

Subject: Chemical Engineering Principles-II

CHE-103 3 RD Semester Pre-req.	Subject: Chemical Engineering Principles-II	2CH	
		Theory (2)	
	CEP-1	Category	Core
Course Contents as per PEC Guidelines 2023-2024			
<u>Contents:</u> • 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.