



# TECHNICAL UNIVERSITY OF MOMBASA

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Faculty of Engineering and Technology

Department of BUILDING & Civil engineering

**UNIVERSITY EXAMINATION FOR:**

**BACHELOR OF SCIENCE IN CIVIL ENGINEERING**

**ECV 4506 : PUBLIC HEALTH ENGINEERING III**

**END OF SEMESTER EXAMINATION**

**SERIES: APRIL 2025**

**TIME: 2 HOURS**

**DATE:**

## **Instructions to Candidates**

You should have the following for this examination

*-Answer Booklet, examination pass and student ID*

This paper consists of **four** questions.

Attempt question ONE (Compulsory) and any other TWO questions.

**Do not write on the question paper**

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## **QUESTION ONE (COMPULSORY) 30 Marks**

- a) Conventional sewerage system as a method of excreta disposal in rural areas and isolated buildings is inappropriate. Discuss the reasons why this is so and give an example of appropriate method of sewage disposal under these circumstances. **(5 Marks)**
- b) State the meaning of the following terms as used in sewage sludge treatment:
  - i. Dewatering of sludge
  - ii. De-gritting of sludge
  - iii. Sludge concentration**(6 Marks)**
- c) What is the purpose of sewage sludge dewatering? **(4 Marks)**
- d) Industrial wastes disposal require consideration from the view point of the industrialist, the public and the sanitary engineer. Discuss the concerns and role of each of these stakeholders in safe industrial wastewater disposal. **(5 Marks)**
- e) Treated wastewater can be reused for various purposes. Discuss three different uses of treated wastewater. **(5 Marks)**

- f) Industrialization is important for a country economically but it also comes with its own challenges. Discuss. **(5 Marks)**.

## **ANSWER ANY TWO QUESTIONS FROM THIS SECTION**

### **QUESTION TWO (20 Marks)**

- a) What is sewage sludge stabilization? **(4 Marks)**
- b) Briefly describe aerobic sewage sludge stabilization process. **(4 Marks)**
- c) Explain the importance of sludge drying before disposal and state two methods of sludge drying. **(4 Marks)**
- d) Explain what is meant by the following:
  - i. batch operation in sewage sludge stabilization.
  - ii. Continuous operation in sewage sludge stabilization.**(4 Marks)**
- e) Sewage has suspended solids content of 300mg/l. The sedimentation tank removes 65% of the suspended solids and the water content of the sludge is 96%. Determine the quantity of sludge produced after treating  $4.8 \times 10^6$  litres of sewage. Assume a specific gravity of sludge as 1.0. **(4 Marks)**

### **QUESTION THREE (20 Marks)**

- a. What are the effects of discharging untreated industrial wastewater to a water source? **(4 Marks)**
- b. Discuss the requirements of discharging industrial effluent on land. **(4 Marks)**
- c. State the categories of contaminants in industrial wastewater? **(4 Marks)**
- d. Discuss the meaning of “solid waste management” as used in sanitary engineering? **(4 Marks)**
- e. Briefly outline the various stages of solid waste management from the point of generation to the final disposal area. **(4 Marks)**

### **QUESTION FOUR (20 Marks)**

- a. Define the following terms:

- i. Adsorption
- ii. Adsorbate
- iii. Adsorbent

**(6 marks)**

- b. What are the conditions necessary for adsorption process to occur? **(4 Marks)**
- c. What are the factors that affect the rate of adsorption? **(4 Marks)**
- d. Define what is meant by adsorption equilibrium. **(2 Marks)**
- e. There are many practical applications of the principle of adsorption. Describe two of these applications. **(4 Marks)**