THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A constituent of JKUAT)

Faculty of Applied and Health Sciences

DEPARTMENT OF PURE AND APPLIED SCIENCES

UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF TECHNOLOGY IN APPLIED CHEMISTRY

ACH 4306 : INDUSTRIAL POLLUTION CONTROL

SPECIAL/SUPPLEMENTARY EXAMINATION

FEBRUARY 2013 SERIES

2 HOURS

Instructions to candidates:

This paper consist of **FIVE** questions

Answer question **ONE** (compulsory) and any other **TWO** questions

Question ONE

a) List FOUR types of emissions from industrial sources that are primary air pollutants in the order of relative toxicity to animals. **(4marks)**

b) State FOUR preventive and control measures for SOx emissions from industrial sources, with appropriate examples. **(6marks)**

c) Atmospheric cleaning of NOx by HO. Radicals is beneficial to air quality, but a long-term problem to the aquatic environment. Explain this statement **(6marks)**

d) Outline the following methods for treatment of sludge from wastewater treatment facilities

(i) Sludge looping **(4marks)**

(ii) Drying beds. **(4marks)**

e) Describe with appropriate examples, absorption/adsorption as a method for control of gaseous emission from industrial sources. **(6marks)**

Question TWO

a) Explain the following strategies to reduce waste strengths in industrial waste management

   (i) Process changes **(6marks)**

   (ii) Equipment modifications **(6marks)**

b) Provide two methods for neutralization of acidic waste. **(2marks)**

c) Describe with appropriate examples the effect of discharging acidic wastewater in natural waters. **(6marks)**

Question THREE

a) Explain how levels of dissolved oxygen indicate the ability for self-cleaning of a natural water system **(6marks)**

b) List FOUR important factors that affect industrial wastewater sedimentation. **(2marks)**

c) Describe the following processes for treatment of industrial wastewater

   (i) Primary treatment **(6marks)**

   (ii) Lagooning in oxidation ponds. **(6marks)**

Question FOUR

a) In the manufacture of urea, common emissions are nitrogen containing dust from pilling and granulation processes.

   (i) Identify and describe a suitable derive control and recovery of urea emissions.

   (8marks)

   (ii) Describe the potential effects of the discharge of untreated wastewater from the urea plant into natural waters. **(6marks)**

b) State measures to control NO and NO_2 emissions in nitric acid manufacturing. **(6marks)**

Question FIVE

a) The largest volume of liquid effluent in petroleum refining include "Sour" process water contaminated with hydrocarbons H_2S NH_3, organic sulfur compounds, organic acids and phenols, and the highly alkaline non-oily / non-sour process water.

Describe treatment and disposal of the two types of liquid effluents. **(11marks)**

b) (i) List the types of gaseous emissions from petroleum refining. **(4marks)**

(ii) State prevention and control measures that need to be put in place to manage the gaseous emissions. **(5marks)**