Course Type	Course Code	Name of Course		Т	Р	Credit
DC	NCYC519	Transition Metal Chemistry		1	0	4

Course Objective

- This course will impart
- The basic understanding of various theories used in coordination chemistry of transition metal complexes and their properties.
- Reaction mechanism and electron transfer reactions

Learning Outcomes

- After studying this course, students should be able to:
- Understand the basic theories related to the bonding in transition metal complexes.
- Interpret the reaction kinetics and the electron transfer mechanism in the complexes.
- Understand origin and the interpretation of magnetic properties in the coordination complexes.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Free ion Terms, Mülliken symbols. Electronic Spectra of transition metal complexes: Orgel, Tanabe-Sugano, Correlation diagram, Crystal Field Theory, Derivation of CFSE, Nephelauxetic effect, Static and Dynamic Jahn-Teller distortion, Charge transfer spectra, Selection rules and its relaxations.	13 L+4T	The students will have the overall information on structure, bonding and conformations of coordination complexes.
2	Stability and reactivity of coordination compounds, thermodynamics and kinetic effects, Crystal field activation energy (CFAE), Spectroscopic method of assignment of absolute configuration of metal chelates and their stereochemical conformations.	11L+4T	This unit enlists the factors influencing the stability of metal complexes such as the nature of metal ions and ligands, bonding between metal ions and ligands, etc. In addition, the methods available for determining stability constants are given in detail.
3	Kinetics and mechanism of reactions of transition metal complexes: The trans effect, substitution reactions, volume of activation, Stochiometric and Intimate mechanisms, Rate Laws for D, A, and I pathways, Eigen- Wilkin's Mechanism, acid base hydrolysis, outer and inner sphere reactions, Self-exchange redox reactions, Marcus Hush theory for cross reactions.	10L+5T	This unit will impart the reaction mechanism, kinetics and the electron transfer processes in the coordination complexes.
4	Definition of magnetic properties, Sources of paramagnetism, Diamagnetism and Pascal Constants, Derivation of Curie Equation, Curie	8 L+1T	Students will cover the basic understanding of the magnetic properties in the coordination complexes.

and Curie-Weiss Law, Determination of Magnetic Susceptibility, Orbital and spin contribution to magnetic susceptibility, Introduction to magnetic properties of lanthanides, Magnetic exchange coupling, Spin crossover phenomena.		
Total	42L+14T	

Text Books:

 Inorganic chemistry, Gary L. Miessler, Paul J. Fischer, and Donald A. Tarr; 5th Edition, Pearson, 2012.

Reference Books:

- 1. Shriver & Atkins: Inorganic Chemistry, P.W. Atkins, T. Overton, J. Rourke, M. Weller and F. Armstrong; 5th Edition, Oxford University Press, 2013.
- 2. Inorganic Chemistry, Catherine E. Housecroft and Alan G. Sharpe.; 4th Edition, Pearson, 2012.