

Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

**GUJARAT TECHNOLOGICAL UNIVERSITY**

**BE - SEMESTER-VI (NEW) - EXAMINATION – SUMMER 2016**

**Subject Code:2160405**

**Date:09/05/2016**

**Subject Name: Principles of Process Engineering-III**

**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) Define adiabatic saturation temperature and derive the equation of ‘adiabatic saturation curve’ on the psychometric chart and state its usefulness. **07**  
(b) Explain nature of adsorbents and their selection criteria along with some examples. **07**
- Q.2** (a) Explain various types of cooling tower arrangements in industries along with their sketches. **07**  
(b) Explain single stage adsorption operation with neat diagram, graph and equations. **07**
- OR**
- (b) What is azeotrope? Discuss positive deviations from ideality with examples & neat sketch. **07**
- Q.3** (a) A liquid mixture containing 50 mole % n-Heptane and 50 mole % n-Octane is flash vaporized at 1 std atm. pressure and 30°C to vaporize 60 mole % of the feed. Compute the composition of liquid and vapor in the separator. Relative volatility of n-Heptane to n-Octane : 2.16 **07**  
(b) Explain differential distillation and derive Rayleigh equation. **07**
- OR**
- Q.3** (a) Explain stepwise procedure of McCabe-Thiele method for obtaining number of stages in a binary distillation column. Clearly state all assumptions also. **07**  
(b) Discuss principle of steam distillation and give applications of it. **07**
- Q.4** (a) Explain with a neat diagram, principle and working of Rotary Dryer. **07**  
(b) A filter cake is dried for 5 hours from an initial moisture content of 30% to 10% (wet basis). Calculate the time required to dry the filter cake from 30% to 6% (wet basis). Equilibrium moisture content is 4% on dry basis and Critical moisture content is 14% on dry basis. **07**
- OR**
- Q.4** (a) With special reference to falling rate period and constant rate period, explain rate of drying curve. **07**  
(b) Define: **07**  
Bound moisture, unbound moisture, equilibrium moisture, free moisture, critical moisture, adsorption, crystallization.
- Q.5** (a) Discuss agitated batch crystallizer with a neat diagram. **07**  
(b) What is reflux ratio? Explain Total, Minimum and Optimum reflux ratio. **07**
- OR**
- Q.5** (a) Define nucleation and saturation. Write principles of crystallization. **07**  
(b) Compare Extractive and Azeotropic distillation with examples. **07**

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