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GRADE 11

NOVEMBER 2018

**AGRICULTURAL SCIENCES P2
MARKING GUIDELINE**

MARKS: 150

This marking guideline consists of 10 pages.

SECTION A**QUESTION 1**

- 
- 1.1 1.1.1 D ✓✓
 1.1.2 A ✓✓
 1.1.3 D ✓✓
 1.1.4 C ✓✓
 1.1.5 A ✓✓
 1.1.6 C ✓✓
 1.1.7 C ✓✓
 1.1.8 D ✓✓
 1.1.9 A ✓✓
 1.1.10 B ✓✓ (10 x 2) (20)
- 1.2 1.2.1 D ✓✓
 1.2.2 H ✓✓
 1.2.3 A ✓✓
 1.2.4 G ✓✓
 1.2.5 F ✓✓ (5 x 2) (10)
- 1.3 1.3.1 Stamen ✓✓
 1.3.2 Pruning ✓✓
 1.3.3 Humus ✓✓
 1.3.4 Band placement ✓✓
 1.3.5 Soil survey ✓✓ (5 x 2) (10)
- 1.4 1.4.1 Xylem ✓
 1.4.2 Evaporation pan ✓
 1.4.3 Groundwater ✓
 1.4.4 Primary tillage ✓
 1.4.5 Greenhouses ✓ (5 x 1) (5)

TOTAL SECTION A: 45

SECTION B:**QUESTION 2: PLANT NUTRITION****2.1 Processes in plant production****2.1.1 Identification of the processes**

A – Respiration ✓

B – Photosynthesis ✓

(2)

2.1.2 Tabulation of the difference between the TWO processes

	Photosynthesis	Respiration
(a) Carbohydrates	Are formed and energy is stored in these carbohydrates ✓	Are broken down and energy is released. ✓
(b) Oxygen	Oxygen is released into the atmosphere. ✓	Oxygen is absorbed from the atmosphere ✓

(2)

(2)

2.1.3 TWO pigments involved in the process

- Chlorophyll ✓
- Carotenes ✓
- Carotenoids ✓
- Xantophylls ✓

(Any 2 x 1)

(2)

2.1.4 End products of photosynthesis

- Carbohydrates ✓
- Oxygen ✓

(2)

2.1.5 Phases of the photosynthesis

- Hill reaction/light phase ✓
- Calvin cycle/dark phase ✓

(2)

2.2 Storage organs**2.2.1 Matching the examples of food with their storage organs**

(a) Sunflower ✓

(b) Sweet potato ✓

(c) Ginger ✓

(3)

2.2.2 TWO adaptation features of plants to reduce transpiration

- Thick cuticle ✓
- Hairy leaves ✓
- Pinnas/small leaf surface ✓
- Small sunken stomata ✓

(Any 2 x 1)

(3)

2.3 Plant nutrients**2.3.1 Classification**

A – micro element ✓ (1)

Naming of elements

- Manganese ✓ (1)
- Magnesium ✓ (1)

2.3.2 TWO primary nutrients

- Potassium ✓
- Nitrates ✓
- Phosphates ✓ (Any 2 x 1) (2)

TWO secondary nutrients

- Calcium ✓
- Magnesium ✓ (2)

2.3.3 TWO non-mineral elements

- Hydrogen ✓
- Oxygen ✓ (2)

2.4 Organic fertilisers**2.4.1 Effects of different organic fertilisers on plant height**

Organic fertilisers	Height of plants (cm)
Compost	6 100
Chicken dung	4 500
Peat moss	4 300
Fish waste	4 200
Cow dung	4 200

- 1 mark for the table ✓
 1 mark for title/heading/caption ✓
 1 mark for indicating all fertilisers ✓
 1 mark for all correct height ✓ (4)

2.4.2 Identification of organic fertiliser

Compost ✓ (1)

Justification

Has the highest height / growth than the other fertilisers ✓ (1)

2.4.3 ONE factors to consider when using farm manure

- The age of the animal ✓
- Type of ration fed to animals ✓
- Age of the manure ✓
- Individuality of animals ✓ (Any 1 x 1) (1)

2.4.4 TWO methods of fertiliser application

- Band application ✓
- Foliar application ✓
- Aerial application ✓
- Broadcasting ✓
- Fertigation ✓
- Application through irrigation water ✓

(Any 2 x 1) (2)
[35]

QUESTION 3: PLANT REPRODUCTION**3.1 Dicotyledonous flower****3.1.1 Identification of the number representing the part**

Number 3 ✓ (1)

3.1.2 Indication of whether the flower is unisexual or bisexual

Bisexual flower ✓ (1)

Motivate your answer

The flower has both male and female sex organs. ✓ (1)

3.1.3 Number of the structure responsible for the attraction of insects

Number 5 ✓ (1)

3.1.4 (a) Two male nuclei

Vegetative nuclei ✓
Generative nuclei ✓ (2)

(b) ONE function performed by each nuclei

Vegetative nuclei – directs pollen tube towards the ovum ✓ (1)

Generative nuclei – fertilises the egg cell ✓ (1)

3.2 Asexual reproduction**3.2.1 Matching diagrams to asexual reproduction methods**

(a) Rhizome ✓ (1)

(b) Grafting ✓ (1)

(c) Corms ✓ (1)

(d) Bulb ✓ (1)

3.2.2 TWO disadvantages of vegetative reproduction

- No genetic variation in the progeny ✓
- Susceptible to pests and diseases ✓
- Overcrowding may lead to competition for resources ✓
- Expert knowledge and skill is required ✓
- Plants with poorly developed root system ✓

(Any 2 x 1) (2)

3.2.3 Indication of parts joined in method labelled B

Scion ✓

Root stock ✓

(2)

3.2.4 TWO advantages of gene mutation

- Contributes to the conservation and use of plant genetic ✓
- Provides additional income for farmers ✓
- Desirable traits such as disease resistance can be induced ✓
- Contributes to food security ✓

(Any 2 x 1)

(2)

3.3 Genetic Modification**3.3.1 Impact of GM crops**

- Higher yield ✓

(1)

3.3.2 Calculation of total yield of yellow maize in kg

$$60 \times 5 = 300 \text{ tons } \checkmark$$

$$= 300 \times 1\,000 \checkmark$$

$$= 300\,000 \text{ kg } \checkmark$$

(3)

3.3.3 TWO public concerns about the use of GM crops

- Health risk/allergies ✓
- Environmental risk / Beneficial insects could be killed ✓
- Socio-economic concern / Monopoly ✓
- Ethical issues ✓

(Any 2 x 1)

(2)

3.4 Weeds**3.4.1 THREE adaptations of weeds**

- Grow easily in disturbed environment ✓
- Produce large quantities of seeds which are easily dispersed ✓
- Seeds are often persistent in the soil seed bank for many years ✓
- Can thrive in extreme environmental conditions such as drought ✓

(Any 3 x 1)

(3)

3.4.2 Explain *integrated pest management*

Is a comprehensive control program where different methods ✓ such as mechanical control, chemical control and biological agents are integrated to fight weed pests ✓

(2)

3.4.3 TWO reasons IPM regarded as a preferred method of weed control

- Promotes healthy plants ✓
- Prevents pollution of water systems by different chemicals ✓
- Protects ecosystem and biodiversity ✓
- Environmentally friendly ✓
- Labour and chemical application equipment costs are lower ✓
- Natural enemies of pests are protected, which limits the spread of pests and diseases ✓

(Any 2 x 1) (2)

3.5 Plant diseases

3.5.1 Potatoes / tomatoes / eggplant / tobacco cotton / ginger ✓ (Any 1 x 1) (1)

3.5.2 Aphids / mites rain / water / insects / animals ✓ (Any 1 x 1) (1)

3.5.3 Moulds ✓ (1)

3.5.4 Grapes / shrubs / palms ✓ (Any 1 x 1) (1)

[35]**QUESTION 4: OPTIMAL RESOURCE UTILISATION****4.1 Soil survey****4.1.1 TWO characteristics to consider in a soil survey**

- Degree of erosion on the farm ✓
- Texture of the soil ✓
- Depth of the soil ✓
- The number of rocks in the soil ✓

(Any 2 x 1) (2)

4.1.2 TWO aims of precision farming

- Enable the farmer to have more precise control over planting and husbandry practices ✓
- To farm each sub-field as a separate unit allowing for a farmer to optimise the production factors over which he has control ✓

(2)

4.2 Irrigation

4.2.1 TWO main sources of water used for irrigation

- Groundwater ✓
- Surface water ✓
- Under river flow ✓

(Any 2 x 1) (2)

4.2.2 TWO factors influencing water quality

- Salinity / total dissolved salts ✓
- Water infiltration ✓
- Specific ion toxicity ✓
- Excessive nutrients ✓
- Scale deposits ✓
- Mineral content ✓

(Any 2 x 1) (2)

4.2.3 TWO disadvantages of the centre pivot system

- When the wind blows the distribution of water is uneven ✓
- On hot days evaporation losses are high ✓
- Surface compaction occurs in unstable soil ✓
- Energy use is high ✓

(Any 2 x 1) (2)

4.3 Drainage system

4.3.1 Identification of layouts

- A – Natural system ✓
- B – Herringbone ✓
- C – Grid ✓

(3)

4.3.2 Topography/terrains of each layout

- A – Undulated land with scattered wet patches ✓
- B – Land with a clear depression down the middle ✓
- C – Level ground ✓

(3)

4.4 Structures in an intensive production system

4.4.1 Identification of the structure

- Greenhouse ✓

(1)

4.4.2 TWO advantage of greenhouse

- Crops that would normally not grow in a particular area can be grown ✓
- Crops can be produced for specific market dates ✓
- Quality products can be produced ✓
- More crops can be obtained throughout the year ✓
- Productivity per crop is increased ✓
- The percentage of germination is higher in greenhouses ✓
- Pest and disease control is more effective ✓
- Damage due to frost, wind and rain is eliminated ✓

(Any 2 x 1) (2)

4.3.3 TWO growth mediums in hydroponics

- Perlite ✓
- Vermiculite ✓
- Cocopeat ✓
- Rockwool ✓
- Clay pebbles ✓

(Any 2 x 1) (2)

4.5 Conservation tillage**4.5.1 TWO types of conservation practices**

- Mulching ✓
- Strip tillage ✓
- No/zero tillage ✓

(Any 2 x 1) (2)

4.5.2 Tabulation between monoculture and crop rotation

	Monoculture	Crop rotation
(a) Soil erosion	Can lead to soil erosion as the structure of soil may be destroyed ✓	Will produce high volume of organic matter that will protect the soil against soil erosion ✓
(b) Implements used	The farmer can use same implements each year because same crop is planted ✓	Growing different crops require different implements ✓

(2)

(2)

4.5.3 Labelling of implements

- A – Mould board plough ✓
 B – Disc plough ✓
 C – Chiesel plough ✓

(3)

4.5.4 Identification of implement used for primary cultivation

- A / Mould board plough ✓

(1)

4.6 Aquaculture**4.6.1 Reason of farming exotic species**

- They grow better and faster ✓
 - Some people prefer eating exotic fish ✓
 - They are hardy ✓
 - They are more fertile, breed easily and produce many young ✓
 - They are more in demand and provide a larger market ✓
 - They are profitable to cultivate ✓
- (Any 2 x 1) (2)

4.6.2 TWO requirements of aquaculture

- Good water quality ✓
 - Dissolved oxygen ✓
 - Feed management ✓
 - pH ✓
 - Maintenance ✓
 - Nitrogenous compounds ✓
 - Disease control ✓
- (Any 2 x 1) (2)
- [35]**

TOTAL SECTION B: 105
GRAND TOTAL: 150

