THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATION COUNCIL OF TANZANIA

DIPLOMA IN TECHNICAL EDUCATION EXAMINATION

732 CHEMISTRY TEACHING METHODS

Time: 3 Hour. **Monday,08th May 2000, p.m.**

Instructions

1. This paper consists of sections **A**, **B** and **C.**
2. Answer all questions in sections **A** and **B**, and **two (2)** questions from section **C.**
3. Section **A** carries **36 marks**, section **B** carries **40 marks** and section **C** carries **24 marks**.
4. Cellular phones and other unauthorized materials are **not** allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet(s).

SECTION A (36 marks)

Answer all questions in this section.

1. With examples, explain four (4) ways in which Chemistry education contributes to the achievement of national development goals in Tanzania.

2. Examine four (4) critical errors that teachers make when interpreting the Chemistry syllabus and explain how each can negatively affect student performance.

3. Identify four (4) conditions under which the use of discovery learning in Chemistry may be ineffective. Support each point with an example from a specific Chemistry topic.

4. Define the following terms in the context of pedagogical content knowledge for Chemistry teachers:
   (a) Constructivism
   (b) Differentiated instruction
   (c) Curriculum alignment
   (d) Scientific literacy

5. Explain four (4) ethical responsibilities of Chemistry teachers during the administration of internal practical examinations.

6. Describe four (4) major challenges that hinder effective implementation of the Competency-Based Curriculum in the teaching of Chemistry in resource-constrained Tanzanian schools.

7. Discuss four (4) psychological principles that a Chemistry teacher must apply when introducing the topic of electrochemical cells to Form IV students.

8. Mention four (4) advanced formative assessment tools that can be used during inquiry-based Chemistry lessons and explain their importance in tracking student understanding.

9. Explain four (4) risks of neglecting the affective domain in Chemistry instruction and how they impact learner motivation and long-term engagement with science.

SECTION B (40 marks)

Answer both questions in this section.

10. A Chemistry teacher designed a lesson on the topic “Rate of Reaction” and used an experiment involving the reaction between sodium thiosulphate and hydrochloric acid.

    (a) Write the balanced chemical equation for the reaction.

    (b) Explain the scientific principle behind the change in visibility during the reaction.

    (c) Identify four (4) key variables that affect the rate of this reaction and suggest how each can be investigated in the classroom.

    (d) Propose an advanced rubric for assessing students' experimental design and interpretation in this lesson.

11. During a titration experiment, a Form IV student titrated 25.0 cm^3 of sodium hydroxide solution against 0.100 M hydrochloric acid. The average volume of acid used was 22.50 cm^3.

    (a) Write a balanced chemical equation for the reaction.

    (b) Calculate the number of moles of HCl used.

    (c) Calculate the concentration of the sodium hydroxide solution in mol/dm^3.

    (d) Suggest two (2) modifications that would improve the precision and reliability of this titration in a real classroom setting.

SECTION C (24 marks)

Answer any two (2) questions from this section.

12. A teacher observed a significant gender gap in Chemistry practical performance in a Form III class.

    (a) Propose four (4) instructional interventions to promote gender inclusiveness in Chemistry practicals.

    (b) Explain how socio-cultural beliefs may influence student participation and performance in laboratory activities.

    (c) Describe two (2) ways in which school leadership can support equitable access to science education.

13. Using the Backward Design model, plan a unit on the topic “Organic Chemistry” for Form III. Your response should include:

(a) The desired results (learning outcomes)

(b) Acceptable evidence of learning

(c) Learning experiences and instruction design

(d) A plan for student reflection and self-assessment

14. Evaluate the role of cognitive science in enhancing Chemistry teaching and learning. Provide six (6) evidence-based teaching strategies derived from cognitive research and show how they apply in specific Chemistry topics.

15. A school introduced project-based learning (PBL) in teaching secondary Chemistry.

    (a) Define project-based learning in the context of Chemistry education.

    (b) Outline three (3) project ideas suitable for Form IV students.

    (c) Discuss three (3) benefits and three (3) challenges of using PBL in Chemistry.

    (d) Suggest two (2) methods of evaluating student performance in PBL.