



MACHAKOS UNIVERSITY

University Examinations 2016/2017

**SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF BUILDING AND CIVIL ENGINEERING**

**THIRD YEAR FIRST SEMESTER EXAMINATION FOR BACHELOR OF
SCIENCE CIVIL ENGINEERING
SUPPLEMENTARY EXAMINATION
ECV 310: PUBLIC HEALTH ENGINEERING II**

DATE: 1/9/2017

TIME: 2:00 – 4:00 PM

INSTRUCTIONS

- (i) Attempt Any Three Questions**
 - (ii) Reasonable Assumptions Should Be Made Where**
 - (iii) M Necessary**
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QUESTION ONE (COMPULSORY)

The diversity of manufacturing processes employed by industry makes any general characterization of resultant wastewater impossible. Pollutant loading will vary extensively within a given industry, and consequently, wastewater characterization must be done on a plant-by-plant basis. In order to accomplish this, a plant wastewater survey must be carried out. Briefly describe this survey. (20 marks)

QUESTION TWO (20 MARKS)

- (i) Why are the following physical characteristics of wastewater important to the environmental engineer? (10 marks)
 - Solids
 - Color

- Temperature
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- (ii) Certain tests have been developed to indicate water quality based on chemical characteristics which can be simpler, less expensive, or more indicative of water quality than a chemical compound test. These are referred to as chemical indicator tests. Discuss 5 of such tests. (10 marks)

QUESTION THREE (20 MARKS)

- (i) Enumerate and briefly discuss four methods of collection and conveyance of wastewater. (10 marks)
- (ii) Manholes are very important sewer appurtenances. What is their role and how are they located? (10 marks)

QUESTION FOUR (20 MARKS)

- (i) Discuss the design principles of sanitary sewers (10 marks)
- (ii) Hence or otherwise design a sanitary sewer flowing half full given the following parameters (10 marks)
- Flow rate = 650L/day
 - Channel slope = 0.0001
 - $N = 0.012$

QUESTION FIVE (20 MARKS)

- (i) What are the commonest faults associated with septic tanks? (10 marks)
- (ii) Determine the size of a septic tank for a picnic park which hosts 500 residents on average daily. Assume that the anticipated flow is 150L/day per capita and HRT of 24hrs (10 marks)