

NATIONAL OPEN UNIVERSITY OF NIGERIA

**UNIVERSITY VILLAGE, PLOT 91 CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESS WAY, JABI - ABUJA.**

**FACULTY OF SCIENCES**

**DEPARTMENT OF PURE AND APPLIED SCIENCE**

**OCTOBER/NOVEMBER, 2019 SECOND SEMESTER EXAMINATION**

**COURSE CODE: CHM 316**

**COURSE TITLE: INDUSTRIAL CHEMICAL TECHNOLOGY I**

**CREDIT UNIT: 2**

**TIME: 2 Hours**

**INSTRUCTION: Answer question one and any other three questions.**

**QUESTION ONE**

1ai. Explain briefly the concept of mass transfer by convection.

 2 marks

1aii.)What is heat transfer? Mention the fundamental methods of heat transfer. 3 marks

1b. With reference to boiling of water in open air, explain mass transfer by change of phase.

 2 marks

1c. Mention six (6) examples of mass transfer. 3 marks

1d. Define the term diffusion flux. 2 marks

1e. Differentiate between unit operations and unit process. 71/2 marks

1f. what is a chemical reactor? Hence state the different types of reactors.

 51/2 marks

**QUESTION TWO**

2a. State and explain briefly the Second law of thermodynamics. 31/ 2 marks

2b. What is heat conduction (2 marks). Discuss briefly the three types of heat conduction (31/2 marks each).

**QUESTION THREE**

3a.) Write briefly on Chemical Technology Equipment. 41/2 marks

3b.) What is a Heat exchanger? Give four (4) examples of heat exchangers.

 61/2 marks

3c.) Explain briefly application of distillation in the chemical industries. 4 marks

**QUESTION FOUR**

Discuss briefly the following:

1. Adsorption 3 marks
2. recrystallization 6 marks
3. membrane filtration 6 marks

**QUESTION FIVE**

5a.) Write a short note on mass transfer. 8 marks

5b.) Describe briefly the operating principles of distillation. 7 marks