



# TECHNICAL UNIVERSITY OF MOMBASA

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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**

**END OF SEMESTER EXAMINATION**

**SERIES: APRIL 2016**

**TIME: 2 HOURS**

**DATE:** Pick Date May 2016

## PAPER II

### 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.**

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### Question ONE

- (a) Describe the occurrences in a stream after the discharge of domestic sewage that define the latter's ability for self-cleansing (6 marks)
- (b) (i) Highlight the characteristics of a suspended biofilm system in wastewater treatment. (2 marks)  
(ii) Give any ONE example of an application of the system in wastewater treatment. (1 mark)
- (c) (i) Explain the formation of acid rain due to gaseous emissions from industrial sources. (4 marks)  
(ii) Outline any THREE preventive or control measures for SO<sub>2</sub> emissions. (3 marks)
- (d) Explain how HO<sup>•</sup> radicals are involved in the removal of NO<sub>2</sub> from the atmosphere. (3 marks)
- (e) Describe the following terms in water pollution control;
- i. Procedural standards (3 marks)
- ii. Performance standards. (3 marks)

- (f) Define the term Environmental Quality Objectives (EQOs). (2 marks)
- (g) State TWO methods for reducing the volume of waste generated by industries. (3 marks)

### **Question TWO**

- (a) Describe the formation of acid mine drainage, using appropriate reaction equations. (6 marks)
- (b) Identify and outline the characteristics of THREE major categories of aqueous discharges from industrial plants. (6 marks)
- (c) Highlight TWO methods for the neutralisation of large volumes of industrial acidic wastewater. (8 marks)

### **Question THREE**

- (a) Describe the pollution effects of the discharge of oxygen demanding wastes on natural water systems. (6 marks)
- (b) Identify the natural processes in an oxidation pond and outline the role of each in accomplishing treatment of wastewater. (8 marks)
- (c) Highlight THREE prevention or control measures for emissions of particulate matter from a cement manufacturing plant. (6 marks)

### **Question FOUR**

- (a) Outline the design and operation of an Electrostatic Precipitator (ESP) for control of particulate matter emissions, indicating factors affecting the efficiency of the equipment. (14 marks)
- (b) Outline THREE prevention or control measures for fugitive VOC emissions from a petroleum refinery. (6 marks)

### **Question FIVE**

- (a) Explain the following processes in the reduction of waste strength in industrial waste;
- (i) Equalisation of wastes (6 marks)
  - (ii) Segregation of wastes. (6 marks)
- (b) Describe an activated sludge system for the treatment of wastewater. (8 marks)