BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI- K. K. BIRLA GOA CAMPUS

INSTRUCTION DIVISION

SECOND SEMESTER 2017-2018

Course Handout (Part II) Date: 28/7/2017

In addition to part -I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No. : CHE F211 **Course Title: Chemical Process Calculations**
Instructor-in-charge: Pradeep Kumar Sow **Tutorial Instructor: Pradeep Kumar Sow/Shuchi**

1. Scope and Objective of the Course:

This course is to an introductory stoichiometry course that traditionally plays several important roles in Chemical engineering curriculum. It prepares the student to formulate and solve material and energy balances on chemical process systems and lays the foundation for subsequent courses.

2.1 Text Book: Himmelblau D. M. "Basic Principles and Calculations in Chemical Engineering", PHI 6th Ed.

2.2 Reference Book: Felder R.M. & Rousseau R.W.,"Elementary Principals of Chemical Process", John Wiley & Sons, Inc., 3rd Ed.

3. **Course Plan:**

Lect. No.	Learning Objectives	Topics to be covered	Ref. (Text book)
1	Introduction to Chemical Engineering	Historical overview of Chemical Engineering: more recent developments, Features of organized chemical processing-from chemistry to chemical engineering.	
2-3	Units and dimensions	Units and dimensions, conversion of units, Force and weight, dimensional homogeneity	H 1.1
4–6	Basic concepts	Mole unit, Mass and volume, Density, specific gravity, Chemical compositions, Pressure, Temperature	H 1.2 – 1.7
7	Ideal gases and Mixtures	Ideal gas law calculations, Mixtures- Dalton's law, Amagat's law, Avg. properties for mixtures, Real gases	H 4.1
8–9	Solutions & Phase behavior	Vapor pressure, Boiling point, Partial pressure, Clapeyron Equation Ideal solutions, Raoult's law, Henry's law,	H 4.3–4.4, 5.2-4
10–13	Fundamentals of Material balances	Process classification, system, Balances, Program of analysis of material balance problem, Solving material balance without chemical reaction Recycle, bypass, purge calculations	H 3.1–3.3 H 3.6
14–16	Material balance with chemical reactions	Balances on reactive systems and processes, Additional considerations about chemical processes	H 3.4
17–18	Material balances involving multiple systems	Solving material balance problems involving multiple subsystems	H 3.5

19–22	Energy balances	Concepts and units, Forms of energy, General energy balance for closed and open system without chemical reaction, Calculation of enthalpy changes	H 5.1- Felder 7.3-7.4
23–26	Energy balances with chemical reaction	Energy balances that account for chemical reaction, Energy balance procedure	H 5.4 Felder 7.6
27–29	Energy balances on nonreactive system	Elements of energy balance calculation for non reactive system	Felder 8
30–32	Balances on reactive processes	Heats of reaction, Hess's law, Heats of formation, Heats of combustion, Energy balances on reactive processes	Felder 9
33–36	Humidity	Humidity, Partial saturation, Relative saturation, Humidity charts and theirs uses	H 5.7
37-39	Computer aided balance calculation	Introduction to computer aided calculations- steady state material and energy balances for chemical plants	Felder 10
40-43	Unsteady state material and energy balances	Unsteady state material and energy balances	H 7.1

4. **Evaluation Scheme:**

Component	Duration	Weightage (%)	Date & Time	Remarks
Test I	90 mins.	30	10/10/2017 (FN)	OB/CB
Assignment/Tutorial/ Quiz		30	Regular	
Comprehensive Exam.	3 hrs.	40	01/12/17 (FN)	OB/CB

5. **Chamber Consultation Hour:** To be announced in the class

6. **Notice:** Notices, if any, concerning the course will be displayed on the Chemical Engg. Board/ Moodle.

7. The date, time and venue of Test – 1 and comprehensive exam is mentioned in the Time-table.
   The Surprise quiz / Assignment / Tutorial test will be at the discretion of the Instructor-in- Charge.

8. Make-up will be granted for genuine cases only. Prior permission of IC is compulsory.

Instructor-in-charge
CHE F211