



## 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 4318 : PUBLIC HEALTH ENGINEERING I**

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 **four** questions.

Attempt any **THREE** questions.

**Do not write on the question paper.**

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### **QUESTION ONE (20 Marks)**

- a) State and describe any two sources of water. **(4 Marks)**
- b) Explain the importance of an impounding reservoir as a component of a water supply scheme. **(4 Marks)**
- c) State the factors considered when selecting a suitable site for an impounding reservoir.
- d) Discuss the importance of filtration in a water treatment plant. **(4 Marks)**
- e) Explain why gravity system is preferred compared to pumping water supply system. **(4 Marks)**

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

- a. Explain the importance of water quality in water supply engineering. **(4 Marks)**
- b. Differentiate between impurities with health significance and impurities with aesthetic significance in drinking water. **(4 Marks)**
- c. Describe the process of manganese removal from water in a water treatment plant. **(4 Marks)**
- d. Explain the importance of water screens in a water treatment plant. **(4 Marks)**

- e. Design a rapid sand filtration unit for a treatment plant handling  $15,000 \text{ m}^3/\text{d}$ . Assume a filtration rate of  $5 \text{ m}^3/\text{h}/\text{m}^2$ . **(4 Marks)**

### QUESTION THREE (20 Marks)

- a. Describe with the help of sketches any two types of water intakes. **(4 Marks)**
- b. Explain why adequate operation and maintenance of water supplies is important. **(4 Marks)**
- c. Discuss the importance of metering water consumers. **(3 Marks)**
- d. Explain why population projection is important in the design of a water supply project. **(3 Marks)**
- e. A town in Kenya is experiencing chronic water shortages. The National Government is planning a major water supply project to meet its water demand for the next twenty years and beyond and they have engaged a consultant for that purpose. The population growth rate is projected to be 2% from now and throughout the planning period. The current (2024) population is estimated at 200,000 and the average per capita consumption is  $150 \text{ l/h/d}$ . If the project is expected to be operational in 2030 (initial year) calculate (i) the projected population in the ultimate year (ii) the ultimate year domestic water demand in cubic metres for the town. **(6 Marks)**

### QUESTION FOUR (20 Marks)

- a. Discuss the purpose of disinfecting a new water pipeline before commissioning it. **(3 Marks)**
- b. Describe how disinfection is done in a new water pipeline. **(4 Marks)**
- c. State the accessories provided in the design of water storage reservoirs. **(4 Marks)**
- d. Explain the function of a water-balancing reservoir in a water distribution system. **(3 Marks)**
- e. Determine the velocity of flow and flow rate in a circular water pipe of diameter 150cm, laid on a slope of 1 in 750 while flowing full. The pipe is made of steel with a Manning's coefficient of  $n = 0.012$ . **(6 Marks)**