



# UNIVERSITY OF NAIROBI

## UNIVERSITY EXAMINATIONS 2017/2018

### FOURTH YEAR EXAMINATIONS FOR THE DEGREE OF BACHELOR OF SCIENCE IN CHEMISTRY, ANALYTICAL CHEMISTRY AND INDUSTRIAL CHEMISTRY

#### **SCE 406: HAZARDOUS WASTE MANAGEMENT**

**DATE: FEBRUARY 16<sup>TH</sup> 2018**

**TIME: 9.00 A.M. TO 11.00 A.M.**

Answer **ALL** Questions

- Q1 a) What is hazardous waste in accordance with the national environmental management waste act? **[3 marks]**
- b) (i) How does South Africa support the waste hierarchy in its approach to waste management? **[3 marks]**
- (ii) List down any six core principles on which waste management is based. eg subsidiarity etc. **[4 marks]**
- (iii) Name the nine classes of hazardous waste in accordance with SANS 10228 classification, which has been adopted as the SA standard? **[5 marks]**
- c) What is the Hazardous Rating of a specific waste based on? **[3 marks]**
- Q2 a) (i) Physical methods don't destroy wastes, instead, they change them into forms that are easier to treat further or to dispose. Which are the traditional physical methods in waste treatment? **[2 marks]**
- (ii) What does encapsulation involve? **[2 marks]**
- (iii) What is wetting? **[2 marks]**
- b) How does Silica Micro Encapsulation (SME) work and what has it been demonstrated to work effectively on? **[6 marks]**

- Q3. a) Describe each of the following chemical waste treatment techniques using examples and equations where applicable
- (i) Neutralization [4 marks]
  - (ii) Oxidation [4 marks]
  - (iii) Reduction [4 marks]
- b) (i) For what is the precipitation technique useful in waste treatment? [2 marks]
- (ii) Which are the four categories of general Waste Landfill Sites? [2 marks]
- (iii) To what is catalytic detoxification best applied? [3 marks]
- c) (i) Discuss any four aspects of bioremediation [16 marks]
- (ii) What is vitrification? [3 marks]
- (iii) When are complex combination treatment processes often required [2 marks]