

**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

Thursday, 10th May 2018 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).

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1. (a) Differentiate between saturated fats and unsaturated fats.

Saturated fats are types of fats in which all the carbon atoms in the fatty acid chains are connected by single bonds. This makes the fat molecules straight and able to pack closely together, making them solid at room temperature. These fats are commonly found in animal products like butter, lard, and fatty cuts of meat, as well as some tropical oils such as coconut oil.

Unsaturated fats are types of fats where one or more pairs of carbon atoms in the fatty acid chains are connected by double bonds. These double bonds cause the molecules to bend, preventing them from packing closely together, which makes them liquid at room temperature. Unsaturated fats are commonly found in plant oils like olive oil, sunflower oil, and in foods such as avocados and nuts.

(b) Identify the three major groups of carbohydrates basing on their chemical structures and give one example in each group.

Monosaccharides are the simplest form of carbohydrates that consist of a single sugar unit. They are easily absorbed by the body and provide a quick source of energy. An example of a monosaccharide is glucose.

Disaccharides are carbohydrates made up of two monosaccharide molecules joined together by a glycosidic bond. They must be broken down into monosaccharides before absorption. An example of a disaccharide is sucrose.

Polysaccharides are complex carbohydrates formed by the combination of many monosaccharide units joined together in long chains. They serve as energy storage or structural components in plants and animals. An example of a polysaccharide is starch.

2. Explain briefly four factors which affect Basal Metabolic Rates.

Age is an important factor that affects Basal Metabolic Rate (BMR). In young people, the BMR is higher because the body requires more energy for growth and development. As people age, their BMR decreases due to a reduction in lean body mass and physical activity levels.

Body size and composition influence BMR significantly. People with larger bodies or more muscle mass have higher BMRs because muscle tissue burns more calories at rest compared to fat tissue. Therefore, a person with more muscle mass uses more energy, even while resting.

Gender affects BMR because men generally have a higher proportion of muscle mass compared to women, resulting in a higher metabolic rate. This means men typically burn more calories at rest than women of the same age and weight.

Hormonal balance, particularly the levels of thyroid hormones, affects BMR. An overactive thyroid (hyperthyroidism) increases BMR, causing the body to use more energy, while an underactive thyroid (hypothyroidism) reduces BMR, leading to slower metabolism and possible weight gain.

3. (a) Define the term food security.

Food security is a situation where all people, at all times, 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) Identify three essential requirements of household food security.

Availability of food is essential in ensuring household food security. It means having adequate quantities of food consistently available to household members either through production, purchase, or aid.



Accessibility to food ensures that all members of the household can obtain the available food easily without discrimination or limitation caused by financial, physical, or social barriers.

Utilization of food involves proper preparation, storage, and consumption practices to ensure that the food eaten is safe, nutritious, and provides the necessary nutrients needed for good health.

(c) Describe briefly four factors that influence the availability of sufficient food to all household members.

Agricultural productivity directly affects food availability. Households that practice efficient farming methods and achieve higher crop yields will have more food for consumption and storage.

Income levels within the household determine the ability to purchase food. Households with higher incomes are better able to afford a variety of foods in sufficient amounts compared to poorer households.

Infrastructure such as good roads and market facilities improves food distribution and access, ensuring that even remote areas receive adequate supplies of food throughout the year.

Weather conditions like droughts, floods, and unpredictable rainfall patterns influence food production. Unfavorable weather can lead to crop failures and reduced food availability, causing hunger and malnutrition.

4. Describe briefly the importance of the followings in bread making.

Wheat flour is the primary ingredient in bread making as it provides the structure and body of the bread. It contains gluten-forming proteins that, when mixed with liquid, form a network that traps air and allows the bread to rise.

Fresh yeast is important because it produces carbon dioxide gas during fermentation. This gas gets trapped within the dough's gluten structure, causing the dough to rise and giving the bread a light and airy texture.

Warm liquid, such as water or milk, is essential in activating the yeast, initiating fermentation, and combining the ingredients. It also softens the gluten, making the dough elastic and easier to knead.

Table salt is added to improve the flavor of the bread. It also strengthens the gluten structure and controls the rate of yeast fermentation, preventing the dough from rising too quickly and affecting the final texture.

5. Describe briefly eight factors which influence the choice of food we eat.

Cultural and religious beliefs play a significant role in food choices. Certain communities have traditional or religious rules that dictate what foods can or cannot be eaten, such as the avoidance of pork in Islam or beef in Hinduism.

Availability of food in a particular region influences what people eat. People tend to consume foods that are readily available and grown locally because they are often fresher and more affordable.

Economic factors affect food choices because individuals and families will usually buy foods they can afford. People with higher incomes can access a wider variety of foods, while those with limited incomes often choose cheaper, staple foods.

Health conditions and nutritional needs guide food choices, especially for people with special dietary requirements such as diabetics avoiding sugary foods or individuals managing obesity choosing low-fat foods.

Personal preferences and tastes influence the selection of foods people enjoy eating. People are more likely to choose foods that they find appealing in flavor, texture, and appearance.



Advertising and media affect food choices by promoting certain products and creating trends in eating habits, especially among young people who are easily influenced by commercials and social media.

Convenience and ease of preparation often determine food choices, especially for busy people. Quick-to-prepare, ready-to-eat, or processed foods are commonly chosen for their convenience.

Social influences such as family, friends, and social gatherings affect eating habits. People tend to eat what others in their household or social circle are eating, or what is served during celebrations and events.

6. “Air and carbon dioxide gas are leavening agents that should be introduced into the flour mixture before baking”. Elaborate this statement by describing:

(a) Five ways of introducing air into a flour mixture.

Sifting is a method where flour is passed through a sieve or sifter. This process helps to break up lumps and incorporate air into the flour, making it lighter and improving the texture of baked goods.

Beating involves vigorously mixing ingredients like eggs and sugar to trap air into the mixture. The trapped air expands when heated during baking, causing the mixture to rise and become light.

Creaming is done by mixing fat (like butter) and sugar together until the mixture becomes light and fluffy. This process introduces air bubbles into the mixture, which expand during baking to leaven the product.

Folding is a gentle mixing technique where air-filled mixtures such as beaten egg whites or whipped cream are carefully combined with other ingredients to retain the incorporated air, which helps to leaven the final product.

Whisking involves rapidly mixing ingredients like egg whites or cream with a whisk or beater to create a foam filled with tiny air bubbles. These bubbles expand in the heat of the oven, making the mixture rise.

(b) Three chemical ways of introducing carbon dioxide gas into the flour mixture.

Baking powder is a chemical leavening agent made of an acid and an alkali. When it is mixed with liquid and heated, it produces carbon dioxide gas, which causes the flour mixture to rise and become light.

Baking soda (sodium bicarbonate) is another chemical leavening agent that requires an acidic ingredient such as lemon juice, yogurt, or vinegar. When combined, it produces carbon dioxide gas, leavening the mixture.

Using acid and an alkali together, such as cream of tartar with baking soda, also introduces carbon dioxide gas. The reaction occurs when the mixture is moistened and heated, causing gas bubbles to form and expand in the dough or batter.

(c) One biological way of introducing carbon dioxide gas into the flour mixture.

The biological method involves using yeast, a living microorganism that ferments sugars present in the flour mixture. During fermentation, yeast produces carbon dioxide gas, which gets trapped in the gluten network, causing the dough to rise and become airy.

7. Describe six natural compounds used to protect food grains against pest infestations and state the effect of each compound to the food grain pests.

Neem leaves contain natural insecticidal compounds such as azadirachtin, which act as repellents and insect growth inhibitors. When mixed with stored grains, neem leaves deter pests from infesting the grains and can disrupt their reproductive cycle.



Pepper powder has a pungent odor and taste that acts as an irritant and repellent to grain pests. Sprinkling pepper powder among stored grains discourages pests like weevils from feeding and laying eggs on the grains.

Ash is commonly used in traditional grain storage. It creates an unfavorable environment for pests by suffocating them and blocking their breathing pores. Ash also acts as a physical barrier, preventing pests from reaching the grains.

Sand works by mechanically damaging the outer skin of pests when they move through it. This causes dehydration and death to the pests, effectively controlling their population in stored grains.

Lime powder (calcium oxide) creates an alkaline environment that is toxic to many grain pests. It dries out the pests' bodies and prevents them from surviving in the stored grain environment.

Dried chili pods have a strong smell and produce chemical irritants like capsaicin. When placed in storage containers, they repel pests and prevent them from infesting the grains due to the irritating effect on their sensory organs.

8. "The quality of a milled product is determined by the characteristics of the milled seeds". Support this statement by explaining:

(a) Six factors to consider before milling grains.

Moisture content of the grains should be checked because grains with too much moisture can clog milling equipment and lead to poor-quality flour. Dry grains are easier to grind and produce finer, consistent products.

Cleanliness of the grains is important to avoid contamination. Dirty grains with stones, dust, or chaff can damage machinery and lower the quality and safety of the final product.

Size and uniformity of the grains influence the milling process. Uniformly sized grains mill evenly, producing flour of consistent texture and quality, while mixed sizes can lead to uneven milling.

Grain hardness affects the type of flour produced. Hard grains are usually milled into coarse flours, while soft grains produce finer flours. The hardness also determines the amount of energy required for milling.

Color of the grains indicates their maturity and quality. Bright, natural-colored grains produce better-quality flour, while discolored or moldy grains may result in poor-quality, off-flavored, or unsafe products.

The presence of foreign odors in grains is a sign of spoilage or contamination. Grains should have a fresh, neutral smell. Any off-odors can be transferred to the flour, affecting its acceptability and safety.

(b) The four steps of wet milling process.

Cleaning is the first step where grains are thoroughly cleaned to remove dirt, stones, chaff, and other foreign materials. This ensures only clean grains proceed to the next stage.

Soaking involves immersing the grains in water for a certain period to soften them, making it easier to separate components like starch, protein, and fiber during milling.

Grinding is the process of crushing the soaked grains into a paste using milling equipment. This helps to release the starch and other components from the grain structure.

Separation and drying is the final step where the paste is sieved to separate starch, fiber, and other parts. The starch and other useful components are then dried for storage or further processing.



9. Support the statement, “The handling procedures in food processing convert the food into consumable form”, by:

(a) Describing the three stages of handling food in food processing.

Pre-processing handling involves activities performed before actual processing. This includes harvesting, sorting, grading, cleaning, and storage of raw food materials to maintain their quality and prepare them for processing.

Processing handling includes the main operations that convert raw materials into consumable forms. These activities include milling, fermenting, drying, roasting, cooking, or preserving the food depending on the intended final product.

Post-processing handling involves activities done after processing to maintain the food’s quality and safety. These include packaging, labeling, storage, and distribution of the processed food to consumers or markets.

(b) Six effects of drying food grains on their quality.

Drying reduces the moisture content of grains, which prevents the growth of mold, bacteria, and insects, thereby extending the shelf life of the grains.

Proper drying maintains the color of the grains, preserving their natural appearance and making them more appealing to consumers.

It reduces the weight and bulkiness of grains, making them easier and cheaper to transport and store.

Excessive drying can cause cracking or breaking of grains, reducing their market value and suitability for some processing applications.

Drying helps retain the nutritional value of grains by preventing spoilage, although improper drying at high temperatures may cause the loss of heat-sensitive nutrients like some vitamins.

It improves the storability of grains by preventing fermentation and other biochemical reactions that occur in moist conditions, ensuring long-term quality maintenance.

10. Describe six categories of the primary causes of food losses.

Pre-harvest losses occur before crops are harvested from the field. These can be caused by pests, diseases, poor weather conditions, and poor farm management practices, leading to reduced quantities or damaged crops.

Harvesting losses happen during the harvesting process when food is left in the field, damaged by improper handling, or harvested at the wrong time. Delayed harvesting can lead to over-ripening or spoilage.

Post-harvest handling and storage losses result from poor handling techniques, exposure to pests, and unsuitable storage conditions. These include spoilage due to high moisture, infestation by insects, and fungal contamination.

Processing and packaging losses occur during food processing where improper techniques, poor equipment, and contamination lead to food wastage. Incorrect packaging can cause spoilage, leakage, or damage during transport and storage.

Distribution and marketing losses happen during the transportation and selling of food products. Delays, exposure to heat or rain, lack of cold storage facilities, and rough handling cause spoilage and physical damage.



Consumption losses occur at the consumer level when food is wasted during preparation, serving, or storage. Leftovers that are not preserved properly and excess preparation lead to avoidable food wastage in homes, hotels, and restaurants.

