THE OPEN UNIVERSITY OF SRI LANKA

B. Sc. DEGREE PROGRAMME 2015 / 2016

LEVEL 5 - FINAL EXAMINATION

CMU3127 – CHEMICAL ASPECTS OF FOOD INDUSTRY

DURATION: 02 HOURS

Date: 26.01.2017 (Thu) Time: 1.30 to 3.30 p.m.

**Instructions to candidates:**

**This paper consists of six (06) questions. Question 1 is compulsory. You are required to answer four (04) questions out of six (06) including compulsory question number 1.**

(1)

(I) "Moisture is the quality factor in the preservation of some food products". **Name a food product** which uses the reduced moisture for preservation and for the convenience of packaging. (10 marks)

(II) **State an important phospholipid** present in the egg yolk and name **one of its** commercial usage in food industry. (10 marks)

(III) Name **two** types of food monosaccharides which are commonly used as food Carbohydrate in food industry. (10 marks)

(IV) What is Rennin? Explain how Rennin acts on milk? (10 marks)

(V) Why is parboiled rice considered better than other rice varieties? Give two reasons. (10 marks)

(VI) What is meant by "Churning" in the production of butter? (10 marks)

(VII) State **three** aspects covered by practicing "Good Manufacturing Practices" in food industry. (10 marks)

(VIII) Name **two** information that should be on the main panel of the package of a food product. (10 marks)

(IX) Describe the function of borate used in the Kjeldhal determination of protein. (10 marks)

(X) In the Dean & Stark distillation method of determining moisture content, if a high concentration of volatile flavor compounds present, would you likely overestimate or underestimate the moisture content of a food product being tested? Explain your answer.
(10 marks)

(2)

(I) (a) Write down **three** ways by which the shelf life of a food could be increased.

(b) Sketch and label the "Barbender Amylograph" for potato starch. Indicate the area where gelatinization takes place.

(c) Sketch the structure of low methoxy pectin and comment on the degree of esterification.
(40 marks)

(II) (a) Name the native proteins present in milk and wheat.

(b) Name and explain one of the biological changes that take place when protein is denatured.
(30 marks)

(III) (a) Define the term "Preservative" in relation to food industry.

(b) Benzoic acid is used as a preservative to prevent growth of yeast and bacteria in food. The best pH for the benzoic acid preservation is 3-4. Explain this statement.
(20 marks)

(IV) "Enzymes play a vital role in Bread making industry". Explain this statement.
(10 marks)

(3)

(I) Processing of food provides us with a wide range of food products. For each method of processing listed below give examples of **different** food products we can buy.

| **Method of Processing** | **Food Product** |
|---|---|
| Freeze Drying | |
| Canning | |
| Freezing | |
| Chilling | |
| Ultra-Heat Treatment | |

(30 marks)

(II) Wheat flour after milling is colored. In order to use it as an ingredient for bread making, flour undergoes certain "improvements".

(i) What are the "improvements" mentioned in the above statement?
(ii) Name the proteins present in Wheat flour.
(iii) What are the other essential ingredients required for bread making?
(iv) State the role of each ingredient mentioned in (iii) with any relevant chemical equations taking place during baking.

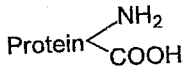
(50 marks)

(III) Emulsification is a functional property of eggs. Illustrate by giving a suitable example to show how this property is being utilized in food industry.

(20 marks)

**(4)**

(I) (a) "At the iso-electric point the overall charge on the protein is neutral". Briefly explain this statement by using following model structure of protein.




(b) Draw the "Zwitterion for the above model structure of protein given in (I)(a).

(30 marks)

(II) Explain with an aid of a reaction how glucose (dextrose) can be used in food industry as sugar alcohols.

(20 marks)

(III) One of the most popular fermented milk product is yoghurt. It is presented to the market in a variety of ways.

(a) Name the bacterial culture/s used in the yoghurt manufacture?
(b) What are the process/changes taking place in milk with the addition of the bacterial culture?
(c) What are the preservatives allowed for yoghurt?

(50 marks)

(5)

(I) Explain how the **consumer is protected** and the **industry is helped** by having food regulations in a country. State **one** other important role of food regulations.

(30 marks)

(II) A trader was suspected selling adulterated chilly power to customers. If you are an authorized person under the food act and have been asked to handle the case, state briefly the steps that you follow.

(40 marks)

(III) (a) What is HACCP? Why is it important in food industry?

(b) What are referred to as Critical Control Points (CCPs)?

(c) Identify Critical Control Point/s in Pasteurization of milk.

(30 marks)

(6)

(I) (a) List down **three** reasons as to why food analyzes is needed?

(b) Method X to quantitate a particular food component was reported to be more accurate than method Y, but method X had lower precision. Explain the meaning of this statement.

(20 marks)

(II) You are asked to analyze the moisture content of a spice sample received to your laboratory.

(a) State the name of the method you would use to obtain its accurate moisture content and explain the principle behind that method.

(b) State two precautions in using the method to ensure accurate results.

(30 marks)

(III) The following procedures may be required to prepare a food sample for accurate fat determination by a solvent extraction method (e.g., Soxhlet method). Explain why each of these procedures may be necessary.

(a) Particle size reduction

(b) Acid hydrolysis

(30 marks)

(IV) Describe with an aid of a reaction what occurs in the digestion step of the Kjeldahl method of protein analysis.

(20 marks)