

**ROYAL CIVIL SERVICE COMMISSION
BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2020
EXAMINATION CATEGORY: TECHNICAL**

PAPER III: SUBJECT SPECIALISATION PAPER FOR HORTICULTURE

Date	: February 27, 2021
Total Marks	: 100
Writing Time	: 150 minutes (2.5 hours)
Reading Time	: 15 minutes (prior to writing time)

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 the 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 on 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. Atterberg Limits measure all of the following contents EXCEPT
 - a) Liquid limit
 - b) Plasticity limit
 - c) Sedimentary limit
 - d) Shrinkage limit

2. Diagnosis and Recommendation Integrated System (DRIS) is a new approach to interpreting leaf or plant analysis. It was first developed by
 - a) Gregor Mendel
 - b) Beaufils
 - c) Aldrich
 - d) John Ray

3. Which of the following is NOT a technique of propagation through specialized plant organs?
 - a) Seeds
 - b) Runners
 - c) Suckers
 - d) Corm

4. Seediness and Kokkan is a disease in one of the horticultural crops that causes huge economic losses to the growers.
Which fruit disease is described above?
 - a) *Malus domestica*
 - b) *Citrus reticulata*
 - c) *Musa Paradisiaca*
 - d) *Fragaria ananassa*

5. Modern fruit cultivation began during the reign of His Majesty The Third King Jigme Dorji Wangchuck, who is regarded as the Father of Modern Bhutan. It was his vision, which was clearly stated in a book on Planting an Orchard (1968), "Our country, the Kingdom of Bhutan, land of Buddhism, is a wonderful place. The variations in altitude and climatic conditions in different regions of Bhutan provide great scope for growing different fruits." Which fruit was considered as most important cash crop those days?
 - a) Kiwi
 - b) Avocado
 - c) Pomegranate
 - d) Apple

6. Allelopathy is a biological phenomenon by which an organism produces one or more biochemicals that influence the germination, growth, survival, and reproduction of other organisms. From the following list, identify the allelopathic compounds:
(*I-Alkaloids, II-Amino Acids, III-Cyanohydrins, IV-Ethylene*)
- I & II
 - II & III
 - I, II & III
 - All of the above
7. The mating between the relatives in a small population is common and this may lower the population's ability to persist and reproduce. The term is referred to
- Hybridization depression
 - Inbreeding depression
 - Emasculation depression
 - Reproduction depression
8. Soil-water conservation play very important role in over-coming the farming challenges in dry-land horticultural system. Which of the following is NOT soil-water conservation practice in dry land horticulture?
- Mulching
 - Cover cropping
 - Stripe cropping
 - Planting wind breaks
9. Vegetables suffer different physiological and nutritional disorders. Which of the following is NOT a physiological disorder in vegetables?
- Measles on melons and cucumber
 - Riciness of cauliflower
 - Molasse in tomato
 - Gomasho of cabbages
10. The shelf life of vegetable depends on the rate of respiration. Considering the shelf life of various vegetables, which of the following statement is NOT TRUE?
- Asparagus has short shelf life due to very high rate of respiration.
 - Onion has very low rate of respiration and shelf life is long.
 - Some vegetables do not respire at all.
 - Broccoli has very low rate of respiration.
11. Among numerous spices grown around the world, one spice is known as king of spice and another as queen. Which of the following spice crops are given the name - the king and the queen of spices respectively?
- Black Pepper and white pepper
 - Black pepper and cardamom
 - Cinnamon and ginger
 - Chilli and cauliflower

12. Nowadays, most of the farmers prefer to grow crops in a controlled environment. This means the temperature, light, humidity and other factors can be regulated as per the requirement of the crops. Which one of the following agricultural technologies is best described above?
- Hydroponics system
 - Precision agriculture
 - In-situ cultivation
 - Protected cultivation
13. A farmer followed an established maturity indexes while harvesting the following horticultural crops from his farm. However, he has forgotten maturity index of one of the following commodities. Which commodity is that?
- Melons : Abscission
 - Pea : Heat units
 - Avocado : Shape
 - Tomato : Color
14. Following are the major horticultural cash crops grown in Bhutan for export EXCEPT
- Kiwi
 - Apple
 - Citrus
 - Potatoes
15. Where is International Society for Horticultural Sciences based in?
- Italy
 - Netherlands
 - Rome
 - Belgium
16. The major export markets for apple and citrus are
- Nepal and India
 - India and Bangladesh
 - Bangladesh and Thailand
 - India and Thailand
17. Under the Command of His Majesty the King, the Ministry of Agriculture and Forests in collaboration with different stakeholders spearheads the Annual Royal Bhutan Flower Exhibition (RBF). Where is 6th RBF held?
- Paro
 - Thimphu
 - Haa
 - S/Jongkhar
18. Which of the following is NOT correctly matched?
- Rose : *Colletotrichum lindemuthianum*
 - Potato : *Eriosoma lanigerum*
 - Pear : *Erwinia amylovora*.
 - Onion : *Botrytis cinerea*

19. Gametangial copulation is a characteristic fertilization in
- Virus
 - Bacteria
 - Fungi
 - Germs
20. The soil textural triangle corresponds to different soil categories and it is divided into
- 9 sections
 - 15 sections
 - 27 sections
 - 12 sections
21. Which of following phases are in correct sequence in Disaster Management?
- Mitigation---Preparedness---Response---Recovery
 - Mitigation---Adaptation---Preparedness---Response
 - Preparedness---Mitigation---Response---Adaptation
 - Preparedness---Adaptation---Response---Recovery
22. Kubota tractors are widely used by the Bhutanese farmers in farm mechanization. Kubota tractors works on
- SI engine
 - AI engine
 - CI engine
 - BI engine
23. Water budgeting is defined as
- an accounting of the rates of water movement in plants for photosynthesis.
 - an accounting of the rate of water movement and change in water storage in all or parts of atmosphere, land and sub-surfaces.
 - an accounting of the rate of movement and storage of water in soil plant system.
 - an accounting of water quality, quantity and investment need for irrigation water.
24. All of the following are organic soil amendments EXCEPT
- Compost
 - Sphagnum peat
 - Wood ash
 - Vermiculite
25. Climate change is affecting the agriculture and food production across the world and Bhutan is not an exception. A recent study has clearly spelt out the threat of climate change in Bhutan. What was the finding of the study?
- Southern belts receive more rainfall comparing to other regions.
 - Bhutan's agro-ecological zones have changed comparing to other countries.
 - Bhutan's glacial lakes are melting faster than those in western Himalayas.
 - Volume of Bhutan's rivers in winter are decreasing every year.

26. The Chi-Square or Goodness of Fit test determines whether there is an association between categorical variables. Researchers accept the hypothesis if the calculated value of Chi-Square is
- less than 0.05
 - more than 0.05
 - more than 5.0
 - less than 5.0
27. Which of the following phases is NOT part of TCA (Tricarboxylic Acid Cycle)?
- Citrate is converted to isocitrate.
 - Hydrogen is converted to H⁺ Ions.
 - Isocitrate is oxidized to alpha-ketoglutarate.
 - Malate is converted into oxaloacetate.
28. The theory which believes that the innermost cortical cells of the root absorb water from the outer side and pump the same into xylem channels was put forward by
- Robert Brown
 - Gregor Mendel
 - Charles Darwin
 - J.C Bose
29. Which of the following is TRUE according to 19th century Engel's law?
- As household income increases, the percentage of that income spent on food increases on a relative basis.
 - As household income increases, the percentage of that income spent on food remains constant on a relative basis.
 - As household income increases, the percentage of that income spent on food declines on a relative basis.
 - As household income increases, the percentage of that income spent on food changes on a relative basis.
30. Which one of the following is NOT a criteria while categorizing the nutrient essentiality to plants?
- Complete or partial lack of the element in question must make normal plant growth impossible.
 - The element in question should be always in dehydrated form.
 - Deficiency symptoms must be reversible by addition of the element in question.
 - The element must play specific role in plant metabolic symptom.

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 difference between sexual and asexual propagation methods? Write two advantages of both propagation methods.
2. Write specific role of the following plant nutrients:
 - a) Nitrogen
 - b) Phosphorus
 - c) Potassium
 - d) Boron
 - e) Copper
3. Farmers use mulching for number of benefits without considering the associated demerits. List down five demerits of mulching.
4. Briefly describe five cultural methods of controlling weeds.

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

“When we place such a mandate on our youth, we have to be, first of all, clear about precisely what we expect. Secondly, the task that we give them should be timeless and of such national importance that it will inspire and motivate them. And finally, what we ask of them must be pragmatic and achievable given the limitations of the current situation.

“For example, Bhutan has abundant water resources compared with most of the countries in the world. Yet, there is no water in many places where it is needed, leaving large tracts of productive land fallow. Water is also a cause of conflict between communities and a predicament for rural and urban settlements alike. Our food import in the past year was over Nu. 7 billion while about 78,000 acres of arable land remained fallow.

“An estimated half of the Bhutanese population is engaged in the agriculture sector. If with a well-designed programme, our youth were engaged in building a robust water management infrastructure, it would be of long term benefit to the country. While global conflicts and wars will be fought over access to water, if we can solve this problem once and for all in Bhutan, it will be a truly noble accomplishment. This would also ensure food security, an essential aspect of our overall national goal

of self-reliance. What the youth of Bhutan achieves over a year or two during the COVID-19 pandemic, will remain as a mark of triumph– an invaluable asset and a lasting legacy for future generations.” (*His Majesty The King*)

1. Deriving inspiration from His Majesty’s speech, how will you revive fallow lands in Bhutan and what interventions do you recommend? (10 marks)
2. Write a brief strategy for employing youths in water management in agriculture sector. (10 marks)
3. Briefly explain how water security contributes to national food security? (10 Marks)
4. Develop a brief project concept on water management for enhancing agriculture production. (20 marks)

CASE II

Covid-19 triggers increased agricultural activities- As businesses in the service sector plummeted in Covid-19’s wake, Bhutanese are turning to agriculture again. The country is more focused than ever on the security of the food supply chain that many laid-off workers now want to keep farming even if the current situation improves. (*excerpt from Kuensel*)

1. From the above abstract, do you think there are youth employment opportunities in horticulture industry? (10 marks).
2. Market is always an issue for local agriculture produces even in the wake of Covid-19. How will you solve such issues in future? (10 marks).
3. The soaring price of vegetables is widely discussed in social media. What is your stand on this? Is it possible to control price hikes for vegetables in the market? What would be your recommendations? (10 marks).
4. **“Urban Agriculture Flops as winter sets in.”** This is the recent headline in one of Kuensel’s news coverage. As a technical person, do you think it is possible to do farming in high altitude areas during winter? What are the challenges and the associated opportunities? What could be the possible interventions you would recommend? (10 marks).
5. Define sustainable agriculture. Do you think farming is a sustainable source of livelihood? Write in brief the advantages of sustainable agriculture for sustainable livelihood (10 marks).

TASHI DELEK