16.0 AGRICULTURE (443)

The year 2009 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 2009, Project A required candidates to **rear rabbits** while B was on production of either **Nappier Grass/Bano Grass** or **cabbages/kales**. Candidates selected and carried out only one of the two projects. The paper is scored out of 100 marks.

16.1 CANDIDATES' OVERALL PERFORMANCE

The table below shows the general performance of candidates in the year 2009 KCSE Agriculture Examination. Performance in the previous three years has been included for comparison.

Table 21: Candidates overall performance in Agriculture for the last four years

YEAR	PAPER	CANDIDATURE	MAXIMUM MARK	MEAN SCORE	STANDARD DEVIATION
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**
2006	1		90	32.67	11.99
	2		90	37.53	12.57
	Overall	**107,068**	**180**	**77.56**	**24.00**

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

16.1.1 Candidates' performance in Agriculture improved. This is shown by the rise in the mean scores for the two papers. **Paper 1 (443/1)** mean score rose from **32.32** in the year 2008 to **33.54** in the year 2009. The mean score for **Paper 2 (443/2)** significantly improved from **25.59** in the year 2008 to **34.91** in the year 2009.

16.1.2 The candidates' overall performance significantly went up as shown by the subject mean score, which improved from **67.10** in the year 2008 to **77.67** in the year 2009.

16.1.3 The overall standard deviation for the two papers improved from **27.32** in the year **2008** to **29.12** in the year **2009**. This means that the two papers were able to discriminate candidates of different abilities.

16.1.4 The candidature increased from **134,039** in the year **2008** to **137,217** in the year **2009**. A similar trend was also observed in the years **2008**, **2007** and **2006**. This is a likely indication of increasing popularity of the subject in schools.

ANALYSIS OF POORLY PERFORMED QUESTIONS

The following is the analysis of the items that were poorly performed by candidates in the year 2009 KCSE Agriculture examination. This report highlights these questions and gives the expected responses. It also offers advice to teachers on the possible methodologies to emphasise during instruction.

16.2 PAPER 1 (443/1)

Question 13
Distinguish between the terms hybrid and composite as used in maize breeding

The item was developed from the content on maize production. It required candidates to give the differences between the two terms.

Weaknesses
Most candidates were unable to give the difference between the two terms.

Expected responses
- **Hybrid** is bred by crossing inbred varieties/inbred lines under controlled pollination.
- **Composite** is bred by crossing a number of varieties under uncontrolled/open pollination.

Advice to teachers
During instruction, teachers should emphasize and ensure that learners understand the technical terms used in agriculture.

Question 24
(b) Describe how the tertiary operation named in (a) is carried out.

The question was derived from the topic, **Land Preparation**. Candidates were expected to give the procedure of ridging.

Weaknesses
Most candidates were unable to explain how ridging is carried out.

Expected response
Soil is dug in a continuous line; and heaped on the side(s); to form a bund/ridge.

Advice to teachers
The item is centred on the practical aspect in land preparation. The procedure can easily be produced by candidates exposed to a practical lesson. Objectives on psychomotor skills should be approached practically during teaching.

Question 26
Name the deficient nutrient element in plants showing the following symptoms:

a) Stunted growth, die back of plant tips, leaves roll up and chlorosis along margins of younger leaves
b) Yellowing of leaves appears first on lower leaves, leaves turn brown and fall prematurely, stunted growth
c) Leaf culling, yellowing of leaves, tips and edges of leaves are scorched and have small mottles

d) Purpling of leaves, stunted growth, slender stalks and lateral buds remain dormant.

Weaknesses
Most candidates were unable to identify the deficient nutrient element from the provided symptoms.

Expected responses
(a) Calcium
(b) Nitrogen
(c) Potassium
(d) Phosphorus

Advice to teachers
Teachers should strive to ensure that the learner acquires the intended knowledge or skill to enable him/her to handle the different forms in which an item comes.

16.3 PAPER 2 (443/2)

No poorly performed items were reported from this paper.

16.4 PAPER 3 (443/3 –PROJECT)

Is the agriculture project paper 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 schools.

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 2009, candidates chose between rabbit rearing and production of nappier grass/bana grass or cabbages/kales. The agriculture teacher's duty was to objectively assess and evaluate each candidate's work at all the stages of project implementation.

16.5 GENERAL ADVICE TO TEACHERS

16.5.1 The whole syllabus should be effectively covered during instruction because examination items will be sampled from the entire syllabus.
16.5.2 The teacher/school should acquire the relevant reference materials and assist candidates to obtain and use the recommended textbooks.
16.5.3 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.
16.5.4 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.
16.5.5 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.

17.0 WOODWORK (444)

In 2009, Woodwork was tested using a **theory paper (444/1)** and **project paper 444/2**. The project was set by the Council but administered and scored by the subject teachers.

17.1 CANDIDATES GENERAL PERFORMANCE

The table below gives performance in the subject for the years **2004, 2005, 2008** and **2009**.

Table 22: Candidates' Overall Performance in Woodwork for the Years, 2004, 2005, 2008 and 2009.

Year	Paper	Candidature	Maximum Score	Mean Score	Standard Deviation
	1		60	24.50	8.69
	2		40	30.67	5.90
2004	**Overall**	**1,156**	**100**	**54.11**	**14.00**
	1		60	19.35	7.72
	2		40	32.70	4.65
2005	**Overall**	**1,052**	**100**	**51.70**	**10.00**
	1		60	27.84	9.23
	2		40	18.61	4.93
2008	**Overall**	**98**	**100**	**46.45**	**12.89**
	1		60	28.27	10.30
	2		40	18.84	6.07
2009	**Overall**	**424**	**100**	**47.12**	**15.49**

From the table above, it is to be observed that:

(i) The candidates for the subject increased from 98 in **2008** to **424** in **2009**.
(ii) Performance in theory paper improved from a mean of **27.84** in **2008** to a mean mark of **28.27** in **2009**.
(iii) There was slight improvement in the project paper where the mean went up by **0.23**
(iv) Overall performance in the subject improved from a mean of **46.45** in **2008** to **47.12** with an improved standard deviation of **15.49**.

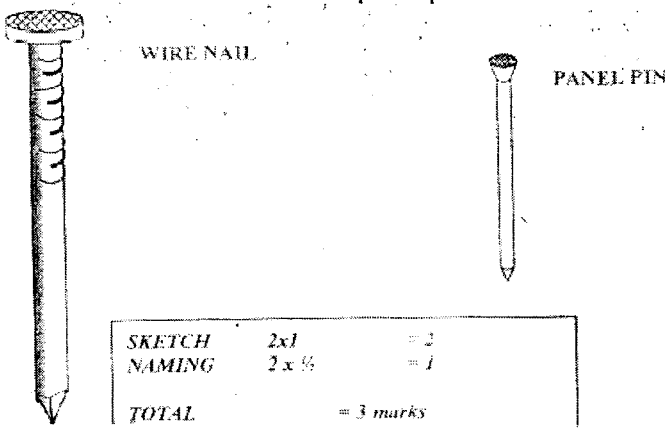
Questions which were poorly performed are discussed below.

Question 5
With the aid of sketches, show the difference between a wire nail and a panel pin nail.
Candidates were expected to know the difference between the types of nails. They were also expected to sketch the wire nail and the panel pin to show their features such as the different sizes of the heads, sizes in forms of length and thickness.

Weakness
The few candidates who did not get the answer correctly did not know the panel pin.
This weakness may have been caused by teachers not making sure that they have kept sample nails to use when teaching and also encouraging the candidates to be often making sketches of the types of nails.

Advice to teachers
Teachers to study the syllabus topics and use the topics to prepare teaching aids and materials. A variety of nails is required in the workshop.

Expected responses
Difference between a wire nail and a panel pin nail.



Question 7
a) State four types of surface finishes that would be used to protect a wood surface against water penetration.
b) Sketch a pictorial view of a bench hook.

- Candidates were expected to know the types of wood surface finishes that can be used to protect the surfaces from water penetration.
- They were also expected to know and sketch a Bench hook.

Weaknesses
A major weakness was noticed on knowledge of wood surface furnishes. This could have been caused by teachers not covering the syllabus topic "Finishing".

Advice to teachers
Teachers should teach all the types of wood surface finishes e.g application of bleaches, paints, stains wood fillers, shellac, varnish, lacquer.

Expected Responses
Types of wood surface finishes.
- Paint
- Varnish
- Wax
- Polish
- Lacquer

Question 8
Name **four** types of wood fillers.

Candidates were expected to know the types of wood fillers.

Weakness
Most candidates could only remember the use of saw dust as a filler but could not remember the rest. This could have been caused by lack of proper tuition.

Advice to teachers
When covering the topic '**FINISHING**' make sure you also teach the types of wood fillers.

Expected Responses
Types of wood fillers:
- Plaster of pariss

- Paste filler
- Staining filler
- Saw dust filler

Question 10
Figure 1 Shows a rectangle ABCD

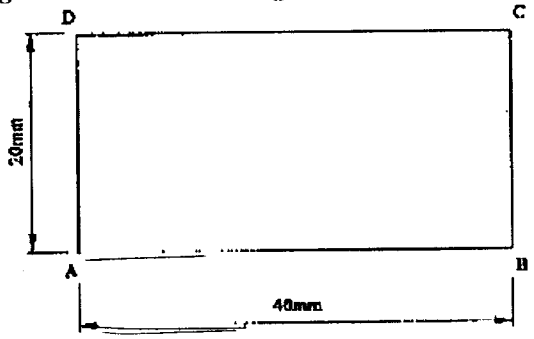


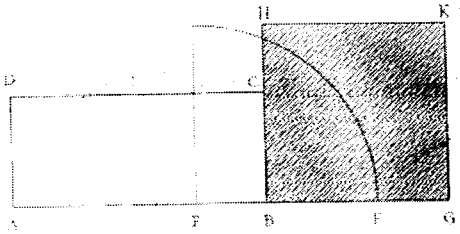
Figure 1

Copy the rectangle hence convert the rectangle into a square of equal area.

Candidates were expected to have covered the topics on geometry to be able to handle this question well.

Weakness
A number of candidates did not attempt this question at all, while those who attempted it had no problem. For those who did not attempt this question it could be because they were not taught.

Expected Responses



Question 15
a) State THREE reasons for staining timber
b) Outline the procedure of measuring stock
c) Use labeled sketches to show two flush finishing of screws

- Candidates were expected to know reasons for staining timber.
- Candidates were also expected to outline the procedure of measuring stock.
- Sketch and label two ways of 'flush finishing of screws'.

Weakness
Most candidates avoided part 'b' of the question. This could have been as a result of lack of tuition or misunderstanding the question.

Advice to teachers
Give more practice on procedures for doing things in the workshop particularly working with tools and materials. Candidates should also be taught to pick out the guiding verbs in a question and also the key words or phrases plan and then start writing response.

Expected Responses

a) Reasons for staining timber

- To make colour of all parts of an item uniform.
- To change the colour of timber to a desired colour
- To harmonize a job with the colour of other items.
- Improve the appearance of cheap, colourless timber.

b) Measuring stock

Length:

- Place the left end of the ruler directly over one end of the stock with the ruler on edge.
- Read at the other end of the measurement on the ruler

Width:

- Measure the width by holding the left end of the ruler on one edge of the stock.
- Slide right thumb along the ruler until you can read the correct width.

Thickness:

- Support the ruler with one hand over the edge with the tip on furthest corner
- Read the graduation just above the near corner.
- For counterboring, a hole the width of the head is bored in the top piece to a depth equal to the depth of the screw head.
- For countersinking; a seat for the base of screw head is formed.

29.14 AGRICULTURE (443)

29.14.1 Agriculture Paper 1 (443/1)

SECTION A (30 marks)

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

1 List **three** methods of treating water for use on the farm. (1½ marks)

2 Give **two** examples for each of the following categories of water pipes:

(a) Metal pipes (1 mark)

(b) Hose pipes (1 mark)

3 State **four** disadvantages of communal land tenure system. (2 marks)

4 List **four** sites on which agroforestry trees can be established on a farm. (2 marks)

5 State **four** financial documents that should be kept on a farm. (2 marks)

6 Give **two** ways in which check dams control soil erosion. (1 mark)

7 List **two** methods of budding that are used in propagation of plants. (1 marks)

8 Give **two** reasons for locating a nursery bed at a well sheltered place. (1 marks)

9 State **four** ways in which burning of vegetation may lead to loss of soil fertility. (2 marks)

10 Give **two** forms in which nitrogen is absorbed from the soil by plants. (1 mark)

11 Why is it necessary to allow freshly cut sorghum (Columbus grass) to wilt before feeding it to livestock? (1 mark)

12 Give **two** roles of soil micro-organisms that are beneficial to crops. (1 mark)

13 Distinguish between the terms hybrid and composite as used in maize breeding. (1 mark)

14 Give **three** reasons for growing crops under optimum temperature conditions. (1½ marks)

15 State **two** harmful effects of strong wind on crop production. (1 mark)

16 Give **two** ways in which cover crops help to conserve water in the soil. (1 mark)

17 Give a reason for carrying out each of the following management practices on a tree nursery:

(a) Pricking out (1 mark)

(b) Root trimming (1 mark)

18 Outline **two** ways of controlling damping off disease on vegetable seedlings in a nursery. (1 mark)

19 State **four** effects of pests with both piercing and sucking mouth parts on crops. (2 marks)

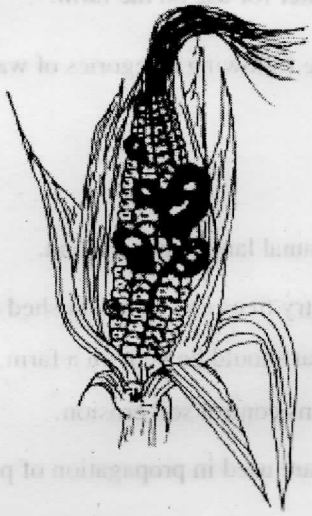
20 Name **four** natural factors that may influence soil erosion. (2 marks)

21 Give **two** conditions in agricultural production under which opportunity cost is zero. (1 mark)

SECTION B (20 marks)

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

22 The diagram below illustrates a maize cob attacked by a disease. Study it carefully and answer the questions that follow.

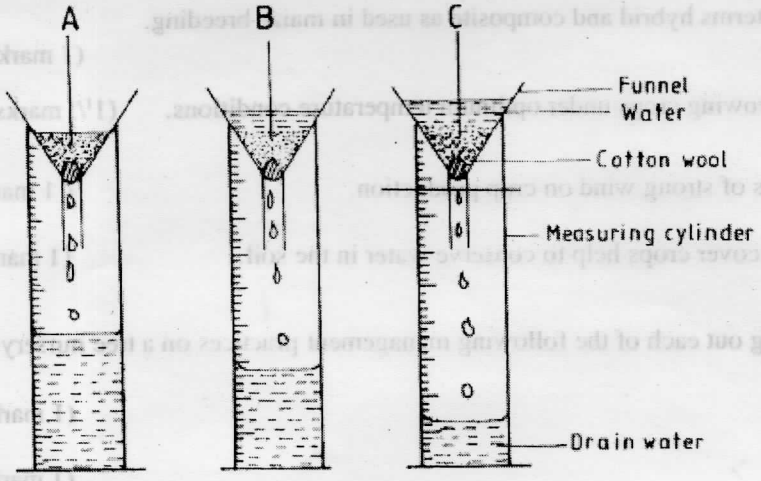


(a) Identify the disease. (1 mark)

(b) Apart from maize, give **two** other crops that may be attacked by the disease. (1 mark)

(c) State **two** methods of controlling the disease. (2 marks)

23 The diagram below illustrates an experiment on soil. Study it carefully and answer the questions that follow.

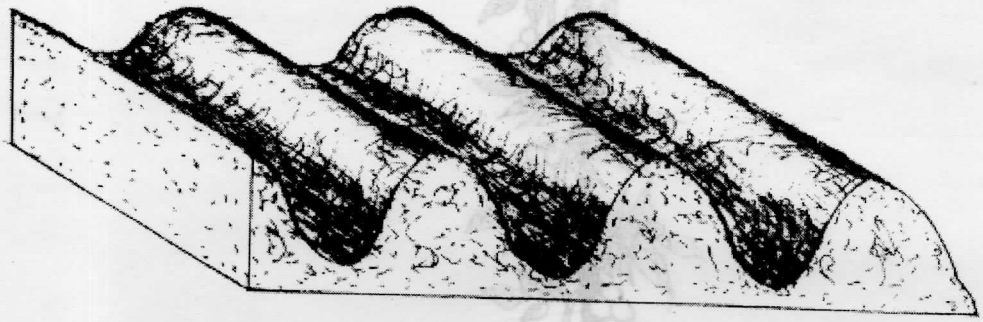


(a) State the aim of the experiment. (1 mark)

(b) If the volume of water illustrated in the measuring cylinders was observed after one hour, identify the soil samples labelled A and B.

(c) State **two** ways in which the soil structure of the soil sample labelled **C** above can be improved. (2 marks)

24 The diagram below illustrates a final seedbed after a tertiary operation done during land preparation. Study it carefully and answer the questions that follow.



(a) Name the tertiary operation carried out on the seedbed. (½ mark)

(b) Describe how the tertiary operation named in (a) above is carried out. (1 ½ marks)

(c) Give **two** advantages of planting crops on the final seedbed illustrated above. (2 marks)

25 What is the function of each of the following ingredients in the preparation of compost manure?

(a) Wood ash (1 mark)

(b) Top soil (1 mark)

26 Name the deficient nutrient element in plants showing the following symptoms:

(a) Stunted growth, die back of plant tips, leaves roll up and chlorosis along margins of younger leaves (½ mark)

(b) Yellowing of leaves appears first on lower leaves, leaves turn brown and fall prematurely, stunted growth (½ mark)

(c) Leaf curling, yellowing of leaves, tips and edges of leaves are scorched and have small mottles (½ mark)

(d) Purpling of leaves, stunted growth, slender stalks and lateral buds remain dormant (½ mark)

27 (a) Why is the use of the following items essential during the harvesting of tea?

(i) plucking stick (1 mark)

(ii) woven basket (1 mark)

(b) The diagram below illustrates a field management practice in tomatoes. Study it carefully and answer the questions that follow.

(i) identify the field practice. (½ mark)

(ii) state **three** reasons for carrying out the practice. (1½ marks)

SECTION C (40 marks)

*Answer any **TWO** questions from this section in the spaces provided after question **30**.*

28 (a) Describe the production of dry beans (*Phaseolus vulgaris*) under the following sub-headings:

(i) varieties common in Kenya; (2 marks)

(ii) selection and preparation of planting materials; (3 marks)

(iii) planting and weeding. (5 marks)

(b) Describe **ten** safety precautions that should be taken when using herbicides to control weeds. (10 marks)

29 (a) Explain **five** advantages of mulching in crop production. (5 marks)

(b) Outline **five** activities that may be undertaken in organic farming. (5 marks)

(c) Discuss **ten** benefits a farmer is likely to get by using vegetative propagation in production of oranges. (10 marks)

30 (a) Explain **ten** roles of a farm manager in agricultural production. (10 marks)

(b) Describe **five** roles of agricultural based women groups in farming. (5 marks)

(c) Describe land preparation and planting in carrot production. (5 marks)

SECTION A (30 marks)

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

1 Study the table below and fill in the missing words. (3 marks)

Description	Cattle	Pigs	Poultry
Young from birth/hatching to weaning.	.....	.....	Chick
Young female before first parturition/ laying.	.....	Gilt	.....
Mature male for breeding.	Bull	.....	.....

2 Name **two** viral diseases that affect each of the following livestock:

(a) Cattle (1 mark)

(b) Poultry (1 mark)

3 Name **one** intermediate host for each of the following livestock parasites:

(a) Liver fluke *(Fasciola spp.)* (½ mark)

(b) Tapeworm *(Taenia spp.)* (½ mark)

4 Give **four** reasons for feeding a lamb on colostrum. (2 marks)

5 State **four** advantages of artificial calf rearing in dairy cattle management. (2 marks

6 State **four** harmful effects of tsetse flies *(Glossina spp)* in livestock. (2 marks)

7 Why is raddling essential in sheep management? (1 mark)

8 Give four reasons for steaming up in dairy cattle management. (2 marks)

9 State four limitations of using hydroelectric power on the farm. (2 marks)

10 Give two reasons for maintaining a wheelbarrow in good working condition. (1 mark)

11 Differentiate between the following tools:

(a) Bastard file and rasp file; (1 mark)

(b) Copying saw and hacksaw. (1 mark)

12 Name two livestock diseases that are caused by protozoa. (1 mark)

13 State **four** ways of restraining cattle during routine management. (2 marks)

14 What is meant by the following terms as used in livestock health:

(a) Incubation period; (1 mark)

(b) Mortality rate. (1 mark)

15 State **two** conditions that may inhibit milk let-down during milking. (1 mark)

16 Give **four** reasons for rearing indigenous cattle in marginal areas of Kenya. (2 marks)

17 Why are the following conditions maintained during artificial incubation of eggs in poultry production?

(a) Proper ventilation; (1 mark)

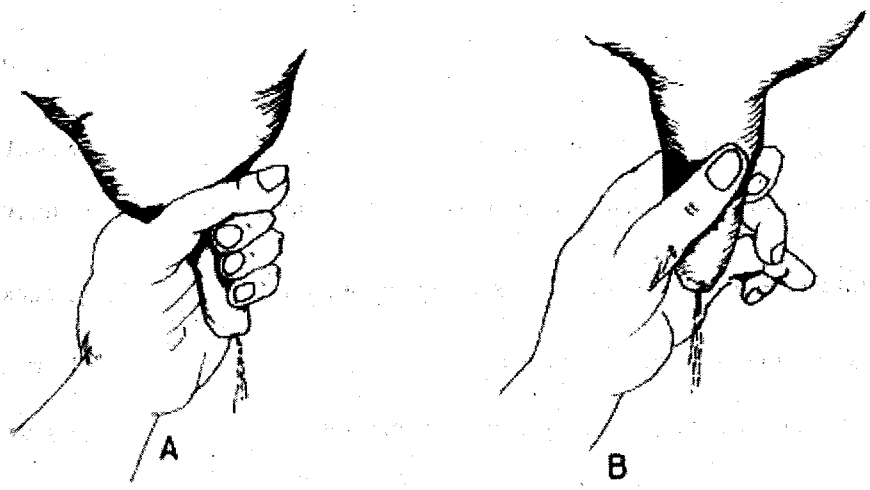
(b) Relative humidity at 60%. (1 mark)

SECTION B (20 marks)

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

18. The diagrams labelled **A** and **B** below illustrate two different milking techniques.

Study them and answer the questions that follow.

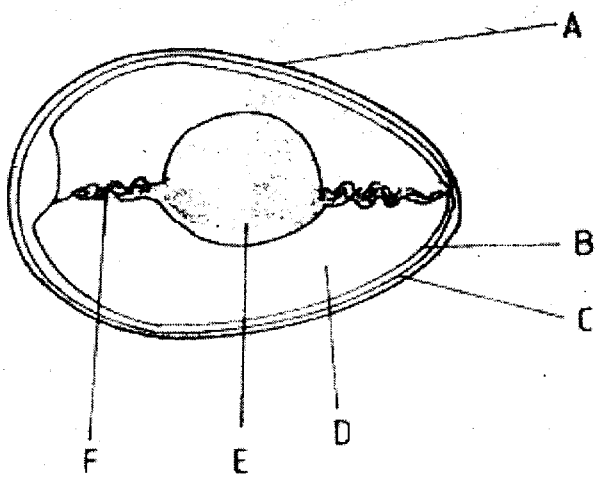


(a) Identify the appropriate technique for milking. (1 mark)

(b) Describe the procedure of milking technique in (a) above. (2 marks)

(c) State **two** disadvantages of using a wrong milking technique. (2 marks)

19 The diagram below is an illustration of an egg. Study it carefully and answer the questions that follow.



(a) Name the parts labelled **B**, **C**, **D** and **F**.

B ..... (½ mark)

C ..... (½ mark)

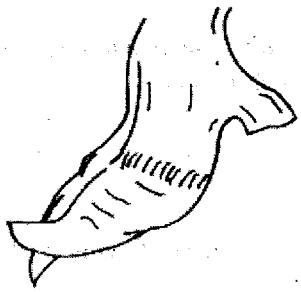
D ..... (½ mark)

F ..... (½ mark)

(b) State **two** qualities of **the part labelled A that should** be considered when selecting eggs for incubation. (2 marks)

(c) What is the function of the part labelled **E** in a fertilized egg? (1 mark)

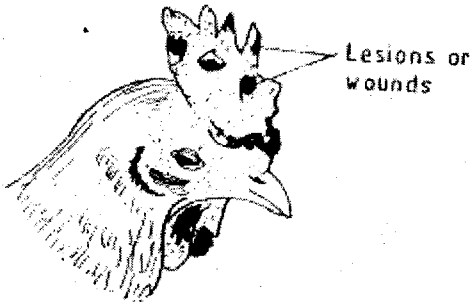
20 The diagram below illustrates a hoof of a sheep. **Study** it carefully and answer the questions that follow.



(a) Name the routine management practice that should be carried out on the hoof illustrated above. **(1 mark)**

(b) State **two** reasons for carrying out the **management** practice in (a) above. **(2 marks)**

21 The following diagram illustrates a symptom of a disease in poultry. **Study it carefully and answer the questions that follow.**



(a) Identify:

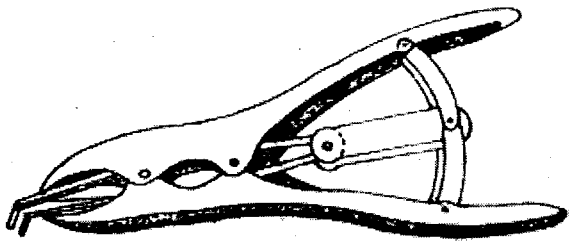
(i) the disease; (½ mark)

(ii) the causal organism. (½ mark)

(b) Apart from lesions, state **two** other symptoms of the disease. (2 marks)

(c) State **two** control measures for the disease. (2 marks)

22 Below is an illustration of a livestock management equipment. Study the diagram and answer the questions that follow.



(a) Identify the equipment. (1 mark)

(b) State the use of the equipment. (1 mark)

SECTION C (40 marks)

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

23 (a) Describe **ten** signs of ill-health in livestock. (10 marks)

(b) Describe the process of digestion in the following sections in the alimentary canal of a non-ruminant animal:

(i) mouth; (1 mark)

(ii) stomach; (3 marks)

(iii) small intestines. (6 marks)

24 (a) Outline **five** benefits of using biogas as a source of power on the farm. (5 marks)

(b) Give **five** advantages of using a subsoiler in seedbed preparation. (5 marks)

(c) Explain **five** factors that a farmer should consider when siting a bee hive to prevent swarming of bees. (10 marks)

25 (a) Describe the life cycle of a named tapeworm *(Taenia spp)*. (10 marks)

(b) Describe the process of egg formation in the reproductive system of a hen. (10 marks)

30.14 AGRICULTURE (443)

30.14.1 Agriculture Paper 1 (443/1)

SECTION A (30 marks)

1.
- Chemical treatment
- Filtration
- Boiling
- Aeration
- Sedimentation/decantation
- Storage for 36 hours

(3 x ½ = 1½ marks)

2.

(a)
- Galvanised iron pipes
- Aluminium pipes

(2 x ½ = 1 mark)

(b)
- Rubber hose pipes
- Plastic hose pipes

(2 x ½ = 1 mark)

3.
- Encourages soil erosion
- Results in overgrazing/overstocking
- Difficult to control breeding
- No individual security on land ownership
- Difficult to acquire loans for agricultural development
- Lacks incentives for permanent/long term development projects
- Difficult to carry out sound farm plan
- Encourages spread of parasites and diseases
- Encourages disputes among community members

(4 x ½ = 2 marks)

4.
- Farm boundaries
- Homestead
- Terraces
- River banks/water catchment areas
- Steep slopes/slopes
- Within pasture land/between crop plots

(4 x ½ = 2 marks)

5.
- Receipt
- Invoice
- Statements
- Purchase order
- Delivery note

(4 x ½ = 2 marks)

6.
- Slow down the speed of run-off to reduce erosive power of water
- Reduce the volume of run-off
- Trap soil sediments

(2 x ½ = 1mark)

7.
- T-budding
- Top budding
- Patch budding/ring budding

(2 x ½ = 1mark)

8.
- Reduce damage to seedlings by strong wind
- Reduce evaporation/transpiration rate due to strong sun and wind *(2 x ½ = 1 mark)*

9.
- Destroys organic matter
- Destroys soil structure
- Kills useful soil organisms
- Exposes soil to agents of soil erosion
- Causes nutrient imbalance/loss of volatile nutrients/accumulation of salts/alters soil pH
- Destroys soil water/loss of soil water *(4 x ½ = 2 marks)*

10.
Nitrate ion/NO_3^-
Ammonium ion/NH_4^+ *(2 x ½ = 1 mark)*

11.
- To avoid prussic acid/hydrocyanic acid poisoning *(1 x 1 = 1 mark)*

12.
- Decomposition of organic matter to release plant nutrients
- Some fix nitrogen/sulphur into the soil
- Some produce toxic substances that help control soil borne diseases *(2 x ½) = 1 mark)*

13.
- **Hybrid** is bred by crossing inbred lines/varieties under controlled pollination
- **Composite** is bred by crossing a number of varieties under uncontrolled/open pollination *(Mark as a whole = 1 mark)*

14.
- Enhances seed germination
- Promotes soil microbial activities
- Improves quality of crop products
- Enhances vigorous growth and development
- Enhances high yields. *(3 x ½ = 1½ marks)*

15.
- Results in soil erosion
- Results in lodging of crops
- High evapotranspiration rates
- Spreads disease/pests/weeds *(2 x ½ = 1)*

16.
- Reduces surface run-offs/increases water infiltration into the soil
- Reduces evaporation rates *(2 x ½ = 1 mark)*

17.
(a)
- Reduces competition for light, space, nutrients, etc.
- Enables the seedlings to grow healthy and strong *(2 x ½ = 1 mark)*

(b)
- Encourages development of short, dense and strong rooting system for faster establishment after transplanting
- To facilitate lifting of seedlings/minimize root damage during transplanting *(2 x ½ = 1 mark)*

18.
- Reduce/remove shade
- Thinning to reduce overcrowding
- Reducing amount and frequency of watering
- Spraying with copper/appropriate fungicides *(2 x ½ = 1 mark)*

19.
- Suck plant sap causing wilting
- Some inject toxic saliva/secretions
- Lower quality of crop products
- Transmit disease agents
- Inflict wounds/openings which provide entry for secondary infections
- Lower crop yields *(4 x ½ = 2 marks)*

20.
- Amount of rainfall/rainfall intensity
- Slope/topography
- Type of soil
- Size of water shade/catchment
- Length of the slope
- Vegetation cover
- Wind velocity/strength of wind *(4 x ½ = 2 mark)*

21.
- When there are no alternatives/choices in enterprises
- When production resources are not limited/are abundant *(2 x ½ = 1 mark)*

SECTION B (20 marks)

22. (a) smut/maize smut/ear smut *(1 x 1 = 1 mark)*
(b) sugarcane/wheat/sorghum/barley/oats/millets/pasture grass *(1 x 1 = 1 mark)*

(c)
- Plant certified seed
- Crop rotation/close season
- Field hygiene/destroy crop residues
- Rogueing
- Hot water treatment
- Use of resistant varieties

(2x1 = 2 marks)

23. (a) to compare porosity/drainage/infiltration and water holding capacity of different soils *(1 x 1 = 1 mark)*

(b) A – Sandy soil
B – Loamy soil *(2 x ½ = 1 mark)*

(c)
- Adding organic matter
- Liming
- Sub soiling/proper tillage
- Draining away excess water *(2 x 1 = 2 marks)*

24. (a) Ridging *(1 x ½ = ½ mark)*

(b) Soil is dug in a continuous line; and heaped on the side(s); to form a bund/ridge
(3 x ½ = 1½ mark)

(c)
- Promotes tuber/root expansion/development
- Facilitates harvesting of root crops
- Conserves soil and water
- Facilitates drainage in water logged soils

(2 x 1 = 2 mark)

25. (a)
- Improves level of phosphorus and potassium in the manure
- Modifies soil pH to enhance microbial activities

(1 x 1 = 1 mark)

(b)
- Introduces micro-organisms required for decomposition of organic matter

(1 x 1 = 1 mark)

26.
(a) Calcium
(b) Nitrogen
(c) Potassium
(d) Phosphorus

(4 x ½ = 2 marks)

27.
(a) (i) Helps to maintain a uniform/level plucking table
(1 x 1 = 1 mark)

(ii) Facilitates air circulation/aeration to prevent fermentation of tea
(1 x 1 = 1 mark)

(b) (i) Staking
(1 x ½ = ½ mark)

(ii)
- enhances production of clean fruits/improves quality of fruits
- Helps in controlling diseases
- Facilitates spraying/weeding/harvesting of the crop
- Prevents infection by soil borne pests

(3 x ½ = 1½ marks)

SECTION C (40 marks)

28
(a) (i)
- Rose coco/GLP2
- Mwezi moja/GLP1004
- Canadian Wonder/GLP24
- K74
- Wairimu/Red haricot
- Mexican142
- Mwitemania

(2 x 1 = 2 marks)

(ii)
- Select varieties suited to the local ecological conditions
- Select dry and mature seeds
- Select sound seeds that are free from physical damage and wrinkles
- Dress seeds against soil borne pests and diseases
- Obtain seeds from a reputable source/certified seeds
- Inoculate seeds with the right strain of bacteria

(3 x 1 = 3 marks)

(iii)
- Plant at the beginning of rains/timely planting
- Make shallow farrows/holes at a depth of 3-5 cm using appropriate tool.
- Apply phosphatic fertilizer/DSP/SSP/DAP/MAP/manure during planting.

- Place 2-4 seeds per hole and cover it up with the soil/seed rate 50-60kg/ha.
- Spacing is 30-50cm by 10-15cm depending on variety.
- Shallow weeding is done to avoid root damage.
- Avoid weeding during flowering to prevent knocking off the flowers.
- Weed when the field is dry to avoid spread of diseases.
- Keep the field weed free in the early stages of growth. ***(5 x 1 = 5 marks)***

(b)

- Wear protective clothing
- Avoid inhaling the herbicide/spray along the direction of wind
- Read and follow the manufacturer's manual
- Avoid sucking or blowing blocked nozzles
- Was thoroughly after handling the chemical
- Store herbicides in a safe place away from children
- Equipment used should not be washed in water sources to prevent pollution
- Empty containers and left overs should be properly disposed to avoid danger to humans, livestock and environment
- Avoid chemical spillage to unintended places/where it may cause danger to human and livestock
- Thoroughly wash the equipment to avoid damage to crops/livestock in subsequent operations.
- Avoid eating or handling food before washing to prevent contamination/poisoning.

(10 x 1 = 10 marks)

29 (a)

- Modifies/regulates soil temperature through insulation effect
- Prevents water evaporation/retains water in the soil
- Prevents soil erosion/intercepts rain drops/reduces speed of run off/increases water infiltration
- Organic mulch decomposes into humus to release plant nutrients
- Organic mulches decompose to form humus which improves soil structure/water holding capacity/drainage/aeration
- Organic mulches buffer soil pH/improve cation exchange capacity

(5 x 1 = 5 marks)

(b)

- Mulching
- Application of organic manure/organic fertilizers
- Crop rotation
- Use of medicinal plant products to control diseases, pests and parasites
- Rearing of livestock on natural feedstuffs without use of chemical additives
- Physical/cultural/biological pest/weed/parasite/disease control

(5 x 1 = 5 marks)

(c)

- Development of early maturing crop
- Development of high yielding crop
- Makes the plant to assume the desired shape and size
- Can obtain two or more orange varieties on the same root stock
- Ensures uniformity of genetic/clonal characteristics
- Development of drought resistant crop
- Propagation of seedless orange varieties
- Development of tree plant that is less thorny
- Fast multiplication of desired crop/variety of oranges
- Development of disease resistant orange crop
- Repair/treatment of damaged parts of orange trees. ***(10 x 1 = 10 marks)***

30 (a)

- Short-term planning for quick decision to avoid losses when there is a crisis.
- Long-term planning based on studies and makes decisions on future plans and operations on the farm
- Collecting information relevant to the farm enterprises.
- Budgeting for future income and expenses as proposed in the farm plan
- Comparing standards of the farm/enterprises with the set standards and making appropriate adjustments
- Detects weaknesses and constraints and finds ways of overcoming them
- Keeps up to date records and uses them in daily running of the farm
- Implements farm decisions
- Guides and supervises the implementation of the farm plan
- Compares performance of the farm with that of other similar farms
- Makes predictions of the farm business
- Is the accounting officer on all financial transactions of the farm
- Takes responsibility for decisions made/bearing risks (10 x 1 = 10 marks)

(b)

- Loaning members to finance their farming activities
- Enlighten members on improved/improved/modern farming techniques/emerging issues
- Establish income generating activities for members
- Assist in marketing agricultural produce for members
- Buy farm inputs in bulk and sell to members at a low price
- Collectively assist members in their farm operations.
- Guarantees members for loans
- Gathering information on intended projects/activities
- Act as agents of change in the community

(5 x 1 = 5 marks)

(c)

- Clearing the bus using appropriate tool
- Primary cultivation using appropriate tool
- Secondary cultivation/harrowing to a fine tilth
- Plant at onset of long rains/when soil has adequate moisture
- Make drills 30cm apart and 1cm deep
- Apply phosphatic fertilizer/ASP/DAP/MAP during planting
- Sow seeds along the drills
- Cover and firm the seeds with soil ***(5 x 1 = 5 marks)***

30.14.2 Agriculture Paper 2 (443/2)

SECTION A: (30 marks)

1.

	Cattle	Pigs	Poultry
Young from birth/hatching to weaning	Calf	Piglet	
Young female before first parturition/laying	Heifer		Pullet
Mature male for breeding		Boar	Cock

(6 x ½ = 3 marks)

2. (a)

- Rinderpest/Cattle plague
- Foot and Mouth Disease
- Lumpy Skin disease

- Rift Valley fever
- Mad Cow disease

(2 x ½ = 1 mark)

(b)

- Newcastle
- Fowl pox
- Gumboro
- Bird flu/Avian flu
- Mareks disease

(2 x ½ = 1 mark)

3. (a) Liver fluke (Fasciola spp) - fresh water snail/*Limnea sp*
   (b) Tapeworm (Taenia spp) - pig/cattle

(2 x ½ = 1 mark)

4.

- It is highly digestible hence suitable for the digestive system which is not fully developed
- It is highly nutritious
- It contains antibodies enabling the young stock to resist early infections
- It has a laxative effect
- It is highly palatable

(4 x ½ = 2 marks)

5.

- Farmer is able to keep accurate records of milk yield
- Easy to regulate the amount of milk taken by the calf
- Cows produce milk even in the absence of the calves
- Allows for maintenance of high standard of hygiene during milking
- There is a possibility of the farmer selling more milk thereby maximizing profits

(4 x ½ = 2 marks)

6.

- Transmit the disease trypanosomiasis
- Suck blood thereby causing anaemia
- Their bites cause damage to skins
- Bites cause wounds which may act as routes for secondary infections by pathogens
- Cause irritation to the animal

(4 x ½ = 2 marks)

7.

- To help identify rams which have mated with ewes/those incapable of mating. OWTTE
- To identify ewes that have been served/fertile/those that are infertile/not served

(1 x 1 x 1 mark)

8.

- Ensures birth of a healthy calf
- Provides nutrients for maximum foetal growth
- Build up energy for parturition
- Increases and maintains high milk yield after birth/stimulates development of alveoli
- Promotes good health of the cow/mother
- Accustoms the cow to concentrate feeding

(4 x ½ = 2 marks)

9.

- Very high initial capital required for installation
- If the market is not large, it becomes uneconomical to install
- Water supply can become unreliable in case of prolonged drought e.g. seasonal rivers
- The river may change its course leading to wasted investment
- Not all farmers can afford the use of electric appliances
- Lack of skilled personnel
- Lack of rivers in some farms

(4 x ½ = 2 marks)

10.
- To reduce cost of repair/replacement
- To improve efficiency
- To prolong life of the wheelbarrow
- To reduce injury/accident incidences *(2 x ½ = 1 mark)*

11. (a) Bastard file is used for smoothing metal while rasp is used for smoothing wood
1 mark (mark as a whole) *(1 mark)*

(b) Coping saw is used for cutting curves in wood while hacksaw is used for cutting metal.
1 mark (mark as a whole) *(1 mark)*

12.
- East Cost Fever (E.C.F.) (Theileriosis)
- Anaplasmosis/gall sickness
- Coccidiosis
- Trypanosomiasis (Nagana)
- Trichomoniasis
- Corridor disease
- Heart water
- Red water (Babesiosis)
- Nairobi sheep disease
- Sweating sickness *(2 x ½ = 1 mark)*

13.
- Use of ropes/halters/casting
- Use of lead stick and bull ring
- Use of crush
- Use of head-yoke
- Use of holdings/isolation pen/yard

(4 x ½ = 2 marks)

14. (a) Incubation Period: - Is the duration between the time a disease causing organism infects/enters an animal and the time the first disease symptoms show.
(1 x 1 = 1 mark)

(b) Mortality rate: - Is the likelihood of death occurring in case of a disease outbreak which is expressed as a percentage of the affected animals that die.
(1 x 1 = 1 mark)

15.
- Change of milking routine
- Strange surroundings/strangers/sudden noise/storm
- Poor milking techniques
- Sickness
- Pain
- Long duration of milking *(2 x ½ = 1 mark)*

16.
- Have fairly high tolerance to high temperature
- Have considerable tolerance to tropical diseases
- Can walk for long distances in search of pastures and water
- Have ability to survive on low quality pasture/forage
- Are able to survive on less amount of food/water without seriously affecting performance

(4 x ½ = 2 marks)

17. (a)

- For air/oxygen circulation for embryonic gaseous exchange
- For air circulation to control humidity

(1 x 1 = 1 mark)

(a)

- Low humidity causes embryonic mortality due to loss of moisture
- High humidity lowers hatchability and produces abnormally bigger chicks which look marshy

(1 x 1 = 1 mark)

SECTION B (20 marks)

18. (a) A/squeezing technique *(1 x 1 = 1 mark)*

(b)

- Teat is grasped at base between the thumb and the index finger
- The other fingers are sequentially tightened starting with index fingers to compress the teat so as to expel the milk into a container
- All fingers are relaxed simultaneously to allow teat to be refilled and a new sequence begins
- Repeat the procedure

(4 x ½ = 2 marks)

(c)

- It is injurious and leads to formation of scar tissue/physical injury on the teat cistern
- The pulling effect leads to tearing of teat tissues making them more prone to bacterial invasion/mastitis
- Chances of milk contamination are high because the application of milking salve/teat dipping becomes necessary for lubrication

(2 x 1 = 2 marks)

19. (a)

B - Inner shell membrane
C - Outer shell membrane
D - Albumen/egg white
F - Chalaza

(4 x ½ = 2 marks)

(b)

- Texture/smoothness of the shell
- Absence of cracks on the shell
- Cleanliness/absence of blood stains
- Oval in shape

(2 x 1 = 2 marks)

(c)

Provides nutrients for the developing embryo/chick *(1 x 1 = 1 mark)*

20. (a)

Hoof trimming *(1 x 1 = 1 mark)*

(b)

- To prevent lameness/difficulty in walking
- To control foot rot
- To ease mating/tupping

(2 x 1 = 2 marks)

21. (a) (i) Fowl/Avian pox
(ii) Virus/Avian pox virus *(2 x ½ = 1 mark)*

(b)

- Watery discharge through eyes and nose
- Difficult breathing and swallowing

- Dullness
- Loss of appetite
- Emaciation *(2 x 1 = 2 marks)*

(c)

- Vaccination
- Removal & Killing of all affected birds
- Observe proper hygiene
- Isolation of affected birds *(2 x 1 = 2 marks)*

22. (a) Elastrator *(1 x 1 = 1 mark)*

(b) Stretching/opening/enlarging *(1 x 1 = 1 mark)*

SECTION C (40 marks)

23. (a)

- Behaviour of the animal – aggressiveness, over excitement produces abnormal sound, isolation
- Animal movement – limping/lameness. strained gait
- General appearance:- restless, dull, less alert or less response to touch/abnormal posture
- Skin/coat:- ruffled/starry coat/loss of hair/dull skin/parts peeling off/cracking/wounds/lesions/swellings
- Mucous membrane:- Dull red/pale/dry/having copious discharge
- Production/performance level:- sudden decline in production/performance/loss of weight and condition
- Pulse rate:- radical departure from the normal range
- Copious salivation
- Lachrymation/shedding tears
- Respiratory rate: abnormal/deviation from the normal range
- Body Temperature: abnormal temperature from the normal range/too high/too low
- Appetite and feeding: - Increased/lack of appetite/abnormal chewing/swallowing/feeding on abnormal food substances.
- urination: - abnormal urine colour/smell/consistency. Difficult urination/less or high frequency
- Defaecation process: - abnormal faecal matter in terms of consistency/smell/colour/ presence of parasites/egg segments/ blood stains/frequent

(Any 10 x 1 = 10 marks)

(b) Process of digestion in a non-ruminant

(i) Mouth

- Food is chewed to break and increase surface area for enzyme action
- Food is mixed with saliva which contains salivary amylase and lubricates the food
- Salivary amylase converts starch to Maltose

(2 x ½ = 1 mark)

(ii) Stomach

- Food is mixed with gastric juice/dilute hydrochloric acid/pepsin/rennin.
- Hydrochloric acid provides optimum pH for enzyme/rennin/pepsin activities and kills a micro-organisms ingested with food. Activates pepsinogen to pepsin
- Pepsin breaks down proteins to proteoses and peptones/peptides
- Rennin coagulates milk to increase the surface area for enzyme/pepsin action

(3 x 1 = (3 marks)

(iii) Small Intestines

- In the duodenum, food is mixed with bile and pancreatic juice (pancreatic amylase, lipase and trypsin)
- Bile emulsifies fats to increase the surface area for enzyme action.

Neutralizes food from stomach

- Pancreatic amylase converts starch to maltose
- Pancreatic lipase coverts fats to glycerol and fatty acids
- Trypsin converts proteins to peptones and peptides.
- In the rest of small intestines, food is mixed with intestinal juice/ erepsin/peptidase, maltase, sucrase/invertase & lactase enzymes)
- Erepsin/peptidase coverts peptones and peptides to amino acids
- Maltase coverts maltose to glucose
- Sucrase (invertase) converts sucrose to glucose and fructose
- Lactose coverts lactose to glucose and galactose
- Digested food materials are absorbed in the ileum
- Undigested and indigestible food materials then move to the large intestines for further digestion *(12 x ½ = 6 marks)*

24. (a) Benefits of using biogas

- Is a cheap source of energy
- Requires low running/maintenance costs
- Is versatile/can be put to many uses such as lighting, cooking, electricity generation, etc.
- Does not pollute the environment/environmental friendly
- Is a sustainable/renewable source of energy
- By products/fermented slurry is used as manure
- Can be income generating
- Raw materials are locally available *(5 x 1 = 5 marks)*

(b) Advantages of using a subsoiler

- It breaks hard pans
- It improves drainage/water infiltration
- It improves soil aeration
- It destroys deep rooted weeds
- It facilitates growth and development of root/deep rooted crops
- It loosens top soil and subsoil without bringing the subsoil to the surface to ensure conservation/minimum tillage/least soil pulverization. *(5 x 1 = 5 marks)*

(c) Factors affecting sitting of a bee hire

- Availability of water:- should be available within 3 km radius to facilitate collection by bees
- Availability of flowers: - should be readily available to facilitate collection of pollen and nectar by bees.
- Shelter:- should be protected from strong sun and wind
- Noise and other disturbances: should be free from noise and other disturbances
- Pests and diseases:- place should be free from pests and diseases
- Dampness and bad odours: - Site should be free from dampness and bad odours.

(Factors 5 x 1) (Explanations 5 x 1) *10 marks*

25. (a) life Cycle of beef/pork tape worm

- Mature segments/proglottids full of eggs are dropped with human faeces
- Eggs are then released from the segments
- Cattle/pigs ingest the eggs during grazing/feeding
- In the intestines, the eggs hatch into embryos
- The embryos penetrate the intestinal wall and enter the blood stream
- The embryos first localize in the liver
- From the liver, the embryos are distributed into the muscles in the body

- In the muscles, they become cysts/bladder worms/*crysticercus cellulosae*
- Human beings get infected when they eat raw/under cooked beef/pork with the cysts
- In the human small intestines, the cyst wall dissolves, the bladder worms emerge and attach on the intestinal wall.
- They then develop into adult worms and start laying eggs.
  - (mark until the order is broken)

(10 x 1) ***(10 marks)***

(b) Process of egg formation

Ovary

- Produces the ovum ***(2 x ½ = 1 mark)***

Funnel/Infundibulum

- Receives the ova
- Chalazae are added and the egg moves to the magnum
- Fertilization occurs here
- Funnel stores the sperms ***(5 x½ = 2½ marks)***

Magnum

- Thick Albumen is added and the yolk moves into the isthmus ***(2 x ½ = 1 mark)***

Isthmus

- Addition of albumen is completed/thick albumen is added
- Water mineral salts and vitamins are added
- Shell membranes are also added and the egg moves to the uterus ***(4 x ½ = 2 marks)***

Vagina

- Egg is temporarily stored
- Egg is inverted to be laid with the broad end first
- Egg is lubricated here ***(4 x ½ = 2 marks)***

Uterus/shell gland

- Shell is added around the egg/ it contains calcium deposits
- Shell pigmentation occurs here ***(3 x ½ = 1½ marks)***