Enrollment No: _____

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech Mid Semester Exam

Semester: 4th **Date: 30/01/2024**
Subject Code: 203103253 **Time: 10:30 AM T0 12:00 PM**
Subject Name: Mass Transfer-I **Total Marks: 40**

Sr. No.		Marks
Q.1	**(A)** 1. Define Overall Mass Transfer Resistance. 2. Direction of Mass transfer is from Higher Concentration to lower Concentration. **True/False** 3. Write down formula of mass flux with respect to observer moving with mass average velocity. 4. Define Eddy diffusion. 5. What is Interphase Mass transfer ?	**05**
	(B) Describe Surface renewal Theory in detail.	**05**
Q.2	**Attempt any four Questions.**	**12**
	(1) Write down equation of Mass & Molar fluxes at different conditions.	
	(2) Derive Expression for diffusion of A in Non diffusing B for the gaseous phase.	
	(3) Explain in detail Fick's law of diffusion along with neat sketch.	
	(4) Compare Different dimensionless groups associated with Mass transfer	
	(5) Explain the Following terms (i)Mass Flux (ii) Molar Flux (iii) Molar Concentration	
Q.3	**Attempt any two questions**	**08**
	(1) Explain in detail : Separation processes in Mass Transfer along with modes of separation & Separating agent.	
	(2) Correlate Fick's law of diffusion with other fundamental laws of Chemical Engineering.	
	(3) Explain the following terms (i) Local Mass Transfer Coefficient (ii) Overall Mass Transfer Coefficient (iii) Overall Mass Transfer Resistance (iv) Local Mass Transfer Resistance	
Q.4	**(A)** In an oxygen-nitrogen gas mixture at 101.3 kPa and 298 K, the concentrations of oxygen at two planes 2 mm apart are 20 and 10% by volume respectively. Calculate the flux of diffusion of oxygen for the cases where : (i) nitrogen is non-diffusing (ii) there is equimolar counter diffusion of the two gases. Diffusivity of O_2 in N_2 is 1.81×10^{-5} m^2 /s.	**05**
	(B) For a steady state condition if A is diffusing in B & B is also diffusing in A prove that rate of diffusion for both the cases will be similar.	**05**
	OR	
	(B) "Rate of renewal of liquid constituents on a gas bubble is similar for each & every constituents.". Justify the statement.	**05**