Course code: **CH101R1**
Course title: **Chemistry**
Pre-requisite(s): **Intermediate level chemistry**
Co- requisite(s):
Credits: **4** L: 3 T: 1 P: 0
Class schedule per week: **04**
Class: **B. Tech**
Semester /Level: **I**
Branch: Chemistry
Name of Teacher:

Course Objectives

This course enables the students:

A.	To create concept of chemical bonding in coordination chemistry
B.	To understand the basics of stereochemistry, aromaticity and reaction mechanism of organic molecules
C.	To understand the reaction dynamics and to know different types of catalysis
D	To apprehend the basic principles and the application of vibrational, electronic and NMR spectroscopy
E	To develop knowledge on the physical state and electrochemistry of molecules

Course Outcomes

After the completion of this course, students will be:

1.	Able to explain the bonding in a coordination complex
2.	Able to explain the 3D structure, aromaticity and stereochemistry of organic molecules
3.	Able to predict the rate, molecularity and mechanism of a simple as well as catalytic reaction
4	Able to explain the UV-vis, IR and NMR spectra of unknown molecules
5.	Able to interpret the phase diagram of simple one and two component heterogeneous systems in equilibrium and the electrochemical behavior of the molecules

CH 101R1 4 (3-1-0) CHEMISTRY (Credit: 4)

Syllabus

Module I: Bonding in Coordination Complex (8 Lecture)
Introduction to Chemical Bonding, Werner's Theory, Bonding in coordination complexes, Crystal Field Theory, Octahedral, Tetrahedral and Square planar complexes, CFSE, Jahn Teller theorem, Spectral, electronic and magnetic properties of coordination complexes.

Module II: Organic Structure and Reactivity (8 Lectures)
Aromaticity, Geometrical isomerism: *cis–trans*, E/Z, and syn-anti isomerism; Optical isomerism & Chirality; Wedge, Fischer, Newmann and Sawhorse projection formulae and interconversions; D/L, R/S nomenclature system; Conformational studies of n-butane.
Addition, Elimination, Substitution and Rearrangement reaction.

Module III: Kinetics and Catalysis: (8 Lectures)
Kinetics of Chain, Parallel/Competing/Side, Consecutive reactions; Fast reactions; Outline of Catalysis, Acid-base catalysis, Enzyme catalysis (Michaelis-Menten equation), Important catalysts in industrial processes: Hydrogenation using Wilkinsons catalyst, Phase transfer catalyst.

Module-IV: Spectroscopic Techniques (8 Lectures)
Absorption Spectroscopy, Lambert-Beers law, Principles and applications of UV-Visible spectroscopy, Principles and applications of Vibrational spectroscopy; Introduction of NMR spectroscopy.

Module V: Phase and Chemical Equilibrium (8 Lectures)
Phase rule: terms involved, Phase diagram of one component (Water) & two component (Pb/Ag) system & their applications; Gibbs Free energy, Van't Hoff equation and Chemical Equilibrium; Nernst Equation, Standard electrode potential, EMF measurement and its application, Batteries and Fuel Cells.

Text books:

1. Huheey, J. E., Inorganic Chemistry: Principles of Structure and Reactivity, 4th edition, Pearson.
2. Morrison, R. N. & Boyd, R. N. Organic Chemistry, Seventh Edition, Pearson
3. Atkins, P. W. & Paula, J. Physical Chemistry, 10th Ed., Oxford University Press, 2014.

Reference books:

1. Lee, J. D. Concise Inorganic Chemistry ELBS, 1991.
2. Mortimer, R. G. Physical Chemistry 3rd Ed., Elsevier (2009).
3. William Kemp, Organic Spectroscopy, 3rd Ed., 2008 Macmillan.

Course Delivery methods
Lecture by use of boards/LCD projectors/OHP projectors
Tutorials/Assignments
Seminars
Mini projects/Projects
Laboratory experiments/teaching aids
Industrial/guest lectures
Industrial visits/in-plant training
Self- learning such as use of NPTEL materials and internets
Simulation

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Mid-Sem	**25**
Assignment	**05**
Two Quizzes	**20**
End Sem Examination Marks	**50**

Assessment Components	CO1	CO2	CO3	CO4	CO5
Mid-Sem	√	√	√		
Assignment	√	√			
Quiz –I	√				
Quiz II				√	
End Sem Examination Marks	√	√	√	√	√

Indirect Assessment –

1. Student Feedback on Faculty

2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Course Outcome #	Program Outcomes			
	PO1	PO2	PO3	PO4
CO1	**M**	**H**	**L**	**L**
CO2	**H**	**H**	**M**	**L**
CO3	**H**	**H**	**H**	**M**
CO4	**H**	**M**	**H**	**L**
CO5	**H**	**H**	**H**	**M**

Mapping Between COs and Course Delivery (CD) methods

CD	Course Delivery methods	Course Outcome	Course Delivery Method
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, 2, 3, 4	CD1
CD2	Tutorials/Assignments	CO1, 2, 3, 4	CD1,CD2
CD3	Seminars	CO 2, 3	CD3
CD4	Mini projects/Projects	CO3, 4	CD4
CD5	Laboratory experiments/teaching aids	CO 1, 2, 3	CD5

CD6	Self- learning such as use of NPTEL materials and internets	CO1, 2, 3, 4	CD6
CD7	Simulation	CO2, 4	CD7

Lecture wise Lesson planning Details.

Week No.	Lect. No.	Ch. No.	Topics to be covered	Text Book / References	COs mapped	Methodology used
1-3	L1-L8	1	Bonding in Coordination Complex	T1, R1	1	PPT Digi Class/Chock -Board
3-6	L9-L16	2	Organic Structure and Reactivity	T3, R2	1	-do-
6-8	L17-L24	3	Kinetics & Catalysis	T2	2	-do-
9-11	L25-L32	4	Spectroscopic Techniques	T2, R3	3	-do-
11-14	L33-L40	5	Phase and Chemical equilibrium	T3, R2	4	-do-