**Mass Transfer-1 Class Test**

**Time Duration: 30 minutes Date: 13th Feb 2023**

**Instructions:**

1.Assume atmospheric temperature and pressure, and required constants if not mentioned.

2. If constants are not provided then solve in terms of the missing constant.

Q.1. A cylindrical tank with a diameter of 2 m and total height of 5 m contains liquid methanol (MeOH, molecular weight 32g/mol), which is present at the bottom of a tank at a level of 1 m, open to the atmosphere. The MeOH vapours are quickly dispersed after they leave the tank. The gas space inside is stagnant. At 40°C, liquid MeOH exerts a vapour pressure of 265 mmHg. The diffusion coefficient of MeOH in air is 1.62 x 10-5 m2/s at 25°C. What is the rate of MeOH vapour emission from the tank, expressed in kg MeOH/day when the tank is at a temperature of 40°C? State all assumptions and boundary conditions.

Q.2. The equilibrium distribution of solute A between air and water at low concentration at a particular temperature is given below.

y=1.2x

At a certain point in a mass transfer device, the concentration of solute A in the bulk air is 0.04 mole fraction and that in the bulk aqueous phase is 0.025. At the same point, the local individual mass transfer coefficients for the transport of A are, ky = 7.2 kmol/(h)(m2)(Δy) and kx = 4.6 kmol/(h)(m2)(Δx). Calculate

(a) the interfacial concentrations in both the gas-phase and liquid-phase;

(b) the overall mass transfer coefficients, Ky and Kx; and

(c) the local mass flux, NA. Which resistance controls the role of mass transfer?