

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VI- EXAMINATION – SUMMER 2016****Subject Code:160501****Date:19/05/2016****Subject Name:Mass Transfer Operation –II****Time: 10:30 AM to 01:00 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) Derive operating line for Rectification and Stripping sections of distillation column with neat figure **07**  
(b) Derive the relation to determine the time needed for constant & falling rate period of the batch drying operations. **07**
- Q.2** (a) Classify dryers and discuss selection criteria for dryers **07**  
(b) Derive feed line equation and discuss different feed conditions in distillation with respect to q-line **07**
- OR**
- (b) Explain the concept of wet-bulb temperature and adiabatic saturation temperature **07**
- Q.3** (a) Define azeotropes and write a note on types of azeotropes **07**  
(b) Discuss differential distillation and derive Rayleigh's equation. **07**
- OR**
- Q.3** (a) Discuss types of adsorption operations and enlist different adsorbents with application **07**  
(b) A mixture of 35 mol% A and 65 mol% B is to be separated in fractionating column. The concentration of A in the distillate is 93 mol% and 96 mol% of all product A is in the distillate. The feed is half vapor and reflux ratio is 4. The relative volatility is 2. Calculate the number of theoretical plates in the column and locate the feed plate. **07**
- Q.4** (a) Differentiate between Bound, Unbound and Free moisture in context with the drying operations. **07**  
(b) Explain pressure swing adsorption with neat diagram **07**
- OR**
- Q.4** (a) A porous solid is dried in a batch dryer under constant drying conditions. Five hours are required to reduce the moisture content from 25 to 6%. The critical moisture content was found to be 14% and the equilibrium moisture 4%. All moisture contents are on the dry basis. Assuming that the rate of drying during falling rate period is proportional to the free moisture content, how long should it take to dry a sample of same solid from 20 to 6% under the same drying conditions ? **07**  
(b) Discuss two stages cross current adsorption using Freundlich equation. **07**
- Q.5** (a) 100 moles of Benzene (A) and Toluene (B) mixture containing 50 % mole of benzene is subjected to a differential distillation at atmospheric pressure till the composition of the benzene in the residue is 33%. Calculate the total moles of the mixture distilled. Average relative volatility is 2.16. **07**

- (b) Explain any five important terms used in psychometric operation for air water mixtures. **07**

**OR**

- Q.5** (a) What do you mean by Ion Exchange? Describe techniques and application of ion exchange and list out the factors on which rate of ion exchange is dependent **07**  
(b) Explain with the sketch, the principle and working of rotary drier. **07**

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