

Date : October 11, 2025
Total Marks : 100
Writing Time : 150 minutes (2.5 hours)
Reading Time : 15 minutes (prior to writing time)

1. Write your Registration Number clearly and correctly on the Answer Booklet.
2. The first 15 minutes is to check the number of pages of Question Paper, printing errors, clarify doubts and to read the instructions. You are NOT permitted to write during this time.
3. This paper consists of **TWO SECTIONS**, namely SECTION A & SECTION B:
 - **SECTION A** has two parts: Part I - 30 Multiple Choice Questions
 Part II - 4 Short Answer Questions

All questions under SECTION A are COMPULSORY.
 - **SECTION B** consists of two Case Studies. Choose only **ONE** case study and answer the questions of your choice.
4. All answers should be written on the Answer Booklet provided to you. Candidates are not allowed to write anything on the question paper. If required, ask for additional Answer Booklet.
5. All answers should be written with correct numbering of Section, Part and Question Number in the Answer Booklet provided to you. Note that any answer written without indicating the Section, Part and Question Number will NOT be evaluated and no marks will be awarded.
6. Begin each Section and Part in a fresh page of the Answer Booklet.
7. You are not permitted to tear off any sheet(s) of the Answer Booklet as well as the Question Paper.
8. Use of any other paper including paper for rough work is not permitted.
9. **You must hand over the Answer Booklet to the Invigilator before leaving the examination hall.**
10. This paper has **7 printed pages**, including this instruction page.

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SECTION A

PART I: Multiple Choice Questions [30 marks]

Choose the correct answer and write down the letter of your chosen answer in the Answer Booklet against the question number e.g. 31 (d). Each question carries ONE mark. Any double writing, smudgy answers or writing more than one choice shall not be evaluated.

1. A monoecious plant has:
 - a) Male flowers and female flowers in separate structures on the same plant.
 - b) Male and female flowers on different plants.
 - c) Only imperfect flowers.
 - d) Only perfect flowers.
2. What is a perfect flower?
 - a) A flower which has male reproductive structures.
 - b) A flower which has female reproductive structures.
 - c) A flower which has both male and female reproductive structures.
 - d) A flower which has bright colours.
3. Tomato is a:
 - a) Fruit.
 - b) Vegetable.
 - c) Root.
 - d) Tuber.
4. The International Society for Horticultural Science (ISHS) is headquartered in:
 - a) Germany.
 - b) England.
 - c) Belgium.
 - d) India.
5. The edible part of potato is the
 - a) Root.
 - b) Tuber.
 - c) Rhizome.
 - d) Corm.
6. A seed achieves its maximum dry weight and has maximum germination potential and vigor during the stage of:
 - a) Physiological maturity.
 - b) Edible maturity.
 - c) Harvest maturity.
 - d) All of the above.
7. Ethylene plays a crucial role in which of the following plant processes?
 - a) Flowering.
 - b) Root elongation.
 - c) Fruit ripening.
 - d) Photosynthesis.

8. In cacti, photosynthesis primarily occurs in the?
 - a) Stem.
 - b) Roots.
 - c) Leaves.
 - d) None of the above.
9. Stratification is a technique by which:
 - a) Seeds are exposed to high temperature.
 - b) Seeds are exposed to low temperature.
 - c) Seeds are exposed to high humidity.
 - d) Seeds are exposed to low humidity.
10. Which irrigation system control weeds most effectively?
 - a) Sprinkler.
 - b) Furrow.
 - c) Basin.
 - d) Drip.
11. Plastic pipes for the conveyance of irrigation water are mainly made of:
 - a) LLDPE.
 - b) LDPE.
 - c) HDPE.
 - d) PP.
12. Which technique is used to rejuvenate old unproductive fruit trees?
 - a) Top working.
 - b) Bridge grafting.
 - c) Top crossing.
 - d) Approach grafting.
13. Which of the following is a bulb vegetable?
 - a) Garlic.
 - b) Asparagus.
 - c) Sweet potato.
 - d) Ginger.
14. Which of the following fruit is commonly propagated through seed?
 - a) Litchi.
 - b) Papaya.
 - c) Mango.
 - d) Guava.
15. How are acid soils reclaimed?
 - a) By liming.
 - b) By adding gypsum.
 - c) Both A and B.
 - d) By adding rock phosphate.

16. Expand the acronym “HLB” which is one of the most devastating citrus diseases globally:
- Huanglongbing.
 - Helicobacter.
 - Highland Bush.
 - High Black.
17. The Great Irish Famine, also known as the “Great Hunger” affected which of the following crop?
- Pumpkin.
 - Pear.
 - Ginger.
 - Potato.
18. Define adjuvants:
- Adjuvants are pesticides.
 - Adjuvants are fungicides.
 - Adjuvants are a group of insecticides that target some variety of sucking insects.
 - Adjuvants are supplemental substances added to a spray mixture to enhance the performance and/or physical properties of the desired chemical.
19. The central chemical structure of chlorophyll has:
- Magnesium.
 - Nitrogen.
 - Carbon.
 - hydrogen.
20. The edible part of a citrus fruit is the:
- Endocarp.
 - Exocarp.
 - Pedicel.
 - Rind.
21. Asparagus is commonly propagated through?
- Seeds.
 - Crowns.
 - Tubers.
 - Grafts.
22. The study of mushrooms is called:
- Mycology.
 - Pomology.
 - Pathology.
 - None of the above.
23. Example of an aggregate fruit is:
- Apple.
 - Mango.
 - Strawberry.
 - Mandarin.

24. Rice is predominantly a:
- a) Cross pollinated crop.
 - b) Self-pollinated crop.
 - c) Vegetatively propagated crop.
 - d) None of the above.
25. Soil pH is important mainly because:
- a) It determines water availability.
 - b) It gives vitamin D.
 - c) It significantly impacts nutrient availability to plants and microbial activity in the soil.
 - d) It prevents soil erosion.
26. The Fall Armyworm (FAW) is a polyphagous pest mainly affecting maize crop in Bhutan, the average fecundity of one FAW female is about:
- a) 250 eggs.
 - b) 3000 eggs.
 - c) 1000 eggs.
 - d) 50 eggs.
27. Apple scab is caused by?
- a) *Venturia inaequalis*.
 - b) *Eriosoma lanigerum*.
 - c) *Puccinia* spp.
 - d) All of the above.
28. Orthodox seeds:
- a) Are traditional seeds.
 - b) Have the ability to endure extreme freezing and drying conditions during ex situ conservation.
 - c) Have the ability to endure extreme heat and moist conditions during ex situ conservation.
 - d) Have short life.
29. Topiary is:
- a) The art of making bonsai.
 - b) Dormancy in temperate plants.
 - c) The horticultural practice of training perennial plants, typically evergreen shrubs and trees, into decorative shapes by clipping their foliage.
 - d) The practice of removing seed cover for better germination.
30. Example of macronutrient in plants:
- a) Nitrogen.
 - b) Phosphorus.
 - c) Potassium.
 - d) All of the above.

PART II – Short Answer Questions [20 marks]

This part has 5 Short Answer Questions. Answer ALL the questions. Each question carries 5 marks.

1. What is Integrated Pest management (IPM) in crops? List down four management approaches commonly used in IPM. **(5 marks)**
2. What is Plant introduction? What are the two main types of plant introduction, write briefly about each of the methods. **(5 marks)**
3. What is plant propagation? What are the two primary forms of plant propagation? State one advantage and one disadvantage for each of the forms. **(5 marks)**
4. What is Seed Replacement Rate (SRR)? List down 4 benefits of SRR. **(5 marks)**

SECTION B: Case Study [50 marks]

Choose either CASE I OR CASE II from this section. Each case study carries 50 marks. Mark for each sub-question is indicated in the brackets.

CASE I

Citrus is one of the most widely grown fruit plants in Bhutan along with a variety of other horticultural crops. The most common and widely grown citrus type in Bhutan is the local mandarin (*Citrus reticulata*).

HLB/Citrus greening is one of the most devastating citrus diseases globally. There is no known cure and it probably entered Bhutan in the 1960s and has become the most serious threat to citrus cultivation and production in Bhutan.

Answer the following questions.

1. Do you think citrus (especially mandarin) is an important cash crop for the Bhutanese farmers? Explain why, data on estimated domestic acreage, production areas, annual production and export value and any supporting evidences are desirable. **(15 marks)**
2. What are the typical symptoms produced by HLB? HLB symptoms are often confused with some other diseases/conditions, list down any 5 such conditions. **(10 marks)**
3. Write briefly on the HLB disease biology. **(5 marks)**
4. Write in detail management practices for HLB disease. **(20 marks)**

CASE II

Chilli is a very important crop in Bhutan, a significant part of Bhutanese cuisine and culture. It is consumed as a vegetable and not a spice. A lot varieties of chillies under good acreage are grown in the country but also significant quantities are imported each year.

In recent years, there have been instances of import bans on chilli due to presence of residues beyond the MRL. Such bans have economic effects, imported chillies are generally cheaper and more affordable, but pesticides residue exceeding the MRLs is a health safety concern.

Answer the following questions.

1. What is MRL? Why are MRLs important? What factors determine setting MRLs? How would you advise the Bhutanese farmers so that the fruits & vegetables they grow meet the MRL standards? **(15 marks)**
2. What is your opinion on such import bans? Write the pros and cons of this management strategy. **(10 marks)**
3. You are working in the Department of Agriculture and now with frequent incidences of consignments of fruits and vegetables exceeding MRLs, you have been asked to come up with a strategy to deal with this issue along with policy recommendations.

You can write in the context of protecting public health, market stability and promoting sustainable production, regional cooperation with neighbouring countries and any other factors you feel must be taken into consideration. **(25 marks)**

TASHI DELEK