education

Department:
Education
North West Provincial Government
REPUBLIC OF SOUTH AFRICA

PROVINCIAL ASSESSMENT

GRADE 11

AGRICULTURAL SCIENCES P2
NOVEMBER 2024

MARKS: 150

TIME: 2 ½ hours

This question paper consists of 15 pages.

INSTRUCTIONS AND INFORMATION

1. This question paper consists of TWO sections, namely SECTION A and SECTION B.
2. Answer ALL the questions on the FOLIO PAPER.
3. Start EACH question on a NEW page.
4. Number the answers correctly according to the numbering system used in this question paper.
5. You may use a non-programmable calculator.
6. Show ALL calculations, including formulae, where applicable.
7. Write neatly and legibly.

SECTION A

QUESTION 1

1.1 Various options are provided as possible answers to the following questions. Choose the correct answer and write only the letter (A–D) next to the question numbers (1.1.1 to 1.1.10) on the FOLIO PAPER, e.g. 1.1.11 B.

1.1.1 The rate of photosynthesis in green plants does NOT depend on one of the following:

A The amount of CO_2 in the atmosphere
B The oxidation process to produce new compounds
C The temperature of the atmosphere
D The light intensity of the sun

1.1.2 The process of a liquid changing to a gas, especially by heating:

A Evaporation
B Denitrification
C Immobilisation
D Ammonification

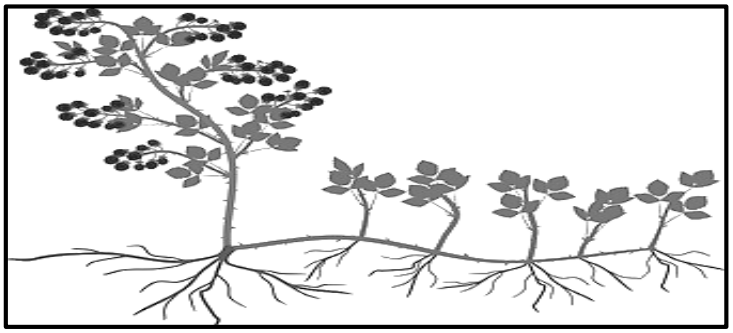
1.1.3 … is a plant part modified for the transportation of water and dissolved minerals that occurs from the roots to the leaves of plants.

A Phloem
B Stalk
C Xylem
D Cuticle

1.1.4 A catabolic process where energy is released and carbohydrates and fats are broken down to simpler substances.

A Mineralisation
B Photosynthesis
C Anabolism
D Respiration

1.1.5 The diagram of the plant below is an example of propagation through ...



A bulbs.
B rhizomes.
C corms.
D stolons.

1.1.6 The structure within the receptive stigma that determines the growth direction of the pollen tube is called the …

A generative nucleus.
B vegetative nucleus.
C micropyle.
D polar nuclei.

1.1.7 ONE of the following damaging effects to plants is caused by plant pests:

A Poor germination and growth of a seedling
B Yellow leaves resulting in poor photosynthesis
C Grain and fruit damage before reaching maturity
D Elongation of plant seedlings

1.1.8 Hand pulling and mulching are all examples of … weed control methods.

A mechanical
B preventive
C biological
D chemical

1.1.9 One of the following is NOT an advantage of hydroponic production systems:

A A favourable climate can be created for plants
B It is necessary for crop rotation
C Correct and optimal nutrition is always provided to plants
D Certain characteristics of the plant can be manipulated to satisfy the consumers' needs

1.1.10 Environmental factors to be considered when selecting the general locality/site of a greenhouse are:

(i) Sunlight
(ii) North side location
(iii) Good drainage
(iv) Cost of materials

Choose the CORRECT combination:

A (i), (iii) and (iv)
B (i), (ii) and (iv)
C (ii), (iii) and (iv)
D (i), (ii) and (iii) (10 x 2) (20)

1.2 Choose a term from COLUMN B that matches a description in COLUMN A. Write only the letter (A–J) next to the question numbers (1.2.1 to 1.2.5) on the FOLIO PAPER, e.g. 1.2.6 K.

COLUMN A		COLUMN B	
1.2.1	Mineral uptake by soil microbes and conversion to organic matter, which is unavailable to plants	A	Passive transport
1.2.2	Membrane transport that does not require energy to move substances across cell membranes	B	Growth medium
1.2.3	The branch of science that combines biology and technology with the aim of improving people's quality of life	C	Respiration
1.2.4	It involves two sperm cells; one fertilizes the egg cell to form the zygote, while the other fuses with the two polar nuclei that form the endosperm	D	Cultivation
1.2.5	A solid, liquid or semi-solid substance designed to support the growth of a population of micro-organisms	E	Immobilisation
		F	Drainage
		G	Humus
		H	Biotechnology
		I	Pathogen
		J	Double fertilisation

(5 x 2) (10)

1.3 Give ONE word/term for each of the following descriptions. Write only the word/term next to the question numbers (1.3.1 to 1.3.5) on the FOLIO PAPER.

1.3.1 The vascular tissue in plants that conducts sugars and other metabolic products downward from the leaves

1.3.2 The production of fruit without fertilisation of ovules, resulting in seedless fruit

1.3.3 The artificial removal of excess water from the root zone of a plant in the soil

1.3.4 The practice of replanting the same crop species in the same field year after year

1.3.5 A structure covered with a transparent material in which crops are grown under controlled environmental conditions (5 x 2) (10)

1.4 Change the UNDERLINED WORD(S) in each of the following statements to make them TRUE. Write only the answer next to the question numbers (1.4.1 to 1.4.5) on the FOLIO PAPER.

1.4.1 <u>Compost</u> are materials of animal origin used to maintain or improve plant nutrition

1.4.2 <u>Hybridisation</u> is when plants with desired traits are chosen by humans.

1.4.3 <u>Soil cultivation</u> is the cultivation of different crops on the same piece of land from one season to another.

1.4.4 <u>Hydroponics</u> is the process of applying water to the crops artificially to fulfil their water requirements.

1.4.5 A <u>Class A – Evaporation pan</u> is a tool for indirectly measuring soil moisture tension in agriculture. (5 x 1) (5)

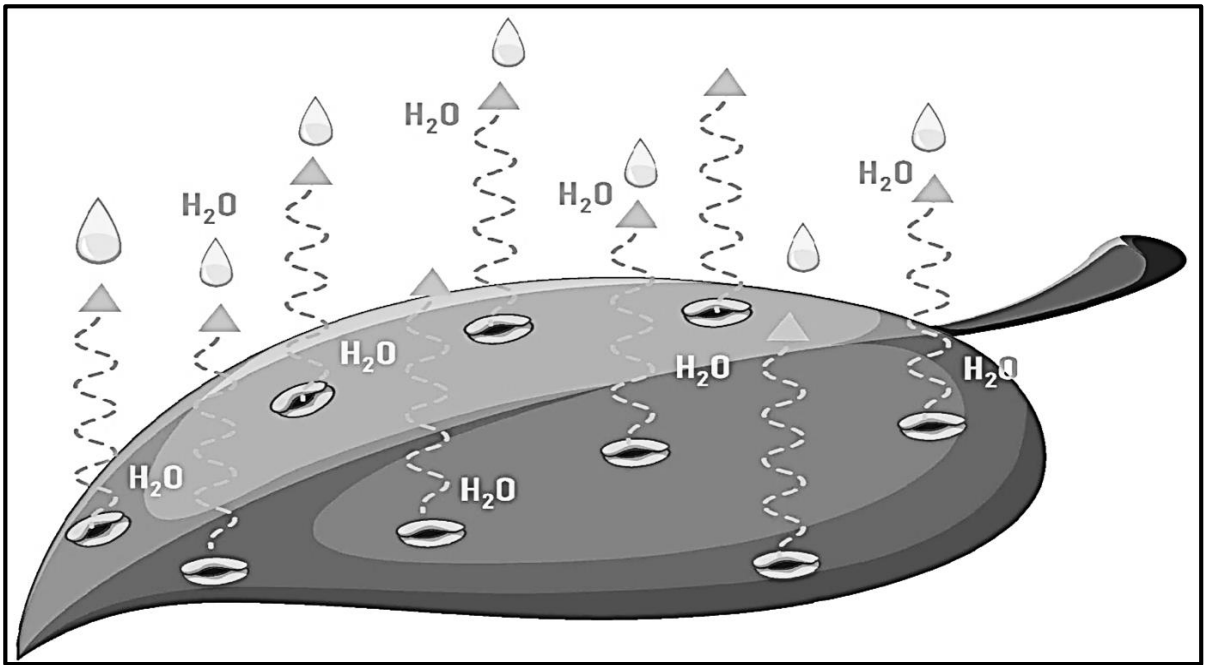
TOTAL SECTION A: 45

SECTION B

QUESTION 2: PLANT NUTRITION

Start this question on a NEW page.

2.1 The picture below illustrates a process that takes place in a plant.



2.1.1 Identify the process illustrated above. (1)

2.1.2 Supply TWO adaptations of plants to reduce water loss. (2)

2.1.3 The process shown above is essential for plant growth. Provide TWO reasons to support this statement. (2)

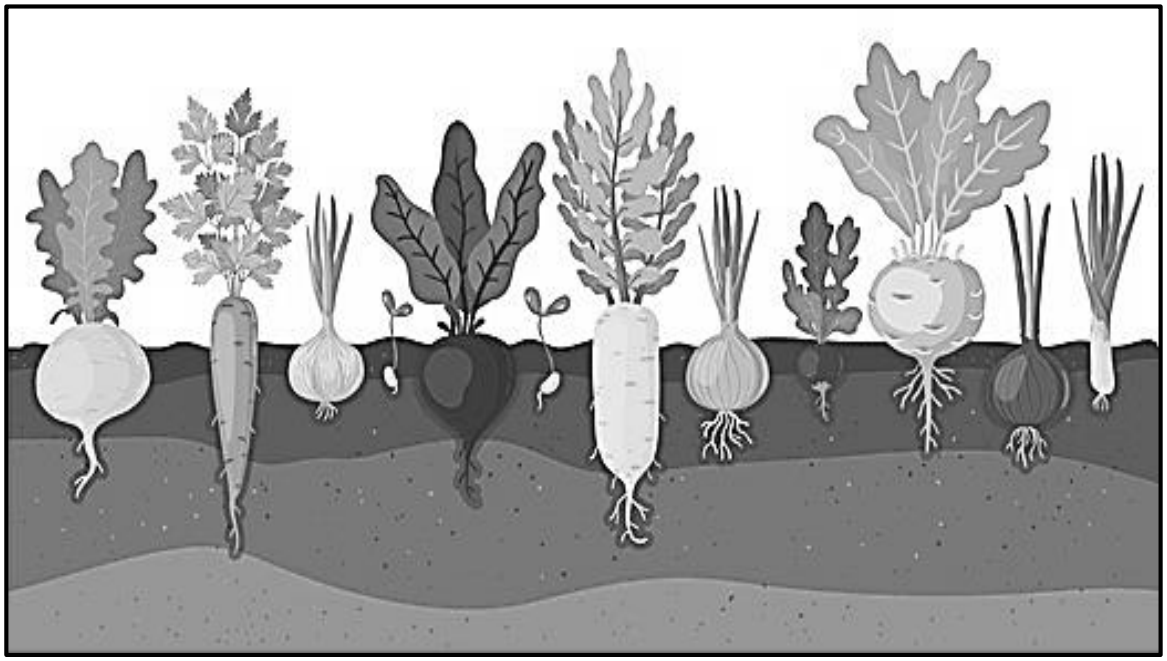
2.2 A farmer bought two different bags of fertilizer mixtures. One fertiliser bag (Bag **A**) is labelled **8:1:3 (30)**. The second fertiliser bag (Bag **B**) is labelled **1:2:7 (28)**. The farmer intends to cultivate leafy vegetables such as lettuce and spinach.

2.2.1 Recommend the fertiliser bag that will provide better yield for leaf crop farmers. (1)

2.2.2 Justify the answer in QUESTION 2.2.1 with TWO reasons. (2)

2.2.3 State the purpose of the number **(30)** on Bag **A 8:1:3 (30)** in QUESTION 2.2. (2)

2.3 The picture below illustrates various organs utilised for food storage in plants.



2.3.1 Supply THREE parts of a plant modified as storage organs. (3)

2.3.2 Indicate ONE chemical process that results in the formation and storage of carbohydrates in plants. (1)

2.3.3 State TWO requirements for the process indicated in QUESTION 2.3.2. (2)

2.3.4 Identify ONE product of the process indicated in QUESTION 2.3.2 that is stored in plants. (1)

2.4 The table below shows some important plant minerals:

MINERAL	DEFICIENCY SYMPTOMS	MACRO/MICRO
A	Older leaves appear purple in colour	Macro
B	Leaf margins and ends become brown and necrotic	Macro
Molybdenum	Stunted growth	**C**
Nitrogen	**D**	Macro

2.4.1 Supply labels (**A**–**D**) to make the table complete. (4)

2.4.2 Suggest TWO methods farmers can use to determine the nutrient status of their soils. (2)

2.4.3 State TWO factors that could influence the availability of the nutrients in the table above to plants. (2)

2.5 The effect light intensity on the rate of photosynthesis determined by the number of O_2 bubbles produced.

LIGHT INTENSITY (cd)	NUMBER OF O_2 BUBBLES
10	25
15	30
20	35
25	40
30	45
35	50

2.5.1 Use the information in the table above to draw a bar graph showing the effect of light intensity on the rate of photosynthesis determined by the number of O_2 bubbles produced. (6)

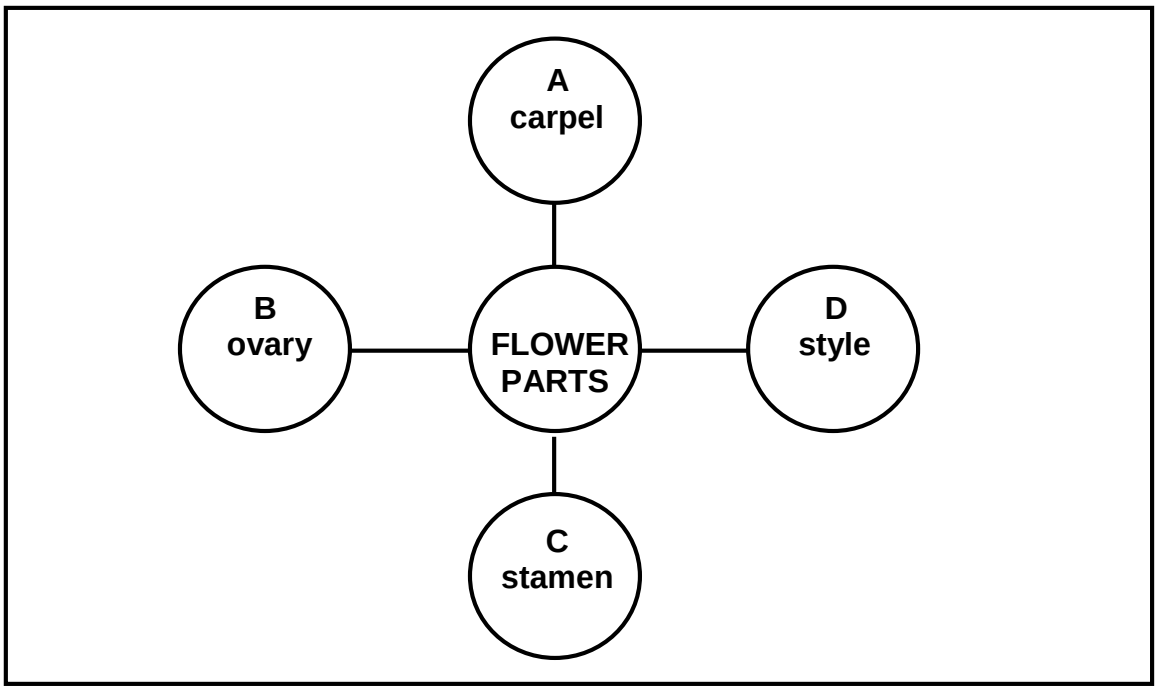
2.5.2 Describe the trend of how the number of O_2 bubbles are affected by the light intensity. (2)

2.5.3 Suggest TWO practical methods farmers can use to manipulate plants as to achieve maximum photosynthesis. (2)
[35]

QUESTION 3: PLANT REPRODUCTION

Start this question on a NEW page.

3.1 The circles below represent flower parts of a *dicotyledonous plant*.



Match the letters (**A**-**D**) to the descriptions in QUESTIONS 3.1.1 to 3.1.4.

3.1.1 Male organ of a flower (1)

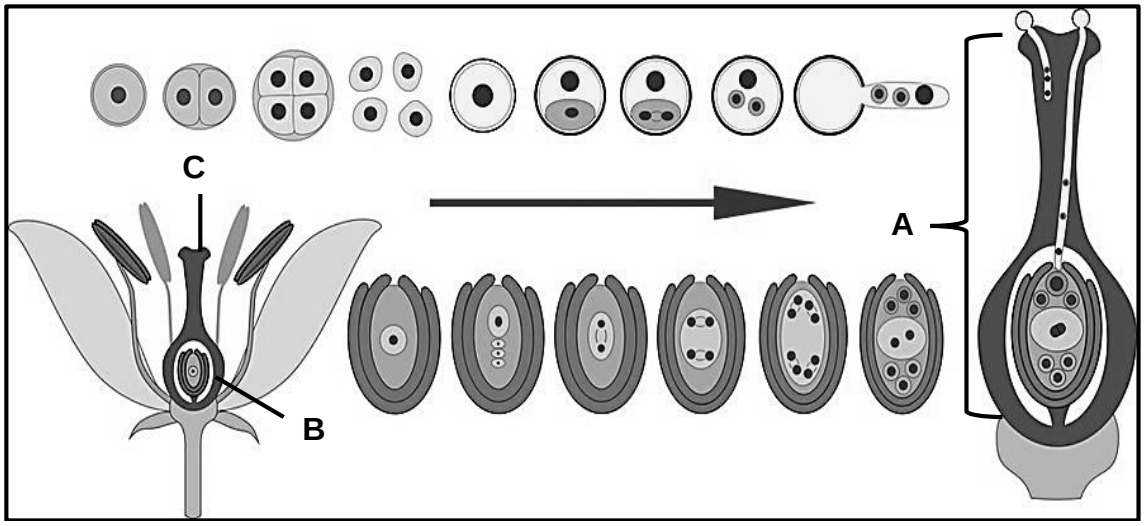
3.1.2 Modified floral leaves which form the pistil (1)

3.1.3 A part of the pistil that produces egg cells (1)

3.1.4 A tube connecting the stigma to the ovary (1)

3.1.5 Define the underlined description in QUESTION 3.1. (2)

3.2 The illustration below represents the germination of a ripe pollen grain.



3.2.1 Provide the LETTER and NAME where the following occur:

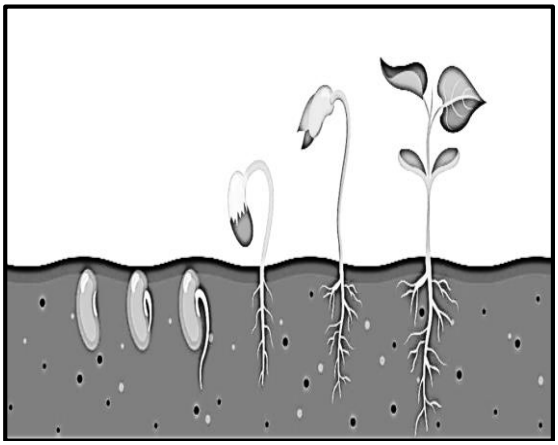
a) Germination of the pollen grain

b) Female reproductive organ

c) The part where fertilisation takes place (6)

3.2.2 Name the cell division that forms the male gametes. (1)

3.3 The diagrams below show the germination of a dicotyledonous and monocotyledonous seed.



A

B

3.3.1 Identify the types of seed germination depicted in **A** and **B**. (2)

3.3.2 List THREE environmental conditions necessary for the successful germination of seeds. (3)

3.3.3 Suggest TWO seed scarification methods that could be used by farmers to break dormancy. (2)

3.4 In hybridisation various desirable traits of different plants are combined in one plant. These plants are propagated to produce seeds for production and of the new plant variety.

3.4.1 State ONE advantage and ONE disadvantage of hybridisation. (2)

3.4.2 Provide THREE desired traits in plant improvement. (3)

3.4.3 Discuss the aim of mutation in plant breeding. (2)

3.5 Picture **(A)** is a maize plant without weeds and Picture **(B)** is a maize plant with weeds in between.

A

B

3.5.1 Deduce ONE way in which weeds reduce yields by studying the pictures above. (1)

3.5.2 Suggest TWO reasons why weeds grow more easily than cultivated crops. (2)

3.5.3 List TWO examples of weed seed dispersal agents. (2)

3.6 Diseases and pests interfere with the normal healthy functioning of a plant. In agriculture, diseases and pests are an ever-present threat for the crop farmer and if the crop is infected or infested, the impact on food security can be serious.

Recommend THREE measures to prevent/control the spread of plant diseases caused by micro-organisms. (3)
[35]

QUESTION 4: OPTIMAL RESOURCE UTILISATION

Start this question on a NEW page.

4.1 Soil surveys are carried out to determine the suitability of a soil for agricultural and non-agricultural purposes.

Below are the steps taken during a soil survey to ensure accurate results:

- A soil classification of clearly indicated profile test holes is used
- Once the aerial photographs have been taken, the survey area is visited
- All the information gathered is interpreted to determine the suitability of the soil
- Aerial photographs of the region are taken and studied
- The farm or area is divided up into homogenous land and/or veld types
- The soil horizons of the test holes are now described

Re-arrange the steps above in chronological order to ensure accurate results. (6)

4.2 Precision farming uses various hi-tech applications to identify all possible factors that could have an influence on production.

4.2.1 Name THREE ultra-modern technologies utilised in agriculture. (3)

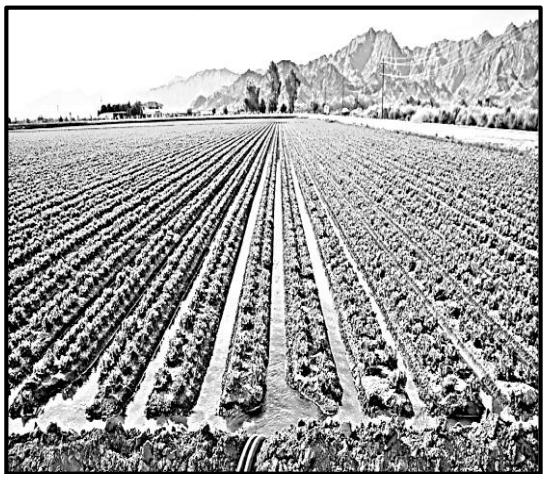
4.2.2 Discuss TWO economic benefits of precision farming. (2)

4.3 Soil cultivation is any practice which should take place prior to establishing crops. Farmers determine the type of cultivation needed by examining the soil or by sending soil samples for analysis to obtain the specific composition of the soil.

4.3.1 Indicate THREE aims/effects of soil cultivation. (3)

4.3.2 Differentiate between *primary* and *secondary* soil cultivation. (4)

4.4 The pictures below represent different irrigation systems.



A

B

C

4.4.1 Identify the irrigation systems at **A**, **B** and **C**. (3)

4.4.2 Suggest TWO conditions under which flood irrigation could be applied. (2)

4.4.3 Give ONE advantage of pivot/sprinkler irrigation in crop production. (1)

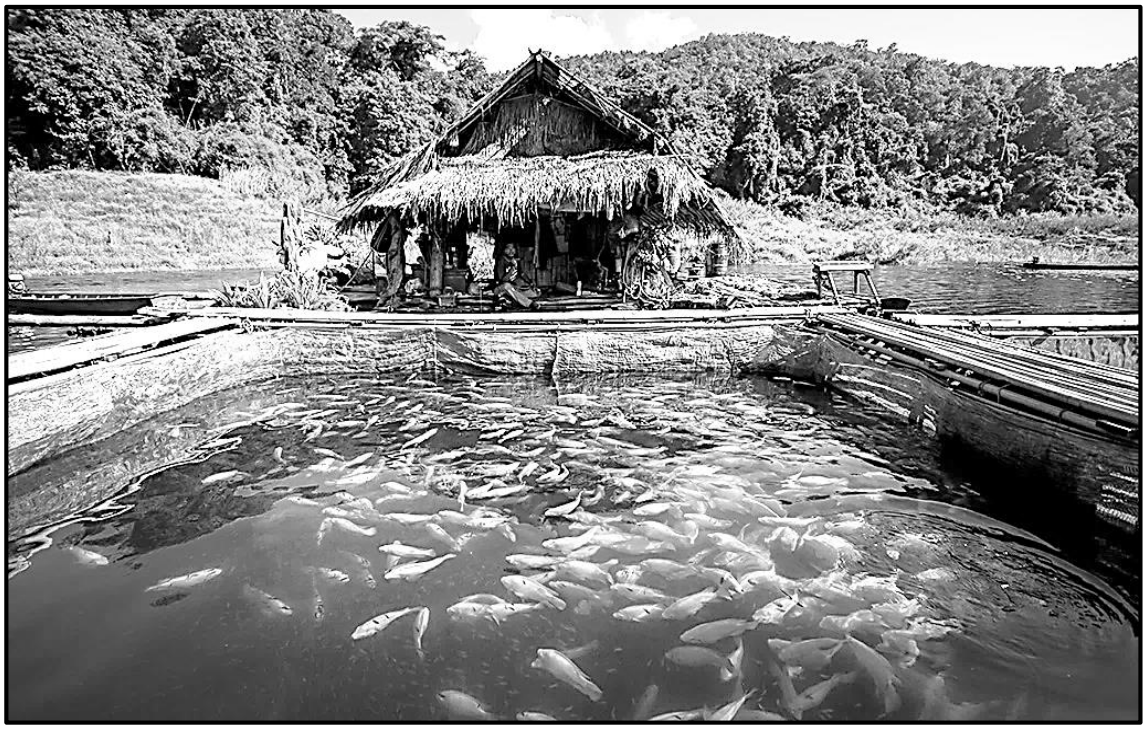
4.4.4 Indicate TWO criteria that determine water quality for irrigation. (2)

4.5 The neutron moisture meter measures the TOTAL moisture content of a soil. Only a part of the water in a soil is available for plant use.

SOIL TYPE	WEIGHT OF MOIST SOIL (g)	WEIGHT OF DRY SOIL (g)	WEIGHT OF WATER (g)
LOAM	150	120	30
SANDY	130	100	20
CLAY	170	140	50

Study the passage and table above, then calculate the total moisture content of the loam soil as a percentage. Show ALL calculations. (4)

4.6 The photo below indicates a type of farming practice.



4.6.1 Identify the type of farming indicated in the photo above. (1)

4.6.2 Describe TWO basic requirements that the above farming system should meet to achieve high yield. (2)

4.6.3 Evaluate the photo, then give TWO factors that farmers must consider when choosing a suitable fish species for commercial farming. (2)
[35]

TOTAL SECTION B: 105
GRAND TOTAL: 150