

G12 ECZ AGRICULTURAL SCIENCE 2016 PAPER 1 SOLUTIONS

Grade 12 ECZ Agricultural Science 2016 Paper 1 (5037/1) — Theory

Wednesday 16 November 2016 | 2 hours | Section A (Q1–5, answer all) + Section B (Q6–10, answer any three)

The full question paper appears first — worked answers follow.

Candidate Name _____

Centre Number				Candidate Number									

EXAMINATIONS COUNCIL OF ZAMBIA

Examination for School Certificate Ordinary Level

Agricultural Science Paper 1 Theory

5037/1

Wednesday

16 NOVEMBER 2016

Additional Materials
Answer Booklet

Time: 2 hours

Instructions to candidates

Write your name, centre number and candidate number in the spaces at the top of this page and on the Answer Booklet.

There are **Ten** questions in this paper.

Section A

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

Section B

Answer any **three** questions.

Write your answers in the Answer Booklet provided.

At the end of the examination:

- 1 fasten the Answer Booklet securely to the question paper.
- 2 enter the numbers of the **Section B** questions you have answered in the grid for Examiner's use.

Information for candidates

The number of marks is given in brackets [] at the end of each question or part question.

You are advised to spend no longer than 40 minutes on **Section A**.

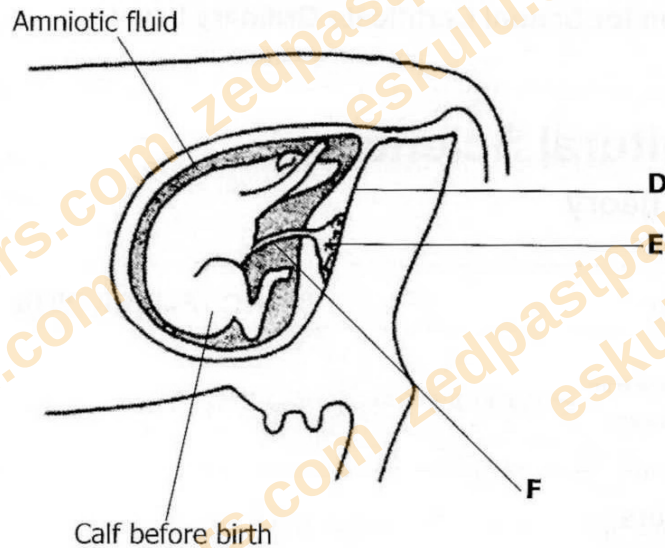
Cell phones are not allowed in the examination room.

FOR EXAMINER'S USE	
Section A	
Section B	
Total	www.zedpastpapers.com

Section A

Answer all questions in this section

- 1 **Figure 1** shows a developing foetus in the uterus of a cow.



- (a) Name the structures labelled **D**, **E** and **F**.

D

E

F [3]

- (b) Describe how structure **E** carries out its functions.

.....

.....

..... [3]

- (c) State the recommended guide for feeding a cow during gestation.

.....

.....

..... [2] www.zedpastpapers.com

[8 marks]

2 (a) What is forestry?

.....

..... [1]

(b) Suggest **three** tree species that can be used to improve soil fertility.

(i)

..... [1]

(ii)

..... [1]

(iii)

..... [1]

(c) State a suitable site for growing trees.

.....

.....

.....

.....

.....

..... [4]

[8 marks]

3 **Figure 2** shows an analysis of a soil sample.

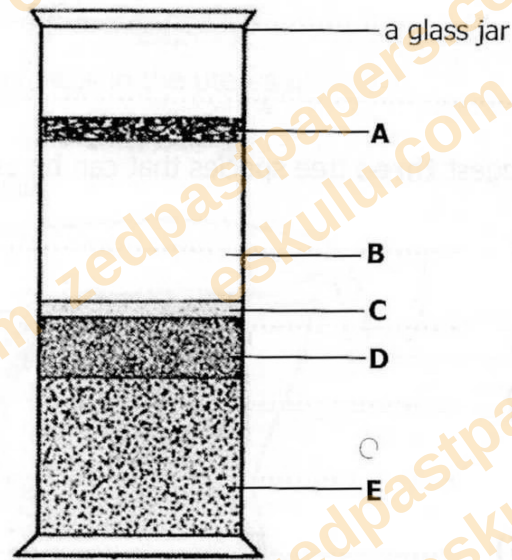


Figure 2

(a) Name the parts labelled **A** to **E**.

- A**
- B**
- C**
- D**
- E** [5]

(b) State **three** soil components that cannot be determined by using the experiment in **figure 2** above.

- 1**
- 2**
- 3** [3]

[8 marks]

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4 **Figure 3** shows an onion bulb.

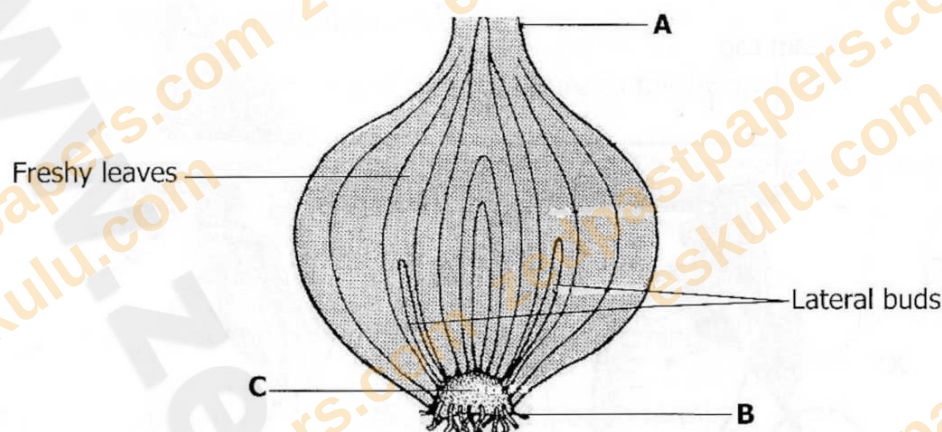


Figure 3

(a) Name the structures labelled **A** to **C**.

A

B

C [3]

(b) State **two** functions of the structure labelled **C**.

.....

..... [2]

(c) Give **one** observable adaptation of **figure 3** that shows that it is a storage organ.

.....

..... [1]

(d) Explain how onions are propagated.

.....

..... [2]

[8 marks]

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- 5 **Figure 4** shows a tractor drawn implement.

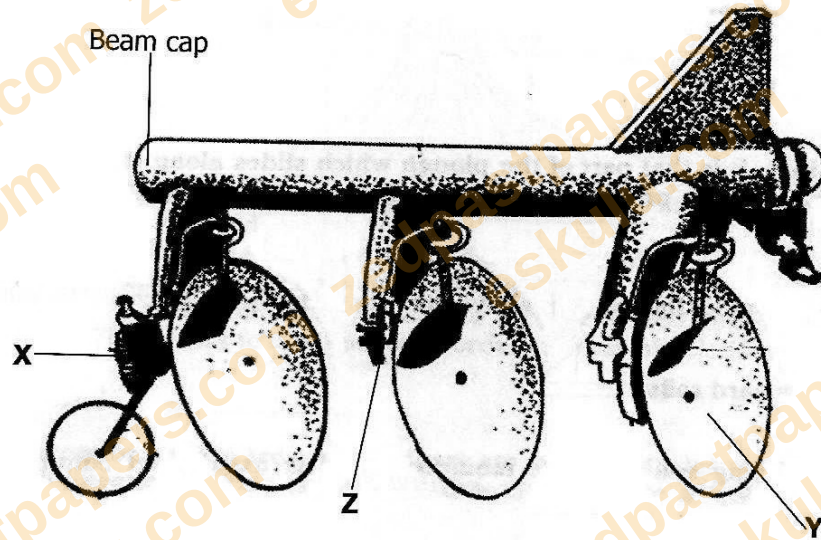


Figure 4

- (a) Identify the implement represented by **figure 4**.

..... [1]

- (b) State the functions of parts labelled **X**, **Y** and **Z**.

X.....

Y.....

Z..... [3]

- (c) State **two** advantages of using the implement represented by **figure 4**.

(i)

..... [1]

(ii)

..... [1]

- (d) How should a farmer prepare power drawn implements for storage?

.....

..... [1]

- (e) State the type of storage building for complex equipment on a farm.

.....

..... [1]

[8 marks]

Section B

Answer any three questions from this section.

6 (a) Explain the harm caused by agriculture to the environment. [11]

(b) Give reasons why farmers should carry out experiments with new and own technologies. [9]

[Total: 20]

7 (a) Describe the meaning of "Conservation farming." [4]

(b) Outline how farmers practice conservation farming. [10]

(c) Discuss the importance of practicing conservation farming. [6]

[Total: 20]

8 (a) Describe the management of broiler chicks from day old to eight weeks under the following headings:

- (i) brooding,
- (ii) feeding,
- (iii) maintenance of health. [15]

(b) Describe the collection and storage of eggs. [5]

[Total: 20]

9 (a) Describe secondary cultivation. [10]

(b) Explain the advantages of using a seed drill over broadcasting seed when sowing seeds on the nursery bed. [2]

(c) State **four** advantages of using the nursery bed in vegetable growing. [4]

(d) Define "**hardening off**" in vegetable production and describe **two** ways in which it is achieved. [4]

[Total: 20]

10 (a) Define a farm budget. [5]

(b) Outline the importance of a farm budget. [9]

(c) State the basic forms of farm budgets. [6]

[Total: 20]



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Question 1. Figure 1 shows a developing foetus (calf before birth) in the uterus of a cow, with the amniotic fluid labelled and structures D, E and F.

Answer: (a) Structures: D = AMNION (the membrane enclosing the amniotic fluid); E = PLACENTA (attached to the uterine wall); F = UMBILICAL CORD (joining the foetus to the placenta).

(b) How structure E (the placenta) carries out its functions:

Answer: The placenta brings the mother's and the foetus's blood very close together (without mixing). Across it, oxygen, water and dissolved nutrients (glucose, amino acids, minerals) pass from the dam's blood to the foetal blood, while carbon dioxide and other wastes pass back to the dam for removal. It also produces hormones that maintain the pregnancy.

(c) Recommended guide for feeding a cow during gestation:

Answer: Give a balanced ration and increase feeding (especially in the last third of pregnancy) to support foetal growth — enough energy, protein, minerals (calcium and phosphorus) and vitamins — without over-fattening, plus plenty of clean water ('steaming up' before calving).

Question 2. (a) What is forestry? (b) Suggest three tree species that can improve soil fertility. (c) State a suitable site for growing trees.

Answer: (a) FORESTRY is the science and practice of planting, managing, protecting and using forests and trees.

(b) Three tree species that improve soil fertility (nitrogen-fixing/leguminous trees):

Answer: (i) Leucaena (*Leucaena leucocephala*); (ii) Sesbania (*Sesbania sesban*); (iii) Faidherbia albida (*Musangu/winter-thorn*). (Also Gliricidia, Acacia, Tephrosia.)

(c) A suitable site for growing trees:

Answer: Deep, well-drained fertile soil; an area with adequate rainfall/water and a suitable climate; gentle slopes; and a site protected from fire and stray animals, away from arable crops.

Question 3. Figure 2 shows the analysis of a soil sample shaken with water in a glass jar and left to settle, giving layers A to E.

In this sedimentation test the soil separates by particle size and weight (heaviest at the bottom; organic matter floats).

Answer: (a) Layers (top to bottom): A = ORGANIC MATTER (humus) floating; B = WATER; C = CLAY (finest particles); D = SILT; E = SAND and GRAVEL (coarsest, settles first at the bottom).

(b) Three soil components that CANNOT be determined by this experiment:

Answer: 1. Soil pH (acidity/alkalinity).

Answer: 2. The mineral/plant-nutrient content (e.g., nitrogen, phosphorus, potassium).

Answer: 3. The living organisms/micro-organisms in the soil. (It only shows texture and organic matter, not chemical or biological properties.)

Question 4. Figure 3 shows an onion bulb, with the fleshy leaves and lateral buds labelled and structures A, B and C.

Answer: (a) Structures: A = FOLIAGE LEAVES / terminal bud (top); B = ADVENTITIOUS ROOTS (bottom); C = the REDUCED STEM (basal plate) at the base.

(b) Two functions of structure C (the reduced stem / basal plate):

Answer: (i) It bears and produces the fleshy leaves, the roots and the lateral buds (the point of attachment).

Answer: (ii) It stores food and is the means of vegetative reproduction.

Answer: (c) One observable adaptation showing it is a storage organ: the swollen FLESHY (scale) LEAVES in which food is stored, making the bulb swollen.

Answer: (d) How onions are propagated: by seed (sown in a nursery and transplanted) and vegetatively by small bulbs/sets and lateral buds (offsets).

Question 5. Figure 4 shows a tractor-drawn implement carrying concave discs on a beam.

Answer: (a) Implement: a DISC PLOUGH.

(b) Functions of parts X, Y and Z:

Answer: X = DISC BLADE — the concave revolving plate that cuts, lifts, turns and inverts the soil.

Answer: Y = FURROW (rear) WHEEL — supports and stabilises the plough, controls the depth of ploughing and resists side thrust.

Answer: Z = SCRAPER — removes soil that sticks to the disc so that it keeps turning freely.

(c) Two advantages of the disc plough:

Answer: (i) It works well in hard, dry soils and can plough land with roots and stones, rolling over obstacles instead of being damaged.

Answer: (ii) It cuts and inverts the soil, burying weeds and crop residues, and is good for opening up new land.

Answer: (d) Preparing power-drawn implements for storage: clean off all soil, grease/oil the metal and moving parts to prevent rust, repair worn parts, and keep them under shelter.

Answer: (e) Type of storage building for complex equipment: an IMPLEMENT/MACHINERY SHED (workshop).

Question 6. [SECTION B] (a) Explain the harm caused by agriculture to the environment. (b) Give reasons why farmers should carry out experiments with new and own technologies.

(a) HARM CAUSED BY AGRICULTURE TO THE ENVIRONMENT:

Answer: Clearing land causes deforestation and loss of habitat/biodiversity; ploughing bare land and overgrazing cause soil erosion and, eventually, desertification; fertilizers and

pesticides pollute soil and water and poison non-target organisms; continuous monoculture exhausts soil fertility; burning crop residues and livestock release greenhouse gases; eroded soil silts up rivers; and over-irrigation can cause salinity/water-logging.

(b) WHY FARMERS SHOULD EXPERIMENT WITH NEW (AND THEIR OWN) TECHNOLOGIES:

Answer: To test whether a technology suits local conditions before adopting it fully (reducing risk); to increase yields and efficiency; to lower costs; to find higher-yielding or pest/disease-resistant varieties; to improve quality; to adapt methods to their own farm; and to stay competitive while conserving resources.

Question 7. (a) Describe the meaning of 'Conservation farming'. (b) Outline how farmers practise conservation farming. (c) Discuss the importance of practising conservation farming.

Answer: (a) CONSERVATION FARMING is a system of crop production that conserves soil and water — using minimum soil disturbance, permanent soil cover (crop residues), and crop rotation — so as to maintain or improve soil fertility and reduce erosion.

(b) HOW FARMERS PRACTISE CONSERVATION FARMING:

Answer: Minimum or zero tillage; digging permanent planting basins/potholes; retaining crop residues as mulch (no burning); crop rotation including legumes and intercropping; early land preparation and timely planting; precise placement of seed and fertilizer in the basins; agroforestry (e.g., *Faidherbia albida*); and contour ridges/terraces to slow run-off.

(c) IMPORTANCE OF CONSERVATION FARMING:

Answer: It conserves soil moisture (helping crops survive dry spells); greatly reduces soil erosion; maintains and improves soil fertility and structure; gives higher and more stable yields; lowers input costs through precise application; and is environmentally sustainable.

Question 8. (a) Describe the management of broiler chicks from day old to eight weeks under: (i) brooding, (ii) feeding, (iii) maintenance of health. (b) Describe the collection and storage of eggs.

Answer: (a)(i) BROODING: provide a brooder with a heat source kept at about 32–35°C in week one, reduced by about 3°C each week; use clean, dry litter; give adequate space, good ventilation and lighting; and guard against drafts, dampness and predators.

Answer: (a)(ii) FEEDING: give broiler starter mash (high protein, ~22–24%) for the first weeks, then finisher mash; provide clean water at all times; supply enough feeders and drinkers; and feed ad libitum (free choice).

Answer: (a)(iii) MAINTENANCE OF HEALTH: vaccinate against diseases (e.g., Newcastle, Gumboro); keep the house clean and disinfected with clean litter and water; practise biosecurity; give a coccidiostat/deworm as needed; avoid overcrowding; and isolate or cull sick birds.

(b) COLLECTION AND STORAGE OF EGGS:

Answer: Collect eggs frequently (2–3 times a day) and handle them carefully; clean dirty eggs and candle/grade them; store with the pointed end down in a cool (~13°C), fairly humid place away from strong smells; and market them within a reasonable time to keep them fresh.

Question 9. (a) Describe secondary cultivation. (b) Explain the advantages of using a seed drill over broadcasting. (c) State four advantages of using the nursery bed in vegetable growing. (d) Define 'hardening off' and describe two ways it is achieved.

(a) SECONDARY CULTIVATION:

Answer: The cultivation done AFTER primary tillage to prepare a fine seedbed — operations such as harrowing, disking, rolling and ridging. It breaks down clods, levels and firms the soil, controls weeds and incorporates manure/residues, producing a fine tilth ready for planting.

Answer: (b) ADVANTAGES OF A SEED DRILL OVER BROADCASTING: it places the seed at a uniform depth and spacing, uses less seed, gives even germination, covers the seed (less loss to birds) and makes later weeding easier.

(c) FOUR ADVANTAGES OF A NURSERY BED:

Answer: (i) Young, delicate seedlings are easily cared for in a small area; (ii) only healthy, vigorous seedlings are selected for transplanting; (iii) seedlings are protected from pests and harsh weather; (iv) seed is economised and seedlings can be raised while the main field is being prepared (giving a uniform crop).

Answer: (d) HARDENING OFF: gradually exposing nursery seedlings to harsher field conditions before transplanting so they suffer less transplanting shock. Two ways: gradually reduce the frequency of watering; and gradually remove the shade so the seedlings are exposed to direct sunlight and wind.

Question 10. (a) Define a farm budget. (b) Outline the importance of a farm budget. (c) State the basic forms of farm budgets.

Answer: (a) A FARM BUDGET is a financial plan that estimates the expected income (returns) and expenditure (costs) of a farm or enterprise over a period of time.

(b) IMPORTANCE OF A FARM BUDGET:

Answer: It helps plan the use of resources; estimates the expected profit or loss in advance; guides decision-making and the choice between enterprises; is needed to obtain loans/credit; controls spending and avoids wastage; and provides a standard against which actual performance is monitored.

(c) BASIC FORMS OF FARM BUDGETS:

Answer: Partial budget; complete (whole-farm) budget; enterprise budget; and cash-flow budget.

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