

Subject: Chemical Engineering Principles-II

CHE-222 3RD Semester	Subject: Chemical Engineering Principles- II	2CH	
		Theory (2)	
Pre-req.	CEP-1	Category	Core
Course Contents as per PEC Guidelines 2023-2024			
• Energy and its forms: Principle of energy, Concepts of units, different forms of energy and their calculations, basic concepts of energy balance, the general energy balance equation. • Laws and properties of thermodynamics: Laws of thermodynamics, definition of thermodynamic properties like Heat capacity, Enthalpy, calculation of enthalpy changes (without phase change), with phase change transitions. Energy balance on nonreactive processes: Close system energy balance, open system energy balance, Mechanical energy balance, enthalpy balance without reaction, Energy balance on nonreactive processes of multiple inlet and outlet streams, Energy balance for heat of solution. • Energy balance on Reactive systems: Energy balance with heat of reaction, Energy balance on heat of combustion. • Balances on unsteady state processes: Examples of unsteady state energy balance. • Case studies on chemical processes (Analysis with example) • Computer applications/Programming in stoichiometric calculations.			

Weekly plan

Week /Lecture	Topic
1	Introduction to chemical engineering calculations
2-3	Units and dimensions, unit conversions, dimensional homogeneity
4	Principle of energy, Concepts of units, different forms of energy and their calculations
5	Laws of thermodynamics, definition of thermodynamic properties like Heat capacity, Enthalpy.
6	Calculation of enthalpy changes (without phase change), with phase change transitions / Energy Balance on non-reactive systems basics

7-8	Energy balance: Non-Reactive system (Closed System, Open system) Steady State and Unsteady state
9-10	Mid Term Exams/ Energy balance for multiple input and output, Basic introduction to reactive systems
11-12	Energy balance with heat of reaction
13	Energy balance on heat of combustion.
14	Balances on unsteady state processes: Examples of unsteady state energy balance / Heat Effects
15-16	Case studies on chemical processes (Analysis with example)/ Industrial Examples
17	Revision
18	End Semester Exam

TEXT AND REFERENCE BOOKS:

- Himmelblau David M. "Basic Principles and Calculations in Chemical Engineering". 8th Ed. 2014. Prentice Hall PTR.
- Felder Richard M., Rousseau Ronald W. "Elementary Principles of Chemical Processes" 3rd Ed. 2005. John Willey & Sons.
- Reklaitis G. V., Schneider Daniel R. "Introduction to Material and Energy Balances" 1983. John Wiley & Sons.
- Hougen Olaf A., Watson Kenneth M. "Chemical Processes Principles". 2004, John Wiley and Sons & CBS Publishers.
- Chopy & Hicks, "Handbook of Chemical Engineering Calculations", 2nd Ed. 1994 McGraw-Hill Professional Publishing.

