

SYLLABUS
JUNIOR LAB ASSISTANT (CHEMICAL ENGINEERING)

- **Fluid Mechanics and Mechanical Operations**

- a. Fluid statics, surface tension, Newtonian and non-Newtonian fluids, transport properties, shell balances including differential form of Bernoulli equation and energy balance, equation of continuity, equation of motion, equation of mechanical energy, flow through pipeline systems, velocity profiles, flowmeters, pumps and compressors, flow past immersed bodies including packed and fluidized beds.
- b. Particle size and shape, particle size distribution, size reduction and classification of solid particles; free and hindered settling; centrifuge and cyclones; thickening and classification, filtration, agitation and mixing.

- **Heat Transfer**

Equation of energy, steady and unsteady heat conduction, convection and radiation, thermal boundary layer and heat transfer coefficients, boiling, condensation and evaporation; types of heat exchangers and evaporators and their process calculations; design of double pipe, shell and tube heat exchangers, and single and multiple effect evaporators.

- **Mass Transfer**

Fick's laws, molecular diffusion in fluids, mass transfer coefficients, film, penetration and surface renewal theories; momentum, heat and mass transfer analogies; stage-wise and continuous contacting and stage efficiencies; HTU & NTU concepts; design and operation of equipment for distillation, absorption, leaching, liquid-liquid extraction, drying, humidification, dehumidification and adsorption, membrane separations (micro-filtration, ultra-filtration, nano-filtration and reverse osmosis).

- **Chemical Reaction Engineering**

Theories of reaction rates; kinetics of homogeneous reactions, interpretation of kinetic data, single and multiple reactions in ideal reactors, kinetics of enzyme reactions (Michaelis-Menten and Monod models), non-ideal reactors; residence time distribution, single parameter model.

- **Instrumentation and Process Control**

Measurement of process variables; sensors and transducers; P&ID equipment symbols; transfer functions and dynamic responses of various systems, controller modes (P, PI, and PID); control valves; transducer dynamics; stability, frequency response, controller tuning, cascade and feed forward control, general principal of measurement systems.

- General English, Quantitative Aptitude, Analytical Reasoning & General Knowledge / Current Affairs.