THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL

ADVANCED CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

155/3 **FOOD AND HUMAN NUTRITION 3**

(For Both School and Private Candidates)

Time : 3 Hours **ANSWERS** **Year : 2007**

Instructions

1. This paper consists of sections **three (3)** questions
2. Answer all questions
3. Question **one (1)** carries **twenty (20)** marks and question **two (2)** and **three (3)** carries **fifteen (15)** marks each.
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).

1. You are provided with potatoes, water, and iodine solution.

   (a) Cutting a potato into two pieces, boiling one and leaving the other raw, allows comparison. Raw potato turns blue-black with iodine, while boiled potato shows little or no colour change.

   (b) Raw potato contains intact starch granules that form a helical structure with iodine, producing the blue-black colour. Boiling gelatinizes the starch, destroying the helical arrangement and preventing colour formation.

   (c) Mashing 50 g of raw potato with 20 ml of water and heating it produces a thick paste as starch granules swell and gelatinize, absorbing water.

   (d) Raw potato starch gives blue-black colour due to amylose-iodine complex formation. Heating disrupts granule structure, causing gelatinization, which thickens the paste and eliminates the colour change.

2. You are provided with milk, vinegar, and distilled water.

   (a) Adding 10 ml of vinegar to 50 ml of milk causes coagulation, forming white curds.

   (b) Filtering the mixture collects the precipitate (casein), which appears firm and slightly rubbery.

   (c) Washing the casein with distilled water and testing with Biuret reagent produces a violet colour, confirming protein presence.

   (d) Acid lowers the pH of milk, destabilizing casein micelles and causing precipitation. This principle is relevant in cheese production, where controlled acidification or rennet addition coagulates milk proteins.

3. You are provided with fresh banana, lemon juice, and boiling water.

   (a) Slicing the banana and treating the three portions shows: the control browns due to enzymatic oxidation, the portion dipped in lemon juice remains pale, and the boiled portion shows minimal colour change.

   (b) Enzymatic browning occurs as polyphenol oxidase catalyzes oxidation of phenolic compounds to brown pigments.

(c) Browning can be prevented by lowering pH (acid), heating (denaturing enzymes), or reducing oxygen exposure.

(d) Industrial applications include controlling browning in packaged fruits, fruit juices, or canned products to maintain visual appeal and quality.