

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. All of the following are the branches of Horticulture **EXCEPT**
(I) Pomology, (II) Oenology, (III) Olericulture, (IV) Orthology
 - a) I only
 - b) II and III
 - c) IV only
 - d) I and III
2. What is **Agriculture 4.0**?
 - a) Use of IoT and other precision technologies in Agriculture
 - b) Use of only IoT in Agriculture
 - c) Use of Engineering in Agriculture
 - d) Use of fast-growing nutrients in Agriculture
3. Which of the following is best Ethylene absorbers used in fruit packing?
 - a) Zinc thiosulphate
 - b) Potassium thiosulphate
 - c) Sugar thiosulphate
 - d) Potassium Permanganate
4. Which best defines the term '**Apomixes**' in horticulture?
 - a) It is an asexual reproduction that occurs without fertilization but producing embryo and seed.
 - b) It a sexual reproduction that occurs with fertilization producing embryo and seed.
 - c) It is combination of both sexual and asexual reproduction producing embryo and seed.
 - d) None of the above
5. The red color in tomato is due to
 - a) Anthocyanin
 - b) Lycopene
 - c) Xanthophylls
 - d) None of the above
6. The optimum temperature requirement for seed germination of horticultural crop is in between:
 - a) 8⁰C to 15⁰C
 - b) 25⁰C to 35⁰C
 - c) 20⁰C to 25⁰C
 - d) 35⁰C to 45⁰C
7. The National flower of Bhutan is:
 - a) *Meconopsis merakensis*
 - b) *Meconopsis bhutia*
 - c) *Meconopsis grantis*
 - d) *Meconopsis napaulensis*

8. Which one of the following is not a temperate horticultural crop?
- Almond
 - Cherry
 - Persimmon
 - Macadamia nut
9. Which country is largest almond producing country in 2021/2022?
- India
 - China
 - USA
 - Russia
10. Which of the following is not a factor that affects the productivity of horticultural crops?
- Size of the farm
 - Water quality in the farm
 - Soil fertility of a farm
 - Crop variety grown in a farm
11. Choose the **CORRECT** description related to horticulture industry:
- Truck Gardening is a type of gardening where broken trucks are used for growing vegetables
 - Black garlic is processed by placing *Allium sativum* in a warm, moist, controlled environment over the course of several weeks
 - De-suckering is practiced in commercial beans production
 - Wild ginseng is a short-lived herbaceous perennial plant
12. Choose the correct Hardy-Weinberg's law equation used in plant genetics to calculate allele frequencies in a population.
- $p^2 + pq + q^2 = 1.$
 - $p^2 + 4pq + q^2 = 1.$
 - $p^2 + 3pq + q^2 = 1.$
 - $p^2 + 2pq + q^2 = 1.$
13. Choose the special characteristics of dry land horticultural crops?
- Deep-rooted and perennial in nature
 - Drought resistant
 - Hardy & tolerant to rigorous monsoon
 - All of the above
14. Match the vegetables with the right nutrient deficiency symptom
- Nitrogen-----The leaves of the vegetables become dark green and then black
 - Iron-----Yellowing of plant leaves while the tissue close to the leaf veins remains green
 - Phosphorus-----Leaves become light yellow and then decay
 - Zinc-----Stems thick and woody with vegetative growths retarded
15. As a manager in one of the commercial horticulture farm projects, you are assigned to develop a project concept. Which phase of the project would de-prioritize in the concept?
- Planning
 - Implementation
 - Maturity
 - Closing

16. What is an approximate gross return from an acre of avocado orchard if productivity is 35 Kg/tree @ plantation rate of 110 plants/acre? The current market price for avocado is Nu. 250/Kg.
- Nu. 925,500
 - Nu. 962,500
 - Nu. 972,500
 - Nu. 935,500

17. Which of the following is not a part of seed testing?
- Flavor test
 - Purity test
 - Germination test
 - Seed moisture test

18. Which of the following element is necessary in grapes to translocate sugar?
- Mg
 - Bo
 - Ca
 - Cu

19. Identify the mushroom in the photo?

- Amanita rubrovolvata*
- Russula Emetica
- Ganoderma lucidium*
- Russula fragrantissima*



20. The best season to propagate the plants through cutting is in _____ season.

- Winter
- Summer
- Autumn
- Spring/growing

21. Which of the following chemical is allowed to use in Organic Agriculture?

- 2-4-D sprays
- Sulphur sprays
- Sulphuric acid sprays
- Hydrochloric acid sprays

22. The blossom end rot of tomato is a _____ disorder caused due to Ca deficiency

- Chemical
- Mechanical
- Physiological
- None of the above

23. The zero energy cold store functions based on the principle of

- Passive evaporative cooling.
- Passive transpirative cooling
- Passive hydro-cooling
- Passive sand and water cooling

24. All of the following are principles of food preservation **EXCEPT**
- Exclusion of air.
 - Removal of moisture
 - Maintenance of temperature.
 - Addition of micro-organisms
25. Which of the following are not fat-soluble vitamins?
- Vitamin A
 - Vitamin D
 - Vitamin E
 - Vitamin C
26. In a situation where land is an issue to grow adequate quantity of crops to feed the ever-growing population, one of the best options for food production in urban setting is:
- Hydroponics
 - Rock gardening
 - Vertical gardening
 - Underground gardening
27. Which of the following is incorrect with their centre of origin?
- Pear-----China
 - Apple-----Bhutan
 - Rose-----Central Asia
 - Chilli pepper-----Central/South America
28. _____ gardens differ from other styles in that most of the plants chosen require a level of shade tolerance. Avoid planting in lines or formal designs and aim for a mix of interesting textures, forms and colors. Which garden is described above?
- Japanese gardens
 - English gardens
 - Mughal gardens
 - Woodland gardens
29. In horticulture, radioisotopes are used for the study of the following, **EXCEPT**
- Nutritional studies of trace elements
 - Metabolism in plants
 - Plant pathology
 - Fruit color
30. The main difference between SI and CI engine is
- the SI engine ignition process is carried out with the help of a spark plug whereas Compression Ignition (CI) engine works on the basis of Diesel cycle or Constant pressure heat addition cycle.
 - the SI engine operated machines are imported ones where as CI engine are locally produced and manufactured.
 - the SI engine uses more fuel comparing to the CI Engines.
 - there is no main difference between SI and CI engines as they are both machines.

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 are the critical stages of irrigation requirement for fruit crops? Explain in brief any four different types of irrigation system in horticultural crops. **(5 marks)**
2. Elaborate GAP and define it. Explain in brief the principles/pillars of GAP? **(5 marks)**
3. What is agro-meteorology? Explain in brief any four major practical application of agro-meteorology in horticulture production. **(5 marks)**
4. What are the basic principles of experimental design? Describe in brief four different types of experimental design. **(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

“Most of Bhutan’s vulnerable farming communities reside either close to protected areas (parks and biological corridors) or in reserved forests. Finding the balance between the dual objectives of economic development and conservation is therefore a critical challenge. The loss of crops and livestock in poor rural areas can have a devastating impact to households, while the retaliatory killing of wildlife is a challenge to long term conservation and maintenance of national biodiversity. Human-wild life conflict (HWC) is one of the biggest challenges for crop and livestock production (*WWF*).

In connection to the HWC, answer the following questions.

1. Explain in details the Human-wildlife conflict issues in Bhutan. What are the strategies and technologies would you use/recommend to resolve human-wildlife conflict? **(20 marks)**
2. How do you relate human-wildlife conflict with rural-urban migration? **(10 marks)**
3. Write a brief concept note to implement human-wildlife management activities. Your project concept should contain the major components. **(20 marks)**

CASE II

‘Entrepreneurship is seen as the tool to fasten up the rural development processes and is considered as a key strategy not only to reduce rural-urban migration but also instrumental in enhancing income and creation of employment opportunities. A horticulture entrepreneur backed up by proper guidance and support can lead to a successful life. Therefore, Government must nurture horticulture entrepreneurs so that they become entrepreneur in true sense to create wealth and employment opportunities’ (*publishingindia.com*).

In connection to the Entrepreneurship, answer the following questions.

1. Write in details the concept of Entrepreneurship, characteristics and process of entrepreneurship development in horticulture. **(20 marks)**

PAPER III: SUBJECT SPECIALISATION PAPER FOR HORTICULTURE

2. Do you think there is scope for horticulture enterprise development in Bhutan? What types of horticulture enterprise development would you recommend and why? **(10 marks)**
3. Write down in details the meaning, types/forms, features and functions of business advertisement **(10 marks)**
4. Is leadership and communication skills important in running horticulture enterprise? Why/why not? **(10 marks)**

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