TEVETA

Technical Education, Vocational and Entrepreneurship Training Authority

DIPLOMA IN SCIENCE LABORATORY TECHNOLOGY

LEVEL 6-YEAR III EXAMINATIONS

FINAL INTEGRATED SUMMATIVE EXAMINATIONS

SITTING: NOVEMBER/DECEMBER 2025

SUBJECT: INDUSTRIAL CHEMISTRY (PRACTICAL)

TIME: ONE (1) HOUR THIRTY (30) MINUTES **TOTAL MARKS: 100**

PASS MARK: 50

INSTRUCTIONS TO CANDIDATE

1. Write your Examination Number and National Registration Card (NRC) number on the Marking Guide provided.
2. This paper has One (1) task. Perform the task according to the procedure given.
3. Cellphones and programmable calculators are not allowed in the examination room.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO

TITLE: QUALITY CONTROL TESTING OF SOAP: pH, TOTAL FATTY MATTER (TFM), AND HARDNESS

INTRODUCTION:

Quality control (QC) is a fundamental aspect of industrial operations that ensures products meet predefined standards and customer expectations. It involves systematic procedures for testing, monitoring, and verifying that all processes—from raw material selection to the final product—comply with specific quality requirements. In today's competitive market, maintaining consistent quality is essential for consumer safety, regulatory compliance, cost-effectiveness, and brand reputation.

APPARATUS/ REAGENTS

Materials and Equipment:

Soap sample

pH meter or pH paper

Distilled water

Hot plate

Beakers, conical flask

Analytical balance

Ethanol

Hydrochloric acid (HCl), 0.5N

Phenolphthalein indicator

Sodium hydroxide (NaOH), 0.5N

Titration setup (burette, pipette, stand)

Glass stirring rod

Filter paper

Mortar and pestle

PROCEDURE

A. pH Determination

1. Dissolve 1 g of soap in 100 mL of distilled water.
2. Stir until the soap dissolves completely.
3. Measure the pH using a pH meter or pH paper.
4. Record the result.

B. Total Fatty Matter (TFM) Determination (Titrimetric method)

1. Weigh about **5 g** of grated soap.
2. Dissolve in a mixture of **50 mL hot ethanol** and **20 mL water**.
3. Add a few drops of phenolphthalein.
4. Titrate with **0.5N HCl** until the pink colour disappears.
5. Calculate TFM using the titration result and a standard formula (provided during the test).

Formula

TFM (%) = (Volume of HCl × Normality × 28.05) / Weight of soap sample

C. Hardness Test (Physical)

1. Press the soap sample with the thumb or cut a small piece.
2. Record physical resistance and any surface crumbling.

CALCULATIONS

1. State whether TFM value is in the desired range.
2. Explain the significance of pH in soap.
3. Describe ways hardness affects usability.