

INSTITUTE	FACULTY OF SCIENCE
PROGRAM	MASTER OF SCIENCE (CHEMISTRY)
SEMESTER	1
COURSE TITLE	INORGANIC CHEMISTRY - I
COURSE CODE	02CY2402
COURSE CREDITS	6

Course Outcomes: After completion of this course, student will be able to:

- 1 Student will be able to explain the fundamental concepts in coordination chemistry of transition metals
- 2 Student will be able to use the concept of magneto chemistry to explain the various magnetic properties of transition metal complexes
- 3 Apply the concept of ESR spectroscopy to explain the reactions of transition metal complexes.
- 4 Realize the importance of organometallic compounds in research and chemical industry

Pre-requisite of course: Before studying Inorganic chemistry, all students have basic knowledge of inorganic and organic compounds, molecular structure, Molecular orbital theories and knowledge related to UG level chemistry.

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
5	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	Coordination Compounds: Double salts, Coordination compounds, Coordination complexes and complex ions, Coordination number, various types of ligands, Color of coordination compounds, chelates, Effective atomic number, Valence bond theory, Crystal field theory, Crystal field splitting of energy levels, Crystal field stabilization energy, Magnetic properties of metal complexes, Ligand field theory, Jahn-Teller effect.	20
2	Magneto chemistry: Definition, Ferromagnetism, Anti-ferromagnetism, Ferri-magnetisms, Diamagnetism and Pascal's Constant, Russell-Saunders (RS) or LS Coupling, Relations between Multiple width to kT, Stereo chemical applications of Magnetic Properties of the First Transition Series, Lanthanides and actinides, Determination of magnetic susceptibility by Gouy's Method.	15

Contents : Unit	Topics	Contact Hours
3	Electron spin resonance: Theory of ESR, ESR applications for the structure determination of metal complexes, Applications of ESR for understanding metal complexes relevant to biology. Interaction between nuclear spin and electron spin	10
4	Organometallic Compounds: Introduction, classification of organometallic compounds, ionic organometallic compounds, organometallic compounds having metal-carbon sigma bond, organometallic compounds of Group 2, Group 12, Group 13, Group 14, Group 15 and transition metals, Organometallic compounds with pi bond ligands, ferrocene, Zeise's salt, reactions of ferrocene and its aromaticity, hapticity, 18-electron rule, counting of effective atomic numbers, isolobal analogy and nomenclature of organometallic compounds.	15
Total Hours		60

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	Experiments Experiment 1, Experiment 2, Experiment 3, Experiment 4, Experiment 5, Experiment 6, Experiment 7, Experiment 8, Experiment 9, Experiment 10, Experiment 11, Experiment 12	30
Total Hours		30

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking
10.00	20.00	25.00	25.00	10.00	10.00

Instructional Method:

- 1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
- 2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room
- 3 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

Instructional Method:

- 4 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory
- 5 Use of hazardous/toxic chemicals should be avoided as far as possible in laboratory.
- 6 All students in the laboratory must wear safety goggles and lab coats during lab session.