



DEDAN KIMATHI UNIVERSITY OF TECHNOLOGY
UNIVERSITY EXAMINATIONS 2019/2020
SECOND YEAR FIRST SEMESTER EXAMINATION FOR THE BACHELOR OF
SCIENCE DEGREE IN NUTRITION AND DIETETICS

FND 2102: MACRONUTRIENTS

DATE: April /2020

TIME: 2 HOURS

INSTRUCTIONS TO CANDIDATES:

- **This paper consists of two sections A and B.**
- **Answer all questions in section A and any other two (2) in section B.**

Section A= 30 marks

Section B = 40 marks.

Section A- [30 Marks].

Question One

- a) State the structural differences between amylose and amylopectin (3 marks).
- b) Briefly explain why consumption of unrefined carbohydrates is encouraged for individuals on weight management regimen (4 marks).
- c) Lipoproteins are a heterogeneous group of particles with different lipid and protein compositions. Highlight the differences between chylomicrons and high-density lipoprotein cholesterol. (3 marks).

Question Two

- a) Discuss the concept of protein turnover (3 marks).
- b) Subject A is a 31-year-old pregnant woman of average pre-pregnancy weight who is consuming 2500 kcalories and 80 grams of protein a day.
 - i. What would you predict about Subject A's nitrogen balance? (1 mark).
 - ii. Laboratory results shows that she lost 10.4 grams of nitrogen in urine and faeces. Calculate her nitrogen balance. (2 marks).
 - iii. Explain whether the nitrogen value in part (ii) supports your prediction in part (i) (1 mark).
- c) State the function of the phospholipids and how does this relate to their structure? (3 mark).



Question Three

- a) Kenya is currently experiencing double burden of malnutrition. Explain this situation (3 marks).
- b) In an emergency situation where refugees are grouped together and without resources, one of the top priorities is to provide enough energy. The current guidelines are to provide 2100 Kcal per person per day, with 10-12 % energy from protein and at least 17% of energy as fats. This is usually translated as a cereal mix with pulses or beans and oil distributed to the population. What are the risks with this type of diet and what advice would you give to control the risks? (3 marks).
- c) Both gamma-linolenic acid and alpha-linolenic acid contain 18 carbon atoms and three double bonds. In what ways are they different and why is this important? (4 marks).

SECTION B – [40 MARKS]

Question Four

- a) State and explain any THREE possible causes of obesity in low- and middle-income economies (6 marks).
- b) Obesity and its consequences are largely preventable! State any THREE prevention measures that can be implemented at
 - i. Food industry level? (3 marks).
 - ii. Societal level? (3 marks).
- c) Explain how context and potential resources, and formal and informal structure can cause protein energy malnutrition (4 marks).
- d) Explain why a protein deficiency might result into oedema and increased susceptibility to infection (4 marks).

Question Five

- a) Several hypotheses have been put forward to explain how dietary fibre might affect development of colon cancer. State and explain any THREE possible reasons why dietary fibre intake is key to the development of this phenomenon. (6 marks).
- b) Explain how poor consumption on non-starch polysaccharides and resistant could lead to a gastrointestinal disorder like diverticular disease. (3 marks).
- c) Discuss the functional properties of proteins in human nutrition based on the subjects stated below. Motivate your answers with relevant examples where possible.



- i. Messenger/Hormones (3 marks).
 - ii. Transport proteins (3 marks).
- d) Explain how the following lipases helps in meeting the energy needs of the body due to fat
- i. Lipoprotein lipase (2.5 marks).
 - ii. Hormone sensitive lipase (2.5 marks).

Question Six

- a) Describe THREE different methodologies (and their limitations) for determination of the nutritional value of food proteins. (18 marks).
- b) From Q6 Part a, apply this to
- i. egg protein (1 mark).
 - and
 - ii. wheat protein. (1 mark).