THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATION COUNCIL OF TANZANIA

DIPLOMA IN TECHNICAL EDUCATION EXAMINATION

732 CHEMISTRY TEACHING METHODS

Time: 3 Hour. **Monday, 10th May 2003, 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. Discuss four (4) fundamental pedagogical implications of introducing the mole concept to students at Form III level.

2. Describe four (4) challenges a Chemistry teacher may face when integrating inquiry-based learning (IBL) into experimental topics like rates of reaction or electrolysis.

3. Explain the didactic significance of balancing redox equations by the ion-electron method and why it should be emphasized in Form IV Chemistry.

4. With specific reference to Form II learners, outline four (4) learner-centered approaches you would apply to introduce the concept of the reactivity series.

5. (a) What is meant by the term "construct validity" in the context of Chemistry assessment?

   (b) Give three (3) practical strategies to improve construct validity in Chemistry test items.

6. Identify four (4) specific laboratory scenarios where procedural errors can lead to misinterpretation of empirical data and suggest appropriate preventive strategies.

7. Justify the inclusion of cross-cutting issues like climate change and industrial pollution in Chemistry curriculum content, giving four (4) academic or ethical reasons.

8. Propose four (4) principles to guide a Chemistry teacher in selecting content for a revision lesson two weeks before national examinations.

9. A Chemistry teacher decides to integrate a flipped classroom approach in Form IV classes. Explain four (4) critical preparatory steps necessary to implement this pedagogical innovation effectively.

SECTION B (40 marks)

Answer both questions in this section.

10. During a teaching practice, a trainee teacher decided to use project-based learning (PBL) to teach the sub-topic "Water and its Composition."

    (a) Propose a comprehensive project outline, including the aim, student activities, duration, and mode of assessment.

    (b) Highlight four (4) pedagogical strengths and three (3) limitations of using project-based learning in this context.

    (c) Suggest three (3) criteria that should be used to evaluate students' learning outcomes from this project.

11. In an electrochemical experiment, a current of 0.25 A was passed through a copper (II) sulphate solution using copper electrodes for 32 minutes and 10 seconds.

    (a) Calculate the total quantity of electricity used in coulombs.

    (b) Calculate the number of moles of electrons transferred.

    (c) Determine the mass of copper deposited at the cathode. (1 Faraday = 96,500 C/mol, Molar mass of Cu = 63.5 g/mol, n = 2)

    (d) Identify and explain two (2) classroom management challenges that may arise during this experiment and how to mitigate them.

SECTION C (24 marks)

Answer two (2) questions from this section.

12. (a) Define the term "cognitive overload" as applied in Chemistry instruction.

    (b) Identify and explain three (3) Chemistry topics where students are prone to cognitive overload.

    (c) Describe three (3) instructional strategies a teacher can apply to minimize cognitive overload in senior Chemistry classes.

13. Using examples and balanced equations, discuss six (6) key principles of Green Chemistry that can be incorporated into the Tanzanian secondary Chemistry curriculum.

14. A Form III teacher conducted a midterm evaluation where the mean score was 42, standard deviation was 8, and a student scored 58.

    (a) Calculate the z-score for the student.

    (b) Interpret the meaning of the score in terms of performance.

    (c) Discuss the implications of using norm-referenced interpretations in assessing Chemistry learning outcomes.

    (d) Suggest two (2) alternative models of interpreting learner performance and explain their benefits in Chemistry teaching.

15. Construct a marking guide for the following question and award marks out of 20:

    "Explain the processes and reactions involved in the extraction of iron from its ore in a blast furnace. Use equations and diagrams to support your explanation."

    (a) Outline marking points including chemical reactions, diagram features, physical changes, and temperature zones.

    (b) State four (4) common misconceptions students have when answering such a question and explain how a teacher should address them during instruction.