Technical University of Mombasa
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 4103: INTRODUCTION TO INDUSTRIAL CHEMISTRY

SPECIAL/SUPPLEMENTARY EXAMINATION

OCTOBER 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) Differentiate between:-

   (i)   Compressible and incorpressible filter cake   **(3marks)**

   (ii)   Propeller and paddle Agitator   **(3marks)**

b) Organic compound distill in steam at 99°C under an external pressure of 760mmHg and produce distillate containing 20% by mass of organic liquid. Calculate RMM of organic compound given vapour pressure of water as 733mmHg   **(4marks)**

c) State:

   (i)   Importance of crystal size   **(2marks)**

   (ii)   Rittingers law is used in size Reduction   **(2marks)**

   (iii)   Characteristic of falling rate period in drying   **(2marks)**

d) Define

(i)   Vapour pressure

(ii)   Bound water' **(3marks)**

e) A triple effect evaporator is used to concentrate organic colloids. The temperature of steam to the first effect is 108°C, the boiling point in the cast effect is 54°C. The overall heat transfer co-efficient in w/m^2 °C are 2,500, 2000 and 2000 in the first, second and third effect respectively. At what temperature will liquid Boil is the third effect.

(4marks)

f) Outline TWO methods which can be used to produce Nitrogen gas. **(3marks)**

g) Given work index of limestone as 12.74 calculate power required to crush 200 tonne/hour of limestone if 80% of the feed passes a 3-inch screen and 50% of the product passes ¼ inch screen. **(4marks)**

Question TWO

a) (i)   Give a sketch of forced circulation crystallized **(3marks)**

(ii)   With the help of a diagram explain the working of thickeners **(5marks)**

b) 80% of salt which passed through 600mm sieve was crushed by 6 horse power motor in which 80%. Posses 50mm sieve predict. IF 6-horse power is sufficient to ground such that 80% passes 150mm sieve. **(5marks)**

c) State

(i)   Limitation of cooling crystallization. **(4marks)**

(ii)   Types of sedimentation process **(3marks)**

Question THREE

a) Outline

(i)   Different methods of preventing swirling in Agitators **(3marks)**

(ii)   Industrial importance of size reduction **(3marks)**

b) Briefly explain :-

(i)   How to achieve flow through filter **(3marks)**

(ii)   Separation of phenyamine in a mixture using steam distillation. **(3marks)**

c) With the help of :-

(i)   Equation state crushing efficiency as used in size Reduction. **(2marks)**

(ii)   Diagram, briefly describe the working of hammer mill   **(5marks)**

d)   Define vailed Nucleotion.

Question FOUR

a) Differentiate between:-

(i)   Circulation evaporator and double effect evaporation   **(3marks)**

(ii)   Continuous filtration and Discontinuous filtration   **(3marks)**

b) Define Crystallization   **(2marks)**

c) Explain briefly :-

(i)   Two methods used to produce Hydrogen peroxide   **(4marks)**

(ii)   Process of nucleation and crystal growth as used in crystallization **(4marks)**

d) Sketch a well label diagrams diagram of steam distillation   **(4marks)**

Question FIVE

a) State different properties of filter medium   **(2marks)**

b) Outline different methods of :-

(i)   Reducing size of solids   **(3marks)**

(ii)   Carrying out non-adiebotic drying   **(2marks)**

c) With the help of a diagrams briefly describe the working of

(i)   Tray dryer   **(5 marks)**

(ii)   Tumbling mills   **(5 marks)**

d) Define the following terms:-

(i)   Sedimentation   **(1mark)**

(ii)   Boiling point   **(1mark)**

(iii)   Entrainment   **(1mark)**