

<b>INSTITUTE</b>	<b>FACULTY OF SCIENCE</b>
<b>PROGRAM</b>	<b>BACHELOR OF SCIENCE (CHEMISTRY)</b>
<b>SEMESTER</b>	<b>5</b>
<b>COURSE TITLE</b>	<b>INORGANIC &amp; INDUSTRIAL CHEMISTRY</b>
<b>COURSE CODE</b>	<b>02CY0305</b>
<b>COURSE CREDITS</b>	<b>4</b>

**Objective:**

- 1 To study the introduction of coordination chemistry.
- 2 To make students capable of understanding the basics of wave mechanics.
- 3 To study the introduction, properties, manufacture of cement.
- 4 To study the introduction of ceramics, glass and refractories.

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

- 1 Understand the concepts of coordination chemistry.
- 2 Be aware of the basics of wave mechanics
- 3 Obtain the information regarding cement.
- 4 Understand the basic of ceramic, glass and refractories.

**Pre-requisite of course:** Understand basics of chemistry with industrial aspects

**Teaching and Examination Scheme**

<b>Theory Hours</b>	<b>Tutorial Hours</b>	<b>Practical Hours</b>	<b>ESE</b>	<b>IA</b>	<b>CSE</b>	<b>Viva</b>	<b>Term Work</b>
4	0	0	50	30	20	0	0

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
1	<b>Coordination Chemistry</b> Introduction, Double salts, coordination compounds, coordination complexes and complexes ions, coordination number, classification of ligands, valence bond theory, crystal field theory, crystal field splitting of energy levels, magnetic properties of metal complexes and crystal field theory, ligand field theory, Jahn Teller effect, multi electron system.	15
2	<b>Wave mechanics</b> Introduction, operators, Algebra of operators, multiplication of operators, commutative property, linear operator, commutator of operator, operator $\hat{p}$ and $\hat{p}^2$ , momentum operator, Hamiltonian operator, particle in a one-dimensional box, Wave function and energy of a particle in one dimensional box.	15

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
3	<b>Cement</b> Introduction, types of cement, raw materials, cement rock beneficiation, Manufacturing process of cement, Setting and hardening of Portland cement, Properties of cement, Indian standards institute (ISI) specification of cement, Mortars and concrete, Curing and decay of concrete, Uses of cement.	15
4	<b>Ceramic, Glass and Refractories</b> Introduction to ceramics, raw materials, classification based on reduction in porosity, manufacturing, body preparation using clay slip. Introduction to glass, physical and chemical properties of glass, raw materials, methods of manufacturing, special types of glasses. Introduction to refractories, classification of refractories, properties of refractories, manufacturing, fire clay bricks manufacture, properties and uses.	15
<b>Total Hours</b>		<b>60</b>

#### **Textbook :**

- 1 A Textbook of Physical Chemistry - Quantum Chemistry and Molecular Spectroscopy, K L Kapoor , McGraw-Hill, 2020
- 2 Text Book of Coordination Chemistry, R. K. Sharma, Discovery Publishing House, 2007
- 3 Ceramic and Glass Materials, James F. Shackelford, Robert H. Doremus, Springer Science & Business Media, 2008
- 4 Refractories for the Cement Industry, Prasunjit Sengupta, Springer Cham, 2019

#### **References:**

- 1 Concise Inorganic Chemistry, Concise Inorganic Chemistry, J.D. Lee, Oxford University Press, 2008
- 2 Principles of Inorganic Chemistry, Principles of Inorganic Chemistry, B.R. Puri, L.R. Sharma, K.C. Kalia , Vishal Publishing Co., 2020
- 3 Wave Mechanics, Wave Mechanics, Wolfgang Pauli , Dover Publications Inc.,, 2003
- 4 Cement Chemistry, Cement Chemistry, Kuldeep Singh , Notion Press, 2022
- 5 The Complete Book on Glass and Ceramics Technology, The Complete Book on Glass and Ceramics Technology, NIIR Board of Consultants & Engineers, Asia Pacific Business Press Inc, 2017

#### **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

<b>Remember / Knowledge</b>	<b>Understand</b>	<b>Apply</b>	<b>Analyze</b>	<b>Evaluate</b>	<b>Higher order Thinking / Creative</b>
10.00	20.00	30.00	30.00	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 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 <https://www.youtube.com/watch?v=XF1d571UWCA>
- 2 <http://nptel.ac.in/course.php?disciplineId=104> 3. <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](http://www.vlab.co.in/ba_labs_all.php?id=9)
- 4 <https://www.youtube.com/user/TMPChem> 6.
- 5 <https://www.youtube.com/playlist?list=PL166048DD75B05C0D>
- 6 <https://www.youtube.com/watch?v=XTk83rIUc7A>
- 7 <https://www.youtube.com/watch?v=58-BDq-jxa8>
- 8 <https://www.youtube.com/playlist?list=PLADrjVbKQUdxiHfIOM83jygUpYgVlzsom>
- 9 <https://www.youtube.com/watch?v=RWSZRqn-vx8&list=PLyTVFDODCIzi3-R9mqJUHLmKwZbliIEfH>
- 10 <https://www.youtube.com/watch?v=mqaSPzlnDLA&list=PLTwJBmJyAP3PXCu4xCTRHZEV6MpI9W7gD>