CHEMICAL REACTION ENGINEERING II

(BE CHEMICAL with MBA 4th Year)

Attempt all questions, assume any missing data Time: 1hr

M Marks:20

1. For a spherical particle of unchanging size in solid-fluid non-catalysed reaction:
   $A(Fluid) + bB(Solid) \rightarrow Product$
   If diffusion through the ash layer is rate controlling, derive the following expression:
   $t/\tau = 1-3(1-X_B)^{2/3} + 2(1-X_B)$
   where
   X_B = fractional conversion
   t= time for reaction
   τ = time for complete conversion (7)

2. Discuss in detail the Single site, Dual site and Eley Rideal mechanisms for surface reaction in solid catalysed gaseous reactions. (6)

3. For the following fluid-fluid reaction:
   $A_{(g \rightarrow l)} + B_{(l)} \rightarrow C_{(g \text{ or } l)}$
   derive a rate expression for straight mass transfer (adsorption) of component A present in gas phase moving to the liquid phase.
   Also Discuss the role of Hatta Number in fluid-fluid reactions. (4, 3)