PCP5I101 CHEMICAL REACTION ENGINEERING

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). Isothermal batch reactor design.

Module II:

Homogeneous flow reactors: Design equations for steady state plug flow reactor (PFR) and steady state continuous stirred tank 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.

Module III:

Design for parallel reactions, product distributions, contacting patterns for reactions in parallel, quantitative treatment of product distribution, selectivity, multiple reactions, and 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 curves.

Text and Reference Books:

- *Chemical Reaction Engineering, 3rd ed. by O Levenspiel, Wiley.*
- *The Engineering of Chemical Reactions, Lanny D. Schmidt, Oxford University Press*
- *Elements of Chemical Reaction Engineering, 4th ed. by H S Fogler, PHI.*
- *Chemical Reactor Analysis and Design, 3rd ed. by G F Froment, K B Bischoff, and J De Wilde, Wiley.*
- *Chemical Engineering Kinetics, 3rd ed. by J M Smith, McGraw-Hill.*