THE PAPUA NEW GUINEA UNIVERSITY OF TECHNOLOGY

FIRST SEMESTER EXAMINATIONS – 2020

FOOD TECHNOLOGY – THIRD YEAR DEGREE

FT 331 FOOD CHEMISTRY

FRIDAY 19TH JUNE, 2020 – 8:20 AM

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 [26 marks]
Question 2 [9 marks]
Question 3 [15 marks]

SECTION B
Question 4 [25 marks]
Question 5 [25 marks]

SECTION A

ANSWER ALL QUESTIONS

1. (a) Lucy wants to buy a pack of gum however, there are two same type of gums sold at different prices. The packet of gum which contains cyclamate is cheaper than the packet of gum without cyclamate. Explain which choice of gum is healthy for Lucy. [1 mark]

(b) Describe the use of ANY ONE of the following chemical preservatives: [1 mark]

(i) Propionic acid.
(ii) Benzoic acid.
(iii) Acetic acid.

(c) Describe the use of these food additives in food industries; [3 marks]

(i) Propellant.
(ii) Firming agents.
(iii) Humectants.

(d) Choose ANY THREE of the following and write short notes; [15 marks]

(i) Clarifying agent.
(ii) Stabilizer.
(iii) Lipid base emulsifier.
(iv) Anti-caking agent.

(e) In the use of food colors, differentiate between dyes and lakes by giving examples of ANY FOUR properties of each. [4 marks]

(f) Explain the reasons for the use of food colors. [2 marks]

(Total marks= 26 marks)

2. (a) How would you explain the safety of food additives to someone who is very concerned about health aspects of additives. [2 marks]

(b) What does it mean for a food additive to be Generally Recognized As Safe (GRAS)? [1 mark]

(c) Explain in your own words the importance of chelating agents. [3 marks]

(d) Name and describe the TWO classes of flavouring agents. [2 marks]

(e) Give an example of a sugar alcohol and a type of food that contains this particular sugar alcohol. [1 mark]

(Total marks= 9 marks)

3. (a) Clara decided to change her diet. She chose sweet potato as her main source of carbohydrates instead of rice. Which variety of sweet potato will provide her diet with adequate amount of various phytochemicals? Explain. [2 marks]

(b) Write short notes on ANY THREE of the following: [9 marks]

(i) Dietary fiber.
(ii) Allium compounds.
(iii) Capsaicinoids.
(iv) Carotenoids.

(c) Name the MAIN phytochemical found in these foods [4 marks]

(i) Pistachios.
(ii) Onions.
(iii) Wheat grain.
(iv) Purple fleshed sweet potato.
(v) Hazel nuts.
(vi) Berries.
(vii) Papaya.
(viii) Tomato.

(Total marks= 15 marks)

SECTION B

ANSWER ALL QUESTIONS

4. (a) Name and describe ANY TWO of the three basic kinds of chemical catalytic mechanisms used by enzymes. [4 marks]

(b) Write short notes describing enzymatic browning, include in your answer, its importance to you as a food manufacturer. [3 marks]

(c) With the aid of an appropriately labelled graph, describe the effect of substrate concentration on enzyme activity. [2 marks]

(d) Explain caramelization and maillard reactions. [4 marks]

(e) Explain the rationale for the use of enzymes as catalysts in food and related industries [2 marks]

(f) Name and explain ANY TWO ways of controlling enzymatic browning reactions. [2 marks]

(g) Select ANY TWO of the following inhibitors and describe: [4 marks]

(i) Irreversible inhibitor
(ii) Competitive inhibitor
(iii) Non-competitive inhibitor
(iv) Un-competitive inhibitor

(h) Select ANY TWO of the following factors that affect enzyme activity and describe: [4 marks]

(i) Water activity
(ii) Enzyme concentration
(iii) pH
(iv) Temperature

(Total = 25 marks)

5. (a) Give an overview of hydrocolloids used in the food industry. [2 marks]

(b) Write short notes on ANY TWO of the following: [4 marks]

(i) ANY ONE named seed gum.
(ii) ANY ONE named exudate.
(iii) ANY ONE named seaweed gum.
(iv) ANY ONE named biosynthetic or fermented gums

(c) Describe the use of hydrocolloids as fat replacers and edible films. [3 marks]

(d) Do hydrocolloids affect colour, appearance and flavour of the food products they are used in? Explain. [2 marks]

(e) Hydrocolloids are polysaccharides. Describe how structural features of these polysaccharides affect their solubility. [3 marks]

(f) Adding viscosity to foods is an important function of hydrocolloids. Write notes describing hydrocolloids as thickeners, adding viscosity to food systems. [2 marks]

(g) Maggi has a small confectionary company and is interested in manufacturing gelled products. She has come to you for assistance. She wants an explanation of the ways in which the gelation process can be induced. [4 marks]

(h) Describe what junction zones are and their importance in gelation process. [3 marks]

(i) Name and describe ANY ONE named cellulose derivative used as hydrocolloids in foods. [2 marks]

(Total = 25 marks)