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 : 2012**

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 explain two types found in foods.

Carbohydrates are organic compounds made up of carbon, hydrogen, and oxygen, and they serve as the main source of energy for the body.

The two types of carbohydrates found in foods are:

- **Simple carbohydrates**: These are sugars that are easily digested and provide quick energy, such as glucose, fructose, and sucrose found in fruits, honey, and sugar.

- **Complex carbohydrates**: These are long chains of sugar molecules that provide sustained energy and include starches and fiber, found in cereals, legumes, and vegetables.

2. Explain three factors that influence basal metabolic rate (BMR).

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

Body composition: People with higher muscle mass have a higher BMR because muscle tissue requires more energy to maintain than fat tissue.

Hormonal activity: Thyroid hormones significantly influence BMR; higher hormone levels increase energy expenditure, while low levels decrease it.

3. State two advantages and two disadvantages of traditional grain storage.

Advantages:

It is cost-effective since it uses locally available materials like granaries, clay pots, and woven baskets.

It allows storage of grains without the need for electricity or complex technology.

Disadvantages:

It is prone to pest infestation and mold growth due to uncontrolled environmental conditions.

Nutritional quality may degrade over time because of exposure to moisture, heat, and insects.

4. 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, land degradation, or long-term unemployment.

Transitory food insecurity is temporary and occurs due to sudden events such as droughts, floods, conflicts, or market disruptions, which reduce access to food for a short period.

5. (a) List three methods of food preservation.

Drying, freezing, and canning.

(b) State one benefit of each method.

Drying reduces moisture content and prevents microbial growth, extending shelf life.

Freezing slows down microbial activity and enzyme reactions, keeping food fresh for longer.

Canning seals food in airtight containers, preventing spoilage and maintaining safety for long-term storage.

6. Explain the role of yeast in bread making.

Yeast acts as a biological raising agent by fermenting sugars in the dough, producing carbon dioxide gas. This gas gets trapped in the dough structure, causing it to rise and resulting in soft, porous, and well-textured bread.

7. Mention two health hazards associated with improper use of pesticides.

Pesticide misuse can cause acute poisoning in humans, leading to symptoms such as nausea, headaches, and respiratory problems.

It can also result in long-term health effects, including liver and kidney damage, hormonal disruptions, or even cancer.

8. Describe two stages of food processing and explain one of them.

Primary processing: This involves the initial preparation of raw food materials, such as cleaning, sorting, milling grains, or pasteurizing milk.

Secondary processing: This stage transforms raw foods into products suitable for consumption, such as baking bread, making jams, or producing cheese.

Explanation of primary processing: It ensures that the food is safe, clean, and of uniform quality before further processing, which helps maintain nutritional value and prevents contamination.

9. Define food fortification and give one example of a fortified cereal.

Food fortification is the addition of essential vitamins and minerals to foods to improve their nutritional value and prevent deficiencies.

An example of a fortified cereal is wheat flour enriched with iron and folic acid.

10. Explain the effect of dietary fiber on human digestion.

Dietary fiber aids digestion by adding bulk to stool, which facilitates bowel movements and prevents constipation.

It also slows down the absorption of sugars, helping regulate blood glucose levels and reducing the risk of diabetes and heart disease.

SECTION B (60 Marks)

Answer only three questions from this section

11. A household mixes 12 liters of milk with 2.5% fat with 18 liters of milk with 4% fat. Calculate the fat percentage of the mixture and explain its nutritional importance.

Total fat in 12 liters of 2.5% milk = 12 × 0.025 = 0.3 liters.

Total fat in 18 liters of 4% milk = 18 × 0.04 = 0.72 liters.

Total fat in the mixture = 0.3 + 0.72 = 1.02 liters.

Total volume = 12 + 18 = 30 liters.

Fat percentage of mixture = (1.02 ÷ 30) × 100 = 3.4%.

Nutritional importance: The blended milk provides moderate fat, supplying energy and essential fatty acids while reducing the risk of excessive saturated fat intake, which is important for cardiovascular health.

12. Discuss the bioavailability of iron and calcium in foods. Explain the effect of antinutritional factors on their absorption.

Bioavailability refers to the proportion of a nutrient that is absorbed and used by the body.

Iron bioavailability can be enhanced by vitamin C but inhibited by phytates, tannins, and oxalates found in cereals, tea, and spinach.

Calcium absorption can be reduced by oxalates in spinach and phytates in grains.

Understanding these factors helps in planning meals that maximize mineral absorption and prevent deficiencies.

13. Describe traditional preservation methods of grains and fish. Explain common post-harvest losses and ways to reduce them in tropical regions.

Traditional grain preservation methods include storing in granaries, clay pots, and woven baskets, often using natural pest repellents like neem leaves.

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

Common post-harvest losses include insect infestation, mold growth, spoilage due to moisture, and loss of nutrients.

To reduce losses, farmers can use improved storage structures, maintain low moisture content, apply safe natural preservatives, and practice proper handling and hygiene.

14. Design a one-day meal plan suitable for an elder with diabetes. Justify your food choices in terms of energy, protein, and micronutrient content.

Breakfast: Oatmeal with low-fat milk and a handful of nuts. Oatmeal provides complex carbohydrates for steady glucose release, milk offers protein and calcium, and nuts supply healthy fats.

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

Snack: Low-fat yogurt with berries. Yogurt provides protein and probiotics, while berries add fiber and antioxidants.

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

15. Explain chemical and natural methods of controlling pests in stored foods. Discuss the advantages and disadvantages of each method.

Chemical methods use synthetic pesticides to control pests. Advantages: highly effective and fast-acting. Disadvantages: can leave toxic residues, may cause health hazards, and contribute to environmental pollution.

Natural methods include using neem oil, garlic extracts, or ash to repel pests. Advantages: safe for human health and environment, no chemical residues. Disadvantages: may be less effective than chemicals and require frequent application.