

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI K.K.BIRLA GOA CAMPUS
INSTRUCTION DIVISION
FIRST SEMESTER 2018-2019
Course Handout (Part II)

Date: 03/08/2018

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 F214**
Course Title : **Engineering Chemistry**
Instructor-in-charge : **Manjuri Kumar**
Tutorial Instructor : Manjuri Kumar

Course Description:

Introduction to basic principles of various branches of chemistry, and their applications in chemical Industries.

Organic chemistry (Important functional groups and their reactions, Some important name reactions commonly used in chemical industry); **Physical chemistry** (Thermodynamic processes, Thermochemistry, Electrochemistry, Adsorption, Catalysis), **Chemical methods of analysis** (volumetric analysis: neutralization, redox, complexometric titrations), **Instrumental methods of analysis** (IR, UV-vis spectroscopy, Chromatography), **Engineering materials** (cementing materials, refractories, polymers), **Metals and alloys** (Iron and steel), **Corrosion** (types of corrosion and corrosion control methods), **Water treatment** (Hardness of water, water analysis and water treatment), **Fuels and combustion** (Classification of fuels, Analysis of coal, Combustion, Calorific value and its determination).

2. Scope & Objective: It aims to impart students an in-depth knowledge of various aspects of chemistry as applied to engineering. The course also aims to bridge the theoretical concepts and their practical engineering applications, thus highlighting the role of chemistry in the field of Chemical engineering.

3. Text Books:

TB: Dr Suba Ramesh and others, Engineering Chemistry, Wiley India, , 2011,1st Ed.

4. Reference Books:

R1: P. W. Atkins, Elements of physical chemistry, 8th edition, Oxford University Press

R2: T. W. Graham Solomons and Craig B. Fryhle, Organic Chemistry, 9th edition, John Wiley and sons

R3: Perry and Green, Perry's Chemical Engineers' Handbook, 9th Edition, Section 2, McGraw Hill

R4: Dr S. S. Dara and Dr S. S. Umare, A Text book of Engineering Chemistry, S. Chand & Company Ltd, 2000 1st Ed.

R5: William Kemp , Organic Spectroscopy, Palgrave, 1991, 3rd Ed.

5. Course Plan:

L N	Topic	Learning objectives	Text Book/Ref Book Chapter #
1-3	Organic Chemistry: Important Functional groups and their reactions	Alcohols, carboxylic acids, amines, aldehydes and ketones, ethers.	R2:
4-7	Some Name reactions	Friedel-Craft acylation, Beckmann rearrangement, Aldol condensation, Cannizzaro reaction, Hofmann rearrangement, Pinacol-Pinacolone rearrangement, Diels-Alder reaction.	TB: Ch 9
8-11	Physical Chemistry Thermodynamics	Thermodynamic processes, Thermodynamic properties, First law of thermodynamics, Enthalpy, Heat capacity, Thermochemistry, Second law of thermodynamics, Entropy.	TB: Ch 4 R3: sec 2

12	Catalysis	Homogeneous and heterogeneous catalysis, autocatalysis, Enzyme catalysis, mechanism, catalytic promoters and inhibitors.	TB: Ch 5
13-16	Electrochemistry	Types of electrolytes, Electrochemical cells, Electrode potential, Galvanic cells, Nerst equation, Measurement of EMF, types of electrodes, concentration cells, Batteries.	TB: Ch 7
17-19	Adsorption	Introduction to adsorption process, Adsorption isotherms, Breakthrough concentration curves.	TB: Ch 8
20-22	Analytical Chemistry Chemical Methods of analysis	Volumetric analysis, Neutralization titrations, Redox titrations, Complexometric titrations	TB: Ch 11
23-26	Instrumental Methods of analysis	Infrared spectroscopy UV-Visible spectroscopy Chromatography.	TB: Ch 12 R5: Ch 4 TB: Ch 12
27-29	Industrial & Engineering Chemistry Polymers	Classification of Polymers, Types of polymerization, Molecular weight of polymers, polymerization techniques, some important commercial thermoplastics and thermosetting resins,	TB: Ch 13
30-32	Engineering Materials	Cementing materials, Refractories, Insulators, Lubricants	TB: Ch 14 R4: Ch 16
33-34	Metal and Alloys	Physical properties of metals, Chemical characteristics, Iron, Steel, Alloys, Alloys of steel.	TB: Ch 15
35-37	Fuels and Fuel analysis	Classification of fuels, Calorific value, combustion, solid fuels-coal, Proximate and ultimate Analysis of coal, liquid fuel, gaseous fuels, flue gas analysis.	TB: Ch 16
38-39	Corrosion	Types of corrosion, Factors influencing rate of corrosion, Corrosion control methods, Protective coatings,	TB: Ch 18
40-42	Water and its impurities ,Waste water analysis, water treatment	Impurities in water, Hardness of water and its determination, Analysis of water, Boiler feed water, Techniques for water softening.	TB: Ch 19 R4: Ch 1

6. Evaluation Scheme:

Component	Duration	Weightage (%)	Date & Time	Venue	Remarks
Mid semester examination	90 mins	30	10.10.18 Wednesday 11.00-12.30 am		CB
Surprise test/assign		25	To be announced		OB
Attendance		5			
Compre Exam	3 hrs	40	01.12.18 (AN)		CB

5. Chamber Consultation Hour:

To be announced in the class.

6. Notices:

Notices, if any, concerning the course will be displayed on the Chemical Engg Notice Board only.

Manjuri Kumar
Instructor-in-charge
CHE F214