Person who orders the goods.
- Person who authorized the order.
- Purchase order serial number.
- Total amount involved/total cost involved/total cash.
- Name of supplier.
- Cost of goods per item.

(5 x 1 = 5 marks)

(b) **Harvesting of tea.**

- Leaves are picked selectively for the highest quality.
- Pluck top two leaves and the bud.
- Use a plucking stick to maintain the plucking table.
- Pluck at 5 - 7 days intervals in rains and 10 - 14 days in dry periods.
- Put plucked tea in woven baskets to facilitate air circulation/ prevent fermentation.
- Do not compress the leaves in the baskets to prevent heating up/ browning.
- Put plucked tea in cool and shaded place.
- Deliver to the factory on the same day.

(6 x 1 = 6 marks)

(c) **Importance of Irrigation.**

- Irrigation increases crop yields and ensures a steady supply of food throughout the year.
- Maximises the utilization of resources e.g. in places where the soil is fertile but the water/rain is inadequate.
- Important for the reclamation of arid and semi-arid land.
- Provides a regular, reliable and adequate supply of water in areas with little or no rainfall.
- source of employment in areas where it is used extensively.
- Promotes crop production for the export market and therefore contributes to a country's revenue.
- Allows production of paddy rice.
- Allows growing of crops in green houses.
- Facilitates fertigation in crop production.
- Controls pests.

(5 x 1 = 5 marks)

(d) **Role of magnesium**

- Important in chlorophyll formation.
- Promotes the formation of fats and oils in crops e.g. soya beans, sunflower, ground nuts.
- Aids in the absorption and translocation of phosphorous.
- Enhances the nitrogen fixing power of the legumes.
- Activates the synthesis and translocation of carbohydrates and proteins in plants.
- Activates enzymes.

(4 x 1 = 4 marks)

5.7.2 Agriculture Paper 2 (443/2)

SECTION A (30 marks)

1 Raw materials:

- (a) mohair.
- (b) wool.
- (c) fur.

(3 x ½ = 1½ marks)

2. Reasons for egg candling

- Determine freshness.
- Detect any abnormalities.
- Determine fertilised eggs.
- Determination of chick development

(3 x ½ = 1½ marks)

3. Nutritional diseases

- milk fever/parturient puresis.
- bloat/Ruminal tympany
- Grass tetany/grass staggers

(2 x ½ = 1 marks)

4. Advantages of housing calves singly

- control diseases.
- controls parasites.
- prevents formation of hair balls in the rumen.

(2 x ½ = 1 mark)

5. Features of housing

- well ventilated
- well lit.
- easy to clean.
- free from droughts
- spacious
- leakproof
- proper drainage

(4 x ½ = 2 marks)

6. Fish harvesting methods.

- use of seine nets
- use of scoop net
- draining the pond

(3 x ½ = 1½ marks)

7. Dehorning methods

- Caustic potash stick/potassium hydroxide.
- Dehorning spoon.
- Elastrator and rubber ring.
- Dehorning iron
- Dehorning wire/saw
- Dehorning chemical colloidion

(5 x ½ = 2½ marks)

- 8.** (a) capon.
(b) kindling.
(c) Buck/billy.

(3 x ½ = 1½ marks)

9. Beef cattle marketing

- Kenya Meat Commission.
- Livestock Marketing Division, Ministry of Livestock Development.
- Local slaughter houses/butcherries
- Licensed stock traders

(3 x ½ = 1½ marks)

10. Causes of egg eating

- Presence of broken/soft shelled eggs.
- Inadequate laying nests forcing birds to lay on the floor.
- Bright light in the laying nests.
- Idleness of birds in the house
- Mineral deficiency in feeds
- Prolonged presence of eggs in laying nests.

(4 x ½ = 2 marks)

11. Preparation of ewe for mating

- Flushing.
- Crutching.
- Treatment against parasites/diseases

(2 x ½ = 1 marks)

12. Reasons for identification

- Selection for breeding.
- Facilitates treatment of sick animals.
- Culling of poor animals.
- Identification for special feeding.
- For record keeping on an animal.
- Identification of lost/stolen animal.

(4 x ½ = 2 marks)

13. Advantages of fold system in poultry

- Uniformly spreads manure/dropping in the field.
- Requires less feeding.
- Reduces parasite/disease build up.
- Protects birds from predators.

(3 x ½ = 1½ marks)

14. Practices after complete milking

- Teat dipping to control mastitis.
- Weigh and record milk yield.
- Sieve/strain/filter milk.
- Application of milking jelly on teats.
- Store milk in a cool place.
- Clean the milk shed
- Clean the milking equipment
- Release the animal

(4 x ½ = 2 marks)

15. (a) Both bacterial and zoonotic diseases

- Brucellosis.
- Anthrax.

(2 x ½ = 1 marks)

(b) Viral diseases

- Newcastle
- African swine fever

(2 x ½ = 1 marks)

16. Functions of lubrication system in a tractor

- Reduces friction between moving parts.
- Reduces heat produced by rubbing surfaces/cooling effect.
- Cleaning agent
- Prevents rusting.

(3 x ½ = 1½ marks)

17. (a) Isolation and quarantine

Isolation is the separation of infected livestock from the rest of the herd to prevent spread of the disease.

Quarantine is preventing livestock from moving into or out of an area during an outbreak of a notifiable disease.

(mark as a whole 2 marks)

(b) Curative drug and prophylactic drug

- Curative drug is a drug administered when an animal is sick/already infected.
- Prophylactic drug is a routine drug administered to an animal to prevent infection.

(mark as a whole 2 marks)

SECTION B (20 marks)

- 18. (a) A - Hypodermic syringe and needle**
(Rej. Hypodermic syringe alone)
- B - Soil auger**
(2 x 1 = 2 marks)
- (b) Straightening bent metal surfaces/riveting/striking head of cold chisel. (1 mark)
- (c) Cleaning after use to remove dirt.
Greasing/oiling to reduce friction.
Apply oil/painting to prevent rusting
(2 x 1 = 2 marks)
- 19. (a) Tsetse fly/*Glossina species*** (1 mark)
- (b) Transmits *Trypanosomiasis*/nagana causing agents (1 mark)
- (c) - Bush clearing to destroy breeding sites
- Spraying with insecticides to kill them
- Trapping and killing
- Sterilization of male flies to impair breeding
- Creating a buffer zone between game reserves and livestock areas to isolate them.
- Use of impregnated nets to trap them.
(4 x 1 = 4 marks)
- 20. (a) Branding** (1 mark)
- (b) Reduces quality of hides/skins because the heat damages the skin/hide
Causes the animal a lot of pain because it uses heat
Causes wounds which can result in infections
(3 x 1 = 3 marks)
- 21. (a) E - Footbath**
- G - Dip tank**
(2 x 1 = 2 marks)
- (b) **E - Cleans hooves/controls footrot**
- F - Forces the animal to slide and plunge into the dip wash**
- H - Allows the dip wash to drip from the animal and flow back to the dip tank.**
(3 x 1 = 3 marks)

SECTION C (40 marks)

22. (a) - Farrowing pen for farrowing and rearing piglets.
- Boar's pen houses the boar and also used for mating.
- Weaners/Fatteners pen houses piglets from weaning to marketing stage
- Gilts pen houses young females upto service age/12 months.
- In-pig pen houses pregnant pigs before they are moved to the farrowing pen.
(4 x 1 = 4 marks)

(b) **Measures for Tapeworms (*Taenia spp*)**

- Use of prophylactic drugs /antihelminthics to deworm
- Rotational grazing/paddock to starve development stages.
- Burning of infested pastures to destroy developmental stages
- Ploughing infested pastures to destroy developmental stages
- Observe proper hygiene in livestock houses to prevent contamination
- Proper disposal of human excreta to control developmental stages/prevent contamination
- Proper meat inspection to isolate infected meat.
- Proper cooking of meat to kill the cysts.

(6 marks)

- (c) (i) Carbohydrates - main sources of energy. They are respired to release energy e.g. cereals root crops, tubers, molasses, grass pastures,
(ii) Fat and oils - respired to produce energy e.g. oil seeds, animal by-products, pastures/foilage.
(iii) Proteins - growth, repair, production of antibodies, enzymes, hormones and products e.g. seed cakes, leguminous foliage, animal by-products, young green grass.
(iv) Vitamins - protection against infection, promote growth, bone formation, muscular activity, organic catalysts e.g green feeds, sunlight, milk, whole grains.
(v) Minerals - strong bone formation, milk synthesis, formation of hard shelled eggs, prevent mineral deficiency diseases, promote growth e.g. Cereal grains, green vegetables, fish meal, liver meal, salt licks, meat meal.
(vi) Water - transport of food substances, cooling body, easy digestion, excretion.
(Component + role /example - 2 marks x 5 = 10 marks)

23. (a) **Rearing of chicks**

- On arrival supply water mixed with glucose.
- Feed chicks on fresh chick mash.
- Clean feeders before feeding/provide adequate clean water.
- Clean waterers before feeding.
- Provide adequate feeders and waterers as per the age.
- Vaccinate chicks against gumboro disease after two weeks.
- Dust the chicks and the brooder with appropriate chemicals to control external parasites.
- Check and adjust the brooder temperature accordingly.
- Provide coccidiostat in water/feed to control coccidiosis.
- Vaccinate chicks against new castle at 3 - 4 weeks - fowl typhoid at

- seven weeks age.
- Dim lighting to prevent toe pecking.
- Introduce roosts, grit to chicks from 6th week.
- Gradually introduce grower's mash to the chicks from the 7th week.
- Isolate and treat sick chicks.
- Properly dispose dead chicks.
- Keep proper records.
- Deworm the chicks.
- Debeaking
- Provide adequate feeds.

(12 x 1 = 12 marks)

(b) Reasons for embryo transfer

- The calf is born in the local surrounding to minimize effects of climatic changes.
- It is possible to screen and market sexed embryos to minimise the number of male calves.
- It controls sexually transmitted diseases
- Embryos can be stored for a long time awaiting for a recipient female.
- It allows faster multiplication of a superior animal/breed i.e a cow can produce 12 - 15 embryos per year.
- It stimulates production of milk in females that were not ready/able to produce milk.
- Can be used as a study / research tool on a given sire / dam because many offsprings can be produced within a short time for observation.
- It allows the embryo to obtain passive immunity from the surrogate mother.
- The use of embryo saves the cost of production on rearing bulls.
- Embryos are cheaper than animals of equal value.
- Embryo are easy and cheap to transport in test tubes compared to live animals.
- High yielding embryos can be implanted into less valuable females to improve production in the calves obtained.
- Easy to plan for breeding.
- Prevents injury of cows by heavy bulls.

(8 x 1 = 8 marks)

24. (a) Foot rot disease

(i) Causal organism.

- Bacteria/*Fusiformis necrophorus*/*Fusiformis nodosus*/*Fusiformis* family bacteria.

(1 x 1 = 1 mark)

(ii) Signs of infection

- Swollen feet.
- Lameness/pain as the animal walks.
- Pus/rotten smell in the hooves.
- Animal kneels when grazing when fore feet are affected.
- Animal lies down most of the time when hind feet are affected.
- Emaciation because the animal does not eat.

(5 x 1 = 5 marks)

(iii) **Control measures**

- Regular hoof examination and trimming.
- Regular walk through a footbath containing copper sulphate or formalin solution.
- Proper hygiene.
- Isolation of infected animals.
- Treatment of wounds on the feet to prevent predisposal to infection.
- Treatment of infected animals.
- Moving the healthy sheep to dry areas.

(4 x 1 = 4 marks)

(b) **Functional differences between a disc plough and a mouldboard plough**

- (i) Disc plough rolls over obstacles hence good for areas with obstacles e.g. stones, roots, stumps, etc
- (ii) Disc plough works better in fields with trash on the surface due to rolling and cutting action of discs.
- (iii) Disc plough requires less draught power because of the rolling ability of the discs.
- (iv) Mould board plough is rigid hence ploughs at a uniform depth.
- (v) Mould board plough completely inverts the soil slices hence good for burying manure into the soil.
- (vi) Use of a mould board plough requires fewer secondary operations because it completely inverts soil slices.
- (vii) Disc plough can work on any soil condition this allows the farmer to work with it any time.

(5 x 2 = 10 marks)
(Maximum 10 marks)