



(University of Choice)

**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY
(MMUST)**

MAIN CAMPUS

**UNIVERSITY EXAMINATIONS
2015/2016 ACADEMIC YEAR**

THIRD YEAR FIRST SEMESTER EXAMINATIONS

**FOR THE DIPLOMA
IN
CIVIL AND STRUCTURAL ENGINEERING**

COURSE CODE: DCE 079

COURSE TITLE: PUBLIC HEALTH ENGINEERING

DATE:

TIME:

INSTRUCTIONS:

1. This paper consists of FIVE Questions
2. Answer any FOUR Questions
3. Examination duration is **2 Hours**

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 3 Printed Pages. Please Turn Over.

Question One

- a) Outline the importance of the following parameters in public health engineering
 (i) Temperature (ii) pH (iii) Alkalinity (iv) Dissolved Oxygen **[8 marks]**
- b) Discuss the effect of source of water supply upon the water quality and its treatment **[4 Marks]**
- c) Define the following terms as used in wastewater technology and solid waste management
 (i) Sewage (ii) Sewer lines (iii) Garbage (iv) Landfill **[4 marks]**
- d) Why do the COD and BOD analysis usually give different results for the same waste? **[4 marks]**

Question Two

- a) (i) What is the aim of water treatment **[2 Marks]**
 (ii) State four reasons as to why it is desirable to treat water **[4 Marks]**
- b) What could be inferred from the following analytical results concerning the relative ease of biodegradability of each waste?

Waste	5-day BOD (mg/L)	COD(mg/L)
A	240	300
B	100	500
C	120	240

[6 Marks]

- c) Water is responsible for, by some estimates, approximately 80% of all infectious diseases. Discuss the categories of these diseases **[8 marks]**

Question Three

- a) Determine the one (1) day BOD and the ultimate 1st stage BOD of a wastewater whose 5 day 20° C BOD is 200 mg/L. The reaction constant K (base e) = 0.23 **[6 Marks]**
- b) Differentiate between physical, chemical and biological characteristics of wastewater **[3 marks]**
- c) Explain the mechanism of treatment as effected through Trickling filters **[5 marks]**
- d) Outline the criteria for prioritization of chemical contaminants for the establishment of drinking water standards **[6 marks]**

Question Four

- a) Explain the three main types of sewers used in sewerage system **[6 marks]**
- b) A 300 mm diameter sewer is running full. The velocity necessary for self-cleansing is 0.9m/s. Find the required grade and discharge. Assume Manning's coefficient is 0.013. **[6 marks]**
- c) Differentiate between suspended and attached growth treatment system giving examples in each **[4 marks]**
- d) Describe the significance of screening and grit removal in wastewater treatment **[4 marks]**

Question Five

- a) Design a circular settling tank unit for a primary treatment of sewage at 12000 m³/d. Assume detention time is 2hours and surface loading is 40 m³/m²/d **[5 marks]**
- b) Explain the mechanism of treatment in maturation ponds **[5 marks]**
- c) Determination of solid waste composition is a pre-requisite in the management of solid waste. Discuss **[6 marks]**
- d) Outline the factors affecting the composting process of solid waste **[4 marks]**