**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) The composition of air is often given in terms of only the two principal species in the gas mixture

oxygen, O2, yO2 = 0.21

nitrogen, N2, yN2 = 0.79

Determine the mass fraction of both oxygen and nitrogen and the mean molecular weight of the air when it is maintained at 25°C (298K) and 1 atm (1.013×105 Pa). The molecular weight of oxygen is 0.032 kg/mol and of nitrogen is 0.028 kg/mol.

(b) Considering the steady state diffusion in binary gas mixture, derive the equation for the flux for non-equimolar counter diffusion, when NA = NB/2.

Q.2. For a system in which component (A) is transferring from the liquid to the gas phase, the equilibrium is given by yA\* = 0.75xA. At one point in the apparatus the liquid contains 90 mol% of (A) and gas contain 45 mol% of (A). The individual gas film mass transfer coefficient at this point in the apparatus of 0.02716 kmol/m2.s , and 70% of the overall resistance to mass transfer is known to be encountered in the gas film. Determine:

(a) The molar flux of (A).

(b) The interfacial concentration of (A).

(c) The overall mass transfer coefficient for liquid and gas phases.