CRAWFORD UNIVERSITY
COLLEGE OF NATURAL AND APPLIED SCIENCES
DEPARTMENT OF EARTH AND PHYSICAL SCIENCE
INDUSTRIAL CHEMISTRY UNIT
RAIN SEMESTER EXAMINATION 2012/2013 SESSION

COURSE CODE: ICH 440
COURSE TITLE: ENVIRONMENTAL CHEMISTRY/ AIR POLUTION II
TIME ALLOWED: 2 HOUR UNITS: 2
DATE; JUNE, 2013
INSTRUCTIONS: ANSWER ANY THREE QUETIONS.

1. (A) Describe four processes by which air pollution is introduced into the atmosphere
   (B) Using a schematic diagram of a plume released from a stack, calculate the plume rise at distances X_1, X_2 and X_3, given that the actual stack height is 15m while the effective stack heights at X_1, X_2 and X_3 are 20m, 25m and 30m respectively.

2. (A) Describe how an Ottocycle engine operates.
   (B) i. Give reasons for the need for alternatives to Ottocycle engine
   ii. Describe the Opposed – Piston Opposed - Cylinders (OPOC) module in environmental chemistry.
   (C) Describe two approaches to improving on conventional engine design.

3. (A) i. What is a flue gas?
   ii. What is the first step necessary in the treatment of flue gas?
   iii. Name three methods applied in the first step of flue gas treatment and discuss one of these methods
   (B) i. Briefly describe two processes that the current technologies for the treatment of gaseous contaminants are based on.
   ii. Describe two methods used in gaseous contaminants removal.

4. (A) i. What is the purpose of carrying out waste gas purification?
   ii. Explain what prompted the idea of waste gas purification.
   (B) Describe the composition of industrial waste gases.
   (C) Describe the methods you would use to remove SO_2 and NO from flue gas.

Dr Rose Alani