



KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2011/2012

SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR
OF SCIENCE AND BACHELOR OF EDUCATION

SCH 206: UNIT OPERATIONS I

DATE: Wednesday, 28th March, 2012

TIME: 2.00 p.m. – 4.00 p.m.

INSTRUCTIONS:

Answer **ALL** questions.

Q.1 a) What is

- i) Molality
- ii) Unit operations
- iii) Gas absorption
- iv) Distillation
- v) Bubble point

(5 marks)

b) What do you understand by the following terms as used in process equipment:

- i) Toughness
- ii) Hardness
- iii) Creep
- iv) Fatigue
- v) Elastic limit

(5 marks)

- c) Distinguish between
- i) a fluid state and a fluid
 - ii) mass transfer and heat transfer.
 - iii) Adsorption and ion exchange
 - iv) Actual pressure and atmospheric pressure
- (6 marks)
- d) i) Give the scales used for temperature measurement (2 marks)
- ii) Change 200°F to celcius degree (2 marks)
- (Total: 20 marks)

- Q.2 a) What do you understand by the following
- i) An adsorbent
 - ii) An inert gas (in gas absorption operation)
 - iii) Packings
- (3 marks)
- b) Differentiate between:
- i) Chemosorption and physicosorption
 - ii) Slightly soluble gases and highly soluble gases
 - iii) Absorption and stripping
- (3 marks)
- c) Explain the working of a mechanically agitated vessel for gas absorption
- (4 marks)

- Q.3 a) What is
- i) driving force in mass transfer
 - ii) Equilibrium stage
 - iii) Steam distillation
- (3 marks)
- b) i) Name the different methods used for distillation (3 marks)
- ii) Explain with the help of a diagram the differential or simple distillation method. (4 marks)

Q.4 a) What do you understand by the following terms:

- i) A crystal
- ii) Nucleation
- iii) Crystal growth
- iv) Caking of crystals

(5 marks)

b) Name:

- i) three types of crystallizers
- ii) four forms of crystals

(5 marks)

Q.5 a) A solution of sodium Nitrate in water contains 30% NaNO_3 by weight at 40°C temperature. Calculate the percentage yield of NaNO_3 crystals that may be obtained when temperature is reduced to 10°C . Also calculate the yield of NaNO_3 crystal from 100kg of solution.

Data: Solubility of NaNO_3 in water at 10°C is 80.18kg NaNO_3 per 100kg water.

(7 marks)

b) Explain the falling rate period.

(3 marks)

Q.6 a) What is

- i) Drying
- ii) Unbound moisture content
- iii) Critical moisture content

(3 marks)

b) Give and explain the factors on which the rate of drying depends.

(4 marks)

c) With reference to the method of drying, state the types of dryers and explain only one of them.

(3 marks)