

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- Vth SEMESTER-EXAMINATION – MAY/JUNE - 2012****Subject code: 150404****Date: 05/06/2012****Subject Name: Principles of Process Engineering-II****Time: 02:30 pm – 05:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Notations used have their conventional meanings.

- Q.1** (a) Differentiate between direct and indirect mass transfer operations with examples of each in detail. **06**
- (b) Define and explain molecular and eddy diffusion with examples. With special reference to N_A and J_A , derive Fick's law of diffusion. Also, prove that for unidirectional binary diffusion $J_A = -J_B$. **08**

- Q.2** (a) Classify mass transfer operations in detail with examples of each. **07**
- (b) With neat sketches, explain penetration theory for mass transfer at fluid surfaces. **07**

OR

- (b) Explain two resistance theory for interphase mass transfer. **07**

- Q.3** (a) Explain selection criteria for choice of solvent in case of gas absorption. **07**
- (b) Discuss various equipments available for gas-liquid contact in detail. **07**

OR

- Q.3** (a) Give stepwise procedure to determine Minimum Liquid gas ratio for absorbers. **07**
- (b) Explain Absorption factor and stripping factor in detail. **07**

- Q.4** (a) Define liquid extraction and state applications of liquid extraction in chemical and biotechnology industries in detail. **06**
- (b) 150 kg of nicotine-water solution containing 1% nicotine is to be extracted with 250 kg of kerosene at 20°C. Water and kerosene are essentially immiscible in each other. Determine the % extraction of nicotine after single stage. The equilibrium relationship is $Y^* = 0.798X$, where X and Y^* are expressed as kg nicotine/kg kerosene and kg nicotine/kg water respectively. **08**

OR

- Q.4** (a) Discuss the systems of three liquids- one pair partially soluble and the effect of temperature on these ternary equilibria of LLE. **07**
- (b) Explain the equipments of liquid extraction with any one in detail. **07**

- Q.5** (a) Explain mass transfer with chemical reaction with a suitable example. **07**
- (b) With neat sketch, explain shanks system in leaching. **07**

OR

- Q.5** (a) Describe preparation of solids for leaching with examples. **07**
- (b) Discuss any equipment of leaching with neat diagram. **07**
