

Course No.	Course Name	L-T-P-Credits
CY 403	Basic Inorganic and Main Group Chemistry	3-0-0: 3
Prerequisite: NIL		
Course Objectives:	The main objective of the course is to provide basic foundation on the theories of chemical bonding and acid base chemistry. The course is designed to provide knowledge of bonding, structure and properties of main group elements and their inorganic compounds, and redox properties.	
Course Outcomes:	After successful completion of the course, students will be able to: <ol style="list-style-type: none"> 1. Understand basic concepts of bonding theories of diatomic and triatomic molecules and predict structure and properties of molecules. 2. Understand inter and intramolecular interactions and predict properties of molecules. 3. Understand basic concepts of acid base and redox chemistry. 4. Apply these concepts to predict properties of molecules and ions. 5. Understand the bonding in inorganic chain, ring and cage compounds. 	
SYLLABUS		
Module	Contents	Hours
I	Chemical Bonding LCAO-MO methods in homo and heteronuclear diatomic molecules, bonding in triatomic molecules, VSEPR theory, hybridization, Walsh diagram, Bent's rule, structure and reactivity of covalently bonded molecules. Atomic and ionic radii–bond length, bond strength. Hydrogen bonding interactions, effect of hydrogen bonding and other chemical forces on melting, boiling and solubility.	15
II	Acid Base and Redox Chemistry Acid-Base concepts, measure of acid-base strengths, acid-base in water, hard and soft acids and bases, application of Pearson HSAB principle; Non-aqueous solvent, aprotic solvent and super acids. Standard electrode potential, pH dependent of electrode potential, stability of metal ions in water, Latimer and Frost diagrams.	8
III	Main-Group Chemistry Bonding in non-transition element compounds; Inorganic chains, rings, and cage compounds; silicates, boranes, carboranes, metalboranes and metallocarboranes, Wade's rules, S–N, Se–N and P–N compounds, one dimensional conductor, aluminosilicates, zeolites, clays and molecular sieves; halogen and noble gas chemistry; Inter halogen compounds.	13

Essential Readings:

1. J. E. Huheey, E. A. Keiter, R. L. Keiter and O. K. Medhi, *Inorganic Chemistry: Principles of structure and reactivity*, Pearson Education, 4th Edition, 2006.
2. F.A. Cotton, G. Wilkinson, C.A. Murillo and M. Bochmann, *Advanced Inorganic Chemistry*, Wiley, 6th Edition, 2007.

Supplementary Readings:

1. J. D. Lee, *Concise Inorganic Chemistry*, Oxford University Press, 5th Edition, 2008.