



(University of Choice)

**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY
(MMUST)**

MAIN CAMPUS

**UNIVERSITY EXAMINATIONS
2021 /2022 ACADEMIC YEAR**

FIRST YEAR SECOND SEMESTER EXAMINATIONS

**FOR THE DEGREE
OF
MASTER OF SCIENCE IN WATER RESOURCES
ENGINEERING**

COURSE CODE: CWE 815

**COURSE TITLE: WATER QUALITY AND AQUATIC
 ECOLOGY**

DATE: WEDNESDAY 27TH APRIL 2022 TIME: 8.00 – 11.00 PM

INSTRUCTIONS:

1. This paper consists of **FIVE** questions
2. Answer questions **any FOUR** questions.
3. Answer each question on a separate page.
4. Scientific calculators may be used.
5. Do not turn the page before permission is given
6. Examination duration is **3 Hours**

MMUST observes **ZERO** tolerance to examination cheating
This Paper Consists of 2 Printed Pages. Please Turn Over.

QUESTION ONE **[25 Marks]**

- a) Black box models are useful in simulating water quality variables in freshwaters. Describe the use of black box models in water quality modelling in rivers and stream [10 marks]
- b) Describe the key factors driving the fate and transport of contaminants in aquatic environments [15 marks]

QUESTION TWO **[25 marks]**

- a) Sediment studies have proved useful in understanding water quality in lakes. Elaborate this statement [10 marks]
- b) Groundwater quality assessment requires sound governance framework. Sometimes water quality assessment systems yield inadequate information. Explain the main reasons why this may happen especially in developing economies [9 marks]
- c) Bio assessment or biomonitoring is more relevant than physico-chemical monitoring in aquatic ecosystem. Justify [6 marks]

QUESTION THREE **[25 marks]**

- a) Discuss importance of estuarine environment [10 marks]
- b) Advancement in technology has led to emerging contaminants of environmental concern. Describe these contaminants and how they can be removed/managed in the environment [15 marks]

QUESTION FOUR **[25 marks]**

Natural and engineered wetlands are important ecosystem infrastructure. Discuss the characteristics and functions of wetlands in water quality management

QUESTION FIVE **[25 marks]**

- a) Development of water quality index is important in water quality monitoring and assessment. Describe using examples the steps for development of a water quality index [16 marks]
- b) Outline limitations of water quality indices in rivers and streams [4 marks]
- c) Describe with examples the difference between a conceptual model and a physically-based model [5 marks]