

**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**

**APRIL/MAY, 2019 EXAMINATIONS**

**COURSE CODE: CHM 316**

**COURSE TITLE: INDUSTRIAL CHEMICAL TECHNOLOGY I**

**CREDIT UNIT: 2**

**TIME: 2 Hours**

**INSTRUCTION: Answer question one (1) and any other three (3) questions.**

**QUESTION ONE**

1a. What is heat transfer. Describe the fundamental methods of heat transfer? 3 marks

1b. Describe mass transfer. 5 marks

1c. Explain the modes of mass transfer. 12 marks

1d. What is unit process. 5 marks

**QUESTION TWO**

2a. State the Fourier’s law of heat conduction. 2 marks

2b. Mention six (6) examples of mass transfer. 3 marks

2c. Describe diffusion flux. 2 marks

2d. Describe briefly a reactor and enumerate types of reactors. 8 marks

**QUESTION THREE**

3a. Write briefly on physical and chemical processes with appropriate illustrations. 71/2 marks

3b. Explain in detail the term mixing and also the stages involved in mixing. 71/2 marks

**QUESTION FOUR**

4a. Explain the following separation processes:

I Separation by flashing 51/2 marks

ii. Distillation 51/2 marks

4b. Describe agitation. 4 marks

**QUESTION FIVE**

5a. Explain Fick’s first law of diffusion 5 marks

5b. Mention three unit operations that employ heat transfer. 1½ marks

5bii) Using boiling of water in open air, explain mass transfer by change of phase. 2 marks

5c) Draw a flow chart of physical processes of salt manufacture. 21/2 marks

5d) Discuss briefly Gravitational separation: 4 marks