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 : 2010**

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 state two functions of dietary fiber in the human body.

   Food composition refers to the analysis and description of the nutrients and other components present in food, including proteins, carbohydrates, fats, vitamins, minerals, water, and fiber. It helps in understanding the nutritional value of food items and planning diets for health.

   Dietary fiber aids digestion by adding bulk to the stool, which helps prevent constipation and promotes regular bowel movements.

   Dietary fiber also helps control blood cholesterol levels, reducing the risk of cardiovascular diseases by binding cholesterol in the digestive system and promoting its excretion.

2. Differentiate between saturated and unsaturated fats.

   Saturated fats are fats in which all carbon atoms are fully bonded with hydrogen atoms, have no double bonds, and are usually solid at room temperature. Examples include butter and lard.

   Unsaturated fats contain one or more double bonds between carbon atoms, are usually liquid at room temperature, and are considered healthier for the heart. Examples include olive oil and sunflower oil.

3. Explain the difference between chronic and transitory food insecurity and give two factors that contribute to food insecurity.

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

   Transitory food insecurity is a short-term or temporary food shortage caused by sudden events such as natural disasters, conflicts, or market disruptions.

   Factors contributing to food insecurity include climate change, which affects crop production, and poverty, which limits access to adequate food.

4. (a) Define food fortification.

Food fortification is the deliberate addition of essential vitamins and minerals to foods to enhance their nutritional value and prevent nutrient deficiencies in populations.

(b) Mention two foods commonly fortified in Tanzania and the nutrients added.

Salt is commonly fortified with iodine to prevent goiter.

Wheat flour is commonly fortified with iron and folic acid to prevent anemia and promote healthy growth.

5. Distinguish between chemical, physical, and biological raising agents in baking.

Chemical raising agents produce gas through chemical reactions to make dough rise; examples include baking powder and baking soda.

Physical raising agents rely on mechanical methods to incorporate air or steam into dough, such as whisking or using steam in puff pastry.

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

6. Explain the role of yeast in bread making and state one function of salt in baking.

Yeast acts as a biological raising agent by fermenting sugars in the dough, producing carbon dioxide gas, which makes the bread rise and creates a light, porous texture.

Salt strengthens the dough structure, regulates yeast activity, and enhances flavor.

7. Describe three factors that influence basal metabolic rate (BMR).

Age influences BMR; younger people have higher BMR due to greater growth and energy needs.

Body composition affects BMR; individuals with more muscle mass burn more calories at rest compared to those with higher fat content.

Hormonal activity, particularly thyroid hormones, regulates BMR; higher hormone levels increase energy expenditure.

8. State two natural compounds used to protect grains against pests and mention two health hazards of improper pesticide use.

Neem oil and garlic extracts are natural compounds used to protect grains from insect infestations.

Improper pesticide use can cause poisoning and damage to the liver and kidneys.

It can also lead to environmental contamination and accumulation of toxic residues in food.

9. Define wet milling and outline the effect of drying on food quality.

Wet milling is the process of grinding grains or other food materials in water to separate components such as starch, protein, and fiber for further processing.

Drying reduces moisture content, which prevents microbial growth and prolongs shelf life; however, excessive drying may lead to nutrient loss, texture changes, and reduced flavor.

10. Differentiate between food safety and food quality.

Food safety refers to practices and conditions that prevent food from causing harm to consumers, including hygiene, handling, and storage to avoid contamination.

Food quality relates to the attributes of food that make it desirable to consumers, such as taste, texture, appearance, and nutritional content.

SECTION B (60 Marks)

Answer only three questions from this section

11. A farmer mixes 10 liters of milk with 4% fat with 20 liters of milk with 2% fat. Calculate the fat percentage of the resulting mixture and explain the nutritional significance of such blending.

The total fat in the first milk: $10 \times 4\% = 0.4$ liters.

The total fat in the second milk: 20 × 2% = 0.4 liters.

Total fat in the mixture = 0.4 + 0.4 = 0.8 liters.

Total volume of the mixture = 10 + 20 = 30 liters.

Fat percentage of the mixture = (0.8 ÷ 30) × 100 = 2.67%.

Nutritional significance: Blending milk with different fat contents allows control of fat intake, meeting dietary needs while ensuring sufficient energy, and reduces the risk of overconsumption of saturated fats.

12. Discuss the concept of bioavailability of minerals and explain the effect of antivitamins on nutrient absorption, providing examples.

Bioavailability of minerals refers to the proportion of a mineral that is absorbed and utilized by the body after consumption.

Factors affecting bioavailability include the presence of enhancers like vitamin C for iron, and inhibitors such as phytates and oxalates that reduce absorption.

Antivitamins or anti-nutrients interfere with nutrient absorption; for example, tannins in tea reduce iron absorption, and oxalates in spinach bind calcium, limiting its availability.

Understanding bioavailability helps improve nutrition through diet planning, combining foods to maximize nutrient absorption.

13. Describe traditional methods of storing grains and fish. Explain the post-harvest losses that occur due to poor storage in tropical regions and suggest measures to minimize these losses.

Traditional grain storage methods include using granaries, woven baskets, and clay pots, often with natural pest deterrents like neem leaves.

Traditional fish storage involves drying, smoking, and salting to extend shelf life.

Post-harvest losses due to poor storage include insect infestation, mold growth, spoilage from moisture, and nutrient loss.

To minimize losses, use improved storage structures with ventilation, maintain low moisture content, apply safe natural or chemical preservatives, and train farmers in proper handling techniques.

14. Prepare a one-day meal plan suitable for an elder with diabetes. Justify your choices in terms of nutrient content, energy requirements, and health benefits.

Breakfast: Oatmeal with skimmed milk and a handful of nuts.

Oatmeal provides complex carbohydrates for slow glucose release, milk adds protein and calcium, and nuts offer healthy fats to support heart health.

Lunch: Grilled fish, steamed vegetables, and a small portion of brown rice.

Fish provides high-quality protein and omega-3 fatty acids for heart health, vegetables offer fiber and vitamins to regulate blood sugar, and brown rice supplies complex carbohydrates.

Snack: Low-fat yogurt with berries.

Yogurt provides probiotics for gut health and protein, while berries add fiber and antioxidants.

Dinner: Chicken salad with leafy greens, tomatoes, cucumber, and olive oil dressing.

Chicken provides lean protein, vegetables provide fiber and micronutrients, and olive oil offers healthy fats to support cardiovascular health.

15. Discuss food fortification and preservation methods. Explain the role of chemical preservatives in foods and provide examples. Suggest one natural alternative to chemical preservatives for controlling pests.

Food fortification is adding essential nutrients to foods, such as iron to wheat flour or iodine to salt, to prevent deficiencies in populations.

Food preservation methods include drying, freezing, canning, salting, fermentation, and vacuum packaging to extend shelf life and prevent spoilage.

Chemical preservatives inhibit microbial growth and maintain food safety; examples include sodium benzoate in soft drinks and potassium sorbate in baked goods.

A natural alternative to chemical preservatives for controlling pests is neem oil, which acts as an insect repellent and reduces spoilage in stored grains.