Birla Institute of Technology & Science, Pilani
Hyderabad Campus

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)

1. 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