BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI – K.K.BIRLA GOA CAMPUS
FIRST SEMESTER 2017-2018
Course Handout (Part - II)

Date: 01/08/2017

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. : **CHEM F111**
Course Title : **General Chemistry**

Instructor-in-charge : RAGHU NATH BEHERA
Instructors: Halan Prakash, Mainak Banerjee, P. Bhavana, Tincy Lis Thomas, Ranjan Dey, Rashmi Chauhan, K. P. Jayadevan, Subhadeep Banerjee and Tanmoy Mandal

Scope and Objective of the Course: The course provides a comprehensive survey of the concepts involved in the study of the electronic structure of atoms and molecules, spectroscopy, chemical equilibrium, chemical kinetics, stereochemistry and reactivity of organic compounds and transition metal coordination complexes.

Text Books:
T1: P.W. Atkins, Elements of Physical Chemistry: 6th Edition, Oxford University Press, 2015.
T2: T. W. Graham Solomons and Craig B. Fryhle, Organic Chemistry, 10th Edition, John Wiley & Sons, Inc. New York, 2011.
T3: J. D. Lee, Concise Inorganic Chemistry, 5th Edition, Blackwell Science, Oxford, 1999.

L N	Topic	Learning Objectives	Text**
1-4	Quantum Theory	Wave function, Schrodinger Equation, Uncertainty, Simple Applications.	T1: 12.1-12.7, 12.9
5-7	Atomic Structure and Spectra	Hydrogenic Atom: Energy Levels and Wavefunctions, Orbitals, Spectral Transitions, Many-electron Atoms: Pauli Principle, Orbital Approximation, Aufbau Principle, Periodic trends in properties.	T1: 13.1-13.7, 13.8-13.14(SS) 13.15-13.16 (SS)
8-10	Chemical Bonding: VB and MO Theories	VB Theory: Electron Pair Bond, Hybridization, Resonance. MO Theory: LCAO, Bonding and Antibonding Orbitals, Diatomic Molecules.	T1: 14.1-14.11
11-13	Thermodynamics: The First, second and third laws	Thermodynamic Systems, State Functions, Thermal Equilibrium and Temperature, Work, Internal Energy and Heat Transfer, Heat Capacity, Entropy and thermochemistry	T1: Chapters 2-3 (SS), 4.1-4.13
14-15	Spontaneity and equilibrium	Applications of entropy, Gibbs' energy in chemical reactions	T1: 5.1-5.3, 7.1-7.4
16-18	Chemical Kinetics: Experimental Methods, Reaction	Rate Laws, Order, Rate Constants, Arrhenius Equation, Rate-determining step, Steady-state Approximation.	T1: 10.1-10.9, 11.4-11.7

	Rates, Temperature Dependence		
19-21	Vibrational and Electronic spectroscopy	General Features, Vibrational Energy Levels and Spectra and applications; Electronic Spectra: Franck-Condon Principle, Types of Transitions.	T1: 19.7-19.11, 20.1-20.4 T2: 2.16
22-23	Some Concepts in Inorganic Chemistry & Introduction to coordination compounds	Double salts and coordination compounds. Werner's work; Identification of structure by isomer counting. Effective Atomic No. concept.	T3: p194-201
24-25	VB theory and Crystal field theory for octahedral complexes	Explanation for the stability of complexes according to crystal field theory	T3: p202-214
26-27	Jahn-Teller distortions; Square planar and Tetrahedral complexes	How do geometrical distortions stabilize the system? Stability in other geometries	T3: p214-222
28	Chelates & Isomerism	Different types of ligands and stabilization due to entropy factors and electron delocalization in the rings.	T3: p222-224, 307,351-352, 389, 793, 807. p230-232 (SS)
29-31	Stereochemistry	Isomerism, chirality, origin of optical activity, stereochemistry of cyclic compounds, resolution.	T2: 5.1-5.18, 7.2
32-33	Conformations	Rotation around sigma bonds, conformational analysis of butane, cyclohexane	T2: 4.8-4.9, 4.10 (SS), 4.11-4.12
34-35	Substitution reactions	Nucleophilic substitution reactions (both S_N1 and S_N2) of alkyl halides.	T2: 6.2-6.13
36-37	Elimination reactions	Elimination reaction of alkyl halides; Hoffmann and Cope Elimination.	T2: 6.15-6.19, 7.5-7.8, 20.13
38-39	Addition reactions	Addition reactions to >C=C< bond	T2: 8.1 (SS), 8.2-8.14, 10.9
40-42	Aromaticity and aromatic compounds	Structure and reactivity of benzene and other aromatic compounds.	T2: 14.3-14.7, 15.1-15.2, 15.6-15.11

**SS: Self-Study

Evaluation Scheme:

Component	Duration	Weightage%	Date, Day &Time	Remarks
Mid Sem Exam	90 min	30%	10.10.2017, Tue (2:00PM-3:30PM)	Closed Book
Tutorial Tests**	-	20%		Open Book
Comprehensive Exam	3 hrs.	50%	05.12.2017, Tue (9:00AM-12NOON)	Closed Book

******Tutorial Tests will consist of tests/assignments from topics (recently covered) during Sept. and Nov. The duration and exact dates will be announced later.

Chamber Consultation Hours: To be announced in the tutorial class.

Make-up: Will be granted only on genuine reason on case-to-case basis.

Notices: Notices concerning the course will be displayed on the course server (photon), http://photon.bits-goa.ac.in/lms/

Instructor-in-Charge

CHEM F111