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 : 2014**

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 food composition and list three major nutrients found in staple foods.

   Food composition refers to the nutrients and other components present in a food item that contribute to its energy, growth, and maintenance functions in the body.

   Three major nutrients found in staple foods are carbohydrates, proteins, and fats.

2. Differentiate between saturated and unsaturated fats and give one food source for each.

   Saturated fats contain no double bonds between carbon atoms, are usually solid at room temperature, and are found in foods like butter.

   Unsaturated fats contain one or more double bonds, are usually liquid at room temperature, and are found in foods like olive oil.

3. Explain three factors that contribute to household food insecurity.

   Low income limits the ability to purchase sufficient and nutritious food.

   Poor agricultural productivity due to lack of inputs, technology, or unpredictable weather affects food availability.

   High food prices reduce access to food, especially for vulnerable households with limited financial resources.

4. (a) Define food fortification.

   Food fortification is the process of adding essential vitamins and minerals to foods to improve their nutritional quality and prevent deficiencies.

   (b) Mention one cereal and one salt product commonly fortified in Tanzania.

Fortified cereal: Wheat flour with iron and folic acid.
Fortified salt: Iodized salt to prevent goiter.

5. Explain the role of yeast in chemical leavening and how it differs from physical raising agents.

Yeast is a biological leavening agent that ferments sugars in dough to produce carbon dioxide, causing dough to rise.

Physical raising agents, such as air and steam, rely on mechanical incorporation or heat to create gas, rather than fermentation, and do not involve chemical or biological reactions.

6. State two natural compounds used to protect grains from insect damage and describe their mode of action.

Neem oil acts as a repellent, preventing insects from feeding and laying eggs on stored grains.

Garlic extracts release sulfur compounds that repel pests and reduce infestation.

7. Explain the effect of drying on vitamin content in fruits and vegetables.

Drying can lead to loss of heat-sensitive vitamins, such as vitamin C and some B vitamins, reducing the overall nutritional value of fruits and vegetables.

8. Distinguish between food safety and food quality.

Food safety refers to measures and practices that prevent food from causing harm to consumers, such as avoiding contamination and spoilage.

Food quality refers to attributes that make food desirable, including taste, texture, appearance, and nutritional content.

9. Describe two stages of wet milling in cereal processing.

Steeping: Grains are soaked in water to soften the endosperm and facilitate separation of components.

Grinding and separation: The softened grains are ground, and starch, bran, and protein are separated to produce flour, bran, and gluten.

10. State two problems associated with underground storage of grains.

High humidity can lead to mold growth and spoilage.

Poor ventilation encourages insect infestation and reduces grain quality.

SECTION B (60 Marks)

Answer only three questions from this section

11. A farmer mixes 10 liters of milk containing 3% fat with 20 liters of milk containing 2% fat. Calculate the fat content of the mixture. Discuss the importance of blending milk with different fat contents in commercial dairy processing.

Total fat in 10 liters of 3% milk = $10 \times 0.03 = 0.3$ liters.

Total fat in 20 liters of 2% milk = $20 \times 0.02 = 0.4$ liters.

Total fat in mixture = $0.3 + 0.4 = 0.7$ liters.

Total volume = $10 + 20 = 30$ liters.

Fat percentage = $(0.7 \div 30) \times 100 = 2.33\%$.

Blending milk with different fat contents allows dairies to produce milk products with specific fat levels, meeting consumer dietary needs and creating standardized products for health and commercial purposes.

12. Discuss the bioavailability of iron and zinc in plant-based foods. Explain how antinutritional factors such as phytates and tannins reduce mineral absorption, and suggest methods to improve bioavailability.

Bioavailability is the proportion of a nutrient that can be absorbed and utilized by the body.

Iron and zinc from plant-based foods are less bioavailable due to antinutritional factors like phytates (in cereals) and tannins (in tea), which bind minerals and reduce absorption.

Methods to improve bioavailability include soaking, fermenting, germinating grains, and consuming vitamin C-rich foods to enhance iron absorption.

13. Describe traditional methods of storing grains and fish in Tanzania. Discuss common post-harvest losses and propose modern techniques to minimize these losses.

Traditional grain storage includes granaries, clay pots, and woven baskets often treated with neem leaves or ash.

Fish preservation traditionally involves drying, smoking, and salting.

Common post-harvest losses include insect infestation, mold growth, moisture-related spoilage, and nutrient loss.

Modern techniques to minimize losses include improved silos with ventilation and temperature control, airtight storage containers, solar dryers for fish, and regular monitoring of stored products.

14. Explain the process of chemical, physical, and biological leavening in baking. Give examples and indicate the advantages and disadvantages of each method.

Chemical leavening involves baking powder or soda producing gas through a chemical reaction.
Advantages: quick and reliable rise.
Disadvantages: may leave a chemical taste if not balanced.

Physical leavening incorporates air or steam through whisking or folding.
Advantages: natural method, no chemical residues.
Disadvantages: less predictable rise and requires technique.

Biological leavening uses yeast or bacteria to ferment sugars and produce gas.
Advantages: enhances flavor and texture.
Disadvantages: slow process and sensitive to temperature.

15. Discuss food fortification and preservation. Explain the role of chemical preservatives and compare them with one natural method of pest control in stored grains.

Food fortification improves nutritional value by adding vitamins and minerals, e.g., fortified wheat flour or iodized salt.

Food preservation extends shelf life and prevents spoilage. Chemical preservatives, such as sodium benzoate, inhibit microbial growth but may leave residues and cause health concerns.

A natural method, like using neem oil, repels pests safely and prevents infestation without chemicals, although it may be less effective than synthetic preservatives.