



# MACHAKOS UNIVERSITY COLLEGE

(A Constituent College of Kenyatta University)  
University Examinations for 2015/2016 Academic Year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF PHYSICAL SCIENCES

FIRST SEMESTER EXAMINATION FOR DIPLOMA IN EDUCATION

SCH 0204: INDUSTRIAL AND ENVIRONMENTAL CHEMISTRY

DATE: 2/8/2016

TIME: 2:00 – 4:00 PM

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## **INSTRUCTIONS:**

- The paper consists of **two** sections.
- Section **A** is **compulsory** (30 marks).
- Answer any **two** questions from section **B** (each 20 marks).

## SECTION A - COMPULSORY.

### QUESTION ONE

- a) Ammonia is one of the most highly produced inorganic chemicals in the world.
- i) Why is it necessary to remove sulphur compounds from the feedstocks for the ammonia process? (1 mark)
  - ii) With the help of an equation, explain how the sulphur compounds are removed. (2 marks)
  - iii) Describe briefly with the help of a diagram and equations the Haber process for manufacturing of ammonia. (4 marks)
  - iv) Discuss some of the environmental impacts of ammonia production. (2 marks)
- b) Sulphuric acid is one of the commodity chemicals produced in the chemical industry
- i) Describe briefly with the help of equations the production of sulphuric acid using the contact process. (4 marks)
  - ii) Briefly outline the industrial hazards associated with the manufacture of sulphuric acid especially in contact process method. (4 marks)
  - iii) Sulphuric acid can be used as a weapon **in crimes** of assault. What properties of the acid make it ideal for such type of application? (2 marks)
- c) Chemical industries release a range of pollutants to the environment.
- i) Define the term pollutant. (2 marks)
  - ii) Explain three ways through which solid wastes can be disposed (3 marks)
- d) With the aid of equations, explain the manufacture of nitric acid by the ammonia oxidation process. (6 marks)

## SECTION B

### ANSWER ANY TWO QUESTIONS

2. a) Soap and detergents are widely used in our society. Explain the basic steps involved in the Industrial production of soap (10 marks)
- b) Cement is a material which is highly compatible to the earth's eco-system and most adaptable to sustainable development. Outline clearly the various steps involved in the cement manufacture (10 marks)
3. Explain the production process of sugar from sugarcane (20 marks)

4. a) With reference to petrochemical industries, outline the industrial processes that lead to:
- i) Air pollution, and
  - ii) Water pollution (12 marks)
- b) Most petrochemical industries have developed several pollution prevention measures. Explain four of these measures. (8 marks)
5. a) Define the following terms:
- i) Condensation
  - ii) Absorption
  - iii) Adsorption
  - iv) Incineration (4 marks)
- b) Explain five ways of controlling pollution from industrial sites (10 marks)
- c) Explain three main sources of pollution with major impacts on aquatic systems (6 marks)