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

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.

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_2 emissions. (3 marks)

(d) Explain how $HO^{\bullet}$ radicals are involved in the removal of NO_2 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)