

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

PAPER III: SUBJECT SPECIALIZATION PAPER for *Food Technology*

Date	:	
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

Choose the correct answer and write down the letter of the correct answer chosen in the answer sheet against the question number. E.g. 31 (c). Each question carries ONE mark.

1. Following are the treatments to control enzymatic browning in fresh-cut fruits and vegetables except;
 - a. Citric Acid
 - b. Modified Atmosphere Packaging
 - c. Ethylene Absorbers
 - d. Edible Coatings

2. Which of the following methods dehydrates microbial cells by plasmolysis thereby killing them?
 - a. Addition of sugar
 - b. Smoking
 - c. Heating
 - d. Pasteurization

3. Optimum temperature required for thermophilic microorganisms grow and develop is;
 - a. 25 °C
 - b. 45 °C
 - c. 35 °C
 - d. 55 °C

4. is the ripening hormone for climacteric fruits.
 - a. Ethylene
 - b. Auxin
 - c. Cytokinin
 - d. Abscisin

5. Which one of the following product is an example of fermentation by mold;
 - a. Wine
 - b. Sake
 - c. Cider
 - d. Beer

6. Canning of fruits and vegetables is aprocess;
 - a. Cold
 - b. Heat
 - c. Irradiation
 - d. Microwave

7. Low temperature storage of potatoes results in;
 - a. Sweet
 - b. Have more sugar
 - c. Have more starch
 - d. Both a & b

8. Corn syrup is a mixture of;
 - a. Dextrose and maltose
 - b. Dextrose and galactose
 - c. Galactose and maltose
 - d. Glucose and galactose

9. The white portions of meat muscle refers to;
 - a. Vitamins
 - b. Minerals
 - c. Fat
 - d. Carbohydrates

10. If a product is said to be "Sugar Free" it contains how much sugar?
 - a. None
 - b. Less than 0.5 grams of sugar per serving
 - c. Less than 10.0 grams
 - d. Not more than 40 kcal per serving

11. The Primary Milk carbohydrate is;
 - a. Leucine
 - b. Sucrose
 - c. Arginine
 - d. Lactose

12. As it comes from a cow, the solids portion of milk contains approximately 3.7 percent fat and ____ percent solids-not-fat.
 - a. 3%
 - b. 6%
 - c. 9%
 - d. 12%

13. Gluten is viscous and elastic in nature and is combination of;
 - a. Gliadin and glutenin
 - b. Glutenin and starch
 - c. Albumin and Globulin
 - d. Globulin and gliadin

14. Sugar is adulterated with;
 - a. Chalk powder
 - b. Fat and oil
 - c. Sand
 - d. All of these

15. The most important quality attributes which is responsible for colour of the potato chips is
 - a. Starch
 - b. Proteins
 - c. Reducing sugars
 - d. Vitamin C

16. Milk not properly cooled may encounter this off flavor and is caused by improperly cleaned milking machines or equipment.
 - a. Malty
 - b. Foreign
 - c. Feed
 - d. Rancid

17. Drying rate is influenced by;
 - a. Surface area
 - b. Air velocity and RH
 - c. None of these
 - d. All of these

18. In the anaerobic respiration of yeast and bacteria, which of the following is released
 - a. Methanol
 - b. CO₂
 - c. Butanol
 - d. None

19. One of the most common physical tests performed on fats is a determination of the;
 - a. Boiling point
 - b. Melting point
 - c. Cooling point
 - d. Separating point

20. The major ingredient of carbonated soft drinks is;
 - a. Water
 - b. Corn Syrup
 - c. Caffeine
 - d. Flavoring

21. Which one of the drying method is the most used for producing milk powders
- Wet
 - Spray
 - Heat
 - Air
22. The most common sweetener used in candies and chocolates is;
- Glucose
 - Maltose
 - Lactose
 - Sucrose
23. The enzyme which is responsible for softening of several types of fruits is;
- Polopolysulphonase
 - Catalase
 - Polyhydrase
 - Polygalacturonase
24. Following amino acids are very reactive when in contact with sugar to produce Maillard browning except;
- Hisitidine
 - Glycine
 - Threonine
 - Phenylalanine
25. The minimum water activity (a_w) required for growth of bacteria is;
- 0.88
 - 0.91
 - 0.75
 - 0.65
26. The most important food appearance factor is;
- Color
 - Shape
 - Size
 - Packaging
27. All the following techniques are household preservation technique except;
- Smoking
 - Lyophilisation
 - Dehydration
 - Salting

28. The preservation or reducing pathogens in food products by combining many methods like high temperature during processing, low temperature during storage, increasing the acidity etc. is called;
- Mixed preservation technology
 - High pressure food preservation
 - Hurdle technology
 - Stumbling technology
29. The process of preserving meat by stewing in a covered earthenware jug is called;
- Jugging
 - Curing
 - Burial
 - All of these
30. Who is regarded as the father of canning?
- Louis Pasteur
 - John Hall
 - Nicolas Appert
 - Bryan Dokin

PART – II: Short Answer Questions (20 marks)

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

1. Draw a flow chart representing typical fresh-cut process for fruits, vegetables and root crops. What are the biochemical changes brought about by fresh-cut processing?
(2+3)
2. Define the following terms;
 - Artificial flavouring
 - Aseptic packaging
 - Corned Beef
 - Pasteurization
 - Sterilization(5)
3. Differentiate wine and vinegar. Explain the steps in vinegar processing.
(2+3)
4. What are the functions of food packaging? Explain any three properties of glass relating to its use as packaging materials for packing food products.
(2+3)

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.

CASE 1

Since 1804 with the invention of Nicolas Appert's sealing food hermitically in container and sterilizing them by heat, food preservation through canning became very popular. Now-a-days throughout the world canning of fruits, vegetables and other consumable products are being done on commercial scale. The same concept and ideas can be applied to set up a canning industry/cannery in the country.

- a. What is canning of fruits and vegetables? Draw a canning process flow sheet for fruits and vegetables and explain the steps. Describe different peeling methods used for fruits and vegetables canning. (1+15+4)
- b. Explain different types of containers used for canning fruits and vegetables. What is lacquering and explain in detail 'Acid-resistant' and 'Sulphur-resistant' lacquers? List basic equipment and processing machineries required for establishing a cannery. (6+5+2)
- c. What are the general considerations in establishing a commercial fruit and vegetable cannery? Explain in detail. (12)
- d. What are the possible causes of spoilage of canned food? Explain in detail. (5)

CASE II

Production and availability of fresh and nutritious fruits and vegetables is limited to only few months during the season as they are highly perishable in nature. In rural Bhutan during the season farmers produce so much that they cannot consume or store, during the lean season they do not have enough besides accessibility to market is a problem. Integrating simple processing and preservation technologies such as drying /dehydration in the rural communities would improve rural nutrition and availability of food throughout the year.

- a. Explain the sequence of operations in dehydrating fruits and vegetables to support rural community in providing/making nutritious, locally grown produce available throughout the year. Differentiate sun drying and shade drying. Describe freeze drying technology. (10 +2+3)

- b. Draw a drying rate curve and explain different phases. List the factors affecting rate of drying of horticulture produce. Explain any five types of dryers used for drying agriculture produce.

(6+2+10)

- c. What is moisture content on dry basis and wet basis? Establish a relationship between moisture content on wet basis and moisture content on dry basis. If moisture content on wet basis is 60 % or 0.6, what would be the moisture content on dry basis?

(2+3+2)

- d. Develop a reconstitution test for dried/dehydrated products. What are the possible spoilage of dried products and how to prevent them?

(5+5)

Best of luck