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**GRADE 11**

**NOVEMBER 2022**

**AGRICULTURAL SCIENCES P2  
MARKING GUIDELINE**

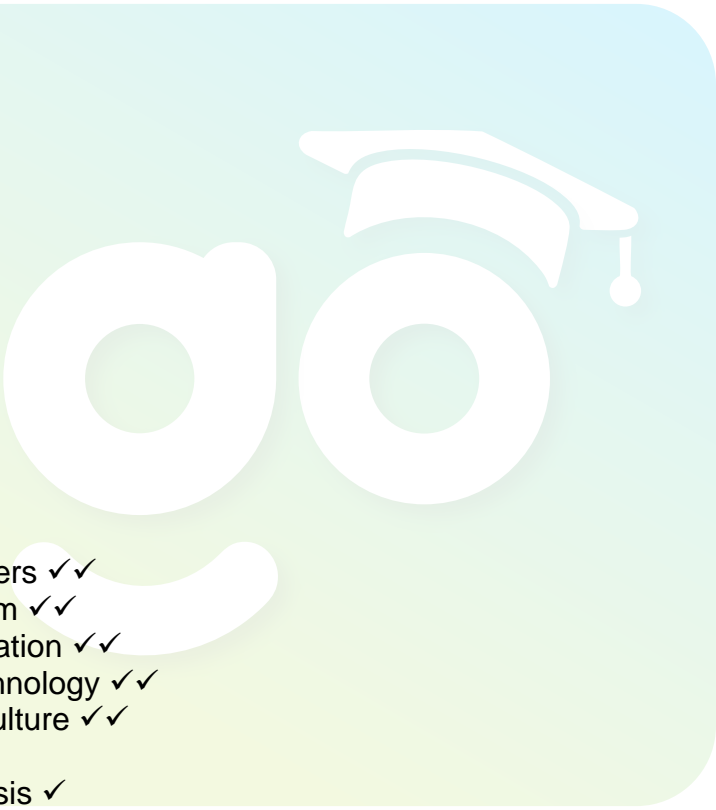
**MARKS: 150**

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This marking guideline consists of 8 pages.

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**SECTION A****QUESTION 1**

- 
- |     |        |                          |          |      |
|-----|--------|--------------------------|----------|------|
| 1.1 | 1.1.1  | A ✓✓                     |          |      |
|     | 1.1.2  | B ✓✓                     |          |      |
|     | 1.1.3  | B ✓✓                     |          |      |
|     | 1.1.4  | D ✓✓                     |          |      |
|     | 1.1.5  | C ✓✓                     |          |      |
|     | 1.1.6  | A ✓✓                     |          |      |
|     | 1.1.7  | D ✓✓                     |          |      |
|     | 1.1.8  | B ✓✓                     |          |      |
|     | 1.1.9  | C ✓✓                     |          |      |
|     | 1.1.10 | B ✓✓                     | (10 x 2) | (20) |
| 1.2 | 1.2.1  | D ✓✓                     |          |      |
|     | 1.2.2  | G ✓✓                     |          |      |
|     | 1.2.3  | B ✓✓                     |          |      |
|     | 1.2.4  | E ✓✓                     |          |      |
|     | 1.2.5  | C ✓✓                     | (5 x 2)  | (10) |
| 1.3 | 1.3.1  | Fertilisers ✓✓           |          |      |
|     | 1.3.2  | Gypsum ✓✓                |          |      |
|     | 1.3.3  | Fertilisation ✓✓         |          |      |
|     | 1.3.4  | Biotechnology ✓✓         |          |      |
|     | 1.3.5  | Aquaculture ✓✓           | (5 x 2)  | (10) |
| 1.4 | 1.4.1  | Chlorosis ✓              |          |      |
|     | 1.4.2  | fungicides ✓             |          |      |
|     | 1.4.3  | Tensiometer ✓            |          |      |
|     | 1.4.4  | Zero tillage / No till ✓ |          |      |
|     | 1.4.5  | mulching ✓               | (5 x 1)  | (5)  |

**TOTAL SECTION A: 45**

**SECTION B****QUESTION 2: PLANT STUDIES (NUTRITION)****2.1 2.1.1 Plant organs where products of photosynthesis are stored**

- Leaves ✓
- Stems ✓
- Roots ✓
- Tubers ✓
- Bulbs ✓

(Any 2 x 1) (2)

**2.1.2 Effect of climate change on photosynthetic rates**

- The high atmospheric CO<sub>2</sub> ✓ / high temperatures ✓ associated with climate is expected to result in higher rates of photosynthesis ✓

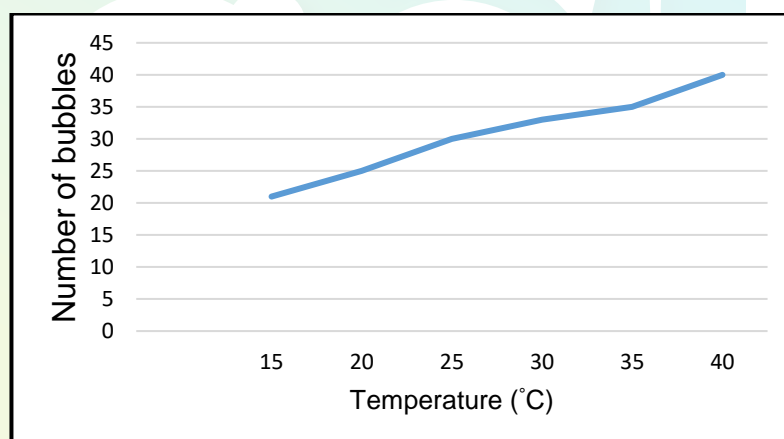
**OR**

- Extremely low temperatures ✓ will result in low photosynthetic rates ✓

**OR**

- Low rainfall ✓ will result in low photosynthetic rates ✓

(2)

**2.2 2.2.1 Effect of temperature on the rate of photosynthesis (bubble release)****Marking checklist**

- Correct heading with both variables ✓
- Correct graph type ✓
- Units (°C) ✓
- y-axis: Correct labelling and calibration ✓
- x-axis: Correct labelling and calibration ✓
- Correct plotting (80% and more correct plotting) ✓

(6)

**2.2.2 Description of trend shown in the graph**

The higher the temperature, ✓ the higher the number of bubbles evolved. ✓

(2)

**2.2.3 Methods of manipulating temperature**

- Use of a greenhouse / tunnel ✓
- Plant density ✓
- Trellising plants ✓
- Pruning ✓

(Any 2 x 1) (2)

- 2.3 2.3.1 **Transport method**  
 A – Active transport ✓  
 B – Simple diffusion ✓  
 C – Facilitated diffusion ✓ (3)
- 2.3.2 **Difference between *osmosis* and *diffusion***  
 Diffusion is the movement of any substance from a region of its higher concentration to a region of its lower concentration, ✓ while osmosis is a special type of diffusion that involves movement water molecules from a region of their higher concentration to a region of their lower concentration ✓ (2)
- 2.3.3 **Functions of water in plants**  
 • Medium for metabolic processes ✓  
 • Temperature regulation ✓  
 • Structural support ✓  
 • Transport of nutrients /products of photosynthesis ✓ (Any 2 x 1) (2)
- 2.4 2.4.1 **Labels**  
 A – Phosphorus ✓  
 B – Potassium ✓  
 C – Micro ✓  
 D – Leaf chlorosis ✓ (4)
- 2.4.2 **Methods that can be used to determine the nutrient status of soils**  
 • Soil analysis ✓  
 • Plant analysis ✓ (2)
- 2.4.3 **Factors influencing nutrient availability**  
 • Soil texture ✓  
 • Soil pH ✓ (2)
- 2.5 2.5.1 **Classification of fertiliser**  
 Organic fertiliser ✓ (1)
- 2.5.2 **Physical benefits of animal manure mentioned in the passage**  
 • Improves soil structure ✓  
 • Increases water holding capacity ✓  
 • Improves drainage of clay soils ✓ (Any 2 x 1) (2)
- 2.5.3 **Potential dangers associated with the use of animal manure**  
 • May contain pathogens ✓  
 • Too much fertiliser can lead to eutrophication of water sources ✓ (2)
- 2.5.4 **Another type of manure that is not mentioned in the passage**  
 Green manure ✓ (1)

[35]

**QUESTION 3: PLANT REPRODUCTION AND PROTECTION**

- 3.1 3.1.1 **Identification of pollination type**  
Cross pollination ✓ (1)
- 3.1.2 **Pollination agent shown in the diagram**  
Bee ✓ (1)
- 3.1.3 **Non-sexual parts of flower in the diagram**  
  - Petals / corolla ✓
  - Sepals / calyx ✓
(2)
- 3.1.4 **Collective name of structures C and B**  
  - Pistil / Gynoecium ✓
(1)
- 3.1.5 **Name and function of structure E**  
Anther ✓ – Produces pollen grains ✓ (2)
- 3.1.6 **Adaptations of the flowers for cross pollination**  
  - Different height of the stigma and anther ✓
  - Different timings of maturation of stigma and anther ✓
  - Self-sterility ✓
(Any 2 x 1) (2)
- 3.2 3.2.1 **Identification of process shown in the diagram**  
Germination ✓ (1)
- 3.2.2 **Basic requirements for successful germination**  
  - Warmth ✓
  - Moisture ✓
  - Plant hormones ✓
(2)
- 3.2.3 **Methods of hastening germination**  
  - Priming / soaking seeds ✓
  - Scarification ✓
(2)
- 3.3 **Identification of an example of a plant**
- 3.3.1 **Examples of plants**  
  - Roses ✓ (1)
  - Onions ✓ (1)
  - Potatoes ✓ (1)
  - Strawberries ✓ (1)
- 3.3.2 **Definition of *asexual reproduction***  
Production of new plants ✓ without fusion of gametes ✓ (2)
- 3.3.3 **Disadvantages of asexual reproduction**  
  - Lack of genetic variation / reduced gene pool ✓
  - Negative mutations are passed onto offspring ✓
  - Less chances to survive environmental changes ✓
(Any 2 x 1) (2)

- 3.4 3.4.1 **Identification of micro-organisms**
- Virus ✓
  - Bacteria ✓
  - Fungi ✓
- (Any 2 x 1) (2)
- 3.4.2 **Identification of pathogen and its vector**
- Virus ✓ – Aphid ✓
- (2)
- 3.4.3 **Modes of pathogen transmission**
- Infected seed or seedlings ✓
  - Infected clothing ✓
  - Infected tools and equipment ✓
  - Vectors such as sucking insects ✓
  - Spores which can be transmitted by wing or water ✓
- (Any 2 x 1) (2)
- 3.4.4 **Measures for preventing spread of plant diseases**
- Remove all weeds ✓
  - Avoid overcrowding plants ✓
  - Use disease resistant varieties ✓
  - Practice intercropping ✓
  - Disinfect pruning tools ✓
  - Practice crop rotation ✓
- (Any 2 x 1) (2)
- 3.5 3.5.1 **Identification of pest management method**
- Integrated Pest Management ✓
- (1)
- 3.5.2 **Benefits of IPM**
- Not harmful to the environment ✓
  - Reduces need to purchase expensive chemical pesticides ✓
  - Less chemicals in food ✓
- (Any 2 x 1) (2)
- 3.5.3 **Challenges rural farmers might face in implementing IPM**
- Lack of knowledge ✓
  - Lack of funds to purchase chemical pesticides ✓
- (Any 2 x 1) (2)
- [35]**

**QUESTION 4: OPTIMAL RESOURCE UTILISATION**

- 4.1 4.1.1 **Identification of cropping system**  
Crop rotation ✓ (1)
- 4.1.2 **Benefits of crop rotation**
- Protects the farmer from total crop failure ✓
  - Maintains soil fertility ✓
  - Improves soil structure ✓
  - Controls pests and diseases ✓
  - Increases soil nitrogen content ✓ (Any 2 x 1) (2)
- 4.1.3 **Principles applied when designing a crop rotation programme**
- Crops that require the same nutrients should not follow each other ✓
  - Crops that are affected by the same pests and diseases should not follow each other ✓
  - Shallow rooted crops should be followed by deep rooted crops ✓ (3)
- 4.1.4 **Common name given to crops planted in Year 3**  
Legumes ✓ (1)
- 4.1.5 **Role of legumes in a rotation programme**  
Legumes form a symbiotic relationship with nitrogen fixing, ✓ which enables them to increase the soil's nitrogen content. ✓ (2)
- 4.2 4.2.1 **Methods of powering tillage**
- Human power ✓
  - Draft-animal power ✓ (2)
- 4.2.2 **Examples of tools that can be used during human powered tillage**
- Pick ✓
  - Hoe ✓
  - Mattock ✓
  - Rake ✓
  - Spade ✓ (Any 2 x 1) (2)
- 4.2.3 **Functions of soil tillage**
- To improve soil aeration and infiltration capacity ✓
  - To break up soil crusts ✓
  - Destroy weeds ✓
  - To incorporate fertilisers and organic matter into the soil ✓ (Any 3 x 1) (3)
- 4.2.4 **Differentiation of *primary* from *secondary cultivation/tillage***  
Primary tillage cut and shatters the soil with deep penetration tools ✓ to produce a rough surface finish, ✓ whereas secondary tillage aims to level and firm the top part of the soil ✓ to produce a smoother surface finish. ✓ (4)



- 4.3 4.3.1 **Identification of structure in the picture**  
Greenhouse / tunnel ✓ (1)
- 4.3.2 **Advantages of using greenhouses/tunnels**
- Crop damage due to frost and rain is eliminated ✓
  - Crops can be grown all year round ✓
  - High quality crops can be produced ✓
  - Yields can be improved ✓
  - Crops that would normally not grow in a particular area can be grown ✓ (Any 2 x 1) (2)
- 4.3.3 **Environmental conditions to be considered when selecting a location for a greenhouse**
- Light ✓
  - Temperature ✓
  - Relative humidity ✓
  - Plant diseases ✓ (Any 3 x 1) (3)
- 4.4 4.4.1 **Identification of process**  
Irrigation ✓ (1)
- 4.4.2 **Sources of irrigation water**
- Lakes / dams ✓
  - Permanent rivers / streams ✓
  - Aquifers / springs / boreholes ✓ (Any 2 x 1) (2)
- 4.4.3 **Benefits of irrigation**
- Minimises crop water stress ✓
  - Increases crop yields and quality ✓ (2)
- 4.4.4 **Signs of poor-quality irrigation water**
- Salinity ✓
  - Turbidity ✓
  - Excess nutrients ✓
  - Specific ion toxicity ✓ (Any 2 x 1) (2)
- 4.4.5 **Consequences of using poor quality water for irrigation**
- Blocked pipes ✓
  - Corrosion of equipment ✓
  - Wilting of plants due to soil salinity ✓
  - Reduced marketability of produce due to unsightly deposits from irrigation water ✓ (Any 2 x 1) (2)

**[35]**

**TOTAL SECTION B: 105**  
**GRAND TOTAL: 150**