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

155/1 **FOOD AND HUMAN NUTRITION 1**

(For Both School and Private Candidates)

Time: 3 Hours **ANSWERS** **Year: 2020**

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).

1. (a) Differentiate bicarbonate of soda from baking powder leavening agents.

   Bicarbonate of soda, also known as baking soda, is a single chemical compound (sodium bicarbonate) that requires the presence of an acidic ingredient in a mixture to produce carbon dioxide gas for leavening. Without an acid, it leaves a soapy, bitter taste and incomplete leavening.

   Baking powder is a combination of bicarbonate of soda and a weak acid (such as cream of tartar) along with a filler like starch. It contains both the alkaline and acidic components needed for a reaction, allowing it to release carbon dioxide when moistened and heated, without needing additional acids in the mixture.

   (b) Identify four weak acids that can be used with bicarbonate of soda to neutralize its effect in the mixture.

   Lemon juice, which contains citric acid, is commonly used in recipes to activate bicarbonate of soda and provide flavor.

   Vinegar, which contains acetic acid, reacts effectively with bicarbonate of soda to produce carbon dioxide gas.

   Cream of tartar, containing tartaric acid, is often combined with baking soda in recipes for cakes and pastries.

   Buttermilk, a fermented dairy product containing lactic acid, also reacts well with bicarbonate of soda to help leaven baked goods.

2. (a) You are given a composition of the available raw whole milk and skimmed milk as 4.6 and 0.1 percent butter fat, respectively. Calculate the amount of each of the two types of milk to be blended together to make 350 litres of milk with a butter content of 3.8 percent.

   Let the quantity of raw whole milk be x litres and skimmed milk be (350 - x) litres.

   Using the Pearson's square method:

   (4.6 - 3.8) = 0.8
   (3.8 - 0.1) = 3.7

   Total parts = 0.8 + 3.7 = 4.5 parts

   Whole milk = (3.7 / 4.5) × 350 = 287.78 litres
   Skimmed milk = (0.8 / 4.5) × 350 = 62.22 litres

   Therefore, 287.78 litres of raw whole milk and 62.22 litres of skimmed milk are needed.

   (b) Give two purposes of changing fat content of the starting milk in food processing.

   Adjusting fat content helps to produce different types of dairy products like cream, low-fat milk, and whole milk according to consumer preferences and nutritional requirements.

   It improves the texture, taste, and consistency of processed dairy products such as yogurt, butter, and cheese by achieving the desired fat level for each specific product.

3. (a) Explain how rapid population growth and HIV/AIDS influence food security.

   Rapid population growth increases the demand for food beyond the rate of production, leading to food shortages, higher prices, and strain on agricultural land and resources.

HIV/AIDS reduces the agricultural labor force as infected individuals become too weak to work and productive adults die prematurely, leaving children and the elderly to manage farms, which reduces overall food production and household food security.

(b) Propose seven measures of improving food security in developing countries.

Promoting modern farming techniques and the use of improved seeds, fertilizers, and pest control increases crop yields and food availability.

Investing in irrigation infrastructure helps farmers to produce crops throughout the year and reduces reliance on unpredictable rainfall.

Providing agricultural loans and subsidies allows farmers to afford better tools, seeds, and farming inputs to enhance production.

Strengthening food storage and preservation facilities reduces post-harvest losses and ensures continuous food supply during off-seasons.

Encouraging food diversification through the promotion of various crops and livestock improves nutrition and reduces dependence on single crops.

Enhancing rural roads and transportation networks improves access to markets, reducing food wastage and increasing farmers' incomes.

Implementing social protection programs like school feeding, food aid, and nutrition education improves food access for vulnerable populations.

4. Explain five methods used to control rodents and give one advantage of each method.

Using rodenticides involves placing poisonous substances in rodent-infested areas. The advantage is that it quickly reduces the rodent population.

Setting traps like spring traps or glue boards physically captures and kills rodents. Its advantage is that it can be done safely indoors without chemicals.

Keeping domestic animals like cats helps control rodents naturally. The advantage is that it is a cost-free, continuous rodent control method.

Maintaining cleanliness by removing leftover food, sealing trash, and clearing bushes denies rodents food and hiding places. Its advantage is that it prevents rodent infestations without chemicals.

Blocking rodent entry points by sealing holes and cracks in buildings keeps rodents out. The advantage is that it's a long-lasting, preventive measure.

5. (a) Explain five significances of sugar and starch to our health.

Sugar provides a quick and easily digestible source of energy necessary for daily activities and body functions.

Starch serves as a long-term energy source because it is broken down slowly, providing sustained energy for the body.

Sugar enhances the taste and flavor of foods and beverages, making them more enjoyable to eat.

Starch contributes to satiety by keeping people full for longer periods, reducing frequent snacking.

Both sugar and starch play a role in metabolism as they are converted into glucose, which is essential for brain function and other body processes.

(b) Explain five significances of dietary fibre to our health.

Dietary fibre helps to regulate bowel movements, preventing constipation and promoting a healthy digestive system.

It lowers blood cholesterol levels by binding with cholesterol in the digestive tract and eliminating it from the body.

Fibre slows down the absorption of sugars into the bloodstream, helping to control blood sugar levels and prevent type 2 diabetes.

It aids in weight management by increasing satiety, reducing overall calorie intake, and preventing overeating.

Dietary fibre reduces the risk of certain diseases such as colon cancer, heart disease, and diverticulosis by promoting gut health and lowering harmful cholesterol.

6. (a) Explain three food toxins which interfere with the bioavailability of minerals.

Phytates found in cereals and legumes bind with minerals like iron, zinc, and calcium in the digestive tract, reducing their absorption and availability to the body.

Oxalates present in vegetables like spinach and sweet potatoes form insoluble compounds with calcium and iron, preventing their absorption.

Tannins found in tea, coffee, and some legumes reduce the absorption of iron by forming insoluble complexes in the intestines.

(b) Explain two antivitamins found in our traditional foods.

Avidin is an antivitamin present in raw egg whites that binds to biotin (vitamin B_7) and prevents its absorption, potentially leading to biotin deficiency.

Thiaminase is found in certain raw fish and fermented foods, and it breaks down thiamine (vitamin B_1) in the digestive tract, reducing its availability to the body.

7. (a) Explain seven conditions under which human poisoning can occur during handling and applying pesticides.

Human poisoning can occur when pesticides are handled without wearing protective clothing such as gloves, masks, or goggles, allowing toxic substances to enter through the skin, eyes, or mouth.

Using excessive amounts of pesticides beyond the recommended application rates increases the risk of exposure and poisoning through contact or inhalation.

Accidental spillage of pesticides during mixing, transporting, or application allows chemicals to be absorbed through the skin or inhaled by handlers and nearby people.

Poisoning can occur if pesticides are stored in food containers or drinking bottles, leading to accidental ingestion by humans who mistake them for food or drink.

Handling pesticides in poorly ventilated areas causes toxic fumes to accumulate in the air, increasing the risk of inhaling dangerous concentrations.

Failure to properly wash hands, face, or clothing after handling pesticides leads to the transfer of toxic residues into the mouth, eyes, or onto food surfaces.

Eating, drinking, or smoking while handling or applying pesticides results in direct ingestion of harmful chemicals and increases the risk of poisoning.

(b) Explain three safety standards that should be taken in handling and applying pesticides.

Pesticides should always be stored in their original labeled containers with clear safety instructions and kept away from food, water, and children to avoid accidental poisoning.

Protective clothing such as gloves, masks, aprons, and goggles must be worn during the mixing, handling, and spraying of pesticides to prevent direct contact with skin, eyes, or inhalation.

Pesticides should only be applied under calm weather conditions to prevent drift, and proper equipment should be used and regularly checked for leaks to ensure controlled, safe application.

(c) Explain eight rules to be followed when handling and applying pesticides in order to prevent oral and dermal toxicity to the people.

Pesticides should never be handled with bare hands; appropriate protective gear such as gloves and long-sleeved clothing should always be used.

Eating, drinking, or smoking while handling or applying pesticides must be strictly avoided to prevent accidental ingestion.

Pesticides should not be mixed, handled, or applied near food, water sources, or kitchen areas to avoid contamination.

Spraying should be done when the wind is calm to prevent pesticide drift that could reach unintended areas or people.

Hands and exposed skin must be thoroughly washed with soap and water immediately after handling or applying pesticides.

Pesticide containers should never be reused for storing food, water, or any other household items to avoid fatal accidents.

Empty pesticide containers should be safely buried or burned in a controlled environment, away from human and animal settlements.

Pesticides should only be applied following the recommended dosage and instructions provided on the label to avoid overexposure.

8. (a) Describe six factors which affect the nutrient intake to elders.

Loss of appetite due to age-related physiological changes or medication side effects leads to reduced food intake and nutritional deficiencies.

Dental problems such as missing teeth or gum diseases make it difficult for elders to chew hard or fibrous foods, limiting their diet choices.

Diminished sense of taste and smell reduces food enjoyment, causing elders to lose interest in eating and leading to poor nutrient intake.

Chronic illnesses like diabetes, hypertension, and heart disease often require dietary restrictions that limit the variety and quantity of nutrients consumed.

Physical disabilities or weakness restrict elders' ability to shop for, prepare, or cook meals, reducing the variety and regularity of food intake.

Limited income after retirement reduces the elders' ability to afford a balanced and varied diet, leading to reliance on cheaper, less nutritious food options.

(b) Suggest nine features of the diet of elders to meet their nutritional requirements.

Elders' diets should include easily digestible and soft foods to accommodate dental and digestive limitations.

Meals should be rich in fiber from fruits, vegetables, and whole grains to prevent constipation and support healthy digestion.

The diet should have adequate calcium and vitamin D sources like dairy products and leafy greens to maintain bone strength and prevent osteoporosis.

Foods high in iron, such as lean meats, legumes, and fortified cereals, should be included to prevent anemia.

Meals should be low in saturated fats and cholesterol to reduce the risk of heart diseases, with healthy fats from fish, nuts, and vegetable oils.

Salt intake should be limited to control blood pressure and reduce the risk of hypertension and stroke.

Small, frequent meals should be provided to encourage regular eating and prevent long fasting periods, especially in those with low appetite.

Vitamin-rich foods, particularly those containing vitamins A, C, and E, should be included to boost immunity and delay age-related degeneration.

Plenty of clean drinking water should be made available to prevent dehydration and support overall body function.

9. Describe nine chemical preservatives which can be used in the food and beverage processing industry to prevent microbial growth in the final products.

Sodium benzoate is used in acidic foods like fruit juices, soft drinks, and pickles to inhibit the growth of yeasts, molds, and some bacteria.

Potassium sorbate is widely used in baked goods, dairy products, and beverages to prevent the growth of molds and yeasts.

Sulfur dioxide is used in dried fruits, wines, and fruit juices to prevent discoloration and inhibit bacterial and fungal growth.

Sodium nitrite is added to cured meats to prevent the growth of Clostridium botulinum, which causes botulism, and also preserves color.

Calcium propionate is used in bread and other baked goods to inhibit the growth of molds and extend shelf life.

Sorbic acid is employed in cheese, wines, and yogurt as an effective antifungal preservative to prevent spoilage.

Propionic acid is commonly added to bakery products to control mold and bacterial growth without affecting the taste.

Citric acid acts as both a preservative and flavor enhancer in beverages, jams, and canned foods by lowering the pH and preventing microbial growth.

Acetic acid, the main component of vinegar, is used in sauces and pickles to inhibit the growth of harmful bacteria and extend product shelf life.