Programme: M. Sc. Part-I (Chemistry)
Course Code: ICO-401
Title of the Course: Topics in Inorganic Chemistry & Environmental Chemistry
Number of Credits: 03 **Effective from AY: 2018-19**

Prerequisites for the course:	Student should have studied the courses in chemistry at F.Y. B.Sc., S.Y.B.Sc. and T.Y.BSc. levels and / or CHIC-401 course so as to have basic knowledge of Inorganic / environmental chemistry.	No. of lectures
Course Objectives:	1. To provide fundamental aspects of transition & inner transition metals & their compounds. 2. To provide knowledge of main group elements of the periodic table & their compounds 3. To introduce various global phenomenon's of atmosphere & environment, follow directive of the Supreme Court in 1993 to introduced environmental education at all levels, have a fair knowledge on the various global activities to justify permissible or adverse, so that future generation are not adversely affected.	
Course Outcomes:	1. Students should be in position to understand fundamentals / usefulness of transition & inner transition metals. 2. Students should be in position to understand chemistry main group elements. 3. Students shall be aware of the maintenance of healthy living atmosphere on the globe.	
Content:	SECTION-I 1. **Chemistry of transition & inner transition elements** 1.1 Transition elements**:** IUPAC definition of transition elements, occurrence, physical & chemical properties, noble character, metal oxides & oxido complexes, examples of metal-metal bonded clusters. 1.2 Inner transition elements: Lanthanides, occurrence, properties, oxidation states, electronic structure, colour and spectra, magnetic properties, lanthanide contraction, compounds of lanthanides. Actinoid chemistry, general trends. 2. **Main group elements and their compounds** 2.1 Boron group: Compounds of boron:- borazine and boron nitride, synthesis, properties, structure & bonding. Borates: classification, structures & examples. 2.2 Carbon group: Allotropes of carbon including C_{60}, intercalation compounds of graphite, carbides. Compounds of silicon: silicates, zeolites & silicones. 2.3 Nitrogen group:- Introduction: oxides & oxyacids of nitrogen. 2.4 Oxygen group: oxyacids & oxohalides of S, S_4N_4 ring compounds: synthesis, properties, structure & bonding.	9 hr 9 hr

	SECTION-II 1. **Atmosphere** Structure and properties of the atmosphere, composition of atmosphere and vertical temperature behaviour, lapse rate and temperature inversion. 2. **Air Pollution** Classification of air pollutants and photochemical reactions in the atmosphere Common air pollutants (e.g. CO, NOx, SO_2, hydrocarbons and particulates) (a) sources (b) physiological and environmental effect (c) monitoring , d) various remedial & technological measures to curb pollution. Air quality standards. 3. **Water pollution** Importance of buffer & buffer index in waste water treatments. C hemical, physical & biological characteristics of water pollution, specific & non-specific characterization of water. DO, BOD, COD, and chlorine demand, typical water treatment & waste water treatment (Municipal). 4. **Treatment of Industrial wastes** Electroplating industry, fertilizer industry and pharmaceuticals industries. 5. **Biogeochemical cycles**: Carbon and Nitrogen cycles nature	2 hr 7 hr 5 hr 2 hr 2 hr
Pedagogy:	Mainly lectures / tutorials. Seminars / assignments / presentations / self-study or a combination of some of these could also be used to some extent.	
Text books / reference books	1. P.W. Atkins, T. Overton, J. Rourke, M. Weller, & F. Armstrong, *Shriver & Atkins Inorganic Chemistry*, Oxford publications, 2009, 5th Ed. 2. J. E. Huheey, E. A. Kieter, R. L. Kieter & O. K. Medhi, *Inorganic Chemistry: Principles of Structure & Reactivity*, Pearson, 2011, 4th Ed. 3. F. A. Cotton, G. Wilkinson & P. L. Gauss, *Basic Inorganic Chemistry*, Wiley, 2008 (reprint), 3rd Ed. 4. N.N. Greenwood and A. Earnshaw, *Chemistry of the Elements*, Pergamon Press, Exetr, Great Britain. 1984. 5. J.D. Lee, *Concise Inorganic Chemistry*, Wiley, 2008, 5th Ed. 6. A.V. Salker, *Environmental Chemistry: Pollution and Remedial Perspective*, Narosa Publication, 2017. 7. A.K. De, *Environmental Chemistry*, New Age, 2006. 8. A.C. Stern, R.W. Boubel, *Fundamentals of Air Pollution*, D. Bruce turner & D.L.Fox, Academic Press, 1984. 9. R.A. Horne, *Chemistry of Our Environment*", John Wiley, N.Y. (1978). 10. C.N. Sawyer & P.J. Macarty, *Chemistry for Environmental Engineering*, Mc Graw Hill, 1978. 12. L.L. Ciaccio, *Water and Water Pollution Hand Book*", Marcel Dekker, 1973. 13. J.C. Lamb, *Water Quality and its Control*, John Wiley & Sons, N.Y., 1985.	