MASENO UNIVERSITY

UNIVERSITY EXAMINATIONS 2013/2014

FIRST YEAR SECOND SEMESTER EXAMINATIONS FOR THE DEGREE OF MASTER OF SCIENCE IN ENVIRONMENTAL SCIENCE

(CITY CAMPUS)

NES 827: FRESH WATER QUALITY AND ECOSYSTEM

Date: 28th March, 2014 Time: 9.00 - 12.00 noon

INSTRUCTIONS:

- **Answer ANY FOUR questions.**

(CITY CAMPUS)

FIRST YEAR SECOND SEMESTER 2013 – 2014

NES 827: FRESH WATER QUALITY AND ECOSYSTEM

TIME : 3 Hours

INSTRUCTIONS : Answer any FOUR questions.

1. Discuss the appropriate method you would use to control water hyacinth in Lake Victoria . (15mks)
2. A contaminant has a pore water concentration of 1 $\mu\, g\, L^{-1}$ at the sediment – water interface. If it has a half – life of 10yrs, how far will it penetrate into the sediments if $\emptyset\, D = 0.9 \times 10^{-5}\, cm^2\, s^{-1}$ and $v_b = 2mm\, yr^{-1}$?. (15mks)
3. Discuss the general morphology of stream invertebrates. (15mks)
4. Lake Naivasha with volume of $10 \times 10^6 m^3$ was analyzed and found to have a steady- state pollution concentration of 3.5mg/L. the pollution is nonconservative with reaction rate constant $K = 0.20/day$. Suppose the condition of the lake is deemed unacceptable and to solve the problem it is decide to completely divert the sewage outfall around the lake, eliminating it as a source of pollution. The incoming stream still has flow $Q_s = 5.0m^3/s$ and concentration $C_s = 10.0\, mg/L$ Assuming complete – mix conditions, find the concentration of pollution in the lake one week after the diversion and find steady – state concentration. (15mks)
5. Discuss factors affecting the distribution of aquatic plants in streams. (15mks)
6. Just below the point where a continuous discharge of pollution mixes with a river, the BOD is 10.9mg/L and DO is 7.6 mg/L. The river and waste mixtures has a temperature of 20^0C, a deoxygenation constant of 0.20/day, an average flow speed of 0.30m/s, and an average depth of 3.0m.
   a. Find the time and distance downstream at which the oxygen deficit is a maximum.
   b. Find the minimum value of dissolved oxygen?.