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 304: WATER SUPPLY AND SANITATION

Date: 8th April, 2014 Time: 11.15 a.m.-1.00 p.m.

INSTRUCTIONS:

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

1. (a) (i) Distinguish between chlorination and fluoridation. (2mks)
(ii) Write briefly on tastes and odours as used in water supply. (4mks)

(b) Explain the advantages and disadvantages of using participatory hygiene and sanitation transformation method. (7mks)

(c) The census record of Maktau town shows the population as follows:

Present	-	50 200
Population before one decade	-	48 000
Population before two decades	-	45 400
Population before three decades	-	40 100

Estimate the probable population of Maktau town after one, two and three decades by using geometrical increase method. (9mks)

(d) Explain how water demand would vary in a town as Maktau {in 1. (c)}. (8mks)

2. (a) (i) Explain the factors that influence the settling process of a discrete particle in a sedimentation tank. (5mks)
(ii) Explain the requirements of an ideal water distribution system. (7mks)

(b)Design a suitable sedimentation tank for a proposed water supply project to a community with a population of 50 000 persons. *Use the following data*:

- Per capita demand = 150litre/day
- Peak demand = 1.5 x average demand
- Detention period = 4hrs
- Velocity of flow = 30cm/min

(8mks)

3. Discuss the potential environmental risks and benefits associated with reusing domestic sewage in irrigating food crops. (20mks)

4. (a) Discuss the fact that water from different sources ought to be treated before distribution to supply systems for various usages. (12mks)

(b) A centrifugal pump is required to lift water at the rate of 150 litres/sec. Calculate the horse power of the engine from the following data. (8mks)

- Suction head = 3m
- Delivery head = 3m
- Coefficient of friction = 0.01
- Efficiency of pump = 75%
- Diameter of pipe = 15cm

5. (a) Distinguish between:
(i) design period and flow through period. (6mks)
(ii) non-scouring velocity and self-cleansing velocity. (6mks)

(b) With a simple sketch, describe the structure and the working of an aqua privy. (8mks)

6. (a) (i) Explain the use of UV-rays in disinfection of water supply schemes. (4mks)
(ii) Describe the construction and working of a slow sand filter. (6mks)

(b) Propose solutions to the challenges currently facing water service providers. (10mks)