INSTITUTE	**FACULTY OF SCIENCE**
PROGRAM	**BACHELOR OF SCIENCE (CHEMISTRY)**
SEMESTER	**3**
COURSE TITLE	**ELEMENTARY CHEMISTRY-III**
COURSE CODE	**02CY0204**
COURSE CREDITS	**4**

Objective:

1. To study different aspects and applications of coordination chemistry of d-block elements.
2. To make students capable of understanding qualitative and quantitative analysis in various purposes.
3. To study the basic information regarding fundamentals of organic reaction.
4. To study the basic concepts of carboxylic acids and its derivatives.

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

1. Gain the basic concepts of co-ordination chemistry of d-block elements.
2. Achieve the knowledge of the basics of reaction mechanism & structure and stability of reacting constituents.
3. Obtain the information regarding qualitative and quantitative analysis in different purposes.
4. Acquire the basic concepts of carboxylic acids and their derivatives.

Pre-requisite of course: All students must have superficial knowledge of periodic table studied in 12th standard level. This unit also require basic knowledge organic chemistry and analytical chemistry.

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
4	0	0	50	30	20	0	0

Contents : Unit	Topics	Contact Hours
1	**Coordination Chemistry of d-block Elements** Introduction, Werner's theory, IUPAC nomenclature, properties of complex compounds, stability of complex compounds, types of ligand, isomerism, structural isomerism, ionization isomerism, hydrate or solvate isomerism, ligand isomerism, coordination isomerism, coordination position isomerism, polymerisation isomerism, linkage isomerism, valence isomerism, stereo isomerism, geometrical isomerism (4 coordinated and 6 coordinated complex compounds) and optical isomerism (6 coordinated complex compound), application of complex compounds.	20

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Contents : Unit	Topics	Contact Hours
2	**Basic of Qualitative and Quantitative Analysis** Introduction, group separation by wet test, common ion effect, use of HCl and H2S in qualitative analysis, use of NH4Cl and NH4OH in qualitative analysis, flame test, borax bead test, charcoal cavity test, cobalt nitrate test, titration, back titration, end point, equivalence point, indicator, types of indicator, primary and secondary standards, difference between end point and equivalence point, gravimetric analysis.	15
3	**Fundamentals of Organic reactions** Aromaticity: Benzenoids and Huckel's rule, types of reactions, SN1 and SN2 reactions with mechanisms, Neighbouring group participation in displacement reactions, Addition reactions (electrophilic, nucleophilic, free radicals), E1 and E2 reactions, substitution reactions like Nitration, Sulphonation, Friedal-crafts alkylation and acylation.	15
4	**Carboxylic acids and its derivatives** Monocarboxylic acids, nomenclature, acidity of carboxylic acids, effect of substituents on acidity, methods of preparation, chemical properties and physical properties of : 1) Carboxylic acids 2) Acid halides 3) Anhydrides 4) Esters and 5) Amides	10
Total Hours		**60**

Textbook :

1 Principles of Inorganic Chemistry , Puri, Sharma and Kali, Vishal Publishing Co., New Delhi, 2020

2 Coordination Chemistry , Ajai Kumar, Aaryush Education, Muzaffarnagar, 2018

3 Organic Reactions and their Mechanisms , P. S. Kalsi, New Age International Publishers, 2020

4 Organic Chemistry (Volume I, II & III), S. M. Mukherji, S. P. Singh, R. P. Kapoor, New Age International (P) Ltd, 2018

References:

1 Basic Inorganic Chemistry , Basic Inorganic Chemistry , Ajai Kumar, Aaryush Education, Muzaffarnagar , 2019

2 Concise Inorganic Chemistry , Concise Inorganic Chemistry , J. D. Lee, Wiley India Pvt. Ltd, 2014

3 Organic Chemistry , Organic Chemistry , Robert Morrison and Boyd, Pearson India Pvt. Ltd, 2016

4 Advanced Organic Chemistry , Advanced Organic Chemistry , Jerry March, Wiley-Inter science, A John Wiley & Sons , 2019

Suggested Theory Distribution:

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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 / Creative**
20.00	30.00	25.00	15.00	10.00	0.00

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. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory

Supplementary Resources:

1. http://nptel.ac.in/course.php?disciplineId=104
2. http://ocw.mit.edu/courses/chemistry/
3. http://vlab.amrita.edu/index.php?sub=2
4. http://www.vlab.co.in/ba_labs_all.php?id=9
5. https://www.youtube.com/user/TMPChem
6. https://www.youtube.com/playlist?list=PL166048DD75B05C0D
7. https://www.youtube.com/channel/UCqk-dmk3AOFtikaFDpsZorg
8. https://www.youtube.com/user/PradeepKshetrapal

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