

NIRMA UNIVERSITY

Institute:	Institute of Technology
Name of Programme:	B.Tech. (Chemical Engineering)
Course Code:	2CH603CC25
Course Title:	Process Calculations
Course Type:	Core
Year of introduction:	2025-2026

L	T	Practical component				C
		LPW	PW	W	S	
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Course Learning Outcomes (CLOs):

At the end of the course, the students will be able to –

1. relate the units and dimensions of various physical quantities. (BL 2)
2. solve the problems using basic chemical engineering principles in industry setups. (BL 3)
3. apply the principles of material balance and energy balance for unit operations and unit processes of chemical industries (BL 4)
4. evaluate energy balance problems for unit operations and processes in chemical industries. (BL 5)

Contents		Teaching Hours (Total 30)
Unit 1	Dimensions and Units Dimensions and system of units, fundamental and derived units, conversions.	2
Unit 2	Basic Chemical Calculations Mole, atomic mass and molar mass, composition of solid & solid mixtures, liquid & liquid mixtures, gas & gaseous mixture, fundamentals laws.	3
Unit 3	Material Balance with and without Chemical Reactions Material balance of unit operations, material balance with and without recycle, bypass and purge streams, concept of limiting and excess reactants, percentage conversion, yield and selectivity, material balance involving chemical reactions with and without recycling, parallel and bypassing operations.	15
Unit 4	Energy Balance with and without Chemical Reactions Heat capacity, sensible heat changes in gases, liquids and solids, heat capacity of gas and liquid mixtures, latent heats, enthalpy changes accompanying chemical reactions, standard heat of formation, combustion and reaction, effect of temperature.	10

Self Study:

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

Tutorial Work:

Tutorial work will be based on content of course and a Generalized Approach to Problem Solving Using Various Software Tools.

Suggested Readings:

1. Himmelblau, D. M., Basic Principles & Calculations in Chemical Engineering, Prentice Hall Publisher.
2. Bhatt, B. I. and Thakore, S. B., Stoichiometry, Tata McGraw Hill.
3. Hougen, O. A., Watson, K. M., Chemical Process Principles Part-I, Material and Energy Balance, John Wiley and Asia Publisher.
4. Sikdar, D.C., Chemical Process Calculations, Prentice Hall of India.
5. Venkatramani, V., Anantharaman, N., Begum, K. M. Meera Sheriffa, Process Calculations, Prentice Hall of India.

L= Lecture, T= Tutorial, P= Practical, C= Credit