



**MASINDE MULIRO UNIVERSITY OF  
SCIENCE AND TECHNOLOGY**

**(MMUST)**

**MAIN CAMPUS**

**MAIN EXAMINATIONS**

**2021 / 2022 ACADEMIC YEAR**

**FOURTH YEAR SECOND SEMESTER  
EXAMINATIONS**

**MAIN EXAMINATIONS**

**FOR**

**THE BACHELOR OF SCIENCE IN DISASTER PREPAREDNESS AND  
ENVIRONMENTAL TECHNOLOGY**

**COURSE CODE: DPE 417**

**COURSE TITLE: INDUSTRIAL WASTEWATER TREATMENT**

**DATE: 22/04/2022**

**TIME: 8 - 10AM**

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**INSTRUCTIONS TO CANDIDATES**

Answer Question 1(ONE) and any other TWO Questions

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 2 Printed Pages. Please Turn Over.

**Question One (compulsory)**

(a). Briefly explain the application and limitation of the following in industrial wastewater analysis:

(i) BOD [3 marks]

(ii) COD [3 marks]

(iii) pH [3 marks]

(b). What is a “wastewater audit”, and how is it used in wastewater management? (3 marks)

(c). Discuss in detail the factors that need to be considered in designing a wastewater treatment facility.

[12 marks]

**Question two**

(a). Elaborate on the main differences in treatment of industrial wastewater and domestic wastewater (municipal sewerage)? [3 marks]

(b). A waste activated sludge with 0.4% solids content is gravity thickened to 2.0 % with a removal efficiency of 95%. Calculate the quantity of underflow per 1.0m<sup>3</sup> of slurry applied and the concentration of solids in the overflow. Assume a specific gravity of 1.05 for the dry solids .

[5 marks]

(c). Discuss the factors that increase the human health risks from disposal of industrial wastewater in Kenya’s urban areas. [15 marks]

**Question three**

(a) Explain in detail what you understand by the term “Jar testing” and how it is applied. [5 marks]

(b). Suppose you want to determine how much of a flocculant is required to purify a stream of wastewater from a factory. Explain the steps you will undertake to determine:

(i) the right concentration of flocculant required [7 marks]

(ii) the most appropriate pH at which this occurs [7 marks]

(b) If the flocculant in (b) above is to be used in a liquid chemical feed system, explain how the concentration obtained above can be converted to a flow rate. [4 marks]

**Question four**

- (a) Discuss the different classification of solids contaminants in wastewater and how they impact on water quality if discharged into natural receiving bodies. [10 marks]
- (b). Discuss the following processes as used in metal removal from wastewater:
- (i) Chemical Precipitation [4 marks]
  - (ii) Nano-filtration [4 marks]
- (c) Compare and contrast between *batch* treatment and *continuous* treatment approaches for wastewater. [6 marks]

