

**THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL OF TANZANIA
ADVANCED CERTIFICATE OF SECONDARY EDUCATION
EXAMINATION**

155/1

FOOD AND HUMAN NUTRITION 1

(For Both School and Private Candidates)

Time: 3 Hours

ANSWERS

Friday, 10th May 2019 a.m

Instructions

1. This paper consists of sections **A** and **B**.
2. Answer **all** questions in section **A** and only **Three (3)** questions from section **B**.
3. Cellular phones and any unauthorised materials are **not** allowed in the examination room.
4. Write your **examination Number** on every page of your answer booklet(s).

maktaba.tetea.org



1. (a) Briefly describe three temporary grain storage methods commonly used by Tanzanian villagers.

Using granaries made of mud and sticks is a common method where grains are stored in small, raised, ventilated structures built using local materials. These granaries are elevated to protect grains from pests, moisture, and animals.

Storing grains in sacks or bags is another method where villagers pack dried grains into woven bags, usually made of sisal or synthetic material. These bags are then kept in the corner of a house or storage room.

Hanging grains in bunches, especially maize cobs, is practiced by tying them in groups and hanging them under house roofs or tree shades. This allows proper air circulation and protects the grains from moisture and some pests.

- (b) Give four disadvantages of an underground food grain storage method.

Underground storage can lead to moisture accumulation, which encourages the growth of molds and fungi, spoiling the grains.

It makes it difficult to monitor the condition of stored grains, leading to unnoticed pest infestations that can cause heavy losses.

The grains are at risk of contamination from soil-borne organisms, which can affect food safety and quality.

Excavating grains for use is laborious and inconvenient, especially during rainy seasons when the soil becomes wet and unstable.

2. (a) Draw a diagram of a cross section of wheat grain and label its nutritive parts.

- Outer layer: Bran
- Middle layer: Endosperm
- Inner part: Germ

- (b) State the location and nutrient composition of each part of wheat grain labeled in part (a).

The bran is the outer layer of the wheat grain. It is rich in dietary fiber, B vitamins, minerals, and antioxidants, which aid digestion and provide important nutrients.

The endosperm is the large middle section of the wheat grain. It primarily contains starch, proteins, and small amounts of vitamins and minerals, serving as the main energy reserve.

The germ is the small inner part of the grain. It contains healthy fats, B vitamins, vitamin E, proteins, and minerals, contributing to the growth of the seed and nutritional value.

3. Briefly explain eight factors to consider when planning family meals.

The number of family members should be considered to ensure that meals are prepared in quantities that satisfy everyone without wastage or shortages.

The age of each family member matters because nutritional needs vary with age. Children, adults, and the elderly require different amounts and types of nutrients.

The health status of family members should be considered, especially for those with special dietary requirements such as diabetics, hypertensive individuals, or pregnant women.



The occupation of family members affects meal planning because physically active people need more energy-giving foods compared to those with sedentary jobs.

The availability of foods locally influences meal planning, as it is easier and cheaper to use seasonal and accessible food items.

Cultural and religious beliefs should be respected when planning meals, avoiding prohibited foods and observing dietary customs.

Income level of the family affects meal choices, as higher-income households have a wider variety of food options compared to low-income families, who may rely on cheaper, staple foods.

Time available for food preparation influences meal planning. Busy families may prefer meals that are quicker to prepare, while others may have the time for more elaborate dishes.

4. (a) (i) State two determinants of the choice of a raising agent to be used and give one example of a product and raising agent used in each case.

The type of food product being prepared determines the raising agent. For example, bread requires yeast for fermentation to create a soft, airy texture.

The method of cooking also influences the choice. For instance, sponge cakes use baking powder as a raising agent because it releases gas quickly during baking.

- (ii) State what will happen if a filler material is not added to the baking powder during baking by giving two points.

If a filler material is not added, the baking powder would be too concentrated, causing an excessive and rapid release of gas, which may result in uneven rising or collapse of the baked product.

It could also leave an unpleasant, bitter aftertaste in the final product because of the unbalanced concentration of alkaline and acidic components.

- (b) Briefly explain how physical raising agent brings about its effect in raising the dough.

A physical raising agent like air is introduced into the mixture through beating, creaming, or whisking. During baking, the trapped air expands due to heat, causing the dough to rise and become light in texture.

5. (a) Outline four properties of vitamin A.

Vitamin A is fat-soluble, meaning it dissolves in fats and oils and is stored in the body's fatty tissues and liver.

It is heat stable in moderate cooking temperatures but can be destroyed by prolonged exposure to heat and light.

Vitamin A occurs in two forms: preformed vitamin A (retinol) found in animal sources and provitamin A (carotenoids) found in plant sources.

It is essential for vision, especially in dim light, and is responsible for maintaining the health of skin and mucous membranes.

- (b) State three functions of vitamin A in the body.

Vitamin A is essential for maintaining good vision, particularly for seeing in low-light conditions by aiding the function of the retina.



It supports the growth and repair of body tissues, promoting healthy skin, hair, and mucous membranes.

Vitamin A strengthens the immune system by protecting the body against infections and ensuring proper functioning of immune cells.

(c) Briefly explain three factors which influence the absorption of vitamin A in the body.

The presence of dietary fat enhances the absorption of vitamin A because it is a fat-soluble vitamin and requires fats for transport through the intestinal wall.

The overall health of the digestive system influences absorption. Conditions like diarrhea, liver disease, or intestinal infections can reduce the body's ability to absorb vitamin A.

The form in which vitamin A is consumed affects its absorption. Preformed vitamin A from animal products is absorbed more efficiently than provitamin A from plant sources, which must first be converted into the active form.

6. "Food fortification is an important practice to improve the micronutrient intake of intended individuals." Support this statement by:

(a) Explaining how cereal flour and common salt are fortified.

Cereal flour is fortified by adding specific vitamins and minerals during the milling or mixing process. Micronutrients like iron, folic acid, and vitamin B₁₂ are mixed into the flour to address nutritional deficiencies in the population. This is done using premixes of the nutrients, carefully blended to ensure even distribution without affecting the taste or appearance of the flour.

Common salt is fortified by adding iodine compounds such as potassium iodate or potassium iodide. The iodine is either sprayed onto the salt during the drying stage or mixed with dry salt granules before packaging. This helps prevent iodine deficiency disorders, including goiter and mental impairment.

(b) Explaining seven necessary conditions for a successful food fortification.

The fortified food must be widely consumed by the target population so that most people regularly receive the added nutrients through their normal diet.

The added micronutrients should be stable in the food vehicle under normal storage and cooking conditions, maintaining their effectiveness without breaking down.

The fortified food should remain acceptable in terms of taste, color, texture, and appearance, to avoid rejection by consumers.

The cost of fortification should be affordable for both producers and consumers, ensuring that fortified products remain accessible to all, including low-income families.

The fortification process must be technically feasible using available equipment, materials, and skills without requiring overly complex technology.

There should be strong government regulation and quality control systems in place to ensure that fortification is done properly and consistently.

Public awareness and education programs are necessary so that consumers understand the importance of fortified foods and willingly include them in their diets.



7. Explain nine actions to be taken by any government in order to improve food security at household level.

Investing in agricultural infrastructure such as irrigation systems, storage facilities, and rural roads ensures increased food production and easier access to markets.

Providing farmers with improved seeds, fertilizers, and farming tools boosts productivity and ensures reliable food supplies for households.

Supporting agricultural research and extension services equips farmers with modern farming knowledge and techniques for sustainable food production.

Implementing policies that stabilize food prices and prevent market fluctuations protects low-income households from food shortages and price shocks.

Encouraging food diversification by promoting the production of a variety of crops and livestock improves nutrition and food availability throughout the year.

Creating reliable food storage and preservation systems reduces post-harvest losses and ensures food availability during off-seasons.

Providing affordable agricultural loans and subsidies enables small-scale farmers to invest in inputs and expand food production.

Promoting nutrition education and awareness helps families make informed food choices and manage household food resources more effectively.

Establishing social protection programs like food aid, school feeding, and cash transfers supports vulnerable groups in times of food insecurity.

8. Describe nine factors that affect nutritional value of foodstuffs.

The type and variety of food determine its nutrient composition, as different foods naturally contain varying amounts of proteins, vitamins, minerals, and other nutrients.

The freshness of food affects its nutritional quality because nutrients degrade over time, especially in perishable items like fruits, vegetables, and dairy products.

The method of food processing can reduce or enhance nutritional value. For instance, milling removes fiber and some vitamins, while fortification can add missing nutrients.

Cooking methods influence nutrient retention. Overcooking, deep-frying, or prolonged boiling can destroy heat-sensitive vitamins like vitamin C and some B vitamins.

The presence of food additives such as preservatives and colorings may affect nutrient availability or create undesirable health effects if used in excess.

Storage conditions like temperature, humidity, and exposure to light can lead to nutrient losses, particularly of fats, vitamins, and some minerals.

The soil quality where crops are grown affects their nutrient content. Poor soils lacking essential minerals lead to nutrient-poor food crops.

Contamination by chemicals, pests, or microorganisms during handling and storage reduces food safety and nutritional quality, leading to health risks.



Food combinations during meal preparation influence nutrient absorption. For example, combining vitamin C-rich foods with plant-based iron enhances iron absorption.

9. "Fish are highly perishable food items which need immediate preservation so as to prevent spoilage." Support the statement by:

(a) Explaining three reasons for the rapid spoilage of fish.

Fish has high moisture content, which creates a favorable environment for the growth of spoilage-causing bacteria and molds.

Fish flesh contains high amounts of protein and non-protein nitrogen compounds, which break down quickly after death, releasing bad odors and toxins.

Fish lacks a protective covering like a thick skin or shell, making it highly susceptible to mechanical damage and contamination from the environment.

(b) Explaining four traditional methods of preserving fish.

Sun drying involves exposing fish to direct sunlight for several days to reduce moisture content, inhibiting microbial growth and spoilage.

Smoking involves exposing fish to smoke from burning wood or charcoal. The heat dries the fish while smoke chemicals act as preservatives.

Salting involves rubbing fish with dry salt or soaking it in saltwater. Salt draws out moisture and creates an environment unsuitable for microbial growth.

Fermentation involves allowing fish to undergo controlled microbial action under specific conditions. This process develops unique flavors and preserves the fish for extended storage.

10. Describe seven major problems facing the storage of non-perishable foods.

Pest infestation by rodents, insects, and weevils can damage stored grains, seeds, and legumes, reducing quantity and contaminating the food.

Moisture absorption from the environment leads to mold growth and spoilage in foods like flour, cereals, and dried legumes.

Poor storage facilities expose non-perishable foods to environmental hazards like dust, rain, and direct sunlight, affecting their quality and safety.

Temperature fluctuations in storage areas can lead to condensation and spoilage of packaged food products.

Contamination from chemicals, pesticides, and cleaning agents stored nearby poses health risks when food absorbs harmful substances.

Lack of proper packaging leaves foods vulnerable to contamination, spoilage, and nutrient loss during storage and transportation.

Poor inventory management causes food to remain too long in storage, leading to expiration, spoilage, and unnecessary waste.

