

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. Big data will play a greater role than ever before in transforming the horticulture industry. Following are the importance of big data in horticulture **EXCEPT**
 - a) Risk assessment
 - b) Crop management
 - c) Greenhouse construction
 - d) Supply chain management

2. _____ is a Japanese National who has played pivotal role in Horticulture Development in the country especially in the East. He was awarded the National Order of Merit (Gold) by His Majesty the King in 2014.
 - a) Dasho Keiji Nishioka
 - b) Mr. Yuichi Tomiyasu
 - c) Mr. Watanabe Kozo
 - d) Mr. Yoichiro Ishihara

3. **Agriculture 4.0** is future of farming technology. Which of the following is not a part of Agriculture 4.0?
 - a) Precision Agriculture
 - b) Big data
 - c) IoT
 - d) LoI

4. Miyazaki _____ is one of the most expensive fruits in the world fetching up to Nu 2.5 lakhs per Kilogram.
 - a) Apple
 - b) Mango
 - c) Macadamia
 - d) Prickly custard apple

5. The word 'Brix' is related to:
 - a) Sunflower
 - b) Sugarcane
 - c) Rice
 - d) Potato

6. Whiptail of Cauliflower is caused due to the deficiency of:
 - a) Mo
 - b) Cl
 - c) Na
 - d) Ca

7. Consider the following statements:
I. Lime is used for correcting the soil acidity.
II. Gypsum is used for the reclamation of alkaline soils.
- Only statement I is correct
 - Only statement II is correct
 - Both statements I & II are correct
 - Both statements I & II are incorrect
8. Diversification in horticulture has the following advantage(s):
- Produce higher biomass per unit area.
 - Are highly remunerative for replacing subsistence farming.
 - Have potential for improvement of wastelands through planned strategies.
 - All of the above
9. Match the following and choose the correct answer.
- | | |
|--------------|-------------------------------|
| 1. Vitamin A | A. Present in bones and teeth |
| 2. Vitamin D | B. Antihemorrhagics |
| 3. Vitamin K | C. Scurvy |
| 4. Ca | D. Rickets |
| 5. Vitamin C | E. Night blindness |
- 1 and E, 2 and D, 3 and B, 4 and A, 5 and C
 - 1 and A, 2 and D, 3 and E, 4 and A, 5 and B
 - 1 and D, 2 and A, 3 and B, 4 and E, 5 and C
 - 1 and B, 2 and C, 3 and D, 4 and E, 5 and A
10. Black heart of potato is caused by:
- Algae
 - Fungi
 - Bacteria
 - Poor ventilation in storage
11. _____ is the value of next best alternatives forgone.
- Minimum cost
 - Opportunity cost
 - Isoquant
 - Marginal cost
12. St. George is rootstock of _____ and resistant to _____.
- Grapes, Wilt
 - Grapes, Powdery mildew
 - Banana, Wilt
 - Banana, bunchy top

13. Apple production as well as quality has drastically reduced in the last few years. There is an urgent need to replace apples with some high value fruit crops. Which fruit crop would you recommend in place of apple?
- Avocado
 - Peach
 - Almond
 - Macadamia nut
14. Inhibition of seed germination due to lack of water is known as:
- Seed dormancy
 - Seed vigour
 - Quiescence
 - Vernalization
15. An oriental fungus has a long history of use for promoting health and longevity in Asian countries especially in countries like China and Japan. Off late, it is gaining popularity among the Bhutanese mushroom growers. Which mushroom is described above?
- Tricholoma matsutake*
 - Lentinula edodes*
 - Cordyceps sinensis*
 - Ganoderma lucidum*
16. Under the Royal Command of His Majesty The King, the Ministry of Agriculture and Forests in partnership with the De-Suung National Service has embarked on a project which is of national importance in March, 2022. What was the project?
- Million Tree Plantation Project
 - Million Fruit Tree Plantation Project
 - Million Bodhi Tree Plantation Project
 - Million Cherry Plantation Project
17. Which of the following is non-edible mushroom?
- Shiitake*
 - Oyster*
 - Ganoderma*
 - None of the above*
18. Which one of the following is **INCORRECT**?
- Zn-----Trace of mineral
 - Mo-----Regulate plant functions
 - N-----drive plant growth and grain yields
 - P-----Comprises 95% of plant's tissues
19. All of the following are the advantages of cryopreservation **EXCEPT**?
- It contributes to the preservation of biological materials
 - The genetic integrity of the materials is stored
 - It is new a technology in Bhutan and it is difficult to implement
 - The shelf life of the genetic materials can be stored for a longer time

20. Which of the following statement is **WRONG**?
- Pollen wall has cavities containing proteins
 - No enzyme can degrade sporopollenin
 - Pollen grains are well represented in fossil strata due to sporopollenin
 - Pollen grains remain viable for several months because their outer covering is made of sporopollenin
21. In C4 plants, the bundle sheath cells
- have thin walls to facilitate gaseous exchange.
 - have a high density of chloroplasts.
 - have large intercellular spaces.
 - are rich in PEP carboxylase.
22. The toughening effect of canned beans is due to:
- Cu
 - Fe
 - Ca
 - Tannin
23. The horticultural crops can be propagated both sexually and asexually. Which of the following is sexual method of propagation?
- Grafting
 - Budding
 - Seeds
 - Cutting
24. In an agricultural credit system, which of the following is/are the principles of credit?
- Principle of productive purpose
 - Principle of productivity
 - Principle of personality
 - All of the above
25. The organic matter content of the soil varies with:
- Vegetation
 - Climate
 - Biological activities
 - All of the above
26. Which of the following are principles of organic agriculture?
(I: Heath, II: Ecology, III: Care, IV: Supporting)
- I, II & III
 - II & III
 - I, III & IV
 - All of the above

27. Given below are two statements:

Statement I: Pinching of the terminal portion of plant minimizes apical dominance and increase side shoots.

Statement II: Apical dominance is prominent in root crops.

In light of the above statement, choose an appropriate answer from the options given below

- a) Statements I and II are correct
 - b) Statements I and II are incorrect
 - c) Statement I is correct and statement II is incorrect
 - d) Statement I is incorrect and statement II is correct
28. Which one of the following is **NOT CORRECT**?
- a) Cauliflower-----Scooping
 - b) Cucurbits-----Metazania
 - c) Carrot----- Carotenoids
 - d) Radish-----Whiptail
29. Anther culture is usually used for the production of:
- a) Diploid plants
 - b) Haploid plants
 - c) Tetraploid plants
 - d) Triploid plants
30. Which one is **NOT** a Japanese Garden?
- a) Tea garden
 - b) Flat garden
 - c) Terrace garden
 - d) Sand garden

PART II – Short Answer Questions [20 marks]

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

1. Enlist and describe in brief the factors responsible for unfruitfulness in fruit crops.
2. Fill in the blanks
 - a) The process of producing several identical copies of gene sequence is known as _____.
 - b) Rio-De-Janerio is variety of _____.
 - c) The best pollinizer variety of apple is _____.
 - d) Application of fertilizer along with the irrigation is known as _____.
 - e) Flavor in citrus fruit is due to the presence of a chemical compound known as _____.
3. Describe at least five ways a farmer can increase crop production.
4. Describe various cropping systems with at least one advantage each.

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

Russia's war in Ukraine is preventing grain from leaving the “**breadbasket of the world**” and making food more expensive across the globe, threatening to worsen shortages, hunger, and political instability in developing countries (*Aljazeera news*)

1. How do you think Russia’s war in Ukraine would affect essential commodity supplies to Bhutan and why or why not? **(10 marks)**
2. Do you think Bhutan should focus on food security and food-self-sufficiency? **(5 marks)**
3. Suggest strategies and way forward for Bhutan to tackle the challenges assuming a scenario in which the supply or export of essential commodities by the countries around the world are banned. **(20 marks)**
4. How scaling up of horticulture production both in terms of volume and area in the country would contribute towards food security as well as employment generation? **(10 marks)**
5. Do you think we should encourage establishment of mega farms in the country? **(5 marks)**

CASE II

Our food supply system is largely dependent on import. However, on the other hand, Bhutan has a huge area of fallow lands that can be revived for food production to meet the growing demand for food and nutrition supply.

1. In your opinion, what are the reasons for leaving the land fallow? Describe at least five possible reasons in details. **(15 marks)**
2. Suggest strategies and measures to revive fallow lands in Bhutan to meet the increasing demand for food and nutrition. **(10 marks)**
3. Do you think wetland conservation is critical in Bhutan? Why or why not? **(10 marks)**
4. How will you create employment opportunities for youths in horticulture sector? How **Agriculture 4.0** would attract youth in the sector? **(15 marks)**

TASHI DELEK