****

**FIRST SEMESTER 2023-2024**

# Course Handout Part II

Date: 11-08-2023

In addition to part-I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

*Course No.* : ***CHEM F326***

## Course Title : **Solid State Chemistry**

## Instructor-in-Charge : **Sounak Roy**

**Scope and Objective of the Course:** This course emphasis the concepts in solid state chemistry through the comprehensive survey of different synthetic techniques, their characterization, and their properties. Focus will be given on the structure-property relationship of materials. Introduction to nanomaterials with recent advances in material science and technology is also provided.

**Textbooks (TB):**

1. ‘Solid State Chemistry and its Applications’, Anthony R. West, Wiley-India Edition 2007.

**Reference books (RB):**

1. ‘Nanomaterials Chemistry – Recent Developments and New Directions’, Edited by C.N.R.Rao, A. Mueller, A.K.Cheetham, Wiley-Vch Edition 2007.
2. Materials Science and Engineering-an Introduction by William d.callister, jr. Seventh Edition, John Wiley (2007)
3. **Course Plan:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Lecture No.** | **Learning objectives** | **Topics to be covered** | **Chapter in the Text Book** | **Learning**  **Outcome** |
| 1 | What is Solid State Chemistry? | Introduction to solid state chemistry | TB Ch 1 | Learning the broad definition of the subject |
| 2-5 | Understanding a wide range of materials synthetic strategy | Preparative Methods | TB Ch 2 | Theoretical knowledge about multiple synthesis technique |
| 6 –8 | Learning various characterization techniques like Thermal Analysis, XRD, XPS, TEM, SEM | Characterization of Inorganic Solids | TB Ch 3, 4 & 5 | Analyzing ability of diffractograms and spectra |
| 9-11 | Understanding of crystallographic defects | Crystal Structures – Descriptive Crystal Chemistry, Factors influencing the crystal structures | TB Ch 7 & 8 |
| 12-13 | 1D, 2D, 3D defects and Solid solutions, Vegard’s Law | Crystal Defects and Non-Stoichiometry | TB Ch 9 | Evaluating the importance of defects |
| 14-16 | Evaluating the importance of defects | Solid Solutions | TB Ch 10 |
| 17-18 | Magnetic, electronic, electrical and optical properties of solid materials arising out of structural properties and their application | Ionic Conductivity and Solid Electrolytes | TB Ch 13 | Understanding and correlating the structure-property relationship |
| 20-23 | Electronic properties and band Theory: Metals, Semiconductors, Inorganic Solids, Color | TB Ch 14 |
| 24-27 | Electrical Properties | TB Ch 15 |
| 28-33 | Magnetic Properties | TB Ch 16 |
| 34-37 | Optical Properties: Luminescence, Lasers | TB Ch 17 |
| 38-40 | Synthesis, properties and new developments of nanomaterials | Nanomaterials Chemistry | RB-A Ch 1-5 | Appreciating the nanomaterials and their properties |

**2. Evaluation Scheme:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Component** | **Duration (minutes)** | **Weightage (%)** | **Date & Time** | **Nature of Component** |
| Midsemester Test | 90 | 35 | 11/10 - 11.30 - 1.00PM | Close book |
| Class Test+ Assignment + Presentation | - | 20 | - | Open book |
| Comprehensive Examination | 180 | 45 | 12/12 AN | Close book |

**3.** Hands on experience on synthesis of materials and their structural characterization to be conducted after hours.

**4. Chamber Consultation Hour:** Will be announced in class.

**5. Notices:** Will be updated in CMS

**6. Make-up Policy:** Make up would be considered only for **genuine reasons**.

**7. Academic Honesty and Integrity Policy:** Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

**INSTRUCTOR-IN-CHARGE**