CHEMICAL REACTION ENGINEERING (3-1-0)

Module – I

Introduction and overview of the subject, kinetics of homogeneous reactions, elementary and non-elementary reactions, Concentration and temperature dependent term of a rate equation, Collision theory, Transition - state theory and Arrhenius theory. Interpretation of batch reactor data for both reversible and irreversible reactions.

Various methods of analysis of batch reactor data (including variable volume and variable pressure (data). Iso-thermal batch reactor design.

Module - II

Homogeneous flow reactors : Design equations for steady state plug flow reactor (PFR) and steady state Continuous StirredTank Reactor (CSTR), data analysis in flow reactors, mean residence time, space time, space velocity. Combined reactors, Reactors in parallel and in series, size comparison of single reactors, Recycle reactors (PFR and CSTR)

Module – III

Design for parallel reactions, product distributions, contacting patterns for reactions in parallel, quantitative treatment of product distribution, selectivity, multiple reactions, qualitative treatment of batch, PFR and mixed reactors. Basics of non-ideal flow, RTD, Age distribution of fluid, pulse experiment, relationship between F and E curve only.

Textbooks and References :

1. Ievenspiel O. Chemical Reaction Engineering, Wiley International.
2. Fogler H. S., Chemical Kinetics and Reactor Calculation.
3. Smith J. M., Chemical Engineering Kinetics, Mc Graw Hill.
4. Wales J. M., Kinetics for Chemical Engineering, Mc Graw Hill.