MASENO UNIVERSITY

UNIVERSITY EXAMINATIONS 2013/2014

THIRD YEAR FIRST SEMESTER EXAMINATIONS FOR THE DEGREE OF BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH INFORMATION TECHNOLOGY

(MAIN CAMPUS)

NES 305: PRACTICAL ENVIRONMENTAL CHEMISTRY

Date: 26th November, 2013 *Time: 8.30 - 10.30 a.m.*

INSTRUCTIONS:

- **Answer Question ONE and any TWO questions.**

NES 305: Practical Environmental and Chemistry

1. The table below shows the analysis taken from a well within Manyatta Estate of Kisumu city.

Sample 100 ml	**Total of titrant to reach end point**	
	Phenolphthalein	Methyl orange
A	10	15.5
B	14.4	38.6
C	8,2	8.4
D	0	12.7

Calculate for all samples

i) Hydroxide alkalinity (7mks)
ii) Carbonate alkalinity (7 mks)
iii) Bicarbonate alkalinity (7mks)

b) Discuss the chemistry of acid mine waters (9mks)

2. Compare the contact times necessary to obtain 99.99 kill of bacteria in water under the following conditions.(20 Marks)

i) Free chlorine residual of 0.15 mg/l and $K = 1.1 \times 10^{-2}$

ii) Combined chlorine residual of 2 mg/l with K = 1.2 x 10-5 (20 Marks)

3. Just below the point where a continuous discharge of pollution mixes with a river, the BOD is 10.9 mg/l and DO is 7.6 mg/l. The river and waste mixture has a temperature of 20°C, a deoxygenation constant of 0.20/day, an average flow speed of 0.30 m/s, and an average depth of 3.0 m.

a) Find the time and distance downstream at which the oxygen deficit is a maximum

b) Find the minimum value of DO.

4. Describe stratospheric ozone destruction by chlorofluorocarbon CFC -12. (20 mks)

5. a) Discuss photochemical smog formation (10 mks)

b) Describe the mechanism of atmospheric reaction of Nitrogen oxides (10 mks)

6. Discuss the chemistry of softening of water (20 mks)