

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 6 – EXAMINATION – SUMMER 2026

Subject Code: 3160501

Date: 08/06/2026

Subject Name: Mass Transfer Operations 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. Simple and non-programmable scientific calculators are allowed.

- Q.1** (a) Define: (a) Dry bulb temperature (b) Dew point (c) Humid heat **03**
 (b) Explain constant pressure equilibria with neat sketch. **04**
 (c) Derive q-line equation for feed tray location. **07**

- Q.2** (a) Explain various industrial application of adsorption. **03**
 (b) Why only unbound moisture is removed during constant drying period? **04**
 (c) Explain azeotropic distillation with suitable example. **07**

OR

- Q.2** (c) 100 kmol of liquid mixture containing 50 mole% n-heptane (more volatile) and 50 mole% n-octane at 30°C is to be subjected to a differential distillation at atmospheric pressure with 60 mole% of liquid distilled. Compute the composition of the composited distillate and the residue using Rayleigh equation. Use equilibrium data for n-heptane and n-octane (in mole fractions of n-heptane in vapour and liquid) is given below: **07**

X	0.5	0.46	0.42	0.38	0.34	0.32
Y	0.689	0.648	0.608	0.567	0.523	0.497

- Q.3** (a) List assumptions of McCabe-Thiele method. **03**
 (b) Compare steam distillation with vacuum distillation. **04**
 (c) With neat sketch explain separation in enriching and stripping section of continuous rectification column. **07**

OR

- Q.3** (a) Explain relative volatility. **03**
 (b) How drying is different from evaporation? **04**
 (c) Apply Freundlich equation to determine the adsorption capacity of an adsorbent in a two-stage cross current operation. **07**

- Q.4** (a) Define: (a) Relative humidity (b) Percentage saturation (c) Lewis relation **03**
 (b) With neat sketch explain spray chambers. **04**
 (c) Give detailed classification of cooling towers and discuss about any one in detail with neat sketch. **07**

OR

- Q.4** (a) Explain flash distillation in brief. 03
(b) With neat sketch explain positive deviation from ideality. 04
(c) Derive equation for Adiabatic Saturation Curve. 07

- Q.5** (a) List benefits of spray drying. 03
(b) Explain freeze drying. 04
(c) Derive the relation to determine the time needed for constant and falling rate period of the batch drying operation. 07

OR

- Q.5** (a) Explain Adsorption hysteresis. 03
(b) Compare and contrast physical adsorption and chemisorptions. 04
(c) Explain ion exchange with its various techniques and application. 07
