



TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Applied and Health Sciences

Department of Pure & Applied Sciences

UNIVERSITY EXAMINATION FOR:

BACHELOR OF TECHNOLOGY IN ANALYTICAL CHEMISTRY

ACH 4306: INDUSTRIAL POLLUTION CONTROL

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: APRIL 2025

TIME: 2 HOURS

DATE: Pick Date Apr 2025

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

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

Do not write on the question paper.

Question ONE

- (a) Provide the criteria that make greenhouse gases ir active. (4 marks)
- (b) Demonstrate the self-cleaning of a stream receiving wastewater discharge with reference to variations in dissolved oxygen levels. (6 marks)
- (c) Identify three common uses of water, which form the main wastewater streams in a manufacturing facility. (3 marks)
- (d) Highlight the environmental impacts of CFCs and HCFCs. (4 marks)
- (e) Provide the reason why particulate matter of size $\leq 10\mu\text{m}$ in diameter is regulated as a criteria pollutant. (4 marks)
- (f) State any THREE methods by which the concentration of contaminants in industrial waste can be reduced. (3 marks)
- (g) (i) Identify TWO types of wastewater streams from a crude oil and petroleum products terminal. (2 marks)
(ii) And for each type of wastewater in (i) above outline the composition. (4 marks)

Question TWO

- (a) Describe the impact of acidification on the buffering capacity of natural water systems. **(8 marks)**
- (b) Identify factors that have to be considered when selecting an appropriate particulate emission control device. **(6 marks)**
- (c) Highlight the principle(s) behind the functioning of the electrostatic precipitator in controlling the emission of particulate matter. **(6 marks)**

Question THREE

- (a) Describe the processes that demonstrate the ability of wetlands to remove nitrogen. **(8 marks)**
- (b) Highlight the processes in a lagoon with anaerobic bottom conditions that are important in the degradation of dissolved organic matter. **(12 marks)**

Question FOUR

- (a) Briefly explain the following processes in the reduction of volumes of waste,
 - (i) Classification of wastewater **(8 marks)**
 - (ii) Re-using both treated industrial and municipal effluents as raw water supplies. **(6 marks)**
- (b) Provide any THREE reasons justifying the neutralisation of industrial wastewater. **(6 marks)**

Question FIVE

- (a) Describe the following applications in industrial waste management
 - (i) Equalisation of wastes **(6 marks)**
 - (ii) Proportioning wastes. **(8 marks)**
- (b) Highlight any THREE prevention and control measures of fugitive VOC emissions from a petroleum refinery. **(6 marks)**