

CORK INSTITUTE OF TECHNOLOGY
INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ

Semester 1 Examinations 2015/16

Module Title: Food and Healthcare Chemistry

Module Code: CHEM7002

School: Biological Sciences

Programme Title: B.Sc. (Honours) in Nutrition and Health Science
B.Sc. (Honours) in Herbal Science
B.Sc. in Food Science and Technology

Programme Code: SNHSC_8_Y3
SHERB_8_Y3
SFSTE_8_Y3

External Examiner(s): Dr. Eibhlís O'Connor
Internal Examiner(s): Germain Levieille

Instructions: Answer 4 out of these 5 proposed questions. Each question carries a equal mark weighing of 25%. Please state clearly the questions addressed in your paper.

Duration: 2 hours

Sitting: Winter 2015 (Semester1)

Requirements for this examination:

Note to Candidates: Please check the Programme Title and the Module Title to ensure that you have received the correct examination paper.
If in doubt please contact an Invigilator.

- Q1. a) Lipids are made of very different molecules with common properties. What is the principal type of lipid found in food? Give its general molecular structure. (5 marks)
- b) Elaborate on how the nature of the fatty acids impacts on the melting of fat. (5 marks)
- c) Describe the three main processes used for the extraction of fat and oils. (5 marks)
- d) Describe the four refining processes oil may require after extraction. (5 marks)
- e) Discuss how the chemical nature of fatty acids affects the nutritional quality of food. (5 marks)
- Q2. I) Give a definition of the following terms.
- a. Iodine number of a fat (3 marks)
- b. Acid value of an oil (3 marks)
- c. Saponification value of a fat (3 marks)
- d. Hydrogenation of vegetable oils (3 marks)
- II) a) Discuss the concept of plasticity of a fat. (6 marks)
- b) Give a short description of the techniques that can be applied to a fat/oil to increase its plastic range. (7 marks)
- Q3. The development of a brown colour in foods can be attributed to 3 main types of reactions. Supported by relevant examples, describe each of these three reactions and highlight their key differences. (25 marks)
- Q4. a) Give a definition of the term “water activity” (a_w) of a food product? (5 marks)
- b) Describe how the water activity of a food product is measured. (3 marks)
- c) Why is it important to know the a_w of a food product? (7 marks)
- d) Prevention of spoilage is an important factor in development of new food products.
- Discuss the prevention of spoiling of food products by controlling water activity. (10 marks)

- Q5. a) Proteins are made of chain of amino acids. Give the general chemical structure of amino acids. (3 marks)
- b) Give the semi developed equation of the creation of amide linkage (also called peptide bond) between two amino acids. (7 marks)
- c) One of the methods to measure the amount of protein in a food product is the Kjeldahl method. Describe the principle of this method and discuss its limitations. (5 marks)
- d) Protein nutritional value revolves around the concept of “protein efficiency ratio (PER)”. Describe the experimental determination of the PER. (5 marks)
- e) What is meant by “limiting amino acid” in food ingredients and discuss its consequences in nutrition? (5 marks)