

PROGRAM: Electronics & Communication Engineering	DEGREE: B.TECH CREDITS: 4
COURSE TITLE : CHEMISTRY-I	SEMESTER: FIRST SECTION : A
COURSE CODE : BS-CH101	Contact hours / Week : 3(L)+1(T)

COURSE OBJECTIVES

Students will learn about

1	Microscopic property of species like atomic structure using Schrodinger equation, molecular orbital theory, crystal field theory, intermolecular forces and critical phenomena of gases.
2	Macroscopic property of molecules related to thermodynamics, electrochemistry, redox reaction, solubility equilibrium, technology of water and corrosion.
3	Spectroscopic techniques to analyse the various ranges of the electromagnetic spectrum and their application.
4	Periodic properties of elements like effective nuclear charge, atomic and ionic sizes, ionization energies, electron affinity, electronegativity, coordination numbers and molecular geometries.
5	Stereochemistry of organic compounds and isomerism in transitional metal compounds.
6	Mechanism of organic reactions and synthesis of drug molecules.

COURSE OUTCOMES

On Completion of the course the student will be able to

<i>Course Code</i>	<i>Description</i>	<i>PO & PSO MAPPING</i>	<i>BT LEVEL</i>
CH101.1 (CO1)	Apply microscopic chemistry in atomic and molecular orbitals and intermolecular forces.	PO1, PO2, PO12, PSO2	L3 (Apply)
CH101.2 (CO2)	Rationalise bulk properties and processes using thermodynamic considerations.	PO1, PO2, PO7	L3 (Apply)
CH101.3 (CO3)	Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.	PO1, PO2, PO3, PO12, PSO2	L3 (Apply)
CH101.4 (CO4)	Rationalise periodic properties and behaviour of the different elements	PO1, PO2, PSO2	L3 (Apply)
CH101.5 (CO5)	Study the stereo chemical structure of various organic compounds	PO1, PO2	L3 (Apply)
CH101.6 (CO6)	Understand major chemical reactions that are used in the synthesis of molecules.	PO1, PO2, PO3	L2 (Understand)

COURSE OUTCOMES VS POs MAPPING (DETAILED; HIGH:3; MEDIUM:2; LOW:1)

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	1	-	1
CO2	3	2		-	-	-	1	-	-	-	-	-	-	-
CO3	2	2	1	-	-	-	-	-	-	-	-	1	-	1
CO4	2	2	-	-	-	-	-	-	-	-	-	-	-	1
CO5	1	2	-	-	-	-	-	-	-	-	-	-	-	-
CO6	1	2	1	-	-	-	-	-	-	-	-	-	-	-
CH101	2	2	1	-	-	-	1	-	-	-	-	1	-	1

LESSON PLAN

L→ Class lecture; A1→ Chalkboard ; T→ Book Reference

S N	Topics to be covered	Teaching Aids	Reference
<i>Unit-1: Atomic and molecular Structure</i>			
L1	Schrodinger equation	A1	T2
L2	Particle in 1D box solution and their applications	A1	T2
L3	Molecular orbital theory for some diatomic molecules.	A1	T2,T3
L4	Pi-molecular orbital diagram of butadiene and benzene, aromaticity	A1	T2,T3
L5	Crystal field theory for transition metal ions.	A1	T1,T2
L6	Energy level diagram of transitional metal ions & magnetic properties	A1	T1
L7	Band structure of solid & role of doping.	A1	T9,T10
<i>Unit-2: Spectroscopic techniques and applications</i>			
L8	Principle of spectroscopy & selection rule	A1	T4, T3
L9	Electronic & UV spectroscopy.	A1	T4, T3
L10	Vibrational and rotational spectroscopy.	A1	T4, T3
11	Fluorescence and its applications in medicine,	A1	T4, T3
12	NMR spectroscopy	A1	T4, T3
13	Surface characterizations techniques	A1	T4, T3
<i>Unit-3: Intermolecular forces</i>			
14	Ionic, dipolar and van Der Waals interactions	A1	T2, T3
15	Equation of state of real gases and critical phenomenon	A1	T2, T3
<i>Unit-4: Use of free energy in chemical equilibrium</i>			
16	First and second law of thermodynamics & their functions.	A1	T9, T10
17	Estimation of entropy and free energies	A1	T9, T10
18	Cell potential, Nernst equation and applications	A1	T9, T10
19	Acid-base, oxidation-reduction & solubility equilibrium	A1	T6, T7
20	Water chemistry,	A1	T6, T7
21	corrosion, Ellingham diagrams	A1	T6, T7
<i>Unit-5: Periodic properties</i>			
22	Effective nuclear charge, variations of s, p, d, f orbital energy of atoms in periodic table.	A1	T1, T3
23	Electronic configuration, ionic size, ionization energy, electron	A1	T1, T3

	affinity, ionization energy, polarizability		
24	Co-ordination compound, HSAB concept	A1	T1, T3
25	VSEPR theory and molecular geometry	A1	T1, T3
<i>Unit-6: Stereochemistry</i>			
26	Representation of 3D structures, structural isomer & stereoisomer	A1	T3, T5
27	Configurations, symmetry and chirality of molecule	A1	T3, T5
28	optical activity, enantiomers, diastereomers	A1	T3, T5
29	Absolute configurations, conformational analysis and isomerism in transitional metal compounds	A1	T3, T5
<i>Unit-7: Organic reaction and synthesis of drug molecules</i>			
30	Reaction mechanism: substitution, addition reactions	A1	T8, T9, T10
31	Elimination (E1 and E2) reactions	A1	T8, T9, T10
32	Oxidations and reductions, cyclization and ring opening	A1	T3, T8
33	Synthesis of some commonly used drug molecules	A1	T3

Reference books:

- T1: Concise Inorganic Chemistry, 4th edition, J.D. Lee, Chapman & Hall
T2: Physical Chemistry, P. C. Rakshit, Sarat Book House.
T3: Engineering Chemistry, Rath and Chakraborty
T4: Fundamental of molecular spectroscopy, by C. N. Banwell
T5: Stereochemistry of Organic Compounds, by D. Nasipuri.
T6: Jain & Jain, engineering Chemistry, 15th edition, Dhanpat Rai Publishing Company, 2008.
T7: Shashi Chawla, A Text book of Engg Chemistry, Dhanpat Rai & Company, 2003.
T8: Peter Sykes, A Guidebook Mechanism in Organic Chemistry, 6th ed. Orient Longman.
T9: S. Bandyopadhyay & N.K. Hazra, Fundamentals engg chemistry, Chhaya Prakashani Pvt. Ltd.
T10: Gourkrishna Dasmohapatra, Engineering Chemistry, 2nd edition, Vikas Publication.

GAPS IN THE SYLLABUS

S.N.	DESCRIPTION	CO	PO	Actions Taken
1.	Wave function property, Hygenberg principle to introduction of Scordinger equation.	CO1	PO1, PO2	Topic was covered by Dr Esa Bose by delivering lecture on 1st Nov, 2018.
2.	Stereochemistry – conversion of projection formula.	CO5	PO3	Topics was discussed during delivery of lecture

TOPICS BEYOND SYLLABUS

S.N.	DESCRIPTION	P O	Actions Taken
1	Study of Particle in 2D/3D box for the application in nanomaterials	PO1, PO2	A workshop was organized on "the role basic Sc in engineering." on 3rd Nov, 2018.

