



**TECHNICAL UNIVERSITY OF MOMBASA**

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FACULTY OF ENGINEERING AND TECHNOLOGY  
DEPARTMENT OF BUILDING & CIVIL ENGINEERING

**UNIVERSITY EXAMINATION FOR:**  
BACHELOR OF SCIENCE IN CIVIL ENGINEERING  
**ECE 2305 : PUBLIC HEALTH ENGINEERING I**  
SPECIAL/SUPPLEMENTARY EXAMINATION

**SERIES: SEPTEMBER 2018**

**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) 30MARKS**

- a) With the aid of a sketch , briefly describe the hydrological cycle
- b) briefly describe the procedure of carrying out the following tests
  - i. jar test for determining the coagulant dose in water treatment
  - ii. presumptive coliform test

(9marks)

- c) Compare the following sources of water with respect to water quality
  - I. Surface water from rivers

(12marks)

- II. Ground water from boreholes
- III. Rainwater from roof catchments

(9marks)

**ANSWER ANY TWO QUESTIONS**

**QUESTION TWO (20MARKS)**

- a) Sketch the following types of intakes:
  - i) A crib intake used in a lake
  - ii) An infiltration gallery(12marks)
- b) State FIVE factors considered in choosing a site in a river (5marks)
- c) Outline THREE types of water demand variations (3marks)

**QUESTION THREE (20 Marks)**

- a) Briefly describe the following water treatment processes
  - i. Coagulation-flocculation
  - ii. Rapid sand filtration(10marks)
- b) Sketch a multiple tray aerator and explain its working principle (4marks)
- c) Outline THREE methods of disinfecting water (6marks)

**QUESTION FOUR (20marks)**

- a) Briefly describe the following impurities found in water :
  - i) Suspended impurities
  - ii) Colloidal impurities
  - iii) Dissolved impurities(6marks)
- b) Explain the effects of the following properties in water
  - i) Acidity
  - ii) Turbidity
  - iii) Temperature

(6marks)

- c) Explain the purpose of the following appurtenances in a pipeline:
- i) Gate valve
  - ii) Air valve
  - iii) Washout
  - iv) Check valve(no-return valve)

(8marks)

**QUESTION FIVE (20marks)**

- a) The population of a town from the census office is as shown in table 1:

Table 1

year	Populati on
1960	8000
1970	12000
1980	17000
1990	22500

Using the arithmetical increase method, determine the town's population in the year:

- I. 2000
- II. 2010

(6marks)

- b) Design a circular intake structure for a river intake using the following data:

- Daily water demand  $5000m^3$
- Pump capacity  $50l/s$  ,working 8 hours per day
- A detention time of at least 20 minutes in the sump
- High water level 1209.1m
- Low water level 1202.5m
- Free board 0.5m
- Stream bed level 1200.1m
- The bottom of the sump should be  $>1.5m$  below the low water level

(8marks)

c) Define the following terms

- i) Indicator organism
- ii) Hard water
- iii) Water disinfection

(6marks)