THE OPEN UNIVERSITY OF SRI LANKA

B. Sc. DEGREE PROGRAMME 2017 / 2018

LEVEL 5 - FINAL EXAMINATION

CYU5307 – CHEMICAL ASPECTS OF FOOD INDUSTRY

DURATION: 02 HOURS

Date: 23-04-2019 **Time:** 1.30 p.m. to 3.30 p.m.

Instructions to candidates:
This paper consists of four (04) compulsory questions. You are required to answer all four (04) questions.

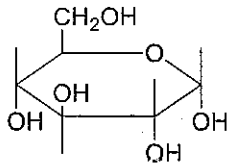
(1) Answer **either** (I) **or** (II) from part A and answer **both** (III) **and** (IV) from part B.

PART A (Answer either I OR II)

(I)

(a) Define what is meant by a Homopolysaccharide.
(b) List two types of polysaccharides present in starch.
(c) Draw the structure of a linear polysaccharide present in starch and identify clearly the glycosidic linkages present in each structure.
(d) Draw the structure of cellulose and identify clearly the glycosidic linkage/ linkages present.

The structure of α-D-glucose molecule (Haworth projection formulae) given below.



α-D-glucose

(40 marks)

(II) "Gelatinization is an important phenomenon in the food industry"

(a) Explain the above statement using the "Brabender Amylograph" for potato starch.
(b) What is meant by Gelatinization temperature of potato starch?
(c) What are modified starch? Why are they important in the Food Industry?

(40 marks)

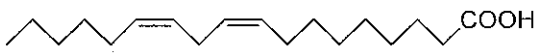
PART B (Answer both III AND IV)

(III) Proteins are generally stable at their naturally occurring pH or at their iso electric point.

(a) Define the term Iso electric point of a protein.
(b) What are native proteins?
(c) Name one native protein present in
  (i) milk and
  (ii) wheat.
(d) Explain the color changes that occur in raw meat in the meat processing industry and during cooking.

(30 marks)

(IV) The molecular formulae of linoleic acid is $C_{18}H_{32}O_2$ and the short hand notation of it is $C_{(18:2)}$. The structure linoleic acid is given below.



During catalytic hydrogenation of linoleic acid complete hydrogenation gives Stearic acid with short hand notation of $C_{(18:0)}$.

(i) **Sketch** the structure of stearic acid formed during complete hydrogenation.
(ii) Partial hydrogenation of linoleic acid gives trans $C_{18:1}$ (n-8) as the most abundant product. **Sketch** its structure.
(iii) Explain the health effects of partial hydrogenated products in question (ii) above.

(30 marks)

(2) (a) (i) Name the proteins, fat and carbohydrates present in milk.

(ii) Is milk an emulsion? Explain.

(iii) Explain the importance of the following terms in the preparation of dairy products.
  (A) solid non-fat
  (B) overrun

(40 marks)

(b) Coagulation of milk protein is an important step in the preparation of yogurt. Explain along with the chemistry and conditions how this is carried out in the preparation of **low-fat yogurt.**

(20 marks)

(c) Mayonnaise is often used as a salad dressing. Ingredients used in the preparation includes vinegar, egg Yolk, lemon juice, mustard, salt and canola oil.

(i) Explain the role of egg Yolk in the mixture. (20 marks)

(d) State three reasons as to why cereals are considered a staple food. (20 marks)

(3) (a) What are the main aspects covered in the Food Act of Sri Lanka?

(20 marks)

(b) According to a newspaper report, in a recent raid carried out by Authorized Food officers in the Colombo municipal area, many restaurants were found not to adhere to the standards expected by the clients.

(i) Who are Authorized officers? What is the role of an Authorized officer?

(ii) Name three categories of persons who can be appointed as Authorized officers

(iii)What powers do Authorized officers have in the above mentioned case reported in the newspaper?

(40 marks)

(c) Briefly explain the role of Codex Alimentarius Commission in relation to food industry.

(15 marks)

(d)Comment on the statement "Implementation of GHP is important in preventing food borne diseases".

(25 marks)

(4) (I) (a) What is meant by the term "Proximate analysis of Food"

(b) What are the six essential food content information that must be present in a standardized nutritional label?

(c) A student performed an oven drying method to determine the moisture content of food material and she observed that this food material formed a semipermeable crust during drying. To overcome this problem what method/ technique should be used, to obtain the accurate results for the moisture content. Comment on your answer.

(30 marks)

(II) A sample of curry powder which contain w% moisture content was given to a student for analysis of Ash content. He obtained the following data.

Weight of curry powder sample = M_1 g

Weight of empty crucible = M_2 g

Weight of ashed sample = M_3 g

However, after weighing the sample it was moistened with little water and some black particles were observed. Then transferred it back to muffle furnace and repeated. The weight of the crucible with completely ashed sample was M_4 g.

(a) Why did this student moisten the sample with a little water?

(b) Calculate the percentage of ash on a dry matter basis by using the symbols given above.

(a) Assuming that, this student has repeated the same experiment from the same amount of curry powder sample again to check the repeatability. However, he obtained different values for ash% during the trials. Comment on this observation.

(40 marks)

(III)

(a) Explain and contrast the principles (not procedures) involved in determining the fat content of a food product by the following methods. Indicate for each method the type of sample that would be appropriate for analysis.

(i) Soxhlet extraction

(ii) Rose-Gotlieb method

(30 marks)