



# THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

((A Constituent College of JKUAT)

(A Centre of Excellence)

## Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR DEGREE IN BACHELOR OF SCIENCE IN  
CIVIL ENGINEERING

ECE 2504: PUBLIC HEALTH ENGINEERING III

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: OCTOBER 2012

TIME: 2 HOURS

### **Instructions to Candidates:**

You should have the following for this examination

- *Answer Booklet*

This paper consists of **FIVE** questions. Answer question **ONE (COMPULSORY)** any other **TWO** questions

Maximum marks for each part of a question are as shown

This paper consists of **TWO** printed pages

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### **SECTION A (COMPULSORY – 30 MARKS)**

- a) What are some of the problems encountered in cooling water recirculation system? **(12 marks)**
- b) State advantages of storing water underground. **(10 marks)**
- c) Define the following terms as used in the field of waste water reclamation.
- i) Direct portable re-use
  - ii) Indirect portable re-use
  - iii) Reclaimed waste water
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iv) Waste water recycling.

(8 marks)

## SECTION B (ANSWER ANY TWO QUESTIONS)

### Question Two (20 marks)

- a) A crop irrigated with reclaimed waste water whose salinity ( $EC_w$ ) measured by electrical conductivity is 0.1ds/m. If the crop is irrigated to achieve a leaching fraction 0.15 (i.e. 85% of the applied water is used by crop or loss through evapotranspiration), determine the following:
- The salinity of the deep percolate water
  - The appropriate leaching fraction to maintain crop yield

The crop is known to suffer significant loss in yield when TDS of the soil water exceeds 5000mg/L

- b) Make short notes on the following:
- Scaling
  - Metallic corrosion
  - The corrosion potential
- (6 marks)
- c) What are advantages of constructed wetlands in waste water treatment? (4 marks)
- d) Mention any **THREE** types of combustors. (6 marks)

### Question Three (20 marks)

- a) What are some of the important land fill-sitting consideration? (8 marks)
- b) Differentiate between Hauled container system (HCS) and the stationary container system. (SCS) (4 marks)
- c) Discuss methods of sludge treatment. (8 marks)

### Question Four (20 marks)

- a) Define onsite waste water treatment system (OWTS) what are the main challenges in its implementation. (12 marks)
- b) Outline the quality considerations of wastewater re-use in relation to irrigation on salinity and sodium Adsorption Ratio (SAR) (3 marks)
- c) Discuss the re-use potential of wastewater in industries. (5 marks)

### Question Five (20 marks)

- a) State **FOUR** factors considered in the on-site storage of solid wastes (4 marks)
- b) What are the major considerations in land fill sitting? (8 marks)
- c) Discuss the area, trench and depression methods of land-filling with solid waste. (6 marks)
- d) How are the solids determined in a raw sludge? (2 marks)