

INSTITUTE	FACULTY OF SCIENCE
PROGRAM	<b>BACHELOR OF SCIENCE (CHEMISTRY)</b>
SEMESTER	3
COURSE TITLE	FUNDAMENTAL CHEMISTRY –III
COURSE CODE	02CY0202
COURSE CREDITS	6

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

- 1 Understand the concepts of coordination chemistry of d-block elements.
- 2 Be aware of the basics of reaction mechanism and structure & stability of reacting constituents.
- 3 Obtain information regarding qualitative and quantitative analysis.
- 4 Understand the basic of organic chemistry.

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

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

#### **Teaching and Examination Scheme**

Contents : Unit	Topics	Contact Hours
1	<b>Fundamentals of Organic reactions</b> 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



Contents : Unit	Topics	Contact Hours
2	<b>Coordination Chemistry of d-block Elements</b> 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 isomerisam, Valence isomerism, Stereo isomerism, Geometrical isomerism (4 coordinated and 6 coordinated complex compounds) and optical isomerism (6 coordinated complex compound), Application of complex compounds.	15
3	<b>Basic of Qualitative and Quantitative Analysis</b> 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, Borex 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
4	<b>Carboxylic Acids and its derivatives</b> 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	15
	Total Hours	60

# Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	<b>Experiments</b> Experiment -1, Experiment -2, Experiment -3, Experiment -4, Experiment -5, Experiment -6, Experiment -7	
	Total Hours	

#### **References:**

- 1 A Textbook Of Physical Chemistry, A Textbook Of Physical Chemistry, K L Kapoor, Macmillan, 1999
- 2 Organic Reactions And Their Mechanisms, Organic Reactions And Their Mechanisms, P S Kalsi, New Age International (P) Ltd, 2017
- 3 Organic Chemistry, Organic Chemistry, Robert T. Morrison and Robert N. Boyd, Prentice-Hall of India, 2007
- 4 Concisc inorganic chemistry, Concisc inorganic chemistry, J.D. Lee., Wiley-Blackwell, 1999
- 5 Principles of physical chemistry, Principles of physical chemistry, B.R. Puri, L.R. Sharma, M.S. Pathania, Vishal Publishing Co, 2012



# **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 /UnderstandApplyKnowledge			Analyze	Evaluate	Higher order Thinking		
20.00	30.00	25.00	15.00	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.
- 4 Students will use supplementary resources such as online videos, NPTEL videos, ecourses, 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.

# **Supplementary Resources:**

- 1 http://ocw.mit.edu/courses/chemistry/
- 2 http://vlab.amrita.edu/index.php?sub=2
- 3 http://www.vlab.co.in/broad-area-chemical-sciences
- 4 https://www.youtube.com/user/TMPChem
- 5 https://www.youtube.com/playlist?list=PL166048DD75B05C0D
- 6 https://www.youtube.com/channel/UCqk-dmk3AOFtikaFDpsZorg
- 7 https://www.youtube.com/user/PradeepKshetrapal