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(*University of Choice*)

MASINDE MULIRO UNIVERSITY OF

SCIENCE AND TECHNOLOGY

(MMUST)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS

2021/2022 ACADEMIC YEAR

SECOND YEAR FIRST SEMESTER

SPECIAL/SUPPLEMENTARY EXAMINATIONS

FOR THE DEGREE

OF

BACHELOR OF SCIENCE (INDUSTRIAL CHEMISTRY)

COURSE CODE: SCI 264

COURSE TITLE: UNIT OPERATIONS

DATE: 05/08/2022 **TIME: 8.00am – 10.00am**

INSTRUCTIONS TO CANDIDATES

Answer all the Questions

TIME: 2 Hours

QUESTION ONE (20 MARKS)

i) Define the term 'Unit Operations' (2 marks)

ii) During sedimentation, the settling of particles depends on some factors. Explain at two of those factors (4 Marks)

iii) A jaw miller is an example of the machines that can be used for size reduction. Explain its operation (3 marks)

iv) State Raoult's law (2 Marks)

v) Give an example of a situation in which simple distillation under reduced pressure may be necessary (3 Marks)

vi) Explain how vapor pressure and density of the evaporating fluid affect the rate of evaporation (4 Marks).

vii) State the Newton's law of cooling? (2 Marks)

QUESTION TWO (15 MARKS)

a) What is meant by the terms 'Agitation' and 'Mixing'? (3 Marks)

b) Explain at least three mixing mechanism (6 marks)

c) What is meant by the term **'raffinate'** in liquid-liquid extraction? (2 Marks)

d) Crystallization cannot occur without supersaturation. List four ways through which supersaturation can be achieved (4 Marks)

QUESTION THREE (20 MARKS)

a) Heat transfer can occur in three ways. Discuss those three ways (6 Marks)

b) Give three features of an ideal crusher or grinder for size reduction (3 Marks)

c) Give four reasons why drying may be necessary within an industry (4 Marks)

d) Describe any two ways via which settling may occur (4 Marks)

e) Give three advantages of filter leaf (3 Marks)

QUESTION FOUR (15 MARKS)

a) Why are unit operations so important in the chemical industry? (2 Marks)

b) Describe two ways in which filter aids may be used (4 Marks)

c) Describe the manner in which a rotary filter works (4 Marks)

d) What do you understand by the term 'leaching' (2 Marks).

e) Describe three differences between drying and evaporation (3 Marks)