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 : 2015**

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 carbohydrates and distinguish between sugar and starch, giving one example of each.

   Carbohydrates are organic compounds composed of carbon, hydrogen, and oxygen that serve as the primary energy source for the body.

   Sugar is a simple carbohydrate that provides quick energy; an example is glucose found in fruits.

   Starch is a complex carbohydrate that provides sustained energy; an example is maize or rice.

2. Explain three functions of proteins in the human body.

   Proteins are essential for growth and repair of tissues, including muscles, skin, and organs.

   They act as enzymes and hormones that regulate metabolic processes and physiological functions.

   Proteins provide energy when carbohydrates and fats are insufficient and contribute to immune defense through antibody production.

3. Describe two environmental factors that affect national food security.

   Drought and irregular rainfall reduce crop yields and food availability.

   Flooding and soil erosion can destroy crops and degrade arable land, limiting national food production.

4. Explain three health hazards associated with improper pesticide use.

   Pesticide exposure can cause acute poisoning, with symptoms such as headaches, nausea, and respiratory problems.

   Long-term exposure may lead to organ damage, hormonal imbalances, or cancer.

   Contaminated food and water can result in gastrointestinal disorders and chronic health issues.

5. (a) List three water-soluble vitamins.

   Vitamin C, Vitamin B1 (Thiamine), Vitamin B2 (Riboflavin).

   (b) Give one deficiency disease associated with each vitamin.

   Vitamin C deficiency causes scurvy, characterized by bleeding gums and poor wound healing.

   Vitamin B1 deficiency causes beriberi, affecting the cardiovascular and nervous systems.

   Vitamin B2 deficiency causes ariboflavinosis, resulting in cracked lips and inflammation of the mouth and tongue.

6. State two effects of post-harvest food losses on household income and national food supply.

   Household income is reduced because the loss of food products leads to lower marketable surplus and economic returns.

   National food supply decreases, contributing to higher food prices and potential food insecurity.

7. Explain the effect of milling quality on the nutritional value of cereals.

   High-quality milling removes bran and germ, which reduces fiber, vitamins, and minerals.

   Proper milling ensures uniform particle size and enhances digestibility but may also reduce some micronutrients if over-processed.

8. Distinguish between chemical preservatives and natural protective compounds in grains.

   Chemical preservatives are synthetic substances added to grains to inhibit microbial growth, such as sodium benzoate.

   Natural protective compounds, like neem leaves or ash, repel insects and prevent spoilage without chemical residues.

9. Describe two factors influencing basal metabolic rate (BMR).

Age: Younger individuals have higher BMR due to growth and higher energy demands.

Muscle mass: Higher muscle mass increases BMR because muscles require more energy to maintain than fat tissue.

10. Explain the difference between chronic and transitory food insecurity.

Chronic food insecurity is a long-term, persistent lack of access to sufficient and nutritious food, often caused by poverty or long-term environmental degradation.

Transitory food insecurity is temporary, arising from sudden events like droughts, floods, or conflicts that disrupt food availability for a short period.

SECTION B (60 Marks)

Answer only three questions from this section

11. A dairy cooperative blends 15 liters of milk with 4% fat and 25 liters with 2% fat. Calculate the fat percentage of the resulting mixture and explain its significance for meeting daily nutritional requirements.

Total fat in 15 liters of 4% milk = 15 × 0.04 = 0.6 liters.

Total fat in 25 liters of 2% milk = 25 × 0.02 = 0.5 liters.

Total fat in mixture = 0.6 + 0.5 = 1.1 liters.

Total volume = 15 + 25 = 40 liters.

Fat percentage = (1.1 ÷ 40) × 100 = 2.75%.

Significance: The blended milk provides a moderate fat content suitable for daily energy needs and supplies essential fatty acids while avoiding excessive saturated fat, supporting cardiovascular health.

12. Discuss the process of wet milling in cereal processing. Explain its effect on starch and protein content, and how it influences the quality of flour for baking.

Wet milling involves soaking grains in water to soften the endosperm, followed by grinding and separating starch, protein, and bran.

This process increases starch purity and concentrates protein in gluten, which improves flour elasticity and baking quality.

It allows production of fine flour suitable for bread and pastry while controlling nutrient content.

13. Describe natural compounds used to protect stored grains from insects and rodents. Compare their effectiveness with chemical pesticides and discuss the advantages and disadvantages of each.

Natural compounds include neem leaves, garlic, and ash, which repel pests and reduce infestation.

Compared to chemical pesticides, natural compounds are safer, environmentally friendly, and leave no residues.

However, they may be less effective, require frequent application, and may not provide long-term protection like synthetic pesticides.

14. Explain the different methods of food fortification, including cereal, salt, and oil fortification. Discuss the nutritional benefits and potential limitations of each method.

Cereal fortification adds iron, folic acid, or vitamins to flour, preventing anemia and supporting growth.

Salt fortification involves adding iodine to prevent goiter.

Oil fortification adds vitamin A to improve vision and immunity.

Limitations include cost of fortification, uneven distribution of nutrients, and potential degradation of added nutrients during storage or cooking.

15. Analyze the impact of environmental degradation, population growth, and civil conflicts on food security. Suggest measures that can improve household and national food security.

Environmental degradation, such as soil erosion, deforestation, and water scarcity, reduces crop productivity.

Rapid population growth increases demand for food, putting pressure on limited resources.

Civil conflicts disrupt production, distribution, and access to food, causing widespread insecurity.

Measures to improve food security include investing in sustainable agriculture, improving irrigation, adopting modern storage and preservation techniques, promoting family planning, and ensuring political stability to maintain supply chains.