ROYAL CIVIL SERVICE COMMISSION
BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2015
EXAMINATION CATEGORY: TECHNICAL

PAPER III: SUBJECT SPECIALIZATION PAPER for *Horticulture*

Date	: 11 October 2015
Total Marks	: 100
Examination Time	: 150 minutes (2.5 hours)
Reading Time	: 15 Minutes (prior to examination time)

GENERAL INSTRUCTIONS:

1. Write your Roll 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 and 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 under your choice.
4. 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 any or correct Section, Part and Question Number will NOT be evaluated and no marks would be awarded.
5. Begin each Section and Part in a fresh page of the Answer Booklet.
6. You are not permitted to tear off any sheet(s) of the Answer Booklet as well as the Question Paper.
7. Use of any other paper including paper for rough work is not permitted.
8. You are required to hand over the Answer Booklet to the Invigilator before leaving the examination hall.
9. This paper has **08** printed pages in all, 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 the correct answer chosen in the Answer Booklet against the question number. E.g. 31 (c). Each question carries ONE mark. Any double writing, smudgy answers or writing more than one choice shall not be evaluated.

1. Domestication in horticulture is the process of selecting specific kinds of
   a. Unwanted traits from the desired crop and breeding it
   b. Wild plants and adapting them for human use
   c. Techniques useful for changing the form of the plant
   d. Crops and apples that are grown in the garden

2. The overall appearance , performance and adaptation of a particular plant is called
   a. DNA based genetics
   b. Genotype
   c. Phenotype
   d. Phenology

3. Callus tissue composed of parenchyma cell is a response to
   a. Pruning and tree recovery
   b. Trenching of the roots for grafting
   c. Wounding of tissues
   d. Abiotic stress in plants

4. Harvest maturity is the time during which the
   a. Fruit is ready for harvest for storage
   b. The ideal time for eating is reached
   c. The highest level of pigmentation is achieved
   d. Seed development is ideal for harvest for reproduction

5. One reason why the scion and root stock are incompatible may be because they are
   a. Genetically unrelated
   b. Closely related and with similar characteristics
   c. Bench grafted
   d. Irradiation of the scion

6. Planting one or more crops in a given area by utilizing the space between the main crops is also called
   a. Crop rotation
   b. Catch cropping

c. Fallow cropping
d. Sequential cropping of the same crop in different years

7. Damage to rind tissue by oil released from damaged oil glands in fruit is
   a. Regreening of skin
   b. Rind staining oil
   c. Oleocellosis
   d. Senescent breakdown

8. In apples bitter pits is a disorder caused by
   a. Low levels of calcium in fruit
   b. High level of calcium in fruit
   c. Lack of Potassium in the soil
   d. High level of potassium in soil

9. Soil texture refers to the
   a. Organization of the soil particles into clumps or aggregates
   b. Composition and size of the individual particles of soil
   c. Capacity to hold the good amount of nutrients among the particles
   d. The character that enables the percolation of water through the roots

10. Spring ephemerals
    a. Develop over-wintering tissue along woody stems and in buds
    b. Have a relatively short growing season but return next season from underground
    c. Live through several growing seasons, and can survive a period of dormancy
    d. Germinate from seed in the fall, with flowering and seed development the following spring, followed by plant death.

11. A structurally complex tissue that conducts water and nutrients from the roots to all parts of the plant is
    a. Xylem tissue
    b. Phloem tissue
    c. Meristematic tissue
    d. Sclerenchyma tissue

12. Fruit developed from a fusion of separate, independent flowers born on a single structure is a
    a. Simple
    b. Aggregate
    c. Multiple
    d. Hesperidium

13. Due to physiological conditions or germination blocks in the embryo itself. It requires a specific period of cold (or heat) with available moisture and oxygen. This is called

    a. Seed coat dormancy
    b. Double dormancy
    c. Rudimentary embryo dormancy
    d. Embryo dormancy

14. ***Rhizobium*** is a beneficial soil organism that forms a symbiotic relationship with plants, primarily those in the bean/pea family. These make atmospheric nitrogen available to plants. What are they?
    a. Fungi
    b. Virus
    c. Bacterium
    d. Bryophytes

15. The term "**strain**" in taxonomic classification is
    a. A sub-group of cultivar with specific characteristics like resistance to a disease or better colour.
    b. A sub-group of cultivar derived by asexual propagation. The offspring have one parent and therefore are identical to the parent because no exchange of genetic materials has occurred.
    c. A sub-group of cultivar propagated by seed
    d. Is based on selection by growth habit, not reproducible by seed. For example, Columnar Norway Maple.

16. A Crown is a plant part that can be used for propagation. It is a
    a. Horizontal, above-ground stems often forming roots and/or plantlets at their tips or nodes.
    b. Compressed stem having leaves and flowers growing above and roots beneath
    c. Short, thickened, underground stem with reduced scaly
    d. Enlarged rhizome containing stored food.

17. An indeterminate flower with repeated branching which can be made up of racemes, spikes, corymbs, or umbels is a
    a. Panicle
    b. Catkin
    c. Composite
    d. Cyme

18. Plant hardiness refers to a plant's tolerance to certain factors, some of which are given below except for one which is not true
    a. Photoperiod
    b. Genetics
    c. Plant size
    d. Rapid temperature changes

19. The form of tree training that shows a strong tree trunk and pyramidal tree shape is called
    a. the espaliered system
    b. the cordon system
    c. the free from system
    d. the central leader system

20. This is not a useful maturity indicators used in assessment for harvesting a fruit
    a. Sugar content
    b. Salt content
    c. Starch content
    d. Flesh firmness

21. Allelopathy in plants in your garden shows these influences on the other plants except this
    a. Helping to produce hormones to protect them from diseases
    b. Can have beneficial or detrimental effect on crops
    c. Helps to increase the yield of the neighbouring crop plants
    d. Helps to repel harmful pests and insects

22. The choice of rootstock used in fruit trees help to
    a. Give higher yields in cropping load
    b. Make it easier to manage the fruit size
    c. Determine the keeping and eating quality of fruit
    d. Control the tree size and disease tolerance

23. The most economically damaging disease in potato is
    a. Spongospora subterranea
    b. Erwinia carotovora
    c. Streptomyces scabies
    d. Phytophthora infestans

24. The effect on plant growth when grown in partial darkness is called
    a. Geotropisim
    b. Phtytotropism
    c. Phototropism
    d. Aquatropism

25. Plants that flower in response to short periods of night darkness are called
    a. Day neutral plants
    b. Short day plants
    c. Long day plants
    d. None of the above

26. Green manures are one of the methods to improve soil fertility, this is mainly done by
    a. Adding as much green biomass as possible after harvest of the main crop
    b. Using green revolution technology to improve nitrogen content in the soil
    c. Utilizing the farm yard manure that has been well rotted to the field
    d. Growing a crop till maturity and ploughing it in before the main crop

27. Application of lime to soil helps to
    a. Bind NPK to the plant roots for better utilisation
    b. Enable better water transfer in the cells of the plant
    c. Increase the pH of the soil
    d. Make the soil lighter in colour

28. Biological pest control is the use of living organism to control a problem caused by another organism. In this method the key material used is
    a. Biological extracts from green plants
    b. Botanical concoctions from organic plants
    c. Beneficial parasites, predators, pathogens
    d. Other botanical plants that have repulsive odour

29. Aeroponic is a technology of growing plants without soil but with the use of
    a. Nutrients through mist
    b. Nutrients in water
    c. Nutrients in artificial media
    d. None of the above answers

30. One of the technologies that is not allowed in organic farming is
    a. Saving your own seeds from your crops
    b. Use of sprayers to spray your crops
    c. Burning crop debris in the field
    d. Use of modern technology to improve efficiency

PART II – Short Answer Type Questions (20 Marks)

Answer ALL the questions. Each question carries 5 marks. Mark for each sub-question is indicated in the brackets.

1. Name five reason reasons or benefits for which cover crops would be encouraged on fields.

2. What are the functions for crop rotations? Give at least five functions

3. Explain the difference of summer pruning and winter pruning. Give 3 possible reasons for summer pruning and winter pruning and if it is recommended for which tree types? Which is more important or useful?

4. Pick a vegetable you would like to grow as a crop and describe some important preparations and plans you will make before actually growing the crop keeping in mind the needs of the production and marketing.

SECTION B

Case Study

Choose either Case 1 or Case 2 from this Section. Each Case carries 50 marks. Mark for each sub-question is indicated in the brackets.

1. A farmer in Tsirang wants to rehabilitate her old citrus orchard and establish a crop that is suitable in her location and make it into a profitable farm with good returns on investment. She has asked for guidance and is willing to do as you instruct.

a. Describe the type of assistance you will provide her as in different methods of extension. (10)

b. List some crops you would recommend, write the reason for the choices and their advantages for the farmer (10)

c. How and where would you recommend her to market the produce to capitalize on her production. (10)

d. Develop a farm rehabilitation plan for citrus, and management plan to achieve her project target (20)

OR

2. Aap Penjor is a prosperous mixed farmer in Semtokha who grows apples and vegetables and some herbs and as five cows on 10 acres of land facing North West. He wants to make his farm a profitable integrated organic farm and maximize the returns by diversifying his activities and what he can offer to customers. Your guidance and advice is sought.

    a. What are your broad strategies and plans for his farm to make it successful? (10)

    b. Where do you see risks and challenges, skill gaps that need to be addressed, identify the problem areas along the value chain (10)

    c. Suggest interventions or actions required to be taken by the farmer (10)

    d. Describe a brief redevelopment plan into an organic farm with list of products or services you could offer to customers including some key issues that needs to be included in the proposal. Make a outline of the project proposal for BOIC with what information would be included under the main topics (20)