



TECHNICAL UNIVERSITY OF MOMBASA

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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.**

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**QUESTION ONE (COMPULSORY) 20 Marks**

- a) Explain the operation of septic tank as a unit of wastewater treatment (6 marks)
- b) 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)
- c) Outline the impacts of untreated effluent of septic tank (6 marks)

**ANSWER ANY TWO QUESTIONS FROM THIS SECTION**

**QUESTION TWO (20 Marks)**

- a) 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)
- b) Explain the self-purification of sewage when discharged in a river (6 marks)

- c) 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)

