



AGRICULTURAL SCIENCES: PAPER II

Time: 2½ hours

150 marks

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. This question paper consists of 14 pages and an Answer Sheet. Please ensure that your examination number is filled in in the spaces provided on the Answer Sheet and that it is handed in with your Answer Book at the end of the examination.
 2. This question paper is made up of two sections, namely **SECTION A** and **SECTION B**.
 3. This question paper consists of four questions.
 4. Question 1 must be answered on the Answer Sheet provided. Questions 2, 3, and 4 must be answered in your Answer Book.
 5. Start **EACH** question on a **NEW** page.
 6. Number the answers correctly according to the numbering system used in this question paper.
 7. Non-programmable calculators may be used.
 8. Show all your calculations, including formulae, where applicable.
 9. It is in your own interest to write legibly and to present your work neatly.
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SECTION A**QUESTION 1**

Answer the following questions on the Answer Sheet provided.

- 1.1 Various options are provided as possible answers to the following questions. Choose the answer and make a cross (X) in the block (A – D) next to the question number (1.1.1 – 1.1.10) on the attached Answer Sheet. NO marks will be awarded if more than one cross (X) appears for the answer.

Example:

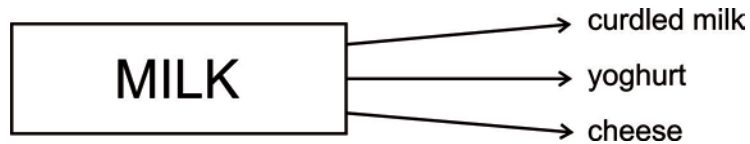
1.1.11	<input checked="" type="checkbox"/>	A	B	C	D
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- 1.1.1 The law of demand for goods or products states that the ...
- A higher the price, the more goods or products will be supplied.
 - B lower the price, the more goods or products will be supplied.
 - C higher the price, the more goods or products will be bought.
 - D None of the above.
- 1.1.2 One of the following is a type of capital that is regarded as permanent and durable.
- A Tractor
 - B Dam
 - C Wages of farm workers
 - D Fuel for the tractor
- 1.1.3 The loss of stock by farmers in rural areas of the country has a direct influence on the ... of their farming enterprise.
- A risk management
 - B labourers
 - C health programme
 - D pasture evaluation
- 1.1.4 Efficient mechanisation in farming is a solution to ...
- A the cost of having labourers trained.
 - B lack of training amongst labourers.
 - C the production of better products.
 - D an increasing shortage of farm labour.
- 1.1.5 The phenotypic ratio for a qualitative characteristic in the F1 generation produced by parents that are both heterozygous for a trait will be ...
- A 1 : 2 : 1
 - B 3 : 1
 - C 1 : 1
 - D 4 : 0

1.1.6 One of following can be regarded as an internal cause of variation.

- A Climate
- B Topography
- C Light intensity
- D Mutation

1.1.7 The product-handling function that is indicated by the illustration below refers to ...



- A transport.
- B standardisation.
- C processing.
- D grading.

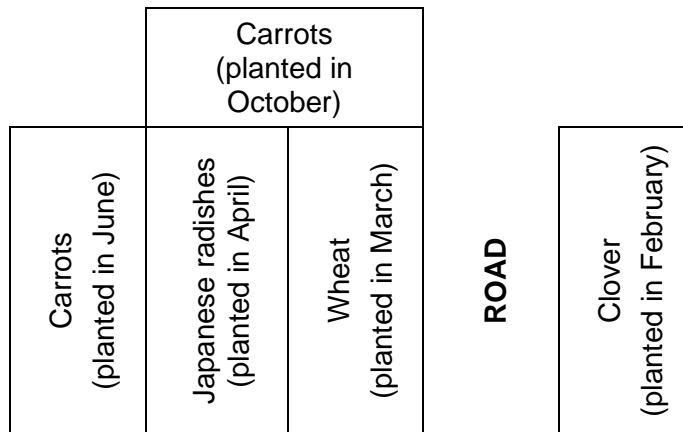
1.1.8 A farm financial planning aspect which is necessary to ensure that money required to keep the production process going is available at all times is called ...

- A income tax.
- B insurance.
- C cash flow.
- D state duty.

1.1.9 Equity schemes in the agricultural industry have the following aim:

- A educating the children of farm labour.
- B enriching participation.
- C marketing products for participants.
- D giving equal opportunities to all farm workers.

1.1.10 The schematic below is an example of a ... record to be kept on a farm.



- A labourer's productivity
- B cropping activity
- C performance activity
- D livestock activity

(20)

1.2 Choose a term/phrase from Column B that matches a description in Column A. Write only the letter (A – J) next to the question number (1.2.1 – 1.2.5) on the Answer Sheet provided. *E.g.* 1.2.6 K.

COLUMN A	COLUMN B
1.2.1 Comprehensive activity involving the combination and coordination of human, physical and financial resources.	A depreciation B line breeding
1.2.2 The loss or decline in value of assets such as vehicles and machinery caused by age, wear and tear.	C selection D management
1.2.3 Inferior cows are mated with a pure-bred Friesland bull to increase milk production.	E species crossing F supervision
1.2.4 A process in breeding by which certain individuals in a population are chosen as next generation parents.	G motivation H decision-making
1.2.5 A stallion (male horse) is mated with a jenny (female donkey) resulting in infertile offspring.	I control J upgrading

(10)

- 1.3 Give ONE word/term/phrase for each of the following descriptions. Write only the word/term/phrase next to the question number (1.3.1 – 1.3.5) on the attached Answer Sheet.
- 1.3.1 An individual with two alleles of a pair of genes that are the same for a characteristic. (2)
- 1.3.2 A technique of changing the characteristics of an organism by inserting genes of another organism into its DNA. (2)
- 1.3.3 This type of marketing ensures that the producers receive a guaranteed price and protects them against very low prices. (2)
- 1.3.4 The overall potential threat that any farmer covers when insurance is utilised in the farming business. (2)
- 1.3.5 A document indicating the expected income and expenditure of a farming business over a period of time in the future. (2)
- 1.4 Change the UNDERLINED WORD(S) in each of the following statements to make the statements TRUE. Write only the correct word(s) next to the question number (1.4.1 – 1.4.5) on the attached Answer Sheet.
- 1.4.1 Heritability makes it possible to identify individuals in a population for the selection of animals for breeding programmes. (1)
- 1.4.2 The control system of marketing is used by cotton-producing farmers who have decided to sell their produce through a single agent. (1)
- 1.4.3 Money or equipment that is accumulated by saving and which is employed in the production process is known as credit. (1)
- 1.4.4 A recessive allele will always affect the phenotype of an individual animal. (1)
- 1.4.5 The development of a long-term plan of an enterprise, based on the weaknesses and strengths and predictions of future trends, requires a manager to develop a bureaucratic plan. (1)

45 marks

SECTION B**QUESTION 2 AGRICULTURAL MANAGEMENT AND MARKETING**

Start this question on a NEW page.

2.1 Read the case study and answer the following questions.

KHAKIBOS MAKES THIS FARM PROFITABLE

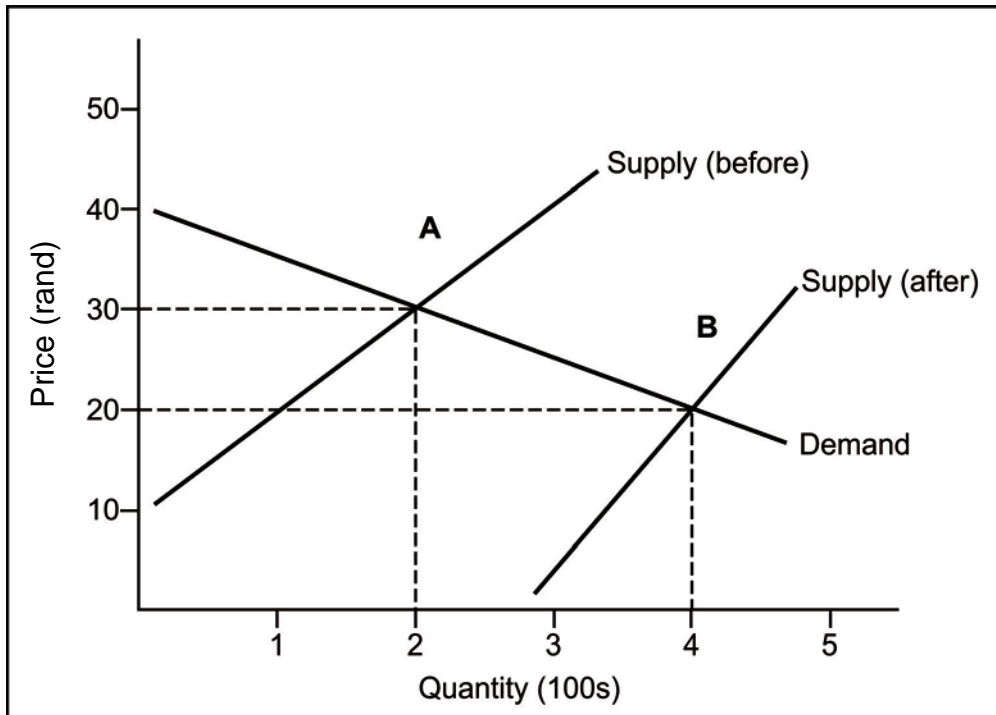
Khakibos (*Tagetes minuta*) is a crop that has been grown by Flip and Miana Minnaar since 1990. The production of crops and essential oils started slowly, with the first exports of Highlands Essential Oils to Europe in 1995. This led to a booming frozen-herb operation called Icy Herb CC. Flip realised that to increase farming profit, one should take control of the value chain by adding value to the product. Consequently, the necessary equipment for distillation was bought.

After a number of European visits, they were encouraged to utilise part of their essential oil crop. Due to stiff competition in the market, a refrigeration plant was designed. Frozen herbs are packed in polystyrene containers, which protect them from the effect of ambient room temperature.

[Source: *Farmer's Weekly*, 20 February 2009]

- 2.1.1 The production of Khakibos has indeed made the farm profitable. Motivate this statement by giving THREE reasons. (3)
- 2.1.2 Name THREE factors or methods that could be considered in the setting of prices for Khakibos products. (3)
- 2.1.3 Identify TWO business strategies applied in the scenario above to increase profits. (2)
- 2.1.4 Name TWO value-adding methods that were used for the Khakibos. (2)

2.2 The graph below shows the changes in the price as the equilibrium of supply changes.



2.2.1 Indicate the equilibrium price when the quantity supplied was 400. (1)

2.2.2 In summer the supply of fruit increases because most fruits are seasonal. Motivate the statement by referring to the data supplied above. (3)

2.2.3 Briefly explain the inelasticity of the supply of agricultural products in the short term. (2)

2.2.4 Discuss how processing can stabilise the income of a farmer. (3)

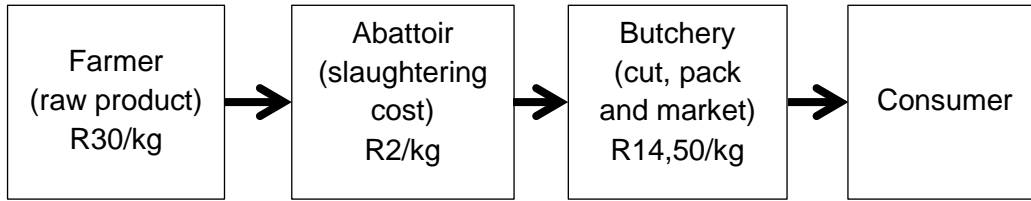
2.3 The steps below are part of the decision-making process:

- Evaluate alternatives
- Identify the problem with regard to its importance
- Choose and follow the best solution
- Analyse possible alternatives

2.3.1 Rearrange the above steps into the correct sequence. (4)

2.3.2 Identify TWO factors that influence the effectiveness of a decision-making process. (2)

2.4 The schematic representation below shows the route of meat from the farm to the consumer.



2.4.1 Using the producer price and mark-ups indicated above, calculate the following:

- (a) The total price that the consumer will pay for a kilogram (kg) of meat at the butchery. (2)
- (b) The percentage of profit that the butchery makes on this deal per kilogram if the butchery spends R5/kg on running costs. (3)

2.4.2 Identify the following aspects in the schematic representation:

- (a) The processor (1)
- (b) The retailer (1)
- (c) The producer (1)

2.4.3 Indicate the marketing aspect illustrated by the schematic representation above. (1)

2.4.4 Determine ONE disadvantage of this marketing aspect for the consumer. (1)

[35]

QUESTION 3 PRODUCTION FACTORS

Start this question on a NEW page.

- 3.1 The table below shows the amount of fertiliser applied and the quantity of potatoes produced on a piece of land owned by a farmer.

Input (Bags of fertiliser)	Yield (Bags of potatoes)
0	18
2	25
4	27
6	28
8	29
10	29

- 3.1.1 Identify the economic characteristic shown by the data in the table above. (1)
- 3.1.2 Deduce the relationship between *fertiliser input* and *potato yield*. (2)
- 3.1.3 Name TWO main measures that a farmer can take to make land more productive. (2)
- 3.1.4 Draw a bar graph showing the relationship between *fertiliser input* and *potato yield*. (5)
- 3.2 HIV/Aids impacts negatively on the productivity of farm labourers on commercial and subsistence farms, which in turn impacts negatively on the productivity of the agricultural sector. It is estimated that seven million agricultural labourers died of HIV/Aids-related diseases in South Africa between 1985 and 2002. Most of these victims were between the ages of 20 and 40 years old.
- 3.2.1 Describe the possible implication of HIV/Aids for the broader agricultural industry. (3)
- 3.2.2 Indicate FOUR actions you would include in a strategic plan that farm managers can use to deal with the impact of HIV/Aids on farming operations. (4)

3.3 The table below represents control results of management tasks done on a specific day at a particular farm.

MONDAY	PLANNING		ORGANISING		
Production enterprise	Planned activity	Employees involved	Other resources	Implementation	Reflection/ Comment
1. Sunflower	Harvest land 10 ha	Piet (driver) Padiso Vosloo 2 temporary employees	Harvester 2 tractors and trailers	Completed 9 ha	1 ha short Harvester had a flat tyre
2. Cattle and horses	Observe cattle	Klasie	Horse, record book	Cattle in order	Up to standard
	Check lick and creep feed	Klasie		Creep feed in camp 3 filled up	Up to standard
	Wean, mark, dose, weigh 100 calves	Moloto, Abram	Handling facilities, branding equipment, remedies and dosing	100 calves and activities completed	Up to standard
	Feed horses	Kagiso, Henry	Feeds	Activities completed	Up to standard
3. Broilers	Prepare house 3 (remove old bedding)	Johanna, Mina, Johannes	Loose hand tools	House prepared Filled water troughs	Up to standard
4. General work	Paint workshop	Private contractor	Own tools	Work proceeding well	Up to standard

3.3.1 Select ONE of the following from the table above:

- (a) Daily activity (1)
- (b) Seasonal activity (1)

3.3.2 Identify the types of labourers suitable for doing the following:

- (a) Assist only during the harvesting of sunflower (1)
- (b) Remove old bedding in the broiler house (1)

3.3.3 State the farm work that was probably done by the casual labourers. Justify your answer. (2)

3.3.4 Tabulate the differences between *fixed*, *movable* and *working* assets and give an example in each case from the data in the table. (6)

3.4 The information below shows the assets and liabilities on a farm.

- Value of farm – R3 500 000
- Tractor loan – R365 000
- Value of vehicles – R275 000
- Overdraft – R150 000
- Bond – R4 200 000
- Cash – R50 000
- Value of buildings – R650 000

Assets	Rand	Liabilities	Rand
Total		Total	
Net worth			

Re-draw the table above and complete it with the information provided. Calculate the net worth of the farm.

(6)
[35]

QUESTION 4 BASIC AGRICULTURAL GENETICS

Start this question on a NEW page.

4.1 The following is a representation of a dihybrid crossing. Answer the questions using the legend below.

Characteristic 1: (Horn conformation) A – polled (no horns) a – horns Characteristic 2: (Coat colour) B – black b – red
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	AB	Ab	aB	ab
AB	1. AABB	2. AABb	3. AaBB	4. AaBb
Ab	5.	6. AAbb	7. AaBb	8. Aabb
aB	9. AaBB	10. AaBb	11. aaBB	12.
ab	13. AaBb	14. Aabb	15. aaBb	16. aabb

4.1.1 State the genotype of the following individuals:

(a) Number 5 (1)

(b) Number 12 (1)

4.1.2 Determine the phenotype of the following individuals:

(a) Number 8 (1)

(b) Number 15 (1)

4.1.3 Individual number 6 was crossed with individual number 11. Draw a Punnett square to determine the genotype of their offspring. (4)

4.1.4 Indicate the phenotype of the offspring bred in Question 4.1.3. (1)

4.2 Look at the crossings **A**, **B** and **C** below that represent different breeding systems applied in cattle farming.

A	B	C
(i) Holstein stud bull	Angus bull	(ii) Brahman bull
X	X	X
Commercial mixed-breed cows	Angus cow (bull's daughter)	(iii) Simmentaler cow

4.2.1 Identify the breeding systems represented by **A**, **B** and **C**. (3)

4.2.2 Indicate the breeding system or systems (**A**, **B** or **C**) that do not promote heterosis. (1)

4.2.3 State **THREE** disadvantages of the breeding system represented by breeding system **B**. (3)

4.2.4 Substitute the breeds numbered (i) to (iii) with a similar suitable alternative breed. (3)

4.3 Modern plant breeding is mainly done through genetic modification, particularly with regard to food crops.

4.3.1 Briefly outline the process of developing a genetically modified organism (GMO). (2)

4.3.2 Indicate **THREE** advantages of genetic modification. (3)

4.3.3 Name **TWO** disadvantages (dangers) of this process. (2)

4.3.4 Hybridisation in plant breeding is labour-intensive. Justify this statement. (2)

4.4 The table below indicates the hereditary values for some characteristics of sheep.

Heritability	Hereditary characteristic			
	Birth weight	Post-weaning gain	Lean meat	Fleece quality
Percentage %	33	60	35	17

4.4.1 Identify the characteristic that would be most effective in the improvement of the flock. Motivate your answer. (2)

4.4.2 Evaluate the effectiveness of the selection of fleece quality in improving the flock. Justify your answer. (2)

- 4.4.3 One in the flock produces an average of 4 kg wool per year, whereas the average wool production per animal in the flock is 3,5 kg. The heritability value of wool production for this breed of sheep is 65%.

Calculate a simple estimated breeding value (EBV) for this flock by using the following formula:

$$\mathbf{EBV = (WA - WH) \times \text{heritability of wool production}}$$

Where **EBV** = estimated breeding value

WA = wool production of the animal

WH = average wool production of the flock

(3)

[35]

105 marks

Total: 150 marks