Major Examination. CLL252. Mass Transfer I

Max. Marks: 60 Max. Time: 2 Hours

Q. 1. Gaseous A is absorbed by solvent S, the latter containing solute B. The gas-liquid interface is taken to be the plane z=0. Species A reacts with B according to the reaction A+B → AB in an instantaneous irreversible reaction. It may be assumed that Fick's 2nd law adequately describes the diffusion processes, since A, B, and AB are present in S in low concentrations. Obtain expressions for concentration profiles of A and B. (30 marks)

Q. 2. A deep pool of ethanol is suddenly exposed to an atmosphere of pure carbon dioxide and unsteady state mass transfer, governed by Fick's law, takes place for 100s. What proportion of the absorbed carbon dioxide will have accumulated in the 1 mm layer closest to the surface in this period? Diffusivity of carbon dioxide in ethanol=4 x 10^{-9} m^2/s (30 marks)
