



TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF ENGINEERING AND TECHNOLOGY

Department of BUILDING & Civil engineering

UNIVERSITY EXAMINATION FOR:

BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING

TCV 4327 : PUBLIC HEALTH ENGINEERING 11

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: MARCH 2025

TIME: 2 HOURS

PAPER B

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

- Explain the operation of septic tank as a unit of wastewater treatment
(6 marks)
- Design a septic tank of 120 users. Sewage flow is 100litre per head per day. The detention period is one (1) day. Assume depth of 1.2m, free board 0.3m, L:B ratio as 1:3 (8 marks)
- Outline the impacts of untreated effluent of septic tank (6 marks)

ANSWER ANY TWO QUESTIONS FROM THIS SECTION

QUESTION TWO (20 Marks)

- Find the efficiency and depth of a biological filter given the following particulars:
 - $BOD_5 = 675\ 000\text{gm}$
 - Inlet BOD of filter = 4.5 m/l
 - Use NRC equation
 - F = Recirculation factor
 - Recirculation ratio
 - Filter is single stage (10 marks)
- Explain the self-purification of sewage when discharged in a river (6 marks)
- Outline the following

- i) Sewerage appurtenances
- ii) Pipes in sewerage system (4 marks)

QUESTION THREE (20 Marks)

- a) State the objectives of treating wastewater (4 marks)
- b) Design a grit chamber with the following particulars
 - Population = 50 000 people
 - Water consumption = 135l/h/d
 - Sewage generation = 80% of water supply
 - Horizontal velocity = 0.2m/sec
 - Provide 25% additional length (10 marks)
- c) Explain the operations of oxidation pond (6 marks)

QUESTION FOUR (20 Marks)

- a) Explain the conventional method of treating wastewater (10 marks)
- b) Design a grit chamber with the following particulars
 - Average flow = 60MLD
 - Provide two chambers
 - Detention period 3 min
 - Breadth to width ratio as 1: 1. 2
 - Use depth 3.0 (6 marks)
- c) State the advantages of activated sludge process (4 marks)

QUESTION FIVE (20 Marks)

- a) Explain the following
 - i) Coagulation
 - ii) Flocculation (6 Marks)
- b) State the objectives of filtration process in wastewater treatment (4 marks)
- c) With the aid of a sketch explain the operations of a biological(trickling)filter (10 marks)

