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 : 2011**

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 security and list two challenges of achieving it at the household level.

   Food security is the condition in which all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food to meet their dietary needs and maintain a healthy and active life.

   Two challenges of achieving food security at the household level include limited income, which restricts the ability to buy sufficient and nutritious food, and poor agricultural productivity due to lack of inputs, technology, or adverse climatic conditions.

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

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

   They serve as enzymes and hormones, regulating metabolic processes and physiological activities in the body.

   Proteins provide energy when carbohydrates and fats are insufficient and play a key role in immune defense by forming antibodies.

3. (a) List any three water-soluble vitamins.

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

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

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

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

   Vitamin B2 deficiency causes ariboflavinosis, which leads to cracked lips and inflammation of the mouth and tongue.

4. Distinguish between chemical, physical, and biological raising agents.

   Chemical raising agents produce gas through chemical reactions in dough or batter, such as baking powder or baking soda.

   Physical raising agents incorporate air or steam mechanically, such as whisking egg whites or using steam in puff pastry.

   Biological raising agents use microorganisms like yeast or bacteria to ferment sugars, producing carbon dioxide to make dough rise.

5. Explain the role of warm liquids in bread making.

   Warm liquids activate yeast by providing an optimal temperature for fermentation, which produces carbon dioxide to make dough rise.

   They also aid in dissolving ingredients, hydrating flour proteins, and improving dough consistency and elasticity.

6. Describe two natural compounds used to protect stored grains against pests.

   Neem oil acts as an insect repellent and protects grains from insect infestation.

   Garlic extracts contain compounds that repel pests and prevent spoilage in stored grains.

7. State two differences between food quality and food safety.

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

   Food safety involves practices and conditions that prevent food from causing harm to consumers, such as proper handling, storage, and hygiene to avoid contamination.

8. Describe the effect of drying on food quality.

   Drying reduces moisture content, which inhibits microbial growth and prolongs shelf life.

However, excessive drying may lead to nutrient loss, changes in texture, and decreased flavor of the food.

9. Explain two methods to improve post-harvest food security.

Using improved storage facilities with controlled temperature and humidity prevents spoilage and insect infestations.

Applying proper post-harvest handling techniques, including drying and safe packaging, reduces losses and maintains food quality.

10. Define dietary fiber and mention one source.

Dietary fiber is the indigestible part of plant foods that aids digestion and promotes bowel regularity.

One source of dietary fiber is green leafy vegetables such as spinach.

SECTION B (60 Marks)

Answer only three questions from this section

11. A farmer blends 15 liters of milk with 3% fat with 25 liters of milk with 1.5% fat. Calculate the fat content of the resulting mixture and discuss its nutritional relevance.

Total fat in 15 liters of 3% milk = $15 \times 0.03 = 0.45$ liters.

Total fat in 25 liters of 1.5% milk = $25 \times 0.015 = 0.375$ liters.

Total fat in the mixture = $0.45 + 0.375 = 0.825$ liters.

Total volume = $15 + 25 = 40$ liters.

Fat percentage = $(0.825 \div 40) \times 100 = 2.06\%$.

Nutritional relevance: Blending milk allows adjustment of fat intake to meet dietary needs, providing energy and essential fatty acids while controlling saturated fat consumption for heart health.

12. Discuss the bioavailability of minerals in foods and explain the effects of antivitamins on nutrient absorption, giving examples.

Bioavailability of minerals is the proportion of minerals in food that is absorbed and utilized by the body.

Antivitamins or antinutrients inhibit nutrient absorption; for example, phytates in cereals reduce iron absorption, and tannins in tea bind iron, making it less available.

Understanding bioavailability helps optimize diets and enhance nutrient intake through proper food combinations and preparation methods.

13. Describe traditional grain and fish preservation methods. Discuss problems in tropical storage and suggest measures to minimize losses.

Traditional grain preservation methods include storage in granaries, clay pots, and woven baskets often combined with natural repellents such as neem leaves.

Traditional fish preservation involves drying, smoking, and salting to prolong shelf life.

Problems in tropical storage include high humidity, insect infestation, microbial spoilage, and nutrient loss.

Measures to minimize losses include improving storage facilities with proper ventilation, maintaining low moisture levels, applying safe natural preservatives, and training farmers in proper handling and hygiene.

14. Prepare a one-day meal plan for an elder. Explain your choices in terms of nutrient content, energy requirements, and dietary guidelines.

Breakfast: Oatmeal with milk and a handful of nuts. Oatmeal provides complex carbohydrates for slow energy release, milk supplies calcium and protein, and nuts provide healthy fats.

Lunch: Grilled fish, steamed vegetables, and brown rice. Fish provides protein and omega-3 fatty acids, vegetables supply fiber and vitamins, and brown rice offers complex carbohydrates.

Snack: Low-fat yogurt with berries. Yogurt supplies protein and probiotics, berries provide fiber and antioxidants.

Dinner: Chicken salad with leafy greens, cucumber, and olive oil dressing. Chicken gives lean protein, vegetables provide fiber and micronutrients, and olive oil supplies healthy fats for heart health.

15. Explain cereal and salt fortification. Discuss the role of chemical preservatives in foods and give one natural alternative for controlling pests.

Cereal fortification involves adding nutrients such as iron, folic acid, or vitamins to flour to prevent deficiencies. Salt fortification involves adding iodine to prevent goiter.

Chemical preservatives prevent microbial growth and extend shelf life; examples include sodium benzoate and potassium sorbate.

A natural alternative for pest control is neem oil, which repels insects and protects stored grains without chemical residues.