THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL

ADVANCED CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

155/1 **FOOD AND HUMAN NUTRITION 1**

(For Both School and Private Candidates)

Time : 3 Hours **ANSWERS** **Year : 2017**

Instructions

1. This paper consists of sections **A** and **B**.
2. Answer all questions in section **A** and only **three (3)** question from section **B**.
3. Non-programmable calculators may be used.
4. Communication devices and any unauthorised materials are **not** allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet(s).

SECTION A (40 Marks)

Answer all questions in this section

1. Define vitamins and classify them into fat-soluble and water-soluble groups, giving one example of each.

   Vitamins are organic compounds required in small amounts by the body for normal growth, metabolism, and maintenance of health.

   Fat-soluble vitamins dissolve in fats and oils and can be stored in the body. An example is **Vitamin A**.

   Water-soluble vitamins dissolve in water and are generally not stored, requiring regular intake. An example is **Vitamin C**.

2. Explain the difference between chronic and acute food insecurity.

   Chronic food insecurity is a long-term, persistent lack of access to sufficient, nutritious food, often due to poverty, low agricultural productivity, or environmental degradation.

   Acute food insecurity is short-term and arises from sudden shocks such as droughts, floods, or conflicts that temporarily disrupt food supply.

3. Describe two traditional methods of preserving fish and how they prevent spoilage.

   Smoking involves exposing fish to smoke from burning wood, which dehydrates the fish and deposits antimicrobial compounds, preventing bacterial growth.

   Salting draws out moisture through osmosis, creating a hostile environment for microbial activity and extending shelf-life.

4. (a) Define dietary fiber.

   Dietary fiber refers to the indigestible portion of plant foods, such as cellulose, hemicellulose, and lignin, that passes through the digestive system largely intact.

   (b) Mention two health benefits of dietary fiber.

Fiber promotes healthy digestion and prevents constipation.

It helps reduce blood cholesterol levels and supports cardiovascular health.

5. State three factors that influence energy expenditure in adults.

Basal metabolic rate (BMR): The energy required to maintain vital body functions at rest.

Physical activity level: More active adults burn more calories.

Thermic effect of food: Energy expended during digestion, absorption, and metabolism of nutrients.

6. Explain the role of bicarbonate and baking powder in chemical leavening of baked foods.

Bicarbonate of soda (sodium bicarbonate) reacts with acidic ingredients to release carbon dioxide, causing dough to rise.

Baking powder contains both an acid and a base; it releases carbon dioxide when moistened and heated, producing consistent leavening without additional acidic ingredients.

7. Describe two natural compounds used to protect stored grains against insects.

Neem leaves contain compounds that repel and kill insects.

Ash acts as a physical barrier on grains, preventing insects from accessing and feeding on stored products.

8. Distinguish between food quality and food safety.

Food quality refers to characteristics such as taste, texture, appearance, nutritional value, and consumer acceptability.

Food safety ensures that food is free from harmful microorganisms, toxins, or chemical contaminants that could cause illness.

9. Explain the effect of drying on the moisture content and shelf-life of cereals.

Drying reduces the moisture content of cereals, making the environment unsuitable for microbial growth.

Lower moisture content increases shelf-life by slowing spoilage and maintaining the quality of grains during storage.

10. State two limitations of underground storage of grains in tropical regions.

High humidity can lead to mold growth and spoilage.

Insect infestations are common due to the warm environment, which accelerates post-harvest losses.

SECTION B (60 Marks)

Answer only three questions from this section

11. A farmer blends 12 liters of milk with 3% fat and 18 liters with 1.5% fat. Calculate the fat content of the mixture. Discuss how milk blending can be used to meet different dietary requirements and commercial standards.

Total fat in 12 liters of 3% milk = 12 × 0.03 = 0.36 liters.

Total fat in 18 liters of 1.5% milk = 18 × 0.015 = 0.27 liters.

Total fat in mixture = 0.36 + 0.27 = 0.63 liters.

Total volume = 12 + 18 = 30 liters.

Fat percentage = (0.63 ÷ 30) × 100 = 2.1%.

Blending milk allows producers to provide products with specific fat contents, catering to dietary needs such as low-fat options for heart health or full-fat milk for energy. It also helps meet commercial standards and market preferences while maintaining nutritional balance.

12. Discuss the bioavailability of minerals such as calcium and iron in cereals and legumes. Explain the effect of antinutritional factors and methods to improve absorption.

Bioavailability refers to the proportion of ingested minerals that can be absorbed and utilized by the body.

Antinutritional factors like phytates and tannins bind minerals such as calcium and iron, reducing their absorption.

Methods to improve absorption include soaking, fermenting, germinating cereals and legumes, and consuming vitamin C-rich foods alongside plant-based sources to enhance iron uptake.

13. Explain the stages of wet milling in cereal processing. Discuss how each stage affects the quality of flour in terms of starch, protein, and functional properties for baking.

Soaking/Steeping: Grains are soaked in water to soften the endosperm. This allows separation of starch, protein, and fiber.

Grinding/Milling: The softened grains are ground to release starch and protein. This stage determines the particle size and texture of flour.

Separation: Starch, protein, and bran are separated, concentrating nutrients appropriately. Proper separation improves baking properties such as dough elasticity, water absorption, and final product texture.

14. Discuss chemical, physical, and biological raising agents used in baking. Provide examples, and explain the advantages and disadvantages of each in food preparation.

Chemical raising agents like baking powder and bicarbonate of soda produce carbon dioxide through chemical reactions. They are fast-acting but may leave a chemical taste if not properly measured.

Physical raising agents such as air and steam expand the dough mechanically or during baking. They produce light texture but require skill in handling and may be less consistent.

Biological raising agents such as yeast ferment sugars to release carbon dioxide. They enhance flavor and texture but require longer proofing times and controlled conditions.

15. Analyze how population growth, HIV/AIDS, and environmental degradation impact household and national food security. Suggest practical measures to enhance food security.

Rapid population growth increases demand for food, placing pressure on limited resources and farmland.

HIV/AIDS reduces labor availability for farming, affecting food production and household nutrition.

Environmental degradation, such as soil erosion, deforestation, and water scarcity, diminishes agricultural productivity.

Practical measures include promoting sustainable agriculture, improving irrigation and soil conservation, adopting modern storage and preservation techniques, supporting affected households, and implementing family planning programs to manage population growth.