	DPG Institute of Technology and Management Sector 34, Gurugram HR 122004
	Lesson Plan
	Course Name: Chemistry
	Faculty Name: Dr.Simpi Mehta (ASST.PROF.)

No. of Lecture Hours/Week	**3L + 1T**	**Exam Hours**	**3Hrs**
Total No. of Lecture Hours	**48**	**Exam Marks**	**75**
Course Code:	25BSC-CH- 101H		

Course Objectives:

1 To acquaint the students with the basic phenomenon/concepts of chemistry that student faces during course of their study in the industry and Engineering field. To rationalise periodic properties such as ionisation potential, electronegativity, oxidation states and electronegativity.

2 To understand and explain scientifically the various chemistry related problems in the industry/engineering field.

3 To distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques and apply this knowledge to identify the materials.

4 To list major chemical reactions which are used in the synthesis of materials.

Lecture No.	**Topics to be covered**	**Teaching Methodology**	**Class Activity/Event**	**Remark/ CO**
1	**General Introduction of Syllabus**			
Section A	**Periodic Properties**	Chalk &Talk		
2	Effective nuclear charge, penetration of orbital's, variation of s, p, and f orbital and energies of atoms in periodic table	Chalk &Talk	Interactive diagram labeling	
3	Electronic configuration, atomic and ionic size, Ionization energies, electron affinity	Chalk &Talk	Group Discussion	
4	Polarizability and oxidation states, electro negativity	Chalk &Talk	Group Discussion	

	Atomic and Molecular structure			
5	Schrodinger equation(Introduction and concept only)	https://www.youtube.com/watch?v=vy-qStGSy0g	Lecture with Interaction	
6	Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations(derivation Excluded).	Chalk &Talk	Group Discussion	
7	Molecular orbital energy level diagrams of diatomic molecules.	https://www.youtube.com/watch?v=Dl6gaTnKexU&list=PL6KqGbWr7g8YVGAgAXXvYwQcRJrpsQgj9&index=33	Group Discussion	
8	Pi-molecular orbitals of butadiene and benzene	Lecture with Examples	Draw pi MO Diagrams	
9	Introduction to Crystal field theory	Lecture with Interaction	Draw CFT Diagrams	
10	The energy level diagrams for transition metal ions	Blended Learning	Group activity	
SECTION B	**Organic reactions and synthesis of a drug molecule**			
11	Introduction in Organic reactions, reaction intermediates, types of attacking reagents	Blended Learning	Draw reaction mechanism on board	
12	Classification of organic reactions, substitution reaction	PPT	Seminar	
13	Oxidation, Reduction and Cyclization reaction	Lecture with Interaction	Virtual experiment	

14	Addition reaction	Flipped Classroom	Discuss mechanism on board	
15	Elimination reactions	https://www.youtube.com/watch?v=XER-SqJj2UQ&list=PLyqSpQzTE6M-Z8hWhO7Hi-beDeWKa4Moh&index=41		
	Stereochemistry			
16	Isomerism, types of isomers and structural isomerism	PPT	Group discussion	
17	Stereoisomerism, Optical isomerism, Concept of chirality	Chalk &Talk	Quiz	
18	Diastereomerism, Meso Compounds	Lecture with Examples	Group discussion	
19	Optical activity, absolute configurations	Blended Learning	Using virtual lab	
20	Conformational analysis (Butane)	Physical Mode	Construct nodel	
21	Conformational analysis (Ethane, propane)	Physical Mode	Group discussion	
22	Isomerism in transitional metal Compounds	Physical Mode	Group discussion	
SECTION C	**Water Chemistry and Corrosion**			
23	Hardness of water- Introduction, Types and Unit of hardness	Blended Learning	Lab experiment	
24	Measurement of hardness by EDTA method	Blended Learning	Lab based activity	
25	Methods of water softening (Lime soda process)	Physical Mode	Discuss real world application	

26	Zeolite Process, Demineralisation process	Blended Learning	Group discussion	
27	Corrosion: Introduction, Types of corrosion.	Lecture with Interaction	Virtual lab	
28	Concept of hardness of water, Difference in lime soda and Zeolite process.	Physical Mode	Group discussion	
29	Dry Corrosion.	Physical Mode	Group discussion	
30	Wet corrosion and its types		Group discussion	
31	Pitting corrosion, waterline corrosion, microbiological corossion	Blended Learning	Group discussion	
32	Corrosion on PPT discussed	Blended Learning		
33	Differential aeration corrosion,stress corrosion, soil corrosion	Physical Mode	Group discussion	
34	Factors affecting corrosion	Blended Learning	Real world examples discussion	
35	Methods of prevention	Lecture with Interaction	Real world examples discussion	
36	Tutorial sheet discussion was carried out	Physical Mode		
37	Method of prevention contd……	Physical Mode	Group discussion	
	Intermolecular Forces			
38	Introduction to intermolecular forces, ionic forces, dipole forces	Blended Learning	Group discussion	
39	Vanderwaals forces, Dipole Dipole interaction	Blended Learning	Draw diagram	
40	Real and ideal gas, Equation of state of real gases and critical phenomenon	Physical Mode	Practice deivation	
Section D	**Spectroscopic techniques and applications**			
41	Basic of Spectroscopy	Lecture with Interaction	Revise basic concepts	

42	Principle of UV-Visible Spectroscopy	Physical Mode	Practise electronic transitions	
43	Application of UV-Visible Spectroscopy	Physical Mode	Group discussion	
44	Problems of students on the already done topic was carried out	Physical Mode	Group discussion	
45	Principle of IR Spectroscopy	Blended Learning	Group discussion	
46	Application of IR Spectroscopy	Blended Learning	Group discussion	
47	Principle of NMR Spectroscopy	Physical Mode	Spinning top example	
48	**Content Beyond Syllabus**	PPT		

Suggested Text / Reference Books

Text books:

1. "A text Book of Engineering Chemistry", by Rajshree Khare . S.K. Kataria & Sons

Reference books

1. University chemistry, by B. H. Mahan

2. Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane

3. Fundamentals of Molecular Spectroscopy, by C. N. Banwell

4. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan

5. Physical Chemistry, by P. W. Atkins

6. Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition.http://bcs.whfreeman.com/vollhardtschore5e/default.asp

Course Outcomes:

At the end of the course, the student will be able to:

CO 1	Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces
CO 2	Understand the concept of hardness of water and phenomenon of corrosion.
CO 3	Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.
CO 4	Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electron affinity

CO-PO-PSO Mapping :

	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO11	PO12	PS O1	PS O2
CO1	3		2		3	2	3	1	3	1	3	1	3	3
CO2	1	1	2	1	1	1	2		1	2	2	1	3	2
CO3		3		1			1				2	1		
CO4	1	2	3		1	1	1	2	1	2	1	1	1	1

Signature of Staff In-charge

Signature of HOD