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 : 2013**

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 mention three main nutrients present in foods.

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

   Three main nutrients present in foods are **carbohydrates**, which provide energy; **proteins**, which are essential for tissue growth and repair; and **fats**, which provide energy and support cell function.

2. Explain the difference between saturated and unsaturated fats and give one food source for each.

   Saturated fats have no double bonds between carbon atoms and are usually solid at room temperature. An example is butter.

   Unsaturated fats contain one or more double bonds, are usually liquid at room temperature, and an example is olive oil.

3. (a) Define food security.

   Food security is the state in which all people have physical, social, and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life.

   (b) List two national measures to improve food security.

- Implementing agricultural policies that promote crop production and food availability.
- Supporting irrigation and modern farming technologies to increase yields and reduce dependence on rainfall.

4. State two roles of salt in bread making.

   Salt strengthens gluten, improving the dough's elasticity and structure.

   It also enhances flavor and controls yeast fermentation, preventing over-rising of the dough.

5. Describe three factors that influence energy expenditure in humans.

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

   Physical activity: More active individuals expend more energy due to movement and exercise.

   Thermic effect of food: Energy used to digest, absorb, and metabolize nutrients increases overall energy expenditure.

6. Explain two natural compounds used to protect grains from pests.

   Neem oil repels insects by disrupting their feeding and reproductive cycles.

   Ash acts as a physical barrier on grain surfaces, preventing insect infestation.

7. Differentiate between food safety and food quality.

   Food safety refers to measures taken to ensure that food is free from contamination, pathogens, and harmful substances.

   Food quality refers to attributes such as taste, texture, appearance, and nutritional value that make food acceptable and desirable to consumers.

8. Describe the effect of wet milling on food quality.

   Wet milling softens grains through soaking and separates starch, protein, and fiber. This process increases the purity of starch and protein, improving flour texture and baking quality while maintaining essential nutrients when done correctly.

9. Explain two measures to reduce post-harvest food losses.

   Proper drying and storage of grains and fish prevent moisture-related spoilage and mold growth.

   Using airtight containers or modern storage facilities with controlled temperature and ventilation reduces insect infestation and maintains food quality.

10. State two challenges of storing food in tropical climates.

High humidity encourages mold growth and accelerates spoilage.

High temperatures increase insect activity, leading to significant post-harvest losses.

SECTION B (60 Marks)

Answer only three questions from this section

11. A farmer mixes 8 liters of milk with 5% fat and 12 liters of milk with 2% fat. Calculate the fat content of the mixture and discuss its importance in diet planning.

Total fat in 8 liters of 5% milk = 8 × 0.05 = 0.4 liters.

Total fat in 12 liters of 2% milk = 12 × 0.02 = 0.24 liters.

Total fat in mixture = 0.4 + 0.24 = 0.64 liters.

Total volume = 8 + 12 = 20 liters.

Fat percentage = (0.64 ÷ 20) × 100 = 3.2%.

Importance: Blending milk with different fat levels provides moderate fat content suitable for energy requirements, supports intake of essential fatty acids, and helps tailor diets for specific health needs, such as reducing excessive saturated fat intake.

12. Discuss the bioavailability of vitamins and minerals in foods. Explain the effect of antivitamins and antinutrients on nutrient absorption.

Bioavailability refers to the proportion of vitamins and minerals that the body can absorb and use.

Antivitamins, such as avidin in raw eggs, interfere with the action of certain vitamins like biotin.

Antinutrients, including phytates, tannins, and oxalates, bind minerals such as iron, zinc, and calcium, reducing their absorption.

Methods to improve absorption include soaking, fermenting, germinating foods, and combining them with vitamin C-rich foods to enhance iron uptake.

13. Describe traditional and modern methods of storing grains and fish. Discuss post-harvest losses and suggest measures to minimize them.

    Traditional grain storage includes granaries, clay pots, and woven baskets often treated with neem leaves or ash. Fish is preserved through drying, smoking, and salting.

    Modern storage methods include airtight silos, refrigeration, and solar drying for fish.

    Post-harvest losses occur due to moisture, insect infestation, mold, and microbial spoilage.

    Minimizing losses involves improved storage facilities, proper drying, safe natural preservatives, and regular monitoring of stored products.

14. Prepare a one-day meal plan for an elder, considering energy, protein, and micronutrient requirements. Explain your selections.

    Breakfast: Oatmeal with low-fat milk and a few nuts. Provides complex carbohydrates for energy, protein for muscle maintenance, and minerals like calcium.

    Lunch: Grilled fish, brown rice, and steamed vegetables. Fish supplies lean protein and omega-3 fatty acids, rice gives sustained energy, and vegetables provide fiber, vitamins, and antioxidants.

    Snack: Low-fat yogurt with berries. Adds protein, probiotics, and antioxidants.

    Dinner: Chicken and vegetable salad with olive oil dressing. Chicken provides protein, vegetables contribute fiber and vitamins, and olive oil supplies healthy fats.

15. Discuss methods of food fortification and preservation. Explain the role of chemical preservatives and suggest one natural alternative.

    Food fortification involves adding essential nutrients like vitamins and minerals to foods, e.g., iron in wheat flour or iodine in salt, to prevent deficiencies.

Food preservation extends shelf life through methods such as drying, freezing, and canning.

Chemical preservatives inhibit microbial growth, maintaining safety and shelf life, but may leave residues and pose health risks.

Natural alternative: Using neem oil or ash can protect stored grains from pests without chemical residues, though it may require more frequent application and careful handling.