



MASENO UNIVERSITY
UNIVERSITY EXAMINATIONS 2015/2016

**THIRD YEAR FIRST SEMESTER EXAMINATION FOR THE DEGREE OF
BACHELOR OF SCIENCE IN EARTH SCIENCE WITH INFORMATION
TECHNOLOGY**

MAIN CAMPUS

NGA 304: WASTEWATER TREATMENT

Date: 18th January, 2016

Time: 8.30 - 10.30am

INSTRUCTIONS:

- **Answer Question ONE and any other TWO questions.**
- **Sketch maps and diagrams should be used whenever appropriate.**



1. a) Examine the role of microorganisms in wastewater treatment (6 marks)
- b) Explain the sources and effects of the following parameters in water and wastewater
- i) Colour (3 marks)
 - ii) Solids (3 marks)
 - iii) Organic matter (3 marks)
- c) Explain the advantages and disadvantages of anaerobic treatment processes (8 marks)
- d) Isiukhu River in Western Kenya passes through Kakamega town. The mean river flow is $2.5\text{m}^3/\text{s}$ with the upstream BOD loading of $90\text{mg}/\text{l}$. The town discharges its treatment effluent into this river at a rate of $0.9\text{m}^3/\text{s}$ with a BOD level of $200\text{mg}/\text{l}$. Calculate the resultant concentration downstream in the vicinity of Kakamega town. (7 marks)
2. a) Describe methods used to process sludge before its final disposal (8 marks)
- b) Write short notes on the following
- i) Attached growth process (4 marks)
 - ii) Constructed wetlands (4 marks)
 - iii) Activated sludge digestion (4 marks)
3. a) Explain the sources of sludge and the characteristics of sludge generated in a conventional wastewater treatment plant (12 marks)
- b) Explain how wastewater treatment is achieved in a facultative pond (8 marks)
4. a) Discuss the conventional wastewater treatment plant (12 marks)
- b) Differentiate between Oxidation ditch and Oxidation pond (8 marks)
5. a) Discuss the fundamental considerations in the application of natural treatment systems (10 marks)
- b) Describe the chemical characteristics of wastewater. (10 marks)

6. a) Discuss problems of wastewater treatment specific to small communities. (10 marks)
- b) Explain the sources and consequences of oil pollution (10marks)
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