



**MASENO UNIVERSITY**  
**UNIVERSITY EXAMINATIONS 2015/2016**

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

**MAIN CAMPUS**

**NES 304: WATER SUPPLY AND SANITATION**

Date: 12<sup>th</sup> January, 2016

Time: 11.00 - 1.00 pm

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INSTRUCTIONS:

- Answer Question ONE and any other TWO Questions.



1. (a) Explain the key challenges of providing portable water to various users in urban centre in Kenya. (6mks)
- (b) Discuss the fact that water from different sources ought to be treated before distribution for various usages. (8mks)
- (c) Critically examine the potential environmental benefits associated with sewage reuse for irrigation purposes. (6mks)
- (d) Expound on the various water demands that would necessitate an establishment of a water supply scheme. (10mks)

2. (a) The census record of Nalromo Town show the population as follow:

Present population	-	50 500
Population before one decade	-	46 000
Population before two decades	-	42 200
Population before three decades	-	39 800

Calculate the probable population after one, two and three decades using arithmetic increase method. (6mks)

(b) Discuss how the principles of participatory hygiene and sanitation would help Nalromo Town community have sound sanitation. (14mks)

3. (a) Explain the theory of sedimentation. (6mks)

(b) (i) 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  $n = 0.012$  (6mks)

(ii) Design a sedimentation tank for a water supply scheme which has to supply  $1.5 \times 10^6$  litres/day to a town. Assume detention period as 5 hours, velocity of flow as 20cm/min, depth of the tank as 3m, allowance for sludge deposition as 50cm. (8mks)

4. (a) With neat sketches, describe:

(i) Reservoir intake works. (3mks)

(ii) Operations and working of aqua privy. (6mks)

(b) (i) Explain the requirement for an ideal water distribution. (6mks)

(ii) Explain the preventive measures that would control water wastages during supply and distribution of water to consumers. (5mks)

5. a) Write shortly on "sewage self-purification theory". (6mks)

b) Explain the working and operation of a bio-gas plant. (14mks)

6. (a) Explain how recuperating test is done. (8mks)

(b) Discuss the process of establishing a sanitary scheme projects. (12mks)