

CHUKA



UNIVERSITY

## UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE  
IN CHEMISTRY

## CHEM 343: INDUSTRIAL AND APPLIED CHEMISTRY I

STREAMS: BSC (CHEM)

TIME: 2 HOURS

DAY/DATE: MONDAY 22/03/2021

8.30 A.M. – 10.30 A.M.

## INSTRUCTIONS:

- Answer question **One** (Compulsory) and any other **Two** questions

**QUESTION ONE [30 MARKS]**

- (a) State six purposes of size enlargement (agglomeration) in the chemical industry (3 marks)
- (b) Describe the following processes: (4 marks)
- (i) Froth-flotation (ii) Size reduction using a ball-mill crusher
- (c) Three raw materials are mixed in a tank to make a final product in the ratio of 1:0.4:1.5, respectively. The first raw material contain A and B with 50% A. The second raw material contain C while the third raw material contain A and C with 75% A.
- (i) Draw a well labelled flow-sheet for the process (2 marks)
- (ii) Determine the flow and composition of the product, assuming a continuous process at steady state (5 marks)
- (d) Describe the industrial manufacture of ammonia using the Haber process (4 marks)
- (e) Explain the key steps for processing sugarcane to sugar (5 marks)
- (f) Describe the industrial manufacture of nitric acid (4 marks)
- (g) Describe the industrial production of sulphuric acid (3 marks)

**QUESTION TWO [20 MARKS]**

- (a) Discuss the factors that determine the location of new chemical plants. **(10 marks)**
- (b) Describe the industrial manufacture of soda-lime glass. **(10 marks)**

**QUESTION THREE [20 MARKS]**

- (a) Discuss the industrial production of Portland cement. **(5 marks)**
- (b) State the properties of Portland cement containing the following: **(3 marks)**
- (i) free lime    (ii) tricalcium silicate    (iii) calcium aluminium ferrite
- (c) Discuss the membrane process for production of sodium hydroxide from brine. **(5 marks)**
- (d) Describe, with the aid of relevant equations, the production of soda ash using the Solvay process. **(7 marks)**

**QUESTION FOUR [20 MARKS]**

- (a) Discuss the chemical processes and unit operations for manufacture of lager beer. **(10 marks)**
- (b) Describe the industrial manufacture of toilet soaps. **(10 marks)**
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