VICTORIAN CURRICULUM AND ASSESSMENT AUTHORITY

Victorian Certificate of Education 2002

SUPERVISOR TO ATTACH PROCESSING LABEL HERE

STUDENT NUMBER

										Letter
Figures										
Words										

AGRICULTURAL AND HORTICULTURAL STUDIES

Written examination

Wednesday 6 November 2002

Reading time: 9.00 am to 9.15 am (15 minutes)
Writing time: 9.15 am to 10.45 am (1 hour 30 minutes)

QUESTION AND ANSWER BOOK

Structure of book

Number of questions	*Number of questions to be answered*	*Number of marks*
10	10	100

- Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners and rulers.
- Students are NOT permitted to bring into the examination room: blank sheets of paper and/or white out liquid/tape.
- No calculator is allowed in this examination.

Materials supplied
- Question and answer book of 19 pages.

Instructions
- Write your **student number** in the space provided above on this page.
- All written responses must be in English.

Students are NOT permitted to bring mobile phones and/or any other electronic communication devices into the examination room.

Instructions

Answer all questions in the spaces provided.

Students are encouraged to use diagrams wherever they may help description or explanation.

Note that Questions 9 and 10 are related to one or two of the articles at the end of the paper.

Question 1

a. Plants grow well if their roots are provided with a suitable growing environment. List **four** different characteristics of a root's environment that managers of horticultural enterprises may modify to get the best growing conditions for their plants.

Characteristic 1 _____

_____

Characteristic 2 _____

_____

Characteristic 3 _____

_____

Characteristic 4 _____

_____

4 marks

b. Animal manure is often used to improve soil. Describe two ways animal manure may improve the soil, and two problems that adding manure may cause.

Improvement 1 _____

_____

Improvement 2 _____

_____

Problem 1 _____

_____

Problem 2 _____

_____

4 marks

c. The hours of daylight and the amount of sunlight received by a plant have different effects on plant growth and development. Explain the difference.

3 marks

CONTINUED OVER PAGE

Question 2

Salinity is a problem affecting many areas in Australia.

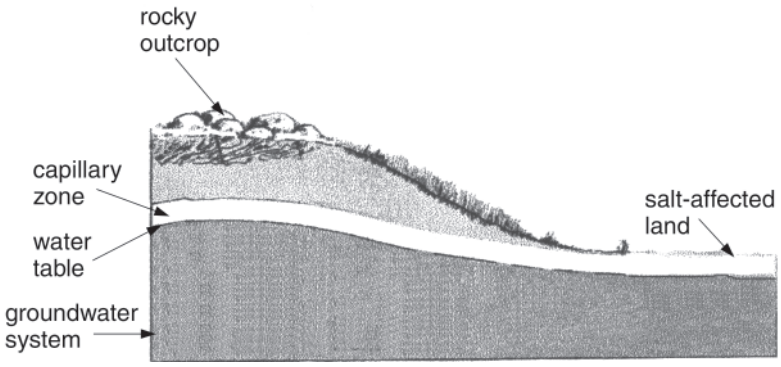

Figure 1. Formation of dryland salinity

a. On Figure 1 (above) show the position of the 'recharge area' and 'discharge area' and explain below how dryland soils become salt-affected.

3 marks

b. In Figure 1 (above), where would be the **most** effective place to plant trees to prevent salinity from occurring? Indicate the correct answer by ticking (✓) the appropriate box.

- on the rocky outcrop ☐
- the top half of the slope ☐
- the bottom half of the slope ☐
- on the salt-affected land ☐

1 mark

c. Besides planting trees, describe two other ways that a land manager could improve the sustainability of the property in Figure 1.

Improvement 1

Improvement 2

2 marks

Question 3

Wind erosion causes topsoil loss every dry season in Australia. Describe **in detail** two management practices that should be used to stop this wind erosion.

Management practice 1 _____

_____

_____

_____

Management practice 2 _____

_____

_____

_____

4 marks

CONTINUED OVER PAGE

Question 4

Microbial diseases occur when a microbial pathogen enters the host animal or plant.

Table 1. Microbial diseases

Newcastle disease of poultry	Swine fever	Scabby mouth	Distemper
Fowl pox	Foot and mouth	Blue tongue	Mosaic virus
Spotted wilt	Mastitis (cattle)	Enterotoxaemia (pulpy kidney)	Foot rot
Tetanus (goats)	Chronic Respiratory Disease (CRD) in poultry	Johne's disease	Crown gall (fruit trees)
Black rot (cabbage)	Bacterial leaf spot	Lumpy jaw	Ringworm
Powdery mildew	Rusts	Stem and root rots	Black spot
Bovine Spongiform Encephalopathy (BSE)	Coccidiosis	Smuts	Peach leaf curl

Choose one microbial disease from the list in Table 1.

Disease _____

i. Explain why it is a **problem**.

_____

_____

_____

_____

ii. Explain how to **prevent** it.

_____

_____

_____

_____

iii. Explain how to **control** it.

_____

_____

_____

_____

6 marks

Question 5

Table 2. Selected organisations

Horticultural Research and Development Corporation	Victorian Farmers' Federation	Murray Goulburn Trading Pty Ltd
Local Water Boards	Landcare Groups	Bureau of Meteorology
Pivot Ltd	Debco Pty Ltd	

Select an organisation from the list in Table 2. Describe what the organisation does and give an example of how it influences the management for sustainability of agricultural or horticultural operations.

Organisation _____

Description _____

_____

_____

_____

_____

_____

Influence on sustainability _____

_____

_____

_____

_____

4 marks

Question 6

Bill bought a small property and wants to produce cut flowers, grown in the field, for the export market. The plants he has chosen to grow give high returns but they have a low tolerance to water logging, salt and competition from broad leaf weeds.

Table 3. Environmental indicators

Water quality in streams	Number of pests	Level of nutrients in water tables and streams	Number of pest predators
Soil bulk density	Frog populations	Tree cover	Soil organic matter
Soil salt levels	Water table level	Soil fertility	Pesticide residue in the soil
Soil water flows	Extent of soil erosion	Prevailing winds	Area of remnant vegetation
Plant species present	Soil pH	Rainfall	Soil structure

a. From the list of environmental indicators in Table 3, select **two** indicators that Bill should use **to assess the suitability** of the property for the cut flower enterprise. Explain how these indicators would help Bill decide whether the property is suitable for cut flowers.

Indicator 1 _____

Suitability _____

_____

_____

_____

Indicator 2 _____

Suitability _____

_____

_____

_____

4 marks

b. From the list of environmental indicators in Table 3, select **two** indicators that Bill should use to monitor **sustainability** of his cut flower production. Explain how Bill should alter his management if the indicator shows that sustainability is threatened.

Indicator 1 _____

Explanation _____

_____

_____

_____

Indicator 2 _____

Explanation _____

_____

_____

_____

4 marks

c. Bill wishes to protect his flower crops from pests and disease using Integrated Pest Management (IPM). Explain what IPM is and give **two** advantages and **two** disadvantages of using it.

IPM _____

_____

_____

Advantage 1 _____

_____

Advantage 2 _____

_____

Disadvantage 1 _____

_____

Disadvantage 2 _____

_____

6 marks

Question 7

Developing an enterprise normally involves a written business plan. A business plan is made up of a production plan, marketing plan and financial plan.

a. Explain in detail how the production plan influences the business plan.

3 marks

b. Explain in detail how the marketing plan influences the business plan.

3 marks

c. Explain in detail how the financial plan influences the business plan.

3 marks

Question 8

Abby recently bought a picturesque grazing property in the foothills of the Great Dividing Range. The property is on the site of a historic goldfield that brings many tourists to the area. She plans to clear the bushland to use the land with high fertility that has never been farmed. The sandy clay-loam country in the moderately high winter rainfall area is ideal for pasture growth. She hopes to benefit from the land's fertility by stocking at a high level. During the colder winter climate, she will supplementary feed the stock to maintain the high stocking rate.

a. Abby is worried that her plans will increase erosion on the property. What type of erosion would be most likely on this property? Justify your answer, and state how it could be prevented and controlled.

Erosion type _____

Reason why it may occur _____

_____

_____

_____

Prevention _____

_____

_____

_____

Control _____

_____

_____

_____

6 marks

b. Abby is also concerned about the risk of other forms of environmental degradation.

Table 4. Types of environmental degradation

Soil nutrient depletion	Soil acidification	Soil decline: biological and structural
Decline in native pastures and environmental value of rangelands	Loss of habitat and biodiversity	Riparian, remnant vegetation damage and rural tree decline
Increase in salinity of dryland farming	Increase in salinity of irrigation farming	River flows
Nutrients, salts and pollutants in wetlands, rivers and water bodies	Contamination of ground water with nutrients, salt and pollutants	Contamination with residues of agricultural chemicals

From Table 4 identify **two** problems, other than erosion, that Abby's management strategies may cause. Explain why these may become a problem and how she should monitor each problem.

Degradation 1 _____

Explanation _____

_____

_____

Monitoring _____

_____

_____

_____

Degradation 2 _____

Explanation _____

_____

_____

Monitoring _____

_____

_____

_____

8 marks

c. Using only the information presented at the start of Question 8, explain how sustainable Abby's new farm will be with regard to the following three areas.

The economic productivity of the enterprise

The management of the physical and biological ecosystem

The impact of the enterprise on the community

6 marks

CONTINUED OVER PAGE

d. How should Abby apply the principles of whole farm planning to make her plans for the property more sustainable? Give reasons for your answer.

6 marks

e. Name the organisation that would **most likely** be able to advise Abby about how to manage her property in a sustainable manner. Using only the information given at the start of Question 8, justify your answer.

Organisation _____

Justification _____

2 marks

Question 9

Choose and read one of the articles on pages 17, 18 and 19 of this examination.

What is the title of the article you have chosen? _____

a. Describe the **currently used practices** that will be replaced by the machinery, equipment or techniques described in the article.

_____

_____

_____

_____

2 marks

b. Explain two advantages of changing from the currently used practices to the practices described in the article.

Advantage 1 _____

_____

_____

_____

Advantage 2 _____

_____

_____

_____

4 marks

c. Explain two problems that may be encountered **as a result of changing** to the practices described in the article.

Problem 1 _____

_____

_____

_____

Problem 2 _____

_____

_____

_____

4 marks

TURN OVER

Question 10

Choose and read one of the articles on pages 17, 18 and 19 of this examination. It may be the one chosen in Question 9, but does not have to be.

What is the title of the article you have chosen? _____

a. Two items of machinery, equipment or techniques are in **bold** in the article. Describe what they do.

Item 1 _____

Item 2 _____

4 marks

b. Explain how these two items of machinery, equipment or techniques improve farmers' or horticulturists' **efficiency**.

4 marks

Refer to the following articles when answering Questions 9 and 10.

Nursery production

Tough greenhouses

Hailstorms can severely damage conventional glasshouses. This problem has been solved by a South Australian market gardener using high-tech, **double-skinned plastic greenhouses**. Small electric motors pump hot air from the top of the greenhouses into the double-skinned ceilings, inflating the roofs to become cushions. The air insulates the shed and also gives it enough strength to resist even the biggest hailstones.

The entire operation is computer climate controlled at a constant 25 degrees Celsius. Within the greenhouses computers also control the **hydroponics system**. The ventilation is controlled to minimise wind turbulence.

Each greenhouse has cost more than $2 million to establish and so far the investment is paying off in terms of increased productivity.

Soil management

Reclamation using trees

Trees selected for their salt tolerance have been used to successfully rehabilitate salt scald. A saline site was planted with salt-tolerant tree species that included river red gum, swamp yate, river sheoak, grey and swamp sheoak. A year later the site was ready to be planted with phalaris and other perennial pasture species.

The site was first sprayed with a **glyphosate spray** and then ripped to 70 cm deep with a bulldozer pulling a **winged ripper**. Weeds were controlled before the August–September planting and fertiliser was applied during October. The direct costs on a 5 hectare site were $3000. The farmer said the conservation benefits justified the expense.

The revegetation is carried out in conjunction with tree plantings on the recharge sites on the surrounding hills.

Horticultural crops

Huge net shows its worth

Hail is a major threat to any fruit crop. Fruit not covered by a **crop net** is difficult to insure. Export markets require perfect fruit.

A giant crop net spans the 62-hectare nashi pear orchard near Shepparton. The net shelters 45 000 nashi trees and 30 000 cherry trees. Nashi trees are difficult to grow as the skin of the nashi is sensitive to abrasion, so the position of the fruit on the tree is important. When pruning in winter the aim is to ensure that 40 pieces of fruit grow either side of each tree with fruit spaced a hand-span apart. All trees are grown on either **Tatura or open trellis** and the fruit is ground-picked to keep down labour costs.

Irrigation management

Probing new ground

Continuous and remote monitoring of soil moisture and fertiliser levels will provide many advantages to irrigators. This monitoring can be done using a soil moisture probe, known as a capacitance or **C-Probe**, linked to a two metre aerial that transmits data from the field directly to an office computer.

Each probe and transmitter costs about $3000 but they last a long time. The probe is inserted into the ground and measures soil conductivity. The C-Probe has **multi-depth sensors**, which give readings throughout the soil profile to display wetting patterns and root activity. This information is then transferred via the aerial transmitter positioned next to the probe in the soil, back to a computer. The information is then used to graph soil moisture content at the different sensor levels.

The system works in a range of irrigation systems, including those for vines, cotton, potatoes, apples and olives.

Pest control

Natural-born enemies

Birds cause damage to a range of orchard crops. They become used to most bird-scaring devices if used on their own. Scaring techniques need to be varied to maintain their initial effect.

Several bird-scaring devices are available, including scarecrows, gas guns and distress calls. **BirdDeter** is a new electronic system, which responds with sounds and visual deterrents. These scare the birds away before they settle in the crop or other areas which are being protected.

The system consists of two parts: a radar detection unit and the bird deterrent module. The radar detection unit senses when birds fly anywhere through the protected area. Then the deterrent module is triggered by radio link from the radar unit.

It has been found that certain natural predators effectively deter birds. A **computer with appropriate software** manages the deterrent module and varies the type, sequence and duration of sounds and visual deterrents of natural predators every time the unit is activated. The system is portable and can be moved around to where it is needed most.

Cropping and pasture

High speed pasture drill

The new Australian designed **Conserva-Tech No-Till seeders** operate at 15–20 km/h compared with the 8–10 km/h of ordinary drills. In addition to its speed it has a one-pass operation and can sow difficult country. The main feature of the $85 000 drill is a gantry of row seeders, each with a rolling disc and press wheel. Its ground hugging abilities give accurate seed-placement at depths of up to 120 mm. Instead of tynes, the rolling discs cut a slot into which seed is deposited before the press wheel closes the slot. No pre-cultivation is required, making this machine well suited to **minimum tillage techniques**. The machine is suitable for a range of soil types and can handle pasture renovation, fodder crops, dryland cropping and raised beds.

Grazing

Computer-aided management decisions

A new grazing simulator computer software program can be used to evaluate stocking rates on a farm and to explore the profitability of leasing more land.

The **GrassGro simulator** quantifies many of the uncertainties surrounding stocking rates and leasing decisions. The simulator is designed to simulate grazing enterprises in temperate areas of southern Australia. It uses historical weather records and takes note of daily weighted weather and soil information and models pasture growth. It then matches these with appropriate livestock and works out the profitability or otherwise of the management decisions.

This system is distinguished from others by using daily weather records. The software can assess the risk of increasing stocking rates. Assessment of **optimum stocking rates** helps to determine the investment in livestock and fertiliser. The information is used in conjunction with personal experience in decision making.

Dairy farming

Inline temperature gauge

Maintaining optimum **dairy hygiene techniques** has motivated a group of young people from Dairyatgipp to design an **inline temperature gauge** that will allow operators to know the temperature of the hot water they are using. Water required to clean the equipment is too hot for farmers to put their hands in to test with conventional hand-held thermometers.

The gauge is fixed in the pipeline in a strong casing. The gauge records temperature quickly and accurately. The inline thermometer is easy to read from some distance. It allows the temperature of the water in the dairy to be known at all times.

Poultry

Free-range poultry

Genuine free-range poultry are being housed in **portable mobile sheds**. A tractor moves the sheds from paddock to paddock. The chickens are supplementary fed on a quality grain mix that includes lucerne and corn. The feed is in the shed all the time, so the chickens can eat whenever they want to. The sheds are made out of metal to deter mites and to reduce the level of bacteria. They are self-contained with water, feed and individual laying boxes with wood shavings. **Solar-collecting panels** attached to the roof provide heating, cooling and lighting.

Pigs

Eco-shelter pig production

The **Eco-shelter piggery** has a 4500-head capacity. The absence of internal divisions in the pens means that the design comes closer to free-range than any other intensive pig-farming system. The pigs can run and play under this system, providing good muscle tone.

Deep-litter bedding, which is spread over the compact clay base of the sheds, is designed to absorb urine and partially break down dung. The smell associated with most piggeries is almost eliminated. Waste removed at the end of each 17-week growing period is marketed as mulch.

The design is endorsed by the RSPCA and is designed under an animal welfare plan. It is commercially sound.

END OF QUESTION AND ANSWER BOOK