MECM–101

M. E./M. Tech. (First Semester)
EXAMINATION, Dec., 2011
(Grading/Non-Grading System)
(Chemical Engg. Branch)
SEPARATION PROCESS
(MECM–101)

Time : Three Hours

Maximum Marks : { *GS : 70* / *NGS : 100* }

Note : Attempt any *four* questions. All questions carry equal marks.

1. (a) Explain the mechanism of diffusion in solids.

(b) Estimate the liquid diffusion coefficient of ethanol C_2H_5OH in a dilute solution of water at 10°C, where

$V_{C_2H_5OH} = 2\,V_C + 6\,V_H + V_O$.

Carbon	$= 14{\cdot}8\ cm^3/g\ mol$
Hydrogen	$= 3{\cdot}7\ cm^3/g\ mol$
Oxygen	$= 7{\cdot}4\ cm^3/g\ mol$

at 10°C the viscosity of a solution containing 0·05 mole of alcohol/liter of water is 1·45 cp.

T = 283 K, ϕ_B for water = 2·6 and M_B for water = 18.

P. T. O.

2. (a) Explain steady state diffusion through a stagnant gas film.

(b) Explain simultaneous heat and mass transfer in the condensation of a vapor upon a cold surface and obtain the expression for total energy flux and mass flux.

3. (a) Explain turbulent flow considerations in molecular momentum diffusivity and eddy mass diffusivity.

(b) Describe the Chilton-Colburn analogy.

4. Explain individual mass transfer coefficients and overall mass transfer coefficient based on concentration gradient between two contacting phases.

5. Explain the plate to plate calculations for multicomponent systems presented by Lewis and Matheson.

6. Describe the stepwise calculation method for the design of the azeotropic tower.