

INSTITUTE	FACULTY OF SCIENCE
PROGRAM	<b>BACHELOR OF SCIENCE (CHEMISTRY)</b>
SEMESTER	4
COURSE TITLE	CHEMISTRY –IV
COURSE CODE	02CY0251
COURSE CREDITS	6

### **Objective:**

- 1 To study physical and chemical properties of Lanthanides and Actinides series.
- 2 To study active methylene compounds.
- 3 To understand the study of colloids.
- 4 To study the properties of wave mechanics

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

- 1 Understand the properties of lanthanides and actinides series. Their effect and their application in nuclear studies.
- 2 Be aware of the basics of active methylene compounds.
- 3 Obtain the information regarding colloids and their applications.
- 4 Understand the basic of wave mechanics and their construction.

Pre-requisite of course:Understanding of Physical and Inorganic 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		
1	Lanthanides and Actinides		
	IntroductionThe Lanthanoid series, properties of Lanthanoids,		
	electronic configuration, oxidation state, ionic radii(lanthanoid		
	contraction, color, magnetic property, basic character, solubility of		
	compounds, double salt, The Actinied series, properties of actinoids,		
	oxidation state, ionic radii, color of ions, formation of complex,		
	comparison with lanthanoids, Thorium extraction and properties.		



Contents : Unit	Topics			
2	<b>Colloids</b> Introduction, Lyophilic and Lyophobic Sols or Colloids, Characteristics of Lyophilic and Lyophobic Sols, Preparation of Sols, Dispersion Methods, Aggregation Methods, Purification methods: Optical Properties: Tyndall Effect, Kinetic Properties: Brownian Movement, Electrical Properties, Electrophoresis, precipitation of lyophobic sols, Gold Number, Stability of Sols, Associated Colloids, Cleansing Action of Soaps and Detergents, Emulsions, Gels, Applications of Colloids.			
3	Active methylene compounds Ethyl acetoacetate, synthetic uses of ethyl acetoacetate, Tautomerism, Keto-Enoltautomerism of ethyl acetoacetate, Diethyl malonate, Synthetic uses of diethyl malonate.			
4	<b>Wave mechanics</b> Introduction, Basic postulates of wave mechanics, Derivation of Schrodinger equation for a particle wave, Physical significance of $\Box$ , $\Box 2$ and $\Box^*\Box$ , Boundary conditions, Normalization condition of wave functions, Eigen value and Eigen function, Normalization constant and normalized wave function.			
Total Hours				

# **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, Experiment 8	
	Total Hours	

### **Textbook :**

- 1 A Textbook of Physical Chemistry, K. L. Kapoor, McGraw Hill Education, 2019
- 2 A Textbook of Inorganic Chemistry, Mandeep Dalal, Dalal Institute, 2017

#### **References:**

- 1 Physical Chemistry, Physical Chemistry, Castellan G. W., Narosa Publishing House, 2004
- 2 Organic Chemistry, Organic Chemistry, Morrison and Boyd, Pearson India, 2016
- 3 Basic Inorganic Chemistry, Basic Inorganic Chemistry, F. Albert Cotton, Wiley, 2007
- 4 Lanthanide and Actinide Chemistry, Lanthanide and Actinide Chemistry, Simon Cotton, John Wiley & Sons, 2006

# 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	
20.00	30.00	25.00	15.00	10.00	0.00	

# **Instructional Method:**

- 1 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://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