

THE PAPUA NEW GUINEA UNIVERSITY OF TECHNOLOGY

SECOND SEMESTER EXAMINATIONS – 2022

FOOD TECHNOLOGY - FIRST YEAR DEGREE

FT 122 INTRODUCTION TO FOOD SCIENCES

THURSDAY 27TH OCTOBER, 2022– 12:50 P.M.

TIME ALLOWED: 3 HOURS

INFORMATION FOR CANDIDATES:

1. You have 10 minutes to read the paper. You must not begin writing in the answer book during this time.
2. **ANSWER ALL QUESTIONS**
3. All answers must be written in the answer books provided.
4. Write your name and number clearly on the front page. Do it now.
5. Calculators are permitted in the examination room. Notes and textbooks are not allowed.
6. Show all workings and calculations in the answer book.

MARKING SCHEME

Section A

Question 1 [15 marks]

Question 2 [8 marks]

Question 3 [11 marks]

Section B

Question 4 [13 marks]

Question 5 [9 marks]

Question 6 [11 marks]

Section C

Question 7 [13 marks]

Question 8 [20 marks]

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SECTION A

ANSWER ALL QUESTIONS

1. (a) Explain what Anthony van Leeuwenhoek did that led to the beginning of the field of microbiology. [3 marks]
- (b) The discovery of existence of microorganisms resulted in two school of thoughts, abiogenesis or the concept of spontaneous generation and biogenesis. Explain. [2 marks]
- (c) Explain phylogenetic and phenetic classification systems. [2 marks]
- (d) Explain binomial system of naming microorganisms and give one example. [2 marks]
- (e) Microorganisms are divided into 2 major groups, eucaryotes and procaryotes. Differentiate between the two groups with reference to size, mitotic division, chromosome number, shape of chromosomes, nuclear membrane and chloroplast. [3 marks]
- (f) Although there are many different types of microscopes, they all operate on the same basic principles. List them. [3 marks]

(Total = 15 marks)

2. Fungi consist of terrestrial fungi and slime moulds.

- (a) Terrestrial fungi is made of Deutoromycetes, Ascomycetes, Zygomycetes and Basidiomycetes.
- (i) List the four methods by which these groups reproduce asexually. [2 marks]
- (ii) State whether the above groups in 2 (a) have septate or coenocytic (aseptatate) hyphae. [2 marks]
- (iii) Which of the above groups do yeasts, *Rhizopus oligosporus*, mushroom and *Penicillium* belong to? [2 marks]
- (b) Explain the reasons why slime moulds are neither fungi nor protozoa. [2 marks]

(Total = 8 marks)

3. (a) Name the four species of Plasmodium that cause malaria. [2 marks]
- (b) Describe the life cycle of malaria parasites. [3½ marks]

- (c) Describe how amoebas move and capture food. [3 marks]
- (d) What is the most common characteristic that differentiates algae from fungi and protozoa. [1 mark]
- (e) Name the group or division of algae that has the toxic species. [½ mark]
- (f) Name two pigments that are found in all the different types of algae. [1 mark]

(Total = 11 marks)

SECTION B**ANSWER ALL QUESTIONS**

4. (a) Write True or False for the following statements. [5 marks]
- (i) A glucose unit has three chiral carbons.
 - (ii) Fehling's test is an analytical test which involves oxidation- reduction reactions.
 - (iii) Glucose, cellulose, polypeptides and glycogen all belong to a class of organic compound called carbohydrates.
 - (iv) Two hexoses of most importance and interest to food chemists are glucose and galactose.
 - (v) Glycoside is an example of an acetal.
 - (vi) Hydrolysis is the breakdown of macromolecules.
 - (vii) The anomeric carbon for ketoses such as fructose is on the second carbon.
 - (viii) Gluconic acid is a product of glucose oxidation.
 - (ix) Baking bread is an example of caramelization reaction.
 - (x) Food stabilizer is an example of food esters.

(b) Differentiate between a diastereomer and an enantiomer. [2 marks]

(c) Explain how the ring structure of D- glucose is formed. [3 marks]

(d) Discuss the following polysaccharides: [3 marks]

- (i) Starch.
- (ii) Cellulose.

(Total = 13 marks)

5. (a) Define the following terms: [3 marks]

- (i) Zwitterion.
- (ii) Peptide.
- (iii) Protein.

(b) Draw the basic structure of an amino acid. [2 marks]

(c) State one property and an example the following: [4 marks]

- (i) Acidic amino acids.
- (ii) Basic amino acids.
- (iii) Polar uncharged amino acids.
- (iv) Non polar hydrophobic amino acids.

(Total= 9 marks)

6. (a) Differentiate between triacylglycerol and phospholipids. [3 marks]
- (b) Name the following triacylglycerol with the following information given. [2 marks]
C1= Stearic acid
C2= Palmitic acid
C3= Oleic acid
- (c) Write short notes on ANY TWO of the following: [6 marks]
- (i) Milk fat.
 - (ii) Marine fat.
 - (iii) Vegetable butter.

(Total= 11 marks)

SECTION C

ANSWER ALL QUESTIONS

7. (a) Match the alphabetically listed nutrients to their numerical functions or descriptions. (½ mark each) [6 marks]

A	Calcium	1	Bone and teeth health maintenance, nerve transmission, muscle contraction, blood clotting.
B	Zinc	2	This micronutrient assists enzymes and is important for metabolism of amino acids and fatty acids.
C	Riboflavin	3	Fluid balance, nerve transmission, muscle contraction.
D	Vitamin E	4	Protein and DNA production, wound healing, growth, immune system function.
E	Sodium	5	It is very important for growth and metabolism and making of the thyroid hormones.
F	Vitamin B12	6	It is a coenzyme needed for energy metabolism, also important for good skin health.
G	Iodine	7	Important for maintenance of bone and teeth and immune system function.
H	Vitamin D	8	Transports oxygen and important for energy production.
I	Vitamin K	9	It is very important for good immune system, reproduction and vision.
J	Iron	10	It protects the cell membrane and is an important antioxidant.
K	Biotin	11	Coenzyme, red blood cell synthesis, maintain nerve cells.
L	Vitamin A	12	Important for blood clot formation.

- (b) Write TRUE/FALSE beside each numbered statement. (½ mark each) [7 marks]

	Statement	True/False
1	Valine, lysine and serine are essential amino acids.	
2	Electrolytes play important role in water regulation; sodium and chloride ions predominate in the intracellular space whilst potassium and phosphate ions predominate in the extracellular space.	
3	Vegans are vegetarians who do not eat animal meat however, they can eat cheese and yoghurt.	
4	Morbidity is the number of deaths whilst mortality is the number of illnesses in a given time.	

	Statement	True/False
5	Sugar alcohols are incompletely digested and absorbed, and therefore very caloric.	
6	Percent daily value (%DV) is the percentage of the recommended intake of a nutrient provided by a whole packet of food.	
7	Tolerable upper intake (UL) level of nutrient provides a limit for those who take supplements or consume large amounts of fortified foods.	
8	Adequate intake levels (AI) of nutrients support adequate nutritional status and are based on rigorous scientific studies.	
9	Dietary reference intakes are intended for all people to use. There is one standardized set of values that can be used by all individuals.	
10	If you knew the age, gender and physical activity level of a person, you will be able to calculate his/her estimated energy requirement.	
11	Acceptable macronutrient distribution ranges include; carbohydrates (45-65%), Protein (20-35%) and Fat (10-35%).	
12	If your nutrient intake is between estimated average requirement (EAR) and the recommended dietary allowance (RDA) then it is probably adequate.	
13	Nutrient requirements refer to the highest intake level of a nutrient that supports basic physiological functions and promotes optimal health.	
14	Limiting amino acids are non-essential amino acids in the lowest concentration in an in-complete protein source.	

(Total = 13 marks)

8. (a) Carbohydrates are critical to support life's most basic function which is the production of energy. Explain. [3 marks]
- (b) Describe a high-quality protein. [2 marks]
- (c) Explain what food groups are and how foods are assigned into groups. Include in your explanation how this can help you plan a balanced and healthful diet. [3 marks]
- (d) What can you do to reduce the risk of developing the most common and deadly chronic diseases. [2 marks]
- (e) Explain the importance of assessment of nutritional status and state the four ways in which that can be done. [3 marks]
- (f) Explain the principles of moderation and variety and their significance in planning balanced diets. [4 marks]
- (g) Define what dietary guidelines are and explain their importance. [3 marks]

(Total = 20 marks)