

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-V (OLD) - EXAMINATION – SUMMER 2017****Subject Code: 153502****Date: 05/05/2017****Subject Name: Basics of Mass Transfer****Time: 02:30 PM to 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.

- Q.1** (a) State dimensions and SI units of viscosity, diffusivity and molar flux. Convert 1 centipoise, 1 cal/g °C, and 1 mol/cm<sup>2</sup> s to corresponding SI units. **07**
- (b) Write Henry's law, Dalton's law, Raoult's law and Fick's law of diffusion with equation. **07**
- Q.2** (a) Derive a relation between individual and overall mass transfer coefficients according to two film theory. **07**
- (b) Derive Rayleigh equation for batch distillation. **07**
- OR**
- (b) Starting from Fick's law of diffusion, derive an integrated equation to compute the molar flux of gas A diffusing through non-diffusing gas B. A and B are ideal gases. **07**
- Q.3** (a) Draw a schematic diagram of tray type gas absorption column and describe the process. **07**
- (b) Define the following terms: Humidity, relative humidity, percentage humidity, humid heat, humid volume and dew point. **07**
- OR**
- Q.3** (a) Name the various types of distillation and schematically explain the working of any one of them. Cite any two industrial application of distillation. **07**
- (b) Explain wet bulb temperature and adiabatic saturation temperature. **07**
- Q.4** (a) Write in brief construction and working of tray dryer. **07**
- (b) What are the different types of packing material used in packed tower? Differentiate between random and regular packing arrangement. **07**
- OR**
- Q.4** (a) State the different types of cooling towers and discuss the working of any one of them in detail. **07**
- (b) Give importance of drying operation. Describe with diagram drying curve. **07**
- Q.5** (a) Explain the mechanism of crystallization process. **07**
- (b) What are the advantages of membrane separation processes? Give any three membrane separation processes and mention their driving forces. **07**
- OR**
- Q.5** (a) Define leaching and give at least two industrial applications of the process. Discuss the effect of various factors on the rate of leaching. **07**
- (b) With the help of neat diagrams describe horizontal tube and vertical tube natural circulation evaporators. **07**

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