

**ROYAL CIVIL SERVICE COMMISSION
BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2018
EXAMINATION CATEGORY: TECHNICAL**

PAPER III: SUBJECT SPECIALISATION PAPER FOR HORTICULTURE

Date	: 7 October 2018
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 being provided 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 QuestionsAll 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 are required to 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. Horticulturists encourage commercial fruit growers to prune their fruit trees following the principles of either heading back or thinning-out. Which of the following is not a good reason to prune fruit trees?
 - a) Pruning provides good distribution of sunshine.
 - b) Pruning increases the longevity of tree.
 - c) Pruning provide aesthetic look.
 - d) Pruning make trees more manageable in shape.
2. *“Where we live must be clean, safe, organized and beautiful for National Integrity, National Pride and for our bright future. This too is Nation Building”*. On what occasion was this statement delivered by His Majesty the King?
 - a) On World Environment Day.
 - b) During the observation of Global Earth Hour.
 - c) During the 1st Royal Bhutan Flower Exhibition.
 - d) During the 109th National Day Celebration.
3. *Hosui* and *Kosui* are two prominent varieties preferred by our farmers and also recommended for promotion by the Department of Agriculture, Ministry of Agriculture & Forests. The above varieties are also currently multiplied and distributed through the National Seed Centre (Paro). Which crop varieties are being described above?
 - a) Sub-tropical Apple
 - b) Pear
 - c) Peach
 - d) Persimmon
4. Which of the following is not a growth media used in biotechnology for plant multiplication?
 - a) White’s medium
 - b) Murashige and Skoog (MS) medium
 - c) Perlite medium
 - d) Nitsch’s medium
5. Pollinizer varieties play very important role in apple production. What percent of the total number of pollinizer plants required in an orchard of 1 acre area?
 - a) 10%
 - b) 20%

- c) 30%
d) 40%
6. Which of the following matched pairs are false?
a) Chilli: Capsicin
b) Tomato: lycopene
c) Garlic: Allicin
d) Onion: Anthocyanin
7. Waxing in fruit is one of the most important postharvest management practices. Which of the following statements are true?
(i) Waxing improves appearance of fruits
(ii) Waxing reduces moisture losses in fruits
(iii) Waxed produces get good market price
(iv) Waxing reduces pests and disease incidences
(v) Waxing improves color development in fruits
a) i & v
b) ii & iii
c) i, ii & iv
d) All of the above
8. Which of the following is most commonly practiced vegetative propagation method in fruit plants?
a) Top-working
b) Cuttings
c) Budding
d) Grafting
9. Choose the following horticultural crops that does not match with its adjacent prominent disease:
a) Apple: *Venturia inaequalis*
b) Potato: *Alternaria solani*
c) Cardamom: *Ellettaria cardamomum*
d) Cabbage: *Verticillium spp*
10. The Ministry of Agriculture and Forests has initiated annual festival in Ura (Bumthang) to celebrate the season of this particular horticultural crop, and also to honor this gift from nature which has not only enhanced income generation but also has improved the livelihood of the communities. What festival is being referred to?
a) Cordyceps Festival
b) Wild Mushroom Festival

- c) Matsutake Festival
 - d) Meconopsis Festival
11. Hydroponics is an art of growing plants in water and this art is increasingly gaining importance all over the world. It is an art of growing plants...
- a) without soil and nutrient.
 - b) without nutrient and chemicals.
 - c) without soil alone.
 - d) without nutrient alone.
12. People often talk about fruits releasing sweet smell during ripening, especially fruits like apples and bananas. This is due to the release of
- a) Gibberellic Acid
 - b) Acetylene
 - c) Ethylene
 - d) Abscisic Acid
13. Fruits and vegetables are rich source of vitamins and the deficiency of certain vitamin causes scurvy, pain in joints, swelling of limbs, unhealthy gums, tooth decay, delay in wound healing and rheumatism. Which vitamin is described above?
- a) Vitamin A
 - b) Vitamin B
 - c) Vitamin C
 - d) Vitamin D
14. How many acres of land is equal to one hectare?
- a) 1.5 Acres
 - b) 2.5 Acres
 - c) 3.5 Acres
 - d) 4.5 Acres
15. What is the recommended seedling rate for planting citrus fruit plants in one acre of land under Bhutanese condition?
- a) 410 plants
 - b) 310 plants
 - c) 110 plants
 - d) 210 plants
16. Which of the following statements is not true?
- a) Deficiency of calcium causes Rickets.
 - b) Vitamin B₂ deficiency causes Beri-beri.
 - c) Protein deficiency causes Kwashiorkor.
 - d) Phosphorus is essential for cell multiplication of bones and soft tissues.

17. Different 'M' series of rootstocks are popular for propagation of apples in Bhutan. M9 is considered as the most dwarfing root-stocks in apple used for high density apple cultivation. The origin of the 'M' Series of apple root-stock is
- The East Malling Research Station in Japan
 - The East Malling Research Station in Himachal Pradesh
 - The East Malling Research Station in China
 - The East Malling Research Station in England
18. The _____ in seeds is the state of suspended growth of the embryo or a resting condition of the seeds.
- Dormancy
 - Quiescence
 - Hibernation
 - Aestivation
19. The following crops are classified based on the photo-period/day length requirements. Which of these crops are rightly classified depending on the duration of light required for flowering?
- Long day plants: Onion, Radish, potato, apple, citrus, banana, beetroot
 - Short day plants: Strawberry, Pineapple, Aster, Chrysanthemum, Cherry
 - Day neutral plants: Tomato, cucumber, Chilli, Beans, Carrot
 - None of the above
20. There are different plant hormones which either promote or retard plant growth. Which of the following plant hormones retards growth and is often used in inducing dormancy in plants?
- Auxins
 - Gibberellins
 - Cytokinins
 - Abscisic Acid
21. Fruits are classified into different morphological groups. Which of the following classification is wrong?
- Watermelon : Hesperidium
 - Apple and pear : Pome fruit
 - Pomegranate : Balusta
 - Mango : Drupe fruit
22. _____ is a Japanese art form using cultivation techniques to produce small trees in containers that mimic the shape and scale of matured trees.
- Topiary art
 - Bonsai art
 - Dwarfing art
 - Miniature art

23. Select the crop which is used for green manuring.
- Stevia
 - Perilla
 - Sugarcane
 - Daincha (sunhemp)
24. Which of the following is a variety of potato?
- Dasherri
 - Fuyu
 - Desiree
 - IR64
25. 'Short internodes may cause rosetting appearance in trees and the younger leaves are usually affected first, showing signs of yellowing between the veins'. Which nutrient deficiency is best described above?
- Nitrogen
 - Calcium
 - Zinc
 - Potassium
26. Which one of the following is a major disease in Horticultural crops in Bhutan causing huge economic losses to the farmers:
- Huanglongbing (HLB)
 - Stripe rust
 - Loranthus
 - Blast
27. All of the following are branches of horticulture EXCEPT:
- Olericulture
 - Pomology
 - Floriculture
 - Apiculture
28. Chlorosis is defined as
- Chronic primary pigment in leaves.
 - Loss of anthocyanin in leaves.
 - Chronic Nitrogen in leaves.
 - Loss of normal green coloration of leaves.

29. Which of the following statement is not true?
- Ginger is propagated through rhizomes
 - Pineapple is propagated through suckers
 - Mango is propagated through cuttings
 - Chilli is propagated through seeds
30. The vase life of flowers can be increased using one of the important technologies called:
- Cryopreservation
 - Freezing
 - Pulsing
 - Salinizing

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 training in horticulture? Enlist different methods of training fruit trees. Explain the advantages of training fruit trees. (5 marks)
2. Dormancy in horticultural crops can be broken through different means. Define what is dormancy and explain in brief different methods to break dormancy in horticultural crops? (5 marks).
3. Describe the deficiency symptom of plant nutrients focusing on Nitrogen, Phosphorus, Potassium and Copper. (5 marks).
4. Describe in brief at-least about five different types of propagation through specialized Vegetative structures with an example each. (5 marks)

SECTION B

Case Study

Choose either Case I OR Case II from this section. Each case study carries 50 marks.

Case I

‘The Kingdom of Bhutan is nestled in the Himalayas, sharing borders with India to the south and China to the north. The country is a net carbon sink and has committed to ensuring that 60% of its total land areas will remain as forest. Despite efforts to encourage sustainable economic growth at the national level, the impacts of climate change, driven partly by the global greenhouse gas

emissions will continue to affect Bhutan. The agriculture sector, which employs about 69% of the total population is the most vulnerable to climate change'(CGIAR).

1. Write in details the challenges faced in promoting horticulture production in the face of changing world climate? (15 marks)
2. What could be the possible climate change adaptation and mitigation measures in horticulture production? (15 marks)
3. How climate change could affect food security in the country? (10 marks)
4. What could be your policy recommendations to uplift horticulture production in the face of climate change? (10 marks).

Case II

'The Government of Bhutan, a poor rugged mountainous kingdom in the Himalayas, aims to convert the whole agricultural area to Organic Agriculture (OA) by 2020 in an effort to provoke a substantial increase of productivity and farmers' income while preserving the environment. Currently less than 10 % of the agricultural area of Bhutan is in OA production. According to our estimates, farmer incomes after conversion will increase only if organic crops will out-yield conventional crops or if farmers can realize higher market prices. Organic yields may partly increase beyond current productivity but may not become as high as in systems using agrochemicals. Integrating more strategies of OA into Bhutanese agriculture is expected to have positive ecological effects' (Neuhoff et. al).

1. Write in details the differences between Organic Agriculture and the Conventional Agriculture systems (10 marks).
2. Write down in details the social, environmental and economic impact of organic agriculture in Bhutan (15 marks).
3. Why do you think organic agriculture is important? (10 marks)
4. Do you think Bhutan can become 100% organic? What opportunities and challenges do you foresee? (15 marks).

TASHI DELEK