COURSE TITLE	**GENERAL CHEMISTRY-IV**
COURSE CODE	**02CY0253**
COURSE CREDITS	**4**

Objective:

1. To understand the properties, electronic configurations, and chemical behaviour of lanthanides and actinides.
2. To explore the synthesis, reactivity, and applications of active methylene compounds in organic chemistry.
3. To introduce the concepts of colloids, their properties, types, and applications.
4. To develop an understanding of wave mechanics and its application in describing the behavior of particles at the atomic level.

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

1. Describe the electronic structures of lanthanides and actinides, explain their unique properties, and analyse their roles in various applications such as nuclear energy and catalysis.
2. Identify active methylene compounds, understand their chemical reactivity, and utilize them in various organic synthesis reactions.
3. Define colloids, differentiate between different types of colloidal systems, and explain their importance in various fields such as pharmaceuticals, food science, and materials engineering.
4. Comprehend the principles of wave-particle duality, apply Schrödinger's equation to describe particle behavior, and interpret quantum mechanical models of atoms and molecules.

Pre-requisite of course: Student should have superficial knowledge and conceptual understanding of organic, physical and inorganic 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

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Contents : Unit	Topics	Contact Hours
1	**Lanthanides and Actinides** Introduction, Lanthanoid Series, Properties of Lanthanoids, Electronic Configuration, Oxidation State, Ionic Radii (Lanthanoid Contraction, Color, Magnetic Property, Basic Character, Solubility of Compounds, Double Salt, The Actinides Series, Properties of Actinoids, Oxidation State, Ionic Radii, Color of Ions, Formation of Complex, Comparison with Lanthanoids, Thorium Extraction and Properties.	16
2	**Active Methylene Compounds** Ethyl Acetoacetate, Synthetic Uses of Ethyl Acetoacetate, Tautomerism, Keto-Enol tautomerism of Ethyl Acetoacetate, Diethyl Malonate, Synthetic Uses of Diethyl Malonate.	12
3	**Colloids** 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, Electro osmosis, precipitation of lyophobic sols, Gold Number, Stability of Sols, Associated Colloids, Cleansing Action of Soaps and Detergents, Emulsions, Gels, Applications of Colloids.	16
4	**Wave Mechanics** Introduction, Basic Postulates of Wave Mechanics, Derivation of Schrodinger Equation for a Particle Wave, Physical Significance of ?, ?2 and ?*?, Boundary Conditions, Normalization Condition of Wave Functions, Eigen Value and Eigen Function, Normalization Constant and Normalized Wave Function.	16
Total Hours		**60**

Textbook :

1 A Textbook of Organic Chemistry, Bahl, S Chand Publishing, 2005

2 A Textbook of Physical Chemistry, S. C. Anand and A. S. Negi, New Age International (P) Ltd Publishers, 1985

3 Principles of Inorganic Chemistry , Puri, Sharma and Kali, Vishal Publishing Co. , 2020

References:

1 Principles of Physical Chemistry, Principles of Physical Chemistry, Madan Pathania, Puri and Sharma, Vishal Publishing Co. , 2020

2 Organic Chemistry, Organic Chemistry, Morrison, Boyd and Bhattacharjee, Pearson Education India, 2010

3 Essentials of Physical Chemistry, Essentials of Physical Chemistry, Arun Bahl, B.S. Bahl and G.D. Tuli, S Chand Publishing, 2022

4 Basic Inorganic Chemistry , Basic Inorganic Chemistry , Ajai Kumar, Aaryush Education, 2019

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References:

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

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 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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