302

(University of Choice)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY

(MMUST)

UNIVERSITY EXAMINATIONS

2023/2024 ACADEMIC YEAR

THIRD YEAR FIRST SEMESTER EXAMINATIONS

FOR THE DEGREE

OF

BACHELOR OF EDUCATION (SCIENCE)

MAIN EXAM

COURSE CODE: ESM 322 **TIME: 2 HOURS**

COURSE TITLE: CHEMISTRY EDUCATION

DATE: 18/12/2023 **TIME: 12:00- 2:00 PM**

INSTRUCTIONS TO CANDIDATES

1. **Question 1 is Compulsory and carries 25 marks. Answer ANY OTHER three Questions each carrying 15 marks**
2. **You are allowed to use secondary school course books, Syllabuses and any digital devices.**
3. **Sharing of materials is not allowed.**
4. **Marks will be awarded for clear and precise work**

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 3 Printed Pages. Please Turn Over.

Question ONE

a) Outline an experimental setup that could be used in the laboratory to measure the standard cell potential of an electrochemical cell based on the following redox systems:

$Ag^{+}_{(aq)} + e^{-} \rightarrow Ag_{(s)}$

$Fe^{3+}_{(aq)} + e^{-} \rightarrow Fe^{2+}_{(aq)}$

In your answer you should include details of the apparatus, solutions, theory and the standard conditions required to measure this standard cell potential. [8 Marks]

b) Nanjala is a chemistry teacher in Lubao mixed secondary school. She intends to teach the concept of bonding to Form two students:
   i) Which concepts does she expect to have been considered earlier to be able to rightly introduce bonding? [2 Marks]
   ii) With reference to the bonding in a water molecule illustrate a teaching resource she will consider during instruction. [3 Marks]
   iii) Explain how she would use the concept of bonding when introducing or teaching the sub-topic of 'Extraction of Sodium Metal' to a form four class. [3 Marks]

c) With reference to the various instructional materials at your disposal; prepare a CBC lesson plan that you can use when teaching the strand 'Salts' and sub-strand 'Methods of preparing Salts' to grade 8 students. [7 Marks]

d) With reference to KICD syllabus specific objective (c) in the topic 'Carbon and some of its compounds', state any two instructional objectives that if achieved during the lesson will help achieve the specific objective. [2 Marks]

Question Two

a) With reference to the **KNEC** and **KICD** Chemistry syllabuses compare and contrast between the organization of the content in both cases. **[9 Marks]**

b) A student in form three was provided with the following reagents in a chemistry practical examination: **Solid K**; Aqueous Ammonia; Aqueous Sodium Sulphate; Dilute Nitric (V) acid and a wooden splint. If **Solid K** is suspected to be Lead (II) carbonate; **required:** From the reagents provided select and describe **three** tests with the expected results that would be carried out consecutively to confirm if **solid K** is Lead (II) carbonate. [6 Marks]

Question Three

Chebet is a chemistry teacher newly posted to Kakamega Model school. She has been assigned to teach Form four students the topic Organic Chemistry II.

a) Prepare a detailed sample Scheme of work outlining how she will cover the topic. [5 Marks]

b) With the aid of test blueprint develop a 30 Mark assessment tool she will use at the end of the topic with an appropriate marking guide. [10 Marks]

Question Four

a) Describe how as a chemistry teacher you will employ the philosophy of constructivism in teaching 'The Mole' to form three students. [5 Marks]
b) Explain precisely how as a chemistry teacher you will teach students to make observations and measurements in Volumetric analysis. [5 Marks]
c) Curriculum development is rooted partly on psychological theories of learning. With reference to Brunner's cognitive development theory; Discuss this statement in the light of secondary school chemistry curriculum. [5 Marks]

Question Five

a) Explain the philosophy behind the paradigm shift in utilization of resources from: Macro-to-Micro-to Virtual in chemistry education practical work. [5 Marks]
b) Chemistry is considered a science. Discuss [10Marks]