

**ROYAL CIVIL SERVICE COMMISSION  
BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2021  
EXAMINATION CATEGORY: TECHNICAL**

**PAPER III: SUBJECT SPECIALISATION PAPER FOR HORTICULTURE**

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<b>Date</b>	: October 31, 2021
<b>Total Marks</b>	: 100
<b>Writing Time</b>	: 150 minutes (2.5 hours)
<b>Reading Time</b>	: 15 minutes (prior to writing time)

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**GENERAL INSTRUCTIONS:**

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 **8 printed pages**, including this instruction page.

**GOOD LUCK**

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. Land fragmentation is one of the biggest issues in Bhutan and has hampered commercialization of horticultural crops. In such case, which cropping system would you recommend to maximize return from per unit area of land?
  - a) Vertical farming system
  - b) Multi-tier cropping system
  - c) Precision farming system
  - d) Mixed cropping system
  
2. \_\_\_\_\_ is a Japanese National who lived for Bhutan and has played pivotal role in agriculture development in the country. He was awarded the Red Scarf by His Majesty the Fourth Druk Gyalpo in 1980.
  - a) Dasho Keiji Nishioka
  - b) Dasho Yuichi Tomiyasu
  - c) Dasho Watanabe Kozo
  - d) Dasho Yoichiro Ishihara
  
3. The formation of seed from the maternal tissues of the ovule, avoiding the processes of meiosis and fertilization is known as
  - a) Asexual propagation
  - b) Chimera
  - c) Apomixes
  - d) Offsets
  
4. Which one of the following crops is not a plantation crop?
  - a) *Citrullus vulgaris*
  - b) *Areca catechu*
  - c) *Cocos nucifera*
  - d) *Camellia theasinesis*
  
5. All of the following sentences are correct, EXCEPT
  - a) Golden apple can be planted as a pollinizer for commercial apple production.
  - b) Avocado is a potential fruit crop for commercialization and can be grown in temperate region.
  - c) Hazelnut is cultivated in Bhutan by FDI Company.
  - d) Fuyu and Jiro are two varieties of Japanese persimmon.

6. Plant breeding is a very long and strenuous process. However, plant breeders spend lots of time and effort to develop following traits in new crop varieties, EXCEPT
- Resistant to pests and diseases.
  - Resilient to climate change.
  - Good quality and high yielding crop varieties.
  - To produce tasty foods.
7. Why are the raised beds encouraged for vegetable gardening and especially for nursery raising?
- Good drainage.
  - Easy cultural operations.
  - Raised beds warm up more quickly in spring.
  - All of the above.
8. Government grant paid to the farmers to supplement income and influence the overall cost and supply of certain commodities is known as
- Buy back scheme
  - Subsidy scheme
  - Cost-sharing mechanism
  - Compensation
9. Following are the nutrient deficiencies producing distinct color changes in foliage of vegetables. Which nutrient deficiency symptom described below do not match with the element?
- New leaves develop light yellow color, first between veins. Later entire leaves become yellow----**Iron**
  - New leaves abnormally small and mottled with yellow, or uniformly chlorotic. Necrotic or dead areas are common----**Zinc**
  - Chlorosis first appears between veins of old leaves while veins remain green. Leaves become brittle and margins curl upward----**Magnesium**
  - Retarded growth with stems slender, fibrous and hard. Normal green of leaves fades to solid pattern of yellowish green----**Zinc**
10. Vegetables are classified into following groups, EXCEPT
- Fungi
  - Roots
  - Fruits
  - Berries
11. Application of \_\_\_\_\_ in horticulture help farmers to achieve increased production and reduce costs by enabling better management of land resources.
- Artificial intelligence
  - Geographic information system
  - Drip irrigation system
  - Protected cultivation

12. What is the difference between formal and informal garden?
- Formal garden is based on geometric shapes.
  - Informal garden is looser and generally uses only natural materials.
  - Formal garden will have high degree of symmetry.
  - All of the above
13. Which of the following is not a breeding technique to improve horticultural crops?
- Introduction
  - Vernalization
  - Selection
  - Emasculation
14. Which of the following are not experimental design method for horticultural crop research?  
(I: Symmetric, II: Split-plot, III: Buffer zoning, IV: Randomized complete block)
- I & III
  - II & III
  - I & IV
  - All of the above
15. The part of the plants used and its medical properties are mentioned below: Which one of the following is NOT TRUE?
- Rosa macrophylla*: The berry is used as an antidote and relieves constipation.
  - Primula sp.*: Whole part of the plant is used for healing wounds and inflammation.
  - Cordyceps sinensis*: Stem is used and contains anti-bleeding and anti-inflammatory properties.
  - Meconopsis simplicifolia*: Whole part of the plant is used and contains anti-malarial property and alleviates liver cirrhosis.
16. Market is one of the biggest issues that has contributed to huge postharvest losses in horticultural crops? As a Horticulturist, which one of the following strategies would you recommend to solve such issues?
- Market-led production
  - Production-led market
  - Farmer-led production
  - Consumer-led production
17. Which of the following is wild-edible mushroom?
- Russula rosacea* (Pers.)
  - Stropharia semiglobata* (Batsch)
  - Amanita rubrovolvata* S.
  - Lactarius deliciosus* (L.)

18. Which of the following crop variety is INCORRECT?
- a) Apple-----*Royal delicious*
  - b) Pear-----*Hosui*
  - c) Persimmon-----*G9*
  - d) Potato-----*Desiree*
19. All of the following are the principles of food preservation, EXCEPT
- a) Removal of micro-organisms through radiation.
  - b) Inactivating enzymes through removal of oxygen.
  - c) Incorporating yeast for fermentation.
  - d) Delaying of chemical reactions.
20. Crop diseases are nuisance to the growers causing huge economic losses. Which one of the following diseases associated with given horticultural crops is CORRECT?
- a) Apple-----Woolly aphids
  - b) Citrus-----Fruit fly
  - c) Peach-----leaf curl
  - d) All of the above
21. A physiological disorder with un-developed leaf blades, large bare midrib and ruffled and distorted leaves is known as
- a) Malformation
  - b) Whiptail
  - c) Fasciation
  - d) Albinism
22. A special horticultural practice in which terminal growing portion of a plant is removed to encourage production of axillary branches and also to control the height is known as
- a) De-suckering
  - b) Disbudding
  - c) Pinching
  - d) Thinning
23. Which of the following is not a fundamental principle of plant disease management?
- a) Exclusion
  - b) Eradication
  - c) Protection
  - d) Alleviation
24. The phases of different project management are matched with the relevant activities. Which one of the following is not correctly matched?
- a) Project initiation phase: Create business case and complete project charter
  - b) Project planning phase: Define project scope, set a budget baseline
  - c) Project execution phase: Create project plans and define roles and responsibilities
  - d) Project Monitoring phase: Track effort and costs and ensure adherence to project plans

25. What is N:P:K ratio of **Suphala** that is being widely used by the Bhutanese farmers?  
 a) 15:20:30  
 b) 15:15:15  
 c) 20:20:20  
 d) 30:30:30
26. Which of the following is types of ecosystem services?  
**(I: Provisioning, II: Regulating, III: Cultural, IV: Supporting)**  
 a) I & II  
 b) II & III  
 c) I & IV  
 d) All of the above
27. A measuring device used to measure the amount of actual evapotranspiration released by plants is known as  
 a) Evapometer  
 b) Transpirometer  
 c) Lysimeter  
 d) Refractometer
28. \_\_\_\_\_ is an enzyme involved in the first major step of carbon fixation, a process by which atmospheric carbon dioxide is converted by plants and other photosynthetic organisms to energy-rich molecules like glucose.  
 a) Rubisco  
 b) Carboxylate  
 c) Nicotinamide  
 d) Phospholate
29. A statistical test used to determine whether two population means are different when the variances are known and the sample size is large is known as  
 a) Z-test  
 b) T-test  
 c) ANNOVA test  
 d) Chi-square test
30. Following figure demonstrates land rent theory formulated by which one of the following renowned economists?  
 a) Karl Marx  
 b) Joseph Stiglitz  
 c) David Ricardo  
 d) Milton Friedman

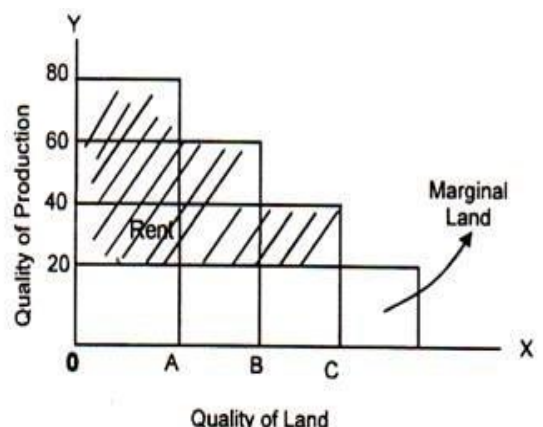


Fig. 1.

**PART II – Short Answer Questions [20 marks]**

**This part has 4 Short Answer Questions. Answer ALL the questions. Each question carries 5 marks.**

1. What is SWOT analysis? Write two advantages and two limitations each of SWOT analysis in Project Management.
2. Describe in brief the different types of vegetable gardening.
3. Describe the different types of orchard Layouts with a simple sketch.
4. Describe at least five different cultural control of pests.

**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**

Contemporary agriculture is both victim and driver of climate change. When we look at the bigger picture, it becomes clear that contemporary agriculture in a painfully ironic way, is accelerating climate change and at the same time suffering the damages resulting from climate change. (*Excerpt from reNature*).

1. What are the climate challenges do you foresee as a result of contemporary agricultural practices? How will you solve such challenges? (10 marks)
2. The environmentalists argue that agro-forestry may be a new weapon to fight climate challenges. Do you agree or disagree? Provide your justifications. (10 marks)
3. Please explain in brief how climate change is currently impacting horticulture production in Bhutan? (10 marks)
4. Do you think organic agriculture is one of the solutions to combat climate crisis? Provide your views. (10 marks)
5. Is it possible for Bhutan to go 100% organic in the next 20 years? Briefly write down some of the challenges in organic agriculture. (10 marks)

**CASE II**

**Agriculture and youth employment, the missing link:** The agricultural sector has a huge potential to create jobs but needs to polish its image in order to attract more young people. To do this, governments should provide relevant education and training.

1. What types of education and trainings do you think is required to attract young people in agriculture? (10 marks)
2. Youth unemployment is one of the national issues. How do you think agriculture sector can contribute towards alleviation of unemployment challenges in the country? (10 marks)
3. How do you think the government should polish image of agriculture to attract young people into farming and other associated jobs? (10 marks)
4. Briefly, write down the concept of entrepreneurship and process of entrepreneurship development. (10 marks)
5. Why communication is important in agri-business management? (10 marks).

**TASHI DELEK**