



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

MAIN CAMPUS

**UNIVERSITY EXAMINATIONS
2023/2024 ACADEMIC YEAR**

FOURTH YEAR FIRST SEMESTER EXAMINATIONS

**FOR THE DEGREE
OF
BACHELOR OF SCIENCE
IN
CIVIL AND STRUCTURAL ENGINEERING**

COURSE CODE: CSE 431

COURSE TITLE: ENVIRONMENTAL ENGINEERING

DATE: 7TH OCTOBER 2023

TIME: 3 P.M – 5 P.M

INSTRUCTIONS:

1. This Paper Consists of FOUR Questions
2. Attempt Question ONE and any other TWO Questions
3. It is to the best interest of the candidate to write legible
4. Some selected formulae are provided at the end of the question paper
5. Examination duration is **2 Hours**

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 2 Printed Pages. Please Turn Over.

QUESTION ONE (Compulsory) [30 Marks]

- a) Describe how each of the following operational factors impact the variability of faecal sludge
 i) toilet usage ii) storage duration iii) inflow and infiltration and climate. [8 marks]
- b) Neglected tropical diseases (NTDs) are related to water sanitation and hygiene (WASH) in a community. Outline any four types of NTDs and their association with WASH [6 marks]
- c) Climate change induced shocks are negatively affecting the attainment of sustainable development goals (SDG). Describe how climate change is a threat to SDG 6 [4 marks]
- d) Confirm that the reaction below follows second order reaction and determine the reaction rate constant [8 marks]

Time, d	0	1	2	3	4	5	6	7	8
Concentration(mg/l)	25	7	4.2	3	2.3	1.8	1.6	1.3	1.2

- e) Outline the limitations for BOD test [4 marks]

QUESTION TWO [20 marks]

- a) Outline the significance of the following in environmental engineering [8 marks]
 i) Heavy metals ii) Algae iii) suspended solids iv) bacteria
- b) Describe the self-purification mechanisms in rivers [6 marks]
- c) Explain how ecosystem based adaptation strategies can be used to mitigate environmental degradation in a country [6 marks]

QUESTION THREE [20 marks]

- a) The BOD of a sewage incubated for one day at 30°C has been found to be 200 mg/l. What will be the 5-day 20°C BOD? Assume $K = 0.12$ (base 10) per day at 20°C [5 marks]
- b) Outline the challenges of wastewater re-use in Kenya [5 marks]
- c) Describe how WASH is integral in the achievement of SDG 2, SDG 3 and SDG 7. [10 marks]

QUESTION FOUR [20 marks]

Describe integrated solid waste management and the challenges hindering its adoption in low and medium income countries

-----END OF QUESTION PAPER-----