

SYLLABUS FOR THE POST OF
LECTURER (TECHNICAL)



Subject : Chemical Engineering

1. **Fundamental of Chemical Engg:** Conversion of units, Numerical calculation and estimation, statistical analysis of data, fitting of non-linear data, Analysis of the Degrees of Freedom in Steady-State Processes, Dimensionless analysis, Ideal and real gases, equation of states, humidification and dehumidification operations, psychometric char
2. **Process Calculation:** Basic material balance Principles, material balance with and without Chemical reaction. Bypass, recycle, purging, Energy balance that accounts for chemical reactions, effect of temperature on standard Heat of reaction, Temperature of reaction.
3. **Fluid Flow Operation:** Compressible and incompressible fluid, Numerical problems related to pressure measurement by manometer, Velocity field, laminar flow, velocity gradient and rate of shear, Turbulant flow, Reynold's experiment. Flow in boundary layer, Bernoulli's equation & its application to pumps, blowers, turbines, Laminar flow of Newtonian fluid, Hagen- poisseuille equation, Laminar flow of non-Newtonian fluids, velocity distribution for turbulent flow
4. **Energy Engg:** Basic concepts of solid fuel, liquid fuel and gaseous fuel. Alternative energy resources, Combustion Calculations.
5. **Chemical Reaction Engg:** Kinetics of Homogeneous Reactions, Interpretation of batch reactor data, Introduction to reactor design, Ideal reactors for a single reaction, Design for single reactions, Introduction to Multiple Reactions, Temperature and Pressure effects, Optimum Operation of Reactors, Temperature, Catalysis and Catalytic Reactors, Residence Time Distribution (RTD) for Chemical Reactors and Models for Non Ideal Reactors.
6. **Mechanical Operations:** Size Reduction of Solids, Motion Of Particles in a Fluid, Sedimentation, Fluidisation, Filtration, Mixing and Agitation
7. **Chemical Engineering Thermodynamics:** First law of thermodynamics, Second law of thermodynamics, Thermodynamics Properties of fluids,
8. **Process Instrumentation:** Response of 1st order and 2nd order instruments. Level measuring devices, Flow measuring devices, Measurement of displacement, measurement of density, Temperature measuring devices
9. **Process Utility:** Importance of process utilities in chemical industry and their applications
10. **Heat Transfer Operation:** Heat transfer by conduction , Heat Transfer by convection, Condensation, Heat Transfer by Radiation, Heat Exchangers and Evaporators.
11. **Mass Transfer Operation:** Diffusion Mass Transfer, Mass transfer co-efficient, Absorption, Drying, Distillation, Solid – Liquid Extraction, Liquid – Liquid Extraction
12. **Process Dynamics and Control:** Modelling the dynamic and static behaviour of Chemical Processes, Dynamic behaviour of Chemical Processes, Feedback controllers. Controllers and final control elements



13. **Petroleum Refining and Petrochemicals:** Primary processing of crude oil, Secondary processing of crude oil, Treatment techniques, Petrochemicals, Environmental and safety aspects in refinery and petrochemicals.
14. **Process Equipment Design:** Design of heat transfer equipments, Design of Pressure vessels and Storage Tanks, Design of mass transfer equipments, Heat exchanger networks
15. **Environmental Pollution Control Engineering:** Air Pollution: Causes and their solutions, Water Pollution: Causes and their solutions, Solid Waste Management, Noise pollution.
16. **Transport Phenomena:** Molecular Transport Mechanisms, Molecular Transport and the General Property Balance, Transport with net convective flux.
17. **Petroleum Production Technology :** Reservoir consideration, Drilling technology, Well analysis and formation damage, Activation techniques, Rigs.
18. **Alternative Energy Resources :** Energy Crisis, Energy Resources, Solar Energy, Energy from Biomass, Hydroelectricity, Geothermal, Wind and Tidal Energy.
19. **Advanced Separation Techniques:** Introduction to Reverse Osmosis, Micro filtration, Ultra filtration.