



MASENO UNIVERSITY
UNIVERSITY EXAMINATIONS 2016/2017

FIRST YEAR SECOND SEMESTER EXAMINATIONS FOR THE
POST-GRADUATE DIPLOMA IN EDUCATION

CITY CAMPUS – SCHOOL BASED

ECT 526: SPECIAL METHODS OF TEACHING CHEMISTRY

Date: 21st December, 2016

Time: 11.00 - 2.00 pm

INSTRUCTIONS:

- Answer question ONE and any other THREE questions



QUESTION ONE: (Compulsory)

- a) i) State any three (3) goals of Science Education (3marks)
ii) Give any two (2) ways in which the “curriculum” may hinder the achievement of these goals (2marks)
- b) i) Outline any two (2) principles that should guide the chemistry teacher in constructing a Scheme of Work (2marks)
ii) Explain why the teacher should be cautious in using a generic scheme of work in planning to teach chemistry (4marks)
- c) The position of the hypothesis marks the difference between Francis Bacon’s view and Karl Popper’s view of science. Explain (4marks)
- d) Explain why the use of word equations is recommended when teaching chemistry in the lower secondary school classes (5marks)
- e) Why is it vital for the chemistry teacher to subject every experiment conducted in the laboratory to the twin processes of rehearsal and risk assessment? (5marks)
- f) Identify any five (5) challenges of integrating the use of ICT in the teaching of chemistry in Kenyan Public Secondary Schools (5marks)

QUESTION TWO

- a) Construct a 40 minutes Lesson Plan to teach a chosen portion of the topic: “Structure of the Atom and the Periodic Table” from the form two chemistry syllabus. (Use the attached information provided) (8marks)
- b) Explain why every Lesson should have a proper conclusion even when it is “overplanned” (2marks)

QUESTION THREE

Describe the differences between “Expository Laboratory Work” and “Experimental Investigation” as strategies that may be used in teaching chemistry highlighting for each strategy any:

- Two (2) characteristics
- Two (2) advantages and
- One (1) shortcoming

(10marks)

QUESTION FOUR

Chemistry is considered as an experimental science to be taught through practical work yet: (i) only a small fraction of the General Objectives listed in the syllabus relate directly to practical work and (ii) the Kenya National Examination Council (KNEC) weighting of the Practical Paper (233/3) is much lower than the two Theory Papers (233/1 and 233/2).

- a) Explain, using an appropriate illustration, what is meant by the term "Experimental Science" (4marks)
- b) State any two (2) of the General Objectives in the syllabus that relate to practical work (2marks)
- c) Give reasons to account for the KNEC lower weighting of the chemistry practical paper relative to the theory papers (4marks)

QUESTION FIVE

- a) i) Describe any three(3) grades of reagents that may be used in the chemistry laboratory (3marks)
ii) Explain why it is essential for the chemistry teacher to know the grades of the reagents to purchase (2marks)
- b) The concept of "Virtual Laboratory" is an attractive option in addressing lack of facilities for teaching chemistry. Explain what the concept means, giving one (1) advantage and one (1) limitation (5marks)

QUESTION SIX

'Observation and Oral Questioning' are two (2) of the assessment techniques suggested in the chemistry syllabus. For each of these two (2) techniques list any:

- Two (2) purposes (i.e. skills it is best suited to assess)
- Two (2) merits and
- One (1) challenge in using it for assessment (10marks)

FORM TWO

6.0.0 STRUCTURE OF THE ATOM AND THE PERIODIC TABLE (24 Lessons)

6.1.0 Specific Objectives

By the end of this topic, the learner should be able to:

- a) name and write the chemical symbols of the first twenty elements of the periodic table
- b) describe the structure of the atom and write the electron arrangement of the first twenty elements of the periodic table
- c) explain the electron arrangement of the atom in terms of energy levels
- d) define atomic number, mass number, isotopes and relative atomic mass
- e) calculate the relative atomic masses from isotopic composition
- f) explain the position of an element in the periodic table in terms of the electron arrangement
- g) define valency and oxidation number of an element
- h) predict the type of ion formed from a given electron arrangement of an atom
- i) predict the valencies and oxidation numbers from position of elements in the periodic table
- j) derive the formulae of some simple compounds from valencies of elements and radicals
- k) write simple balanced chemical equations.

6.2.0 Content

6.2.1 The Structure of the Atom

- Names and symbols of the first twenty elements of the periodic table.
- Simple structure of the atom: proton, electron and neutron; electron energy levels in atoms.

6.2.2 Atomic characteristics

- Definition of atomic number, mass number, isotopes and relative atomic mass (reference ^{12}C); examples of isotopes

- Calculations of relative atomic mass from relative abundance of isotopes of an element

6.2.3 The periodic table

- Build up of the periodic table for the first twenty elements on the basis of energy levels
 - rows (periods)
 - columns (groups)

6.2.4 Ion formation

- Formation of simple ions (cations and anions): qualitative treatment of the ionisation energy and electron affinity.
- Writing of the electron arrangement of ions formed from atoms: lithium, sodium, fluorine, chlorine, aluminium, magnesium and Sulphur; definition of valency and oxidation numbers.
- Derive valency and oxidation number of an element from its position in the periodic table
- Names and formulae of common radicals
- Use of valencies in determining the chemical formulae of some common compounds
- Writing simple balanced chemical equations

6.3.0 Project

- Atomic model construction
Note: The use of chemical equations with state symbols should be emphasised hereafter

7.0.0 CHEMICAL FAMILIES: PATTERNS IN PROPERTIES (28 Lessons)

7.1.0 Specific Objectives

By the end of this topic, the learner should be able to:

- a) identify alkali metals, alkaline earth metals, halogens and noble gases in the periodic table and write their electron arrangement and explain trends in physical properties of alkali metals, alkaline earth metals, halogens and noble gases