

**ROYAL CIVIL SERVICE COMMISSION**  
**CIVIL SERVICE COMMON EXAMINATION (CSCE) 2009**  
**EXAMINATION CATEGORY:TECHNICAL**

**PAPER III: SUBJECT SPECIALIZATION PAPER FOR HORTICULTURE**

Date: 8<sup>th</sup> November, 2009  
Total marks: 100  
Examination time: 2.5 hours  
Reading time: Minimum 5 minutes (Prior to exam time)

---

General instructions

1. This paper consists of 2 sections. Section A consists of 30 multiple choice questions of 1 mark each and 4 short answer questions of 5 marks each. Answer all the questions in the answer sheet provided.
2. Section B consists of two case studies. Candidates are required to attempt one case study and answer the questions. This consists of 50 marks.
3. The total number of pages on this question paper is **6 pages**.

**Section A**

**Answer all the questions**

**I. Choose the correct answer (30 x 1 = 30 marks)**

1. The substance chemical responsible for ‘hotness’ in chilli pepper is
  - a. Capsaicinoids
  - b. Ascorbic acid
  - c. Polyphenol
  - d.  $\beta$ -carotene
2. Previously known as ‘Greening disease’, the name of the disease in citrus was later changed to “Huanglongbing” since it was first shown to be graft-transmissible in
  - a. Vietnam
  - b. Korea
  - c. China
  - d. Japan
3. The most common apple variety grown by Bhutanese farmers is
  - a. Red Delicious
  - b. Lobo
  - c. Red Chief
  - d. Fuji

4. The term 'cole crops' in vegetable consist of the following vegetables
  - a. Chilli, Eggplant, Tomato
  - b. Cabbage, Cauliflower, Broccoli
  - c. Onion, Garlic, Leek
  - d. Pumpkin, Watermelon, Zucchini
  
5. The scientific name of kiwifruit is
  - a. *Actinida deliciosa*
  - b. *Anacardium occidentale* L.
  - c. *Ananas comosus* L.
  - d. *Achras zapota* L.
  
6. A type of hybrid cultivar is produced by crossing two distinct lines and it is called
  - a. F1 hybrid
  - b. Double-cross hybrid
  - c. Triple-cross hybrid
  - d. Synthetic hybrid
  
7. The organism responsible for the decline of cardamom production in Bhutan in recent years is
  - a. *Peronospora parasitica*
  - b. *Colletotrichum acutatum*
  - c. *Albugo candida*
  - d. *Fusarium oxysporium*
  
8. Bhutan Agro Industry Limited is a
  - a. Private agribusiness company
  - b. Corporation
  - c. Fully government owned company
  - d. Foreign Direct Investment (FDI) Company
  
9. The role of BAFRA is to
  - a. Promote agriculture business in rural areas
  - b. Promote the quality of goods and products and ensure food safety and quality
  - c. Finance agriculture business initiatives in rural areas
  - d. Conduct basic research on rice
  
10. Radish (*Raphanus sativa* L.) comes under the family of
  - a. Cruciferae
  - b. Compositae
  - c. Umbelliferae
  - d. Alliaceae
  
11. Olericulture deals with the production, storage, processing and marketing of
  - a. Fruits
  - b. Vegetables
  - c. Nuts
  - d. Medicinal plants

12. It is generally used for staining of DNA after gel electrophoresis or cesium chloride (cscl) centrifugation and is a powerful mutagen and carcinogen. Of the following, which one is it?
- Ethanol
  - Ethidium bromide
  - Sodium hypochlorite
  - Magnesium sulphate
13. Which of the following environmental conditions is likely to promote *Phytophthora* ('wilting') disease in chilli
- Lot of sunshine
  - Windy weather]
  - Prolonged warm moist conditions
  - Acidic soils exposed to dry weather conditions
14. Fruit thinning practice in apples and pears is meant to
- Increase sugar content
  - Reduce likelihood of damage by birds
  - Increase the lifespan of the tree
  - Increase fruit size and quality
15. Liming of soils is necessary in order to
- Increase acidity
  - Decrease acidity
  - Increase alkalinity
  - Decrease alkalinity
16. In general, most Bhutanese soils are
- Rich in phosphorus
  - Poor in phosphorus
  - Rich in Aluminium
  - Rich in diamonds
17. One of the following symptoms in crops (e.g. apple, tomatoes etc) is associated with deficiency of magnesium
- Stunted growth
  - Dark greenish leaves that fall prematurely
  - Yellowing between the leaf veins, particularly in older leaves
  - Reduced leaf size

18. Potato in Bhutan is said to be introduced by
- Ashley Eden
  - George Bogle
  - John Claude White
  - Jawaharlal Nehru
19. IPM popularly stands for
- Integrated Pest Management
  - Improved Planting Method
  - International Potato Marketing
  - Integrated Planning & Monitoring
20. Recently in 2008/2009, an American businessman has entered into a foreign direct investment (FDI) scheme in a horticultural crop in Bhutan with the signing of an MoU with Ministry of Agriculture. The initial activities are already underway in eastern Bhutan. The crop in question is
- Matsutake mushroom
  - Mango
  - Walnut
  - Hazelnut
21. Zero tillage is one of the main features of
- Conventional agriculture
  - Organic agriculture
  - Conservation agriculture
  - Shifting cultivation
22. The Ministry of Agriculture has adopted a popular slogan in 2009 for the 10<sup>th</sup> five year plan and beyond – and it is
- Walking the extra mile
  - One geog three products
  - Market first production later
  - Let us walk the talk
23. Candle (wax) is a very useful material for
- Decreasing soil acidity
  - Conserving moisture in cut plant shoots
  - Rapid healing of wounds in tree crops
  - Attracting bees for pollination

24. "Amrapali" is a hybrid variety of
- Apple
  - Mango
  - Citrus
  - Banana
25. The mushroom which is usually cultivated on oak tree logs is
- Oyster
  - Shitake
  - Matsutake
  - Chanterella
26. The most commonly used medium in tissue culture is a formulation designed by
- Murashige and Skoog
  - Dutcher and Powell
  - Skoog and Tsui
  - Murashige and Tucker
27. Most of the apple tree branches in Thimphu and Paro are covered with some kind of moss-like structures and are found growing in moist, shady areas. They range in color from brown to green and appear crusty or leaf-like. What is it:
- Peeling Bark
  - Lichens
  - Weeds
  - Flowers
28. This is a very high value medicinal plant collected from high altitude areas in Bhutan
- Cordyceps sinensis*
  - Saussurea lappa*
  - Inula racemosa*
  - Carum carvi*
29. Rapid *in vitro* propagation of plants from cells, tissues or organs cultured aseptically on defined media contained in culture vessels maintained under controlled conditions of light and temperature is called:
- Tissue Culture
  - Grafting
  - Layering
  - Budding

30. Natural dyes can be sorted into three categories: natural dyes obtained from plants, animals and minerals and they can be used for dyeing fabrics, papers, dried flowers, etc. The group of plant used for yellow dye extraction and application is
- Safflower, Logwood and Indian Mulberry
  - Teak, Merigold and Saffron
  - Indigo, Water Lily and Pivet
  - Alder, Custard Apple and Rofblamala

**II. Answer the following short questions (4 x 5 marks = 20)**

1. What is the difference between green manure crop and a permanent sod? What are the advantages and give examples of each crop?
2. What are the techniques of reducing losses during post harvest handling?
3. Why is vegetative propagation important in Mango? Describe three important methods of vegetative propagation applied in mango?
4. What is Plant Breeder's Rights and why is it important?

**Section B**

**Choose one of the case studies presented and answer the questions (50 marks).**

**Case 1**

The term 'disease' is defined as any departure from the normal appearance, form, or functioning of a plant or its fruit and they are classified as biotic and abiotic diseases. Describe, using examples, 3 major biotic and 3 major abiotic diseases of one of the following crop of your choice. Write down the management strategies for each of the biotic and abiotic diseases.

- Citrus
- Cabbage
- Rose

**Case 2**

What is organic farming? Outline the main differences between organic farming and conventional farming. If Bhutan was to adopt organic farming on a national scale, what do you think would be the merits and demerits in terms of both environment and trade?

**END OF QUESTION PAPER**

**GOOD LUCK AND TASHI DELEK!!!**