TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR:

BACHELOR OF SCIENCE IN CIVIL ENGINEERING
(INSTITUTION BASED EXAMINATION)

ECE 2305 : PUBLIC HEALTH ENGINEERING I

END OF SEMESTER EXAMINATION

SERIES: MARCH 2017

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)

a) Briefly describe the hydrologic cycle. (6 marks)
b) For a water supply project, outline SIX factors that influence the per capita water demand. (6 marks)
c) The population of a town from the census office is as shown in Table 1:

Table 1

Year	Population
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

(6 marks)

d) State TWO reasons for designing water projects in phases.   (2 marks)
e) Describe various methods used in rain harvesting.   (10 marks)

Attempt any TWO questions

QUESTION TWO

a) Compare the following sources of water;   (9marks)
   i)   Surface water from rivers
   ii) Ground water from boreholes
   iii) Rainwater from roof catchments

b) Sketch a submerged lake intake (crib intake).   (6 marks)
c) Explain the importance of testing water before choosing the source for a water supply.
   (5marks)

QUESTION THREE

a) A water supply is to have the following components;

- A river intake (pumped)
- Filter
- High lift pumps
- Screens
- Chemical dosing plant for coagulants
- Low lift pumps
- Clarifiers
- Disinfection plant
- Preliminary settling tanks
- Coagulation/ flocculation unit
- Clear water tank

i)   Arrange the components in the correct sequence, starting from the first
ii)   Mention the reason a component appears before another one

(12 marks)

b) Briefly describe the following water treatment processes
   i) Coagulation and flocculation
   ii) Disinfection

(8 marks)

QUESTION FOUR

a) Briefly describe the following tests for water
   i) Jar test
   ii) Total coliform test

(12 marks)

b) Explain the procedure of determining the following from a water sample;
   i) Suspended solid
   ii) Total solids
(4 marks)

c) Define the following terms as used in water testing
   i) Acidity
   ii) Alkalinity
(4 marks)

QUESTION FIVE

a) Design a rectangular sedimentation tank to treat 2.4 million litres of raw water per day. Make the following assumptions;
   i) Depth of the tank is 3m
   ii) Length: Breadth ratio is 3

   Also calculate the surface loading in $l/d/m^2$

(6 marks)

b) Explain the TWO major reasons of providing storage tanks in the water distribution systems.
(4 marks)

c) Sketch a typical circular water storage tank labeling all the important parts. (8marks)

d) State TWO reasons for water softening.
(2 marks)