

Course Content

Inorganic and Physical Chemistry (IPC)

1.	Course Title	Inorganic and Physical Chemistry	
2.	Course Code	CY121	
3.	Contact Hrs. (L-T-P)	3-1-0	
4.	Credits	11	
5.	Instructor	Dr. Debashis Panda Associate Professor Department of Sciences & Humanities	
6.	Email ID & Phone Number	dpanda@rgipt.ac.in	9455196041
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1. COURSE CONTENT (Unit wise distribution of content and number of lectures)

<i>Unit</i>	<i>Topics</i>	<i>Syllabus</i>	<i>No. of Lectures</i>
Unit-I	Chemical Bonding	Molecular Orbital (MO) Theory, Symmetries in Molecular Orbitals, MO Diagrams of diatomic molecules, NH ₃ , H ₂ O, CH ₄ , and Metal Complexes.	06
Unit-II	Transition Metals Chemistry:	Crystal Field Theory, Nature of Metal-Ligand Bonding, Stability, Electronic Spectra of Inorganic Complexes and Measurement of Magnetic Properties of Complexes, ORGEL diagram, Tanabe–Sugano diagram.	05
Unit-III	Organometallic Chemistry	Complexes with Metal-Carbon Sigma Bonds, Metal Carbonyl Complexes, Zeise's salt, Metal-Alkyl Complexes, Metal Complexes with Pi Acceptor Ligands, Alkene Complexes, Fischer carbenes & Schrock carbene, Catalysis and Reaction Mechanisms of Metal Complexes	06
Unit-IV	Quantum Chemistry	Schrodinger equation, Wave functions, Probability density, Operator, Eigen function & Eigen Value Schrödinger Equations, Many electron system Particle in a Box/Ring problem, Hydrogen atom. Atomic orbitals, many electron atoms and spin orbitals	06
Unit-V	Atomic & Molecular Spectroscopy	Implications of discrete energy levels, Population of States – Boltzman Distribution, Interaction of radiation with matter, origin of linewidths in molecular spectra, Transition dipole moment and Fermi's Golden Rule, Potential energy surfaces-	06

		Rates of reactions; Steady state approximation and its applications	
Unit-VI	Physical Transformation of Substances	Concept of pre-equilibrium; Equilibrium and related thermodynamic quantities. Phase diagrams, The stabilities of phases, Phase boundaries, Three typical phase diagrams, The location of phase boundaries, the thermodynamic criterion of equilibrium, and the Ehrenfest classification of phase transitions.	05
Unit-VII	Electrochemistry	Nernst equation, Concentration and Formation cells, Equilibrium at Electrode Interface, Double layer, Concept of Polarization, Over Potential, Butler-Volmer and Tafel' s equation, Limiting Current Concept, Applications of Electrochemical Kinetics to Fuel Cell, Water Electrolyzer, Batteries and Corrosion	06

2. READINGS

2.1 TEXT BOOKS:

Unit- I, II, III	Inorganic Chemistry: J. E. Huheey, E. A. Keiter, R. L. Keiter, 4th Ed. Prentice Hall Inorganic Chemistry: Shriver and Atkins, Oxford University Press
Unit- IV, V, VI	Physical Chemistry by Atkins, P. W. and de Paula, J., 7th Ed., Oxford University Press.
Unit-VII	Electrochemical Methods: Fundamentals and Applications by Allen J. Bard, Larry R. Faulkner

2.2 REFERENCE BOOKS:

- General Chemistry, McQuarrie, 4 th Ed., University Science Books.
- Chemistry: A Molecular Approach, Tro, 2nd Ed, Prentice Hall

2.3. **LECTURE SLIDES:** It will be made available to you by the instructor.

“It is very important for young people keep their sense of wonder and keep asking why.”

- Stephen Hawking

HAPPY LEARNING