2nd Periodical Test (17 January 2022)
Mass Transfer-1

Class- BE (Chemical & Food Tech.), 5th Semester   Time Duration-1 hour
Note   Attempt all questions.   M. Marks-25

Q.1   A packed tower is to be designed for the absorption of 98% of the ammonia from an air-ammonia mixture containing 4% ammonia at a rate of 4200 m^3/h using water as the solvent. The tower operates at 105.1 kPa and 303 K. The equilibrium data for NH_3-water system at 303 K is given below:

Partial pressure of NH_3 (mm Hg)	19.3	29.6	40.1	51.0	79.5	110
Kg NH_3 per 100 kg water	2	3	4	5	7.5	10

(i)   Calculate and plot the equilibrium data as x_A vs. p_A, x_A vs. y_A, X_A vs. Y_A.
(ii)   Calculate the minimum liquid rate for the absorption (the inlet water is NH_3-free).
                                                                        (5) (CO3)
Q 2   Explain the construction and working of sieve tray column.   (5) (CO4)

Q 3 The air in a room is at 37.8 ^{0}C and a total pressure of 101.3 kPa abs containing water vapor with a partial pressure is 3.59 kPa. Calculate (i) humidity. (ii) saturation humidity and percentage humidity, (iii) percentage relative humidity.   (5)   (CO4)
Q 4   Write the various steps involved for the design of a cooling tower.   (5) (CO4)
Q 5   Develop a relation to find out time of batch drying.   (5) (CO5)