TONGA FORM SIX CERTIFICATE
2018
AGRICULTURAL SCIENCE

QUESTION AND ANSWER BOOKLET

Time allowed: 3 Hours

INSTRUCTIONS:
1. Write your Student Enrolment Number (SEN) on the top right-hand corner of this page.
2. This paper consists of SIX SECTIONS and is out of 70 Skill Level.

<table>
<thead>
<tr>
<th>SECTIONS</th>
<th>TOPICS</th>
<th>TOTAL SKILL LEVEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>AGRICULTURAL ECOSYSTEM AND ENVIRONMENT</td>
<td>7</td>
</tr>
<tr>
<td>B</td>
<td>SOILS</td>
<td>7</td>
</tr>
<tr>
<td>C</td>
<td>FARM POWER AND AGRICULTURAL MACHINERY</td>
<td>8</td>
</tr>
<tr>
<td>D</td>
<td>CROP PRODUCTION AND CROP PROTECTION</td>
<td>18</td>
</tr>
<tr>
<td>E</td>
<td>ANIMAL PRODUCTION AND HEALTH</td>
<td>18</td>
</tr>
<tr>
<td>F</td>
<td>AGRICULTURAL MANAGEMENT AND MARKETING</td>
<td>12</td>
</tr>
</tbody>
</table>

3. Answer ALL QUESTIONS. Write your answers in the spaces provided in this booklet.
4. Use a BLUE or BLACK ball point pen only for writing. Use a pencil for drawing if required.
5. If you need more spaces for answers, ask the supervisor for extra paper. Write your Student Enrolment Number (SEN) on each additional sheet, number the questions clearly and insert them in the appropriate places in this booklet.
6. Check that this booklet contains pages 2-23 in the correct order and that pages 22-23 has been deliberately left blank.

YOU MUST HAND IN THIS BOOKLET TO THE SUPERVISOR BEFORE YOU LEAVE THE EXAMINATION ROOM.
SECTION A: AGRICULTURAL ECOSYSTEM AND ENVIRONMENT

For questions 1 and 2 circle the letter of the BEST answer. To change your answer, cross out your first answer and circle your final choice.

1. **Sustainable agriculture** can be defined as the ____________________.

   A. measure of the ratio of agriculture outputs to agriculture inputs.
   B. combination of planting methods in growing one crop alongside another.
   C. science of cultivating soil for growing crops and rearing animals to provide foods.
   D. integrated system of plant and animal production practices with specific application lasting over a long term.

2. Choose a factor from the list below that **limits** the productivity of agriculture.

   A. Insect pest
   B. Seedling
   C. Vehicles
   D. Packing shed

3. List the factors influencing the **development** of farming system.

   ___________________________________________________
   ___________________________________________________
   ___________________________________________________
   ___________________________________________________
   ___________________________________________________
   ___________________________________________________

Skill level 1

<table>
<thead>
<tr>
<th>Level</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>NR</td>
<td></td>
</tr>
</tbody>
</table>

Skill level 2

<table>
<thead>
<tr>
<th>Level</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>NR</td>
<td></td>
</tr>
</tbody>
</table>
Study Figure 1 and answer question 4.

**Figure 1: Fertilizing Soil**

4. Explain a way that fertilizing the soil pollutes the environment.

______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________

Skill level 3
3
2
1
0
NR
SECTION B: SOILS

Study **Figure 2** and answer questions 1 and 2.

**Figure 2: Soil Profile**

1. Define **soil profile**.

   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________

2. Identify the most **fertile horizon** in soil as labelled in the profile above.

   ________________________________________________________________

3. Describe the importance of **soil profile**.

   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
Study Figure 3 and answer question 4.

**Figure 3: Soil Infiltration**

- **Infiltration**
  - a. Aggregated soil
- **runoff**
  - soil crusts after aggregates break down

4. Compare the movement of water in **aggregated soil** and **soil crusts**.

________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
__________
___________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________

<table>
<thead>
<tr>
<th>Skill level 3</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>NR</td>
<td></td>
</tr>
</tbody>
</table>
SECTION C: FARM POWER AND AGRICULTURAL MACHINERY

Study Figure 4 and answer question 1.

Figure 4: Tractor Implement

1. The tractor implement in Figure 4 is a___________________.

   A. Sub-soiler
   B. Rotary
   C. Cultivator
   D. Disc harrow

Study Figure 5 and answer question 2.

Figure 5: Tractor Component

2. The tractor component in Figure 5 show _____________________.

   A. a PTO
   B. Hydraulic Hoses
   C. a 3 – Point Linkage
   D. Hitching
Study Figure 6 and answer questions 3, 4 and 5.

**Figure 6: Tractor Parts**

3. The tractor part in Figure 6 labelled A is _______________.
   - A. the Hydraulic
   - B. a wheel
   - C. a PTO
   - D. the Hitching

4. Describe the function of the electrical system.

5. Explain the maintenance of the tractor implement.
Study Figure 7 and answer questions 1 and 2.

**Figure 7: Plant Parts**

1. The plant part in Figure 7 labelled Y is a ________________.
   - A. Node
   - B. Internode
   - C. Shoot
   - D. Root

2. Describe the function of the plant organ Y in Figure 7.

   __________________________________________________________
   __________________________________________________________
   __________________________________________________________
   __________________________________________________________
Study **Figure 8** and answer question 3.

**Figure 8: Vegetative Propagation**

3. Name the vegetative propagation above in **Figure 8**

   A. Corm
   B. Layering
   C. Grafting
   D. Budding

4. Explain **ONE** (1) advantage of vegetative propagation.

5. Explain **ONE** (1) advantages of seed propagation.
Study **Figure 9** and answer question 6.

**Figure 9: Banana Viral Disease**

6. The Viral disease of a banana plant in **Figure 9** is ____________.

   A. a Bunchy Top  
   B. Anthracnose  
   C. Black leaf streak  
   D. Black sigatoka

7. Describe how the viral disease of bananas is spread amongst the bananas.

   ___________________________________________________________________
   ___________________________________________________________________
   ___________________________________________________________________
   ___________________________________________________________________
   ___________________________________________________________________
   ___________________________________________________________________
   ___________________________________________________________________

   Skill level 1
   1
   0
   NR

   Skill level 2
   2
   1
   0
   NR
Study **Figure 10** and answer question 8.

**Figure 10: Yam Disease**

8. The yams shown in **Figure 10** is infected by ______________.
   
   A. protozoa  
   B. fungi  
   C. bacteria  
   D. nematodes

9. Analyse the relationship of the **host plant** (yam above), **pathogen** (disease causing organisms) with the favorable environment in a plant disease triangle.

<table>
<thead>
<tr>
<th>Skill level</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
<th>NR</th>
</tr>
</thead>
</table>
1. The organ labelled A as shown in Figure 11 is the ______________.
   A. bile
   B. liver
   C. stomach
   D. small intestine

2. The gestation period of a sow (pig) is ________ days.
   A. 114
   B. 285
   C. 150
   D. 336
Study **Figure 12** and answer question 3.

**Figure 12: Chicken Diarrhea**

Sione identified the following signs in the Tele’a Lakataha Poultry Farm at Mataliku.

i. chickens were weak,
ii. chickens did not move around,
iii. chickens huddled together
iv. loss of appetite,
v. blood in poop,
vi. have ruffled feather,

and vii. weight loss

3. Identify the problem of the chickens at the Tele’a Lakataha Poultry Farm.

   A. Coccidiosis
   B. Brucellosis
   C. Tuberculosis
   D. Foot and Mouth Disease

4. The definition of Passive Immunity is __________.

   A. a disease which can be transmitted to humans from animals
   B. disorders caused by organisms such as bacteria, viruses, fungi or parasites
   C. immunity from production of antibodies by the immune system in response to the presence of an antigen
   D. immunity which results from the introduction of antibodies from another person or animal such as colostrum
Study **Figure 13** and answer question 5.

**Figure 13: Cow’s Reproductive Organs**

5. Describe the function of the ovary.

________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________

6. Describe the signs of estrus in cows.

________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
Study Figure 14 and answer question 7.

**Figure 14: Cud Chewing**

7. Discuss cud chewing in ruminant.
Study Figure 15 and answer question 8.

**Figure 15: Roundworm Parasites in Pigs (Ascaris suum)**

8. Explain the **lifecycle** of roundworm parasites in pigs.

________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________

<table>
<thead>
<tr>
<th>Skill level 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td>NR</td>
</tr>
</tbody>
</table>
Study **Figure 16** and answer question 9.

**Figure 16: Tick Parasites**

9. Explain the clinical signs of tick damage.

________________________________________________________________________________

________________________________________________________________________________

________________________________________________________________________________

________________________________________________________________________________

________________________________________________________________________________

________________________________________________________________________________

________________________________________________________________________________

________________________________________________________________________________

________________________________________________________________________________

________________________________________________________________________________

________________________________________________________________________________

________________________________________________________________________________

<table>
<thead>
<tr>
<th>Skill level 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td>NR</td>
</tr>
</tbody>
</table>
SECTION F: AGRICULTURAL MANAGEMENT AND MARKETING

1. A Farm Manager can be defined as someone who ____________.
   A. helps measure and map the earth's land and other natural features
   B. tested agricultural machinery and equipment to ensure adequate performance
   C. drives and control farm equipment to till soil and to plant, and to cultivate and harvest crops
   D. directs and coordinates work activities, such as planting, irrigation, chemical application, payrolls, and recordkeeping

2. Compare a good and bad farm manager.

________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
Study Figure 17 and answer questions 3 and 4.

Figure 17: Market Channel for Yams in the New Zealand Market.

3. Identify the market for yams in this market channel.

________________________________________________________________________________
________________________________________________________________________________

4. Define market.

________________________________________________________________________________
________________________________________________________________________________

Skill level 1

<table>
<thead>
<tr>
<th>1</th>
<th>0</th>
<th>NR</th>
</tr>
</thead>
</table>

Skill level 1

| 1 | 0 | NR |
Study Figure 18 and answer questions 5 and 6.

**Figure 18: Demand Curve of Watermelon**

5. Describe the importance of **Promotion** to the demand watermelon as shown in Figure 18.

________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________

<table>
<thead>
<tr>
<th>Skill level 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td>NR</td>
</tr>
</tbody>
</table>
6. Analyse the factors that cause the **shifts** on the demand curve.
THIS PAGE HAS BEEN DELIBERATELY LEFT BLANK.