



STUDENT NUMBER

CENTRE NUMBER

HIGHER SCHOOL CERTIFICATE EXAMINATION

1998

AGRICULTURE

2/3 UNIT (COMMON)

SECTION I

(20 Marks)

*Total time allowed for Sections I, II, III and IV—Three hours
(Plus 5 minutes reading time)*

DIRECTIONS TO CANDIDATES

- Write your Student Number and Centre Number at the top right-hand corner of this page.
- Board-approved calculators may be used.

Section I

- Attempt ALL questions.
- Answer the questions in the spaces provided in this paper.

MARKER'S USE ONLY

| Page | Marks |
|------|-------|
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |

SECTION I

(20 Marks)

Attempt ALL questions.

Allow about 35 minutes for this Section.

MARKER'S
USE ONLY

QUESTION 1

(a)

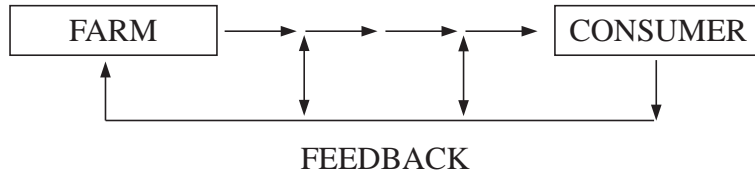


FIG. 1. A MODEL OF AGRICULTURAL MARKETING

Name ONE farm product you have studied.

| |
|----------------------------|
| Name of farm product |
|----------------------------|

(i) List TWO steps that occur in the marketing chain as the product moves from farm to consumer as shown in Figure 1.

1.
2.

(ii) For ONE of the steps listed in part (a) (i), outline how this step affects the product received by the consumer.

| |
|----------------------------|
| Marketing chain step |
|----------------------------|

.....

.....

(iii) Outline how feedback influences farmer decision making for the product.

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QUESTION 1. (Continued)

MARKER'S
USE ONLY

(b)

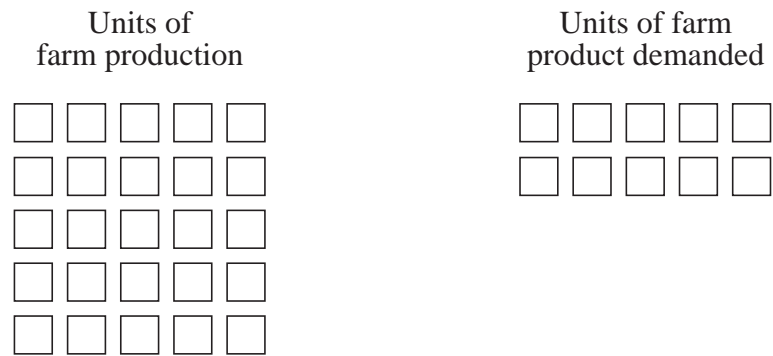


FIG. 2. RELATIVE QUANTITIES OF PRODUCT SUPPLIED AND DEMANDED

(i) State the problem illustrated in Figure 2.

.....

(ii) Outline TWO strategies that a producer could use to overcome the problem you identified in Figure 2.

1.

.....

2.

.....

(iii) Name ONE off-farm agency/organisation, and outline how it might help to overcome the problem in Figure 2.

.....

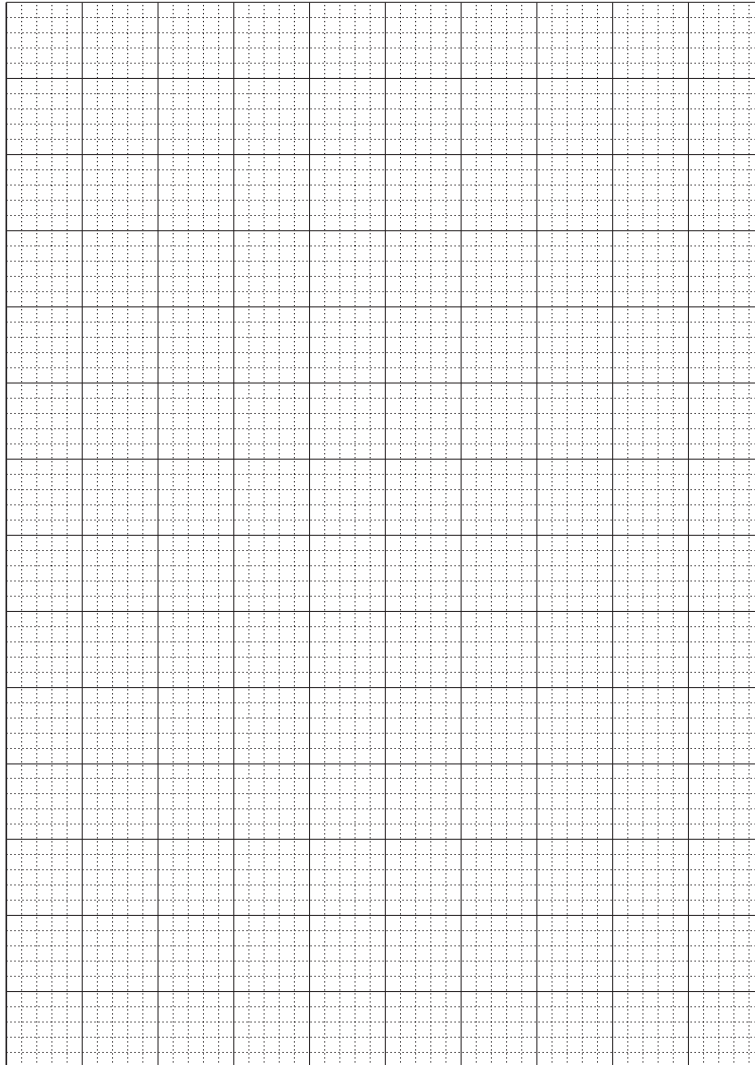
.....

QUESTION 2MARKER'S
USE ONLY

TABLE 1. CHANGE IN FARM OWNERSHIP

| | <i>Number of farms (10 000s)</i> | <i>Average farm area ha (000s)</i> |
|------|--------------------------------------|----------------------------------------|
| 1960 | 2.1 | 2.2 |
| 1970 | 1.9 | 2.4 |
| 1980 | 1.8 | 2.7 |
| 1990 | 1.3 | 3.4 |

- (a) Use a bar graph to represent the data from Table 1 on the grid below.



QUESTION 2. (Continued)

MARKER'S
USE ONLY

(b) From your graph, describe the trends for farm ownership in Australia.

.....
.....

(c) Describe the possible role/impact of technology on these trends.

.....
.....
.....

(d) State TWO factors, other than technology, that may have contributed to these trends.

(i)

(ii)

(e) Describe the social implications of these trends on the wider rural community.

.....
.....
.....
.....

QUESTION 3MARKER'S
USE ONLY

A crop was growing poorly. Soil tests were taken from the paddock and these, combined with observation of plant symptoms, suggested that growth was limited by either sulfur or potassium, or a combination of both nutrients. Soil samples were collected from the site and a glasshouse pot trial was set up with five replications of the following treatments:

- control
- potassium fertiliser (50 kg K/ha)
- sulfur fertiliser (40 kg S/ha).

The results given in Table 2 show dry matter yields (grams/pot) when the plants were cut after eight week's growth.

TABLE 2. DRY MATTER YIELD, (g/pot)

| <i>Treatment</i> | DRY MATTER YIELD (g/pot) | | | | | <i>Mean</i> |
|------------------|--------------------------|---------------|---------------|---------------|---------------|-------------|
| | <i>Rep. 1</i> | <i>Rep. 2</i> | <i>Rep. 3</i> | <i>Rep. 4</i> | <i>Rep. 5</i> | |
| Control | 1.8 | 2.5 | 2.0 | 2.2 | 1.5 | 2.0 |
| Potassium | 2.3 | 2.7 | 2.0 | 2.1 | 2.4 | 2.3 |
| Sulfur | 6.2 | 5.7 | 5.3 | 6.5 | 6.3 | |

- (a) Calculate the mean yield for the sulfur treatment.

.....

- (b) Outline the contents of the pots in the control treatment in this experiment.

.....

.....

- (c) Which nutrient was the main limitation to growth?

.....

- (d) Outline an additional treatment that should have been included in the glasshouse experiment to answer the question suggested by the soil test results.

.....

.....

- (e) Describe further experimental work that would need to be done before making field recommendations about fertiliser rates.

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SECTION II*(45 Marks)*

*Total time allowed for Sections I, II, III and IV—Three hours
(Plus 5 minutes reading time)*

DIRECTIONS TO CANDIDATES

- Write your Student Number and Centre Number at the top right-hand corner of this page.
- Board-approved calculators may be used.

Section II

- Attempt THREE questions.
- Answer the questions in the spaces provided in this paper.
- Place a tick in the boxes on this page to indicate the questions you have attempted in Section II.

| Question | Questions Attempted | Marker's Use Only |
|----------|---------------------|-------------------|
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |

SECTION II

(45 marks)

Attempt THREE questions.

Each question is worth 15 marks.

Allow about 80 minutes for this Section.

MARKER'S
USE ONLY

QUESTION 4

- (a) Table 3 shows the average feed conversion ratios (FCR) that were determined for two groups of animals in a feeding trial.

TABLE 3. RESULTS OF A FEEDING TRIAL

| GROUP A | | | | GROUP B | | | |
|------------|-------------------|--------------------------|------------|------------|-------------------|--------------------------|------------|
| <i>Pen</i> | <i>Feed in kg</i> | <i>Weight gain in kg</i> | <i>FCR</i> | <i>Pen</i> | <i>Feed in kg</i> | <i>Weight gain in kg</i> | <i>FCR</i> |
| 1 | 58.0 | 5.0 | 11.6 | 1 | 28.0 | 5.6 | 5.0 |
| 2 | 116.0 | 8.0 | | 2 | 24.8 | 5.5 | 4.5 |
| 3 | 86.4 | 7.2 | 12.0 | 3 | 32.8 | 8.0 | 4.1 |

- (i) Calculate the feed conversion ratio for Pen 2 in Group A.

.....

- (ii) On the basis of the data presented in Table 3, explain which group is most likely to be monogastric.

.....

.....

- (iii) Explain why animals in Group A have such a high feed conversion ratio.

.....

.....

.....

.....

.....

QUESTION 4. (Continued)

MARKER'S
USE ONLY

- (iv) Describe ONE practice that can be used by producers to aid ruminant digestion.

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.....

(b)

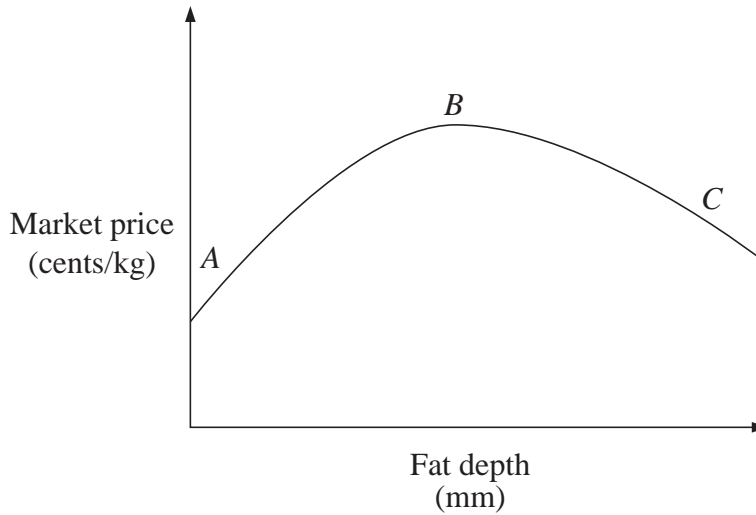


FIG. 3. RELATIONSHIP BETWEEN MARKET PRICE AND FAT DEPTH

- (i) Describe the relationship illustrated in Figure 3 above.

.....

.....

- (ii) Give ONE reason for the market price trend between B and C.

.....

.....

- (iii) Explain why a farm manager may decide to sell animals at a point other than B.

.....

.....

.....

QUESTION 4. (Continued)

MARKER'S
USE ONLY

(c) For a named animal production system, answer the following questions.

| |
|--------------------------------|
| Animal production system |
|--------------------------------|

(i) Outline how ONE animal characteristic, other than fat depth, affects the price received by the farmer.

.....
.....
.....

(ii) Explain how selective breeding can be used to improve the quality of the animal product in this animal production system.

.....
.....
.....

(iii) Describe ONE management practice that aims to maximise the reproductive efficiency of the animal production system.

.....
.....
.....

(iv) For a named pest, describe how it affects the productivity of the animal production system.

.....
.....
.....

QUESTION 5

MARKER'S
USE ONLY

- (a) Experiments were carried out to determine the number of days it took for vegetable seedlings to emerge at different temperatures. The data for the experiment are shown in Table 4.

TABLE 4. NUMBER OF DAYS FOR VEGETABLE SEEDLINGS TO EMERGE AT DIFFERENT TEMPERATURES

| |
|-------------------------|
| Copyright not available |
|-------------------------|

- (i) What is the temperature for the most rapid emergence of lettuce seedlings?
.....
- (ii) Explain why seedlings take longer to emerge at lower temperatures.
.....
.....
- (iii) Describe ONE management technique that a farmer may use to reduce the effect of low temperatures on the emergence of seedlings.
.....
.....

Question 5 continues on page 14

QUESTION 5. (Continued)

MARKER'S
USE ONLY

(b) At all stages in the life cycle of a plant, the plant interacts with its environment.

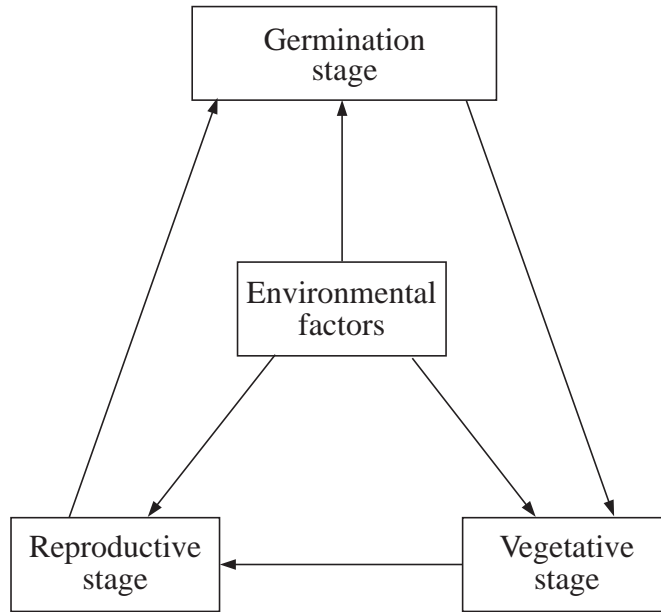


FIG. 4. INTERACTION OF THE PLANT LIFE CYCLE AND THE ENVIRONMENT

(i) Name TWO environmental factors, other than temperature, that affect plant growth and development.

- 1.
- 2.

(ii) For ONE environmental factor named in part (b) (i), explain how its impact on the stages of the plant life cycle affects the final plant product.

.....

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QUESTION 5. (Continued)

MARKER'S
USE ONLY

(c) (i) Outline why a top dressing of artificial nitrogenous fertiliser is often applied to a pasture for the benefit of:

1. pasture plants;

.....
.....

2. grazing animals.

.....
.....

(ii) Describe the possible negative effects of the nutrients in fertilisers on waterways in the wider ecosystem.

.....
.....
.....

(iii) Describe ONE strategy that a farmer could use to help prevent the nutrients in fertilisers being transferred to the wider ecosystem.

.....
.....

(iv) Explain how micro-organisms are involved in ONE alternative method of providing nitrogen for pastures.

.....
.....
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.....

(v) Trampling of pastures is a major cause of lost production. Describe TWO management techniques a farmer might use to reduce the loss of pasture due to trampling by animals.

1.
.....

2.
.....

QUESTION 6

MARKER'S
USE ONLY

- (a) Farmers may use oats for both grazing and grain production. Grazing an oat crop during the vegetative phase affects subsequent grain production. Figure 5 shows the effect of the time of grazing on oat grain yield and sheep liveweight gain when compared with no grazing.

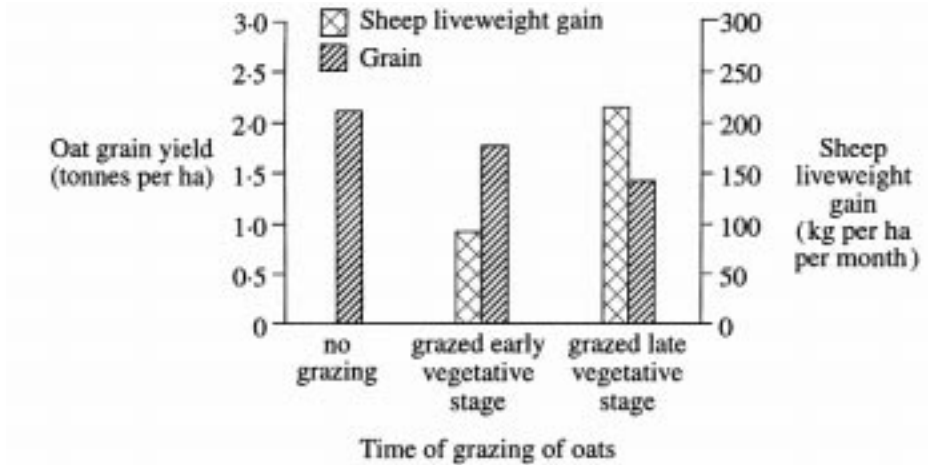


FIG. 5. TIME OF GRAZING, OAT GRAIN YIELD AND SHEEP LIVELWEIGHT GAIN

FIG. 5. TIME OF GRAZING, OAT GRAIN YIELD AND SHEEP LIVELWEIGHT GAIN

- (i) Describe the effect of the time of grazing on:
1. oat grain yield;

.....

.....
 2. sheep liveweight gain.

.....

.....
- (ii) What further information would a producer need to make a financial analysis, to assess if or when to graze the crop?
-
-
-
-
- (iii) Describe a form of financial analysis that could be used to determine the most profitable management option for oats.
-
-

QUESTION 6. (Continued)

MARKER'S
USE ONLY

(b) Figure 6 shows the effect of the rate of selection of bulls on genetic gain.

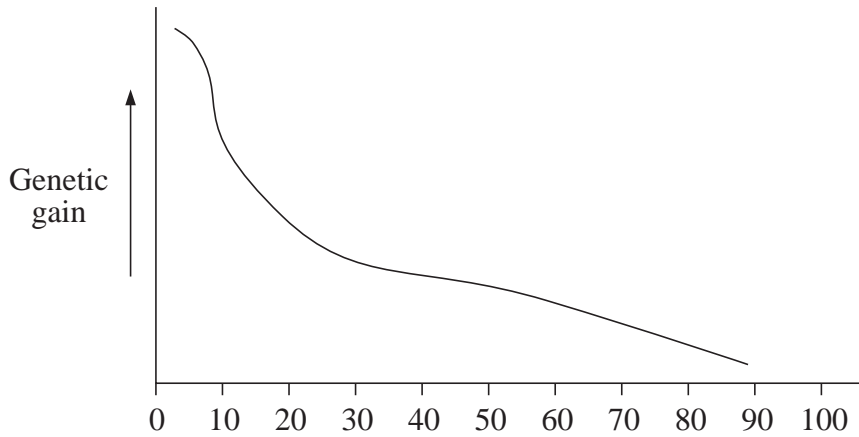


FIG. 6. PERCENTAGE OF BULLS SELECTED FOR BREEDING

(i) State the relationship between the percentage of bulls selected for breeding and genetic gain.

.....

(ii) Outline an implication of this relationship for farmers involved in on-farm breeding programs.

.....
.....

(iii) For an animal system you have studied, explain the changes in management that should occur to achieve the potential of the genetic gain.

Animal system

.....

QUESTION 6. (Continued)

MARKER'S
USE ONLY

(c) A market garden was mulched with wheat straw on one area and legume hay on another. After a period of time it was observed that the mass of legume hay was considerably reduced, compared to the wheat straw.

(i) List THREE reasons why the garden was mulched.

1.

2.

3.

(ii) Explain why the mass of legume hay decreased at a faster rate than the wheat straw.

.....

.....

(iii) Describe TWO effects the decomposition of legume hay would have on soil properties.

1.

2.

(iv) State the effect mulching has on the number of earthworms in the soil. Give reasons for your answer.

.....

.....

.....

(v) Describe the effect of the breakdown of organic matter by earthworms on physical and chemical properties of soil.

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Please turn over

QUESTION 7

MARKER'S
USE ONLY

- (a) Figure 7 is a diary extract from a researcher who was collecting data on insect numbers in response to the number of natural predators. The researcher took three samples of insects and predators in each sampling.

Hot today! 2 FEB

Insects 16 15 11

Predators 3 2 4

Insects a bit high today

9 FEB

Insects 24 18 21

Predators 3 1 2

Insects worse - where are the predators?

16 FEB

Insects 6 4 2

Predators 6 7 5

This is looking good today

FIG. 7. A DIARY EXTRACT

QUESTION 7. (Continued)

MARKER'S
USE ONLY

- (i) The following question refers to Figure 7.

In order to observe the trends in the populations over time, the researcher must calculate means.

Construct a table in the space below that best represents the insect and predator data that could be calculated from the researcher's diary.

| |
|--|
| |
| |

- (ii) Describe a possible reason for the trends shown in the data in your table.

.....

.....

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- (iii) Explain how information like this could be used in finding a method of control for an agricultural insect pest.

.....

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QUESTION 7. (Continued)

MARKER'S
USE ONLY

- (b) Figure 8 illustrates how the characteristics of soil quality provide a link between farming strategies and sustainable agriculture.

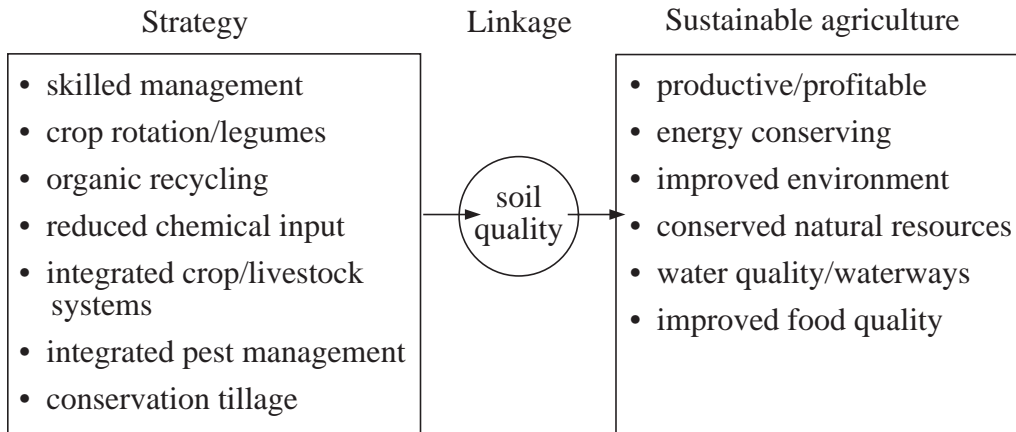


FIG. 8. FARM STRATEGIES AND SUSTAINABLE AGRICULTURE

- (i) Describe how the strategy of crop rotation benefits cropping systems.

.....

.....

.....

.....

- (ii) Figure 8 has soil quality as a central link in agricultural systems.

1. List THREE characteristics that can describe soil quality.

A.

B.

C.

2. Describe a management practice that can adversely affect ONE of the characteristics listed in part (b) (ii).

Soil characteristic

.....

.....

QUESTION 7. (Continued)

MARKER'S
USE ONLY

(iii) From Figure 8, explain how soil quality affects the link between reduced chemical input and:

1. improved food quality;

.....
.....

2. conserved natural resources.

.....
.....

(iv) Describe an integrated pest management (IPM) program for a named plant production system that you have studied.

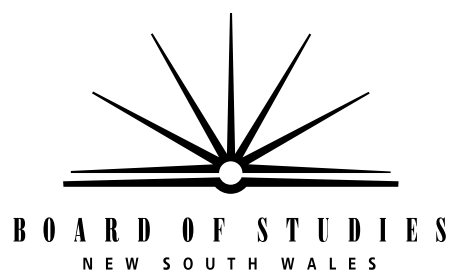
| |
|-------------------------------|
| Plant production system |
|-------------------------------|

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.....

(v) For the IPM system you described in part (b) (iv), outline the role of skilled management in its implementation.

.....
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1998

AGRICULTURE

2/3 UNIT (COMMON)

SECTION III*(20 Marks)***SECTION IV***(15 Marks)*

*Total time allowed for Sections I, II, III and IV—Three hours
(Plus 5 minutes reading time)*

DIRECTIONS TO CANDIDATES

- Write your Student Number and Centre Number at the top right-hand corner of this page.
- Board-approved calculators may be used.

Section III

- Attempt ONE question.
- Answer the question in the spaces provided in this paper.
- Place a tick in the box on this page to indicate the question you have attempted in Section III.

Section IV

- Attempt ONE question.
- Answer the question in a SEPARATE Writing Booklet.
- You may ask for additional Writing Booklets if you need them.

| Question | Questions Attempted | Marker's Use Only |
|----------|---------------------|-------------------|
| 8 | | |
| 9 | | |
| 10 | | |

SECTION III

(20 marks)

Attempt ONE question.

Each question is worth 20 marks.

Allow about 35 minutes for this Section.

MARKER'S
USE ONLY

QUESTION 8. Plant Production

- (a) (i) Outline the role of ONE plant hormone in plant growth and development.

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.....

- (ii) Describe how this plant hormone can be used to manipulate plant production.

.....
.....
.....

- (b) (i) Distinguish between vegetative and reproductive yield in terms of plant growth and development.

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QUESTION 8. (Continued)

MARKER'S
USE ONLY

- (ii) For a named plant production system you have studied, answer the following questions.

| |
|-------------------------------|
| Plant production system |
|-------------------------------|

- 1. State whether vegetative or reproductive yield is the most important for economic product.
.....
- 2. Explain how plant density affects the yield from the named plant production system.
.....
.....
.....
.....

- (c) (i) Describe the technique of tissue culture.
.....
.....
.....
.....
- (ii) State TWO advantages of tissue culture for a plant production system.
 - 1.
 - 2.

Question 8 continues on page 28

QUESTION 9. Animal Production

MARKER'S
USE ONLY

(a) Rumen micro-organisms are essential to the nutrition of ruminant animals.

(i) Name TWO types of micro-organisms in the rumen.

1.

2.

(ii) Describe the roles of these microbes in the digestion of ruminant feedstuffs.

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.....
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.....

(b) For an animal system you have studied, answer the following questions.

Animal system

(i) Describe a technique that a producer can use to manipulate growth and development.

.....
.....
.....
.....

Question 9 continues on page 30

QUESTION 9. (Continued)

MARKER'S
USE ONLY

- (ii) Explain how feedback from markets has led to a change in a specific management strategy associated with this system.

.....

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.....

.....

- (iii) Describe a method of manipulating the genetic material of the animal system that leads to improved product quality OR quantity.

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Question 9 continues on page 31

QUESTION 10. Land Management

MARKER'S
USE ONLY

(a) A total catchment management (TCM) action plan is represented in Figure 9.

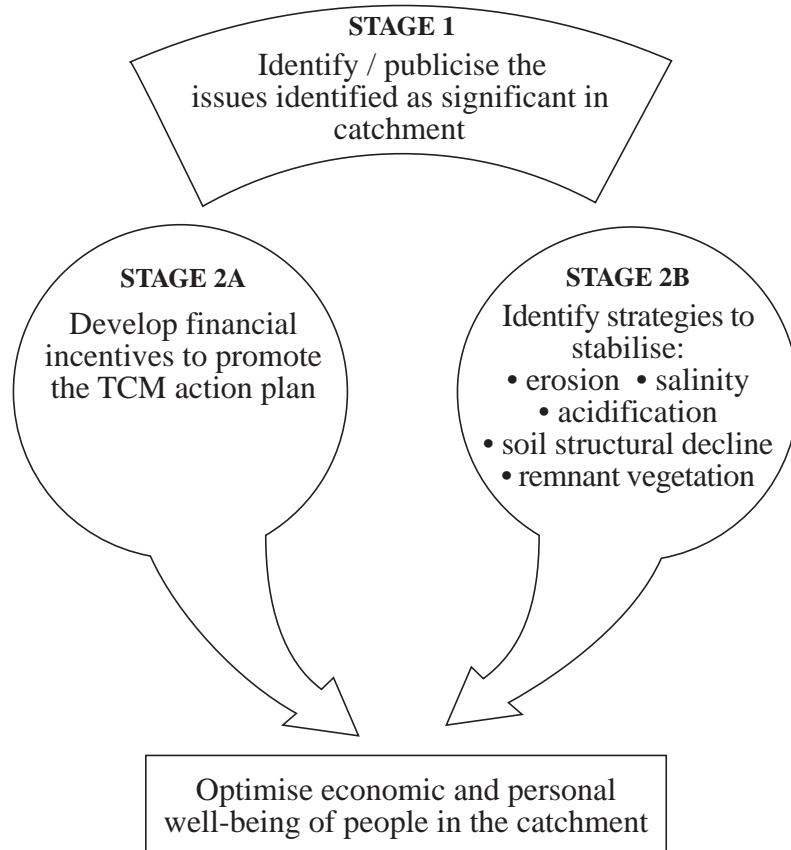


FIG. 9. A TOTAL CATCHMENT MANAGEMENT ACTION PLAN

(i) Using examples, describe the ways in which groups such as Land Care can implement Stage 1 of this action plan.

.....

.....

.....

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.....

(ii) Describe strategies that an individual farmer could use to reduce the effect of ONE of the soil problems identified in Stage 2B of this action plan in Figure 9.

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QUESTION 10. (Continued)

MARKER'S
USE ONLY

- (iii) Explain how social attitudes of farmers and the wider community might affect the implementation of the action plan.

.....
.....
.....
.....

- (iv) State the major characteristics used to assess land for capability classification.

.....
.....
.....

- (v) Explain how land capability assessment of a catchment affects a total catchment management plan.

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Question 10 continues on page 34

SECTION IV**Marks**

(15 marks)

Attempt ONE question.

Each question is worth 15 marks.

Allow about 30 minutes for this Section.

QUESTION 11

In any plant production system, interference is a significant process that has to be managed. Using examples:

- (a) describe the significant components of interference in plant production systems; **6**
- (b) explain strategies managers use to reduce negative interference factors in plant production systems. **9**

QUESTION 12

Improving the productivity of animal production systems has focused largely on improving the genetic potential of animals. Managing nutrition is now the key to future improvements.

For an animal production system you have studied:

- (a) describe the key factors considered by managers to meet the nutritional requirements of the animals; **9**
- (b) discuss the strategies producers use to evaluate the effectiveness of their management of animals. **6 nutritional**

Please turn over

QUESTION 13**Marks**

The key to success in the 1990s is to 'grow for your market' not simply 'market what you grow'.

For ONE farm product you have studied:

- (a) describe the market requirements of this product; **7**
- (b) assess the on-farm and off-farm strategies that are utilised to ensure quality of the product. **8**

QUESTION 14

Past practices such as intensive cultivation, improper use of fertilisers and chemicals, and continuous monoculture, can bring about a reduction in crop production.

- (a) Briefly describe the effect of EACH of these on crop production. **9**
- (b) Describe modern management practices that can replace those listed above to improve plant production. **6**

End of paper