



TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF ENGINEERING AND TECHNOLOGY
Department of BUILDING & Civil engineering
UNIVERSITY EXAMINATION FOR:

BACHELOR OF SCIENCE IN CIVIL ENGINEERING
ECV 4506: PUBLIC HEALTH ENGINEERING III

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: MARCH 2025

TIME: 2 HOURS

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **five** questions.

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

Do not write on the question paper.

QUESTION ONE (COMPULSORY) 30 Marks

- a) Describe two methods of excreta disposal in unsewered areas. **(4 Marks)**
- b) Describe using a neat sketch, the working of a septic tank in sewage treatment. **(6 Marks)**
- c) Write short notes on soak pit. **(3 Marks)**
- d) Explain the sludge digestion tank in the sewage treatment plant. **(4 Marks)**
- e) Explain how industrial wastewater can pollute natural water bodies and how this pollution can be controlled. **(3 Marks)**
- f) Discuss single-, double- and multi-bin system of solid waste collection. **(6 Marks)**
- g) Explain advantages and disadvantages of incineration as a method of solid waste disposal method. **(4 Marks)**

ANSWER ANY TWO QUESTIONS FROM THIS SECTION

QUESTION TWO (20 Marks)

- a. Describe the properties of sludge produced in the primary and secondary sedimentation tanks in a sewage treatment plant. **(4 Marks)**
- b. Discuss in detail the principle of anaerobic sludge digestion. **(5 Marks)**
- c. Discuss the effect of p^H and temperature on sludge digestion. **(5 Marks)**
- d. Sewage has suspended solids content of 250mg/l. The sedimentation tank removes 55% of the suspended solids and the water content of the sludge is 95%. Determine the quantity of sludge both in weight and volume produced after treating 6.5×10^6 litres of sewage. Assume specific gravity of sludge to be 1.0. **(6 Marks)**

QUESTION THREE (20 Marks)

- a. Discuss the composition of solid waste and salvaging of marketable materials. **(4 Marks)**.
- b. Explain why it is important to involve the public when establishing a waste management system. **(4 Marks)**.
- c. Explain briefly the difference between commercial solid waste and garbage. **(4 Marks)**.
- d. Describe a suitable method of solid waste disposal in a city. **(4 Marks)**.
- e. Discuss the role of legislation in solid waste management. **(4 Marks)**.

QUESTION FOUR (20 Marks)

- a. Define the following terms:
 - i. Adsorption
 - ii. Adsorbate
 - iii. Adsorption isotherm

(6 Marks)

- b. Discuss the Lungmuir isotherm including the applicable assumptions. **(6 Marks)**
- c. Describe what is meant by selective adsorption and why it is important in industrial application of adsorption. **(4 Marks)**
- d. Explain how adsorption has been applied in controlling environmental pollution. **(4 Marks)**