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: 26th November, 2013 *Time: 11.00 a.m. - 1.00 p.m.*

INSTRUCTIONS:

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

1. (a) (i) Explain the properties of a wholesome water. (3mks)
(ii) Explain the term "water hammer" (3mks)

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

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

Present	-	50 300
Population before one decade	-	48 100
Population before two decades	-	45 500
Population before three decades	-	40 200

Estimate the probable population of Timoru town after one, two and three decades by using geometrical increase method. (12mks)

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

(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. (a) Write brief notes on participatory hygiene and sanitation transformation. (8mks)

(b) Discuss the potential environmental risks and benefits associated with reusing domestic sewage in irrigating food crops. (12mks)

4. (a) (i) Describe how water quality may deteriorate in conveyance and distribution system. (6mks)
(ii) With reasons, recommend suitable pipes for water conveyance & distribution to Mombasa County. (8mks)

(b) Calculate the velocity of flow and the discharge through sewer of diameter 1m laid at a gradient of 1 in 500. Assume the sewer running full. Use Mannings formula with η =0.012 (8mks)

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

(b) Discuss the variations of water demand in a given community. (12mks)

6. (a) (i) With a neat sketch, describe reservoir intake works. (4mks)
(ii) Explain the advantages and disadvantages of a slow sand filter. (7mks)

(b) Propose solutions to the challenges currently facing water service providers. (9mks)