Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA ENGINEERING – SEMESTER – V • EXAMINATION – WINTER - 2017

Subject Code:3350502 **Date: 06-11-2017**

Subject Name: Mass transfer-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.**
4. **Use of programmable & Communication aids are strictly prohibited.**
5. **Use of only simple calculator is permitted in Mathematics.**
6. **English version is authentic.**

Q.1 Answer any seven out of ten. **14**

1. Define :Relative volatility
2. Classify the mass transfer operations.
3. What is the effect of pressure on relative volatility?
4. Give the application of Spray dryer.
5. Difference between evaporation and drying.
6. Justify the need of gas-liquid contact equipment for mass transfer operation.
7. Define adsorption and state the industrial application of it.
8. State the principle of Ion exchange.
9. Write the statement of Raoult's law
10. State the principle for crystallization.

Q.2 (a) Classify the gas –liquid contact equipment with example. **03**

OR

(a) Explain the effect of gas velocity in packed tower in detail. **03**

(b) Derive the equation $\alpha = P_A/P_B$ **03**

OR

(b) Define Azeotrope and draw the graph for minimum and maximum boiling azeotrope. **03**

(c) Explain the VLE at constant pressure. **04**

OR

(c) Explain the VLE at constant temperature. **04**

(d) Derive the Rayleigh equation for simple distillation. **04**

OR

(d) Explain Flash vaporization distillation. **04**

Q.3 (a) Give the importance of packing and classify them. **03**

OR

(a) Define the humidification and de-humidification.and give one industrial application of each. **03**

(b) Discuss the operating problem of Tray tower. **03**

OR

(b) Classify re-boilers used in distillation and explain any one. **03**

(c) Give the classification of cooling towers in detail. **04**

OR

(c) Classify drying and draying equipment and explain any one equipment. **04**

(d) Derive the equation for the constant and falling rate period for batch drying of solids. **04**

OR

(d) Describe the effect of temperature on adsorption and heat of adsorption. **04**

Q.4 (a) Explain the Freundlich's Equation for adsorption of solute from the dilute solution. **03**

OR

(a) List out the commonly used adsorbents for adsorption process. **03**

(b) Describe the construction and working the Pressure Swing Adsorber. **04**

OR

(b) Explain the construction and working of DTB crystallizer. **04**

(c) A feed of 50 mole % hexane and 50 mole % octane is fed into a pipe still through a pressure reducing valve and then into a flash disengaging chamber. The vapor and liquid leaving the chamber are assumed to be in equilibrium. If the fraction of the feed converted to the vapor is 0.5, find the compositions of the top and bottom products. The following table gives the equilibrium data for this system. **07**

Mole fractions of hexane in liquid *x*	1.00	0.69	0.40	0.192	0.045	0.00
Mole fractions of hexane in vapor *y*	1.00	0.932	0.78	0.538	0.1775	0.00

Q.5 (a) Explain the use of Psychometric chart to find out the properties of gas-vapor system. **04**

(b) Draw the Spray dryer with detail notation. **04**

(c) Write down the steps for McCabe –Thiele method for find out No. of stages in distillation tower. **03**

(d) Describe Flooding and Loading in packed column. **03**

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