**ROYAL CIVIL SERVICE COMMISSION**

**BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2014**

**EXAMINATION CATEGORY: TECHNICAL**

**PAPER III: SUBJECT SPECIALIZATION PAPER for *Food Technology***

**Date** : 12 October 2014

**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.
1. 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.
2. Begin each Section and Part in a fresh page of the Answer Booklet.
3. You are not permitted to tear off any sheet(s) of the Answer Booklet as well as the Question Paper.
4. Use of any other paper including paper for rough work is not permitted.
5. You are required to hand over the Answer Booklet to the Invigilator before leaving the examination hall.
6. 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. A plant or plant parts which will continue ontogeny even if detached from the mother plant is called;
2. Physiological maturity
3. Horticultural maturity
4. Ripening
5. None of the above.
6. The concentration of ethylene required for the ripening of various commodities is in the range of;
7. 10 to 100 ppm
8. 1 to 10 ppm
9. 0.1 to 1 ppm
10. 100 to 1000 ppm
11. Bitter pit in apple, corkspot in pear, black heart in celery, blossom end rot in tomato and tip burn in lettuce are due to deficiency of;
12. Iron
13. Magnesium
14. Calcium
15. Zinc
16. Which of the following may NOT be used as a claim on a food label?
17. Calorie free
18. Low calorie
19. Sugar free
20. Low sugar
21. Which one of the following is a type of food preserved, in part, by bacteria?
22. Bread
23. Yogurt
24. Wine
25. Whole milk
26. Protein is required in the body for;
27. Production of antibodies
28. Bacteria inhibition
29. Proper bowel function
30. Absorption of water
31. To make some ready-to-eat cereals, manufacturers use:
32. Extending and Fluffing
33. Flaking and Shredding
34. Inflaking and Inshredding
35. Posting and Kellogging
36. A fatty acid does NOT contain which of the following elements?
37. Oxygen
38. Nitrogen
39. Carbon
40. Hydrogen
41. In which of the following food is solanine considered a toxin?
42. Tomato
43. Coffee
44. Onion
45. Potato
46. A food additive that retards rancidity of unsaturated oils and prevents browning in fruits and vegetables that occur during exposure to oxygen is called an
47. Anti-caking free-flowing agent
48. Antimicrobial agent
49. Antioxidant
50. Antibuffer agent
51. If the legal maximum of nitrite (NO2) is 156 ppm, how much sodium nitrite can you legally add to 1 kilo gram of meat?
52. 31.2oz
53. 156mg
54. 78mg
55. 15.6 ounces
56. A microorganism commonly found in human nasal passages and on the skin that can cause foodborne illness if food becomes contaminated with is
57. *Clostridiurnpeifringens*
58. *Staphylococcus aureus*
59. *Clostridiunibotulinum*
60. *Escherichia coli* 01 57:H7
61. Water activity is the degree of availability of water in food. The water activity of pure water is \_\_\_\_\_\_\_\_\_\_\_\_
62. 0.100
63. 1.000
64. 10.00
65. 100.0
66. Globular protein found in milk is;
67. Elastin
68. Keratin
69. Casein
70. Gluten
71. The discolouration observed on the surface of fruits when cut or bruised is due to;
72. The Maillard reaction
73. Enzymatic browning
74. Exposure to light
75. Catabolism
76. Which of the following packages is an example of aseptic packaging?
77. Plastic milk carton
78. Tetra Pak box
79. Glass drink bottle
80. Plastic bread bag
81. A preservative used in soft drinks to inhibit growth of molds is;
82. Sodium benzoate
83. Sodium erythorbate
84. Sodium phosphate
85. Sodium chloride
86. The Total Soluble Solid (TSS) content of a product is measured in;
87. Percentage
88. Degree brix
89. Grams
90. Milliliters
91. The design of food processing plant is evaluated through adoption of;
92. Good Manufacturing Practices
93. Simple Manufacturing Practices
94. Normal Manufacturing Practices
95. Advance Manufacturing Practices
96. In the processing of soysauce \_\_\_\_\_\_\_\_\_\_\_\_ is used to derive the final product.
97. Yeast
98. Bacteria
99. Mold
100. Fungi
101. The addition of a nutrient to foods such as adding vitamin D to milk is called;
102. Irradiation
103. Fermentation
104. Nutrification
105. Fortification
106. A label with a unique printed pattern of wide and narrow vertical bars used to represent numerical codes, designed to be read by an optical scanner is called;
107. Product label
108. Bar code
109. Manufacture label
110. None of the above
111. The naturally occurring mycotoxin that is produced by *[Aspergillus](http://en.wikipedia.org/wiki/Aspergillus_flavus%22%20%5Co%20%22Aspergillus%20flavus)* species of fungi is called;
112. Solanine
113. Penicillin
114. Goitrogen
115. Aflatoxin
116. All of the following are primary functions of protein except;
117. Growth and maintenance of cells
118. Production of antibodies
119. Provides good and readily available source of energy
120. Tissue and nerve development
121. The science of evaluating a food product for smell, appearance, taste and texture is referred to as;
122. Proximate analysis
123. Sensory evaluation
124. Food chemistry
125. Rheology
126. A food that can be stored at room temperature for a prolonged or indefinite time period with minimal quality deterioration is said to be;
127. Room stable
128. Shelf superior
129. Shelf stable
130. Room superior
131. A complex protein molecule that stimulates or speeds up a specific chemical reaction without itself undergoing any changes is called;
132. Experiment
133. Anlysis
134. Enzyme
135. Molecule
136. A list of ingredients must be included on a food label. These ingredients are listed in descending order according to their;
137. Bulk
138. Weight
139. Particle size
140. Volume
141. Bacteria such as *Listeria monocytogenes* can grow at a very low temperature and they are categorized as;
142. Refrigophile
143. Psychrophile
144. Mesophile
145. Therinophile
146. The process of preserving cabbage as sauerkraut is an example of;
147. Fermentation
148. Drying
149. Freezing
150. Cold sterilization

**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. What is blanching? Explain the effect of blanching on food nutrient, colour, flavor and texture. (1+4=5)
2. What is aseptic packaging? What type of packaging material is used in aseptic packaging of products? Explain the composition of aseptic package outlining the function of individual components.

(1+1+3=5)

1. Cite the seven principles of HACCP. What are the different types of food processing hazards? Explain in detail.

(2+3=5)

1. Explain the mechanism of drying with a sketch. If the drained weight of 10 g of dried sample containing 5 per cent moisture after rehydration is 70 g and fresh sample before drying contained 90 per cent moisture. Calculate rehydration coefficient in the rehydrated sample.

(2+3=5)

**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**

1. Describe the present scenario and future prospects of food processing industry in Bhutan. Indicate the maturity indices of apple for processing into juice. What are food additives? Explain the role of food additives in food processing industry with examples. (6+2+1+6=15)
2. Differentiate RTS, Squash, Fruit Nectar, Fruit Syrup and Fruit Juice Concentrate based on the international standard guidelines quantifying the major ingredients in percentage.

(5)

1. Design a small scale food processing plant layout for processing of apple products allocating required machineries at strategic positions in the plant. Explain in detail facilities required in the processing plant.

(10+10=20)

1. What type of the material would you recommend for packaging of apple juice, justify your choice? Describe the various sanitation and hygienic conditions practiced in the processing plant.

(5+5=10)

**CASE II**

1. During a festival in Thimphu a retailer placed an order to your processing plant to supply 100 bottles of (500 ml capacity) of peach jam processed under strict quality standards. The total soluble solid content of peach you have purchased has 12 ° brix and acidity of 0.6 per cent. Calculate the
2. Quantity of acid and pectin required.
3. Quantity of fruit pulp required.
4. Amount of sugar and acid present in the fruit pulp
5. Quantity of sugar and acid required

(5 x 4 = 20)

1. Plum was harvested at 9 degree brix and contains high pectin. The acid content of the fruit was found to be 0.8 per cent. Calculate the acid and sugar required to process 100 kilo gram of plum jam.

(5+5 = 10)

1. Sulphur dioxide is used throughout the world in preservation of food products. Explain the major functions of sulphite in food. One of the salts of sulphite used is potassium metabisulphite and the quantity permitted in jam is 200 ppm. Calculate the amount of sulphur dioxide present in milligram.

 (5+5=10)

1. Explain any 5 problems associated with jam production. Describe the method to judge end-point in jam processing.

 (5+5=10)