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)

Duration: 3 Hours **ANSWERS** **Year: 2025**

Instructions

1. This paper consists of sections A and B with a total of **nine (9)** questions.
2. Answer **all** questions in section **A** and choose any **two (2)** questions from section **B.**
3. Section A carries **sixty (60)** marks and section B carries **forty (40)** marks.
4. All writing must be in **black** or **blue** ink.
5. Communication devices and any unauthorised materials are **not** allowed in the examination room.
6. Write your **Examination Number** on every page of your answer booklet(s).

1. Food adequacy can differ from one person to another based on sex, age and physiological status. Identify five components that constitute this concept.

The first component that constitutes food adequacy is quantity. It refers to having enough food to meet the energy requirements of the body depending on one's sex, age and activity level.

The second component is quality. This focuses on the nutritional value of the food, ensuring it provides all essential nutrients such as carbohydrates, proteins, fats, vitamins and minerals in the right proportions.

The third component is safety. It ensures that food consumed is free from harmful substances such as bacteria, toxins or chemical contaminants which could cause illnesses.

The fourth component is accessibility. It involves the ease with which individuals can obtain sufficient and nutritious food at all times, considering economic and physical availability.

The fifth component is utilization. It refers to the body's ability to properly digest and absorb nutrients from food, which depends on health status and hygiene conditions.

2. Propose three foodstuffs with their main nutrient contents that would help to prevent each of the following problems:
   (a) Premature birth
   Consumption of eggs, which are rich in protein and zinc, helps in the development and maintenance of body tissues, reducing the risk of premature birth.
   Intake of leafy green vegetables such as spinach provides folic acid, which supports fetal growth and prevents premature delivery.

Fish such as salmon provides omega-3 fatty acids which support hormonal balance and reduce early labour risk.

(b) Unstoppable bleeding of the mother after giving birth

Eating liver, which is rich in iron, increases blood cell production and reduces bleeding.

Taking citrus fruits such as oranges provides vitamin C that enhances iron absorption and promotes wound healing.

Including leafy vegetables such as kale provides vitamin K which supports blood clotting and prevents excessive bleeding.

(c) Poor development of the brain and nervous system for the infant

Fish such as sardines provides omega-3 fatty acids which are essential for brain and nervous system development.

Eggs supply choline, a nutrient that supports memory and brain growth.

Milk provides vitamin B12 which is vital for healthy nerve function and cognitive development.

(d) Anaemia

Beef provides heme iron which is easily absorbed and prevents iron deficiency anaemia.

Spinach offers non-heme iron along with folate to promote red blood cell formation.

Beans are a good source of iron and protein that enhance haemoglobin production.

3. The manager of Utalii Soft Drink Industry disregards establishing the quality assurance system. If you were to advise him, analyse five benefits of the system you would make him aware of.

The first benefit is that quality assurance ensures consistent product quality by setting production standards and detecting defects before products reach consumers.

The second benefit is that it helps build customer trust and satisfaction since consumers receive safe and reliable products.

The third benefit is cost reduction. It minimizes waste and rework by preventing production errors early in the process.

The fourth benefit is compliance with national and international food safety regulations which protects the company from legal penalties.

The fifth benefit is enhanced company reputation and competitiveness in the market due to reliable product quality and consumer confidence.

4. (a) In the areas where modern storage structures are not available, farmers are recommended to use traditional storage structures to keep their produce safe. Explain the two main types of the traditional storage structures that can be used.

The first type is the granary. It is a raised structure made of mud, reeds, or grass that allows air circulation to prevent grain spoilage.

The second type is the earthen pot. This is made from clay and used to store dry grains like millet or beans, protecting them from pests and moisture.

(b) Large farmers preferred modern to traditional storage structures in storing their food grains. Support this statement using six reasons.

Modern storage structures prevent pest and rodent attacks through the use of sealed and treated materials.

They control temperature and humidity, reducing losses from mould and spoilage.

They allow easy inspection and cleaning which maintains hygiene.

Modern storage structures have larger capacities suitable for bulk storage.

They help maintain the nutritional quality and freshness of stored grains for longer periods.

Lastly, they facilitate mechanized handling which saves time and labour costs.

5. Your neighbour baked sweet rice bread using bakers' yeast. However, the bread did not rise. Analyse two possible causes and two possible solutions for the problem.

One possible cause is that the yeast was dead due to using hot water that killed it. A solution is to ensure the water used for activating yeast is lukewarm.

Another cause is insufficient proofing time which prevents yeast from producing enough carbon dioxide. The solution is to allow adequate rising time in a warm environment before baking.

6. Your ill-looking sister went to hospital where diagnosis revealed that she was suffering from osteomalacia. She then asked for nutritional advice from you:
(a) Explain four kinds of food you would recommend to be consumed.

Milk should be consumed as it provides calcium which strengthens bones. Fish such as sardines or salmon supply vitamin D which enhances calcium absorption. Eggs provide phosphorus and vitamin D necessary for bone health. Green leafy vegetables like spinach give magnesium and calcium that maintain bone structure.

(b) Outline four functions of the minerals obtained from the food suggested in part 6(a).

Calcium supports bone and teeth formation.
Phosphorus aids in energy production and bone mineralization.
Magnesium helps activate enzymes required for bone metabolism.
Vitamin D promotes calcium absorption and bone growth.

(c) Describe the effect of excess consumption of the minerals mentioned in 6(a).

Excess calcium may lead to kidney stone formation.
Too much phosphorus can cause imbalance in calcium levels leading to weak bones.
Excess magnesium can cause diarrhoea and low blood pressure.
Overconsumption of vitamin D may lead to toxicity and hypercalcemia, damaging the kidneys.

7. (a) Describe the following terms as used in energy balance:

(i) Specific Dynamic Action (SDA) refers to the extra energy required by the body to digest, absorb, and metabolize food.

(ii) Basal Metabolic Rate (BMR) is the minimum amount of energy required to maintain basic body functions such as breathing and heartbeat at rest.

(iii) Energy for physical activity is the additional energy required by the body to perform daily movements such as walking, running, or lifting objects.

(b) Use the factorial approach to calculate the total energy expenditure for each person. Compare the energy expenditure by Mcheshi, Mpole and Mkali.

(i) Mcheshi (60 kg)
Energy expenditure = Σ (time × expenditure × body weight)

= (480×1.0833 + 30×2.6667 + 30×2.6667 + 10×4.0000 + 15×2.6667) × 60 ÷ 60

= (520.0 + 80.0 + 80.0 + 40.0 + 40.0)

Total = 760 kcal

(ii) Mpole (65 kg)

= (15×7.000 + 240×2.6667 + 60×1.6667 + 180×2.6667 + 50×2.6667) × 65 ÷ 60

= (105 + 640 + 100 + 480 + 133.3)

Total = 1458.3 kcal

(iii) Mkali (70 kg)

= (120×1.6667 + 120×1.6667 + 30×8.3333 + 60×1.6667 + 10×1.8333) × 70 ÷ 60

= (200 + 200 + 250 + 100 + 30)

Total = 780 kcal

Comparison: Mpole's energy expenditure is highest (1458.3 kcal) due to more active routines, followed by Mkali (780 kcal) and then Mcheshi (760 kcal).

8. Evaluate nine limitations that hinder successful food fortification programme.

Lack of public awareness about fortified foods reduces consumer demand.

High production cost discourages manufacturers from fortifying foods.

Limited technical expertise affects the accuracy of fortification processes.

Inadequate legislation and enforcement fail to ensure compliance.

Poor distribution systems limit access to fortified foods in rural areas.

Corruption in monitoring agencies undermines quality assurance.

Limited availability of fortification premixes makes large-scale production difficult.

Resistance from traditional food processors who fear change.

Unstable power supply affects the operation of fortification machinery.

9. (a) Assume that you are invited by the agricultural officer of Makutano village to educate farmers on spray pesticide formulation. Recommend seven forms of formulations you would present to the farmers.

Emulsifiable concentrates (EC).
Wettable powders (WP).
Dust formulations (D).
Granules (G).
Soluble concentrates (SC).
Flowable suspensions (FS).
Aerosol formulations (A).

(b) Determine the two purposes of pesticide formulation.

To improve the effectiveness of the active ingredient against target pests.
To enhance the safety, handling, and application of the pesticide.