rd Semester	RCH3C002	Chemical Process Calculation	L-T-P 3-0-0	3 CREDITS

Module I: **(07 hrs)**
Ideal gas laws, equation of state, Vapor pressure, Clausius-Clapeyronequation, Ideal and non-ideal solutions, humidity-relative saturation & percentagesaturation, concept of wet & dry bulbs thermometer, use of Humidity chart.

Module II: **(10 hrs)**
Engineering Calculations: Units and dimensions Conversion of units. Chemical reactions: excess reactant, limiting reactant, conversion, extent of reaction yield and selectivity in multiple reactions. Composition of mixtures and solutions. Flow-sheeting: degrees of freedom and its importance in flow-sheeting.

Module III: **(08 hrs)**
Material balances &unit operations: drying, crystallization dissolution, combustion, etc.Solving material balance (steady and unsteady state processes) without and with chemicalreactions, recycle, bypass,& purge calculations.

Module IV: **(10 hrs)**
Energy balance concepts: Heat capacity, Calculation of enthalpy changes without change ofphase, Energy balance with chemical reaction, Standard heat of reaction at constant,pressure & constant volume, effect of T and P on heat of reaction, Adiabatic reaction oftemperature, heat of solution & mixing.

Module V: **(10 hrs)**
calculations for unit operations like mixing, evaporation, crystallization and distillation Combustion reactions. Law of Dalton and Amagat, Densities of gaseous mixture. Real gases: Critical properties, various equation of state, Law of corresponding states. Vapour pressures: Liquefaction, Vaporization, Cox Chart, DuhringPlot.Psychometric calculations.Use of spreadsheet software (Excel/Origin).

Books:

- *Stoichiometry and Process Calculations by B Lakshmikutty and K V Narayanan, PHI.*
- *Stoichiometry, 5th ed. by B I Bhatt and S B Thakore, McGraw-Hill.*
- *Elementary Principles of Chemical Processes, 3rd ed. by R M Felder and R W Rousseau, John Wiley.*
- *Chemical Process Principles: Material and Energy Balances (Part - 1), 2nd ed. by O A Hougen, K M Watson, and R A Ragatz, CBS.*
- *Principles of Chemical Engineering Processes by N Ghasem and R Henda, CRC.*
- *Basic Principles and Calculations in Chemical Engineering, 8th ed. by D M Himmelblau and J B Riggs, PHI.*

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