PRPE3001 FLUIDIZATION ENGINEERING (3-0-0)

Course Objectives:
To study the fluidization phenomena, fluidized bed regimes and models.

Module-I: (12 hr)
Introduction to fluidization, types of fluidization, gross behaviour of fluidized beds, minimum fluidization velocity, pressure drops in fluidized beds, bed voidage, TDH, viscosity and fluidity of beds, bubble behaviour, bed expansion, distributor design.

Module-II: (18 hr)
Simple mathematical treatment, Solid transport: flow and fluidized solids, solids transfer, terminal velocity, particle entrainment and elutriation, simple calculations.

Module-III: (10 hr)
Heat and mass transfer in fluidized beds: Heat transfer mechanism, principles of gas-solid and bed surface transfer, heat transfer to liquid fluidized systems, generalized correlation for fluidized bed mass transfer and its limitations.

Module-IV: (08 hr)
Semi-fluidization: principles, production of various bed parameters, Industrial applications; Design of fluidized bed reactors: Concept of RTD, basic design principles for fluidized bed.

Course Outcomes (CO):
Upon completion of this course, the students will be able to:
CO1: Understand the fluidization phenomena and operational regimes.
CO2: Design various types of gas distributors for fluidized beds and determine effectiveness of gas mixing at the bottom region.
CO3: Analyze fluidized bed behavior with respect to the gas velocity.
CO4: Develop and solve mathematical models of the fluidized bed.

Text Books:
1. Fluidization Engineering, 2nd ed. by D Kunii and O Levenspiel, Butterworth-Heinemann.

Reference Books:
1. Handbook of Fluidization and Fluid-Particle Systems by W C Yang, CRC Press.
2. Fluidization by M Leva, McGraw-Hill.
3. Fluidization by J F Davidson and D Harrison, Academic Press.