DEPARTMENT OF CHEMISTRY

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

SECOND SEMESTER EXAMINATION 2021/2022 SESSION

COURSE CODE: CHM326 **CREDIT UNIT: 2**

COURSE TITLE: INDUSTRIAL CHEMICAL TECHNOLOGY 1I

INSTRUCTION: ANSWER ANY THREE (3) QUESTIONS

TIME ALLOWED: 2 HOURS

Q1a. Write a brief note on the following chemical technological concepts:

i. Mass transfer ii. Material balance. (**5 marks each)**

b. Write briefly on automation and remote control of a process stream (**5 marks)**

c. Explain the concept 'optimum process condition" as it relate to industrial technological process **(5 marks)**

Q2ai. Using the thermal condition, explain the various types of reactors. (**9 marks)**

ii. Give four (4) basic criteria to be considered when selecting a reactor for the production of a named product. **(4 marks)**

b. Describe the working principle of fluidized bed catalytic reactor. (**5 marks)**

c. Distinguish between homogeneous and heterogenous catalytic process. (**2 marks)**

Q3ai. When is a chemical transformation said to occur in kinetic and diffusion region? State how such transformations can be increased in a gas-liquid reaction system. **(6 marks)**

b. Explain the various elementary stages involved in a heterogeneous system. (**6 marks)**

c **i.** Distinguish between heat and energy (**2 marks)**

ii. State the basic laws that governs heat transfer (**3 marks)**

iii. Describe the various mode of heat transfer **(3 marks)**

Q4a. Enumerate the various steps to be adopted in solving a material balance equation.(**6 marks)**

b**.** Justify why continuous and automated operating conditions should be adopted in an manufacture of a given product by a manufacturing outfit. **(4 marks)**

c. In a chemical technological process, 500kg of 20% by mass of HNO_3 solution was concentrated to 80% in a continuous evaporator. Calculate the production rate of the concentrated solution and the rate of water removal from the evaporator. (**10 marks)**