



TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF ENGINEERING AND TECHNOLOGY

Department of BUILDING & Civil engineering

UNIVERSITY EXAMINATION FOR:

BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING

TCV 4425 : WATER & WASTEWATER SYSTEM DESIGN

END OF SEMESTER EXAMINATION

SERIES: APRIL 2025

TIME: 2 HOURS

PAPER A

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) 20 Marks

- a) State three reasons of treating water for domestic use (3 marks)
- b) State three factors to consider when selectin water intake (3 marks)
- c) With the aid of a sketch explain the operation of gravity sand filter (10 marks)
- d) State the processes of treating river water (4 marks)

ANSWER ANY TWO QUESTIONS FROM THIS SECTION

QUESTION TWO (20 Marks)

- a) Calculate the settling velocity of water of a spherical discrete particle of 0.05mm diameter and specific gravity of 2.5. The kinematic velocity is $1.02 \times 10^{-3} \text{ m}^2 / \text{sec}$ at 19°C . Also check if the equation used is valid for the settling velocity (8 marks)
- b) With the aid of a sketch explain the break point chlorination (8 marks)
- c) Explain the coagulation process (4 marks)

QUESTION THREE (20 Marks)

- a) Design aerated grit chamber for treatment of sewage with average flow of 60 MLD. Consider the peak factor of two. Consider two chambers and detention period of three minutes. Width to depth ratio is 1:1.2 and provide depth of 3.0m. Take air supply as $0.3 \text{ m}^3 / \text{mm}$. M. Assume swing arrangement as 0.5m from the floor. (10 marks)
- b) With the aid of a sketch explain the operation of a septic tank (10 mark)

QUESTION FOUR (20 Marks)

- a) With the aid of a sketch explain the treatment of sewage using a trickling/biological filter (10 marks)
- b) Explain the conventional sewage treatment (10 marks)

QUESTION FIVE (20 Marks)

- a) Outline the following;
 - i) Pre- chlorination
 - ii) Super chlorination
 - iii) Sewerage system
 - iv) Sewage
 - v) Influent
 - vi) Effluent (6 marks)
- b) The average daily demand at a town estimated at 8Millonlitres per day. Design a suitable sedimentation tank. Assume a detention period of 5hours and velocity flow at 22cm per minute (10 marks)
- c) State the side effects of not treating sewage (4 marks)

