

Course Code	Course Title	C	H	I	E	T
17P2CMC5	INORGANIC CHEMISTRY-II	4	4	25	75	100

UNIT I SOLID STATE – I 12 Hrs

Crystallographic axis - Axial ratios-law of rational indices-Crystal systems-Elements of symmetry-Point groups and space groups-Unit cells-and space lattices-Lattice planes. Schoenflies notation- Herman-Maugn notation- Glide planes, screw axis-molecular symmetry-Crystal symmetry- Fundamentals of X-ray diffraction-Reciprocal lattice concept, Bragg method. Debye Scherrer method- Wiesenberg's rotating crystal method-Analysis of data and determination of lattice types and unit cell dimensions in cubic system-Elementary treatment of structure factor and scattering factor. Comparison of X ray, neutron and electron diffractions.

UNIT II SOLID STATE – II 12 Hrs

Types of close packing- packing efficiency- co-ordination number-relative density of packing in simple cubic, CCP, HCP and BCP. Tetrahedral and octahedral holes. radius ratio rule- Unit cell structure of sodium chloride, zinc blende, wurtzite, fluorite, antiferite, rutile and cesium chloride – structure of graphite and diamond – spinels normal and inverse types and perovskite structure. Crystal defects – point, line and plane defects – colour centres – Formation of nonstoichiometric oxides.

UNIT III ELECTRICAL PROPERTIES OF SOLIDS 12 Hrs

Electronic structure of solids – Free electron and band theory – Band structure of metals, different types of semiconductors, insulators. P-N junction and photovoltaic effect. superconductivity – types of superconductors. High temperature superconductors. Cooper pair – Meissner effect - Hall effect-thermoelectric effects (Thomson, Peltier, and Seebeck)

UNIT IV NUCLEAR CHEMISTRY 12 Hrs

Quantum numbers - liquid drop and shell models of the nucleus (Magic number and nuclear isomerism). Different types of nuclear reaction – spallation, Nuclear fission and fusion and their mechanism - characteristic of mass and charge distribution of fission products. Theory of fission. Fissile and fertile isotopes. Detectors - bubble chamber, GM counter and Scintillation counter nuclear reaction cross section - Q value - threshold energy of nuclear reaction. Application of radio isotopes in various field. Carbon dating – isotope dilution analysis. Neutron activation analysis and its applications, Nuclear reactor and its components. Breeder reactor and Fast Breeder reactor-nuclear waste disposal.

UNIT V ACID-BASE THEORY AND NON-AQUEOUS SOLVENTS

12 Hrs

Acid-base theory Lux-Flood-Lewis-Usanovich concepts. Pearson HSAB concept-Bonding and its applications– symbiosis. Super acids (elementary idea only).

Classification of solvents, properties of ionizing solvents- levelling effect, Typical reactions in non-aqueous solvents *viz* liq. NH₃, liq. SO₂, liq. HF, and H₂SO₄. Molten solvents.

Text Book(s):

1. Phillips, F.C., An introduction to Crystallography, Fourth Edition, ELBS Edition, 1977.
2. Jeffe and Orchin, Symmetry in chemistry, John Wiley and Sons, Inc., New York-London-Sydney, 1965.
3. West, A.R., Solid state chemistry, Second Edition, John Wiley, New York, 2014.
4. Moore, W.J., Physical chemistry, Fourth edition, Longmans Green & Co. Ltd., 1963.
5. Kittel, Elementary Solid state physics, Eight Edition, Wiley, New York, 2012.
6. Cotton, F.A., and Wilkinson, Advanced Inorganic Chemistry, John Wiley & Sons Ltd., London-New York, 1972
7. Addison, W. E., and John C. Bailar Jr, Structural Principles of Inorganic chemistry, Hüchel, Walter, 1966.
8. Adams, D.M., Inorganic solids, Wiley & Sons, London, New York, Sydney, Toronto, 1974.
9. Phillips, F.C., An introduction to crystallography, Fourth Edition, ELBS., Longmans, Green and Co., London, 1972.
10. Lee. J.D., Concise Inorganic chemistry, Fifth Edition, Wiley India Pvt, New Delhi, 2008.

Reference Books:

1. Emeleus, H.J., and Sharpe, A., Modern Aspects of Inorganic chemistry, Fourth Edition, Routledge and Kegan Paul, United Kingdom, 1975,
2. Robert M. Rose and Shepard, A., Structure and properties of materials, John Wiley Eastern, 1971.
3. Rao, C.N.R., and Gopalakrishnan, Solid state chemistry, Second Edition, Cambridge University Press, UK, 1984.
4. Arnikar, H.J., Essentials of Nuclear chemistry, Second Edition, Wiley, New York, 1987.
5. Dash, U. N., Nuclear chemistry, Second Edition, Sultan Chand And Sons, 2010.
6. Friedlander, G., Kennedy, J.W., and Millerr, J.M., Nuclear and Radiochemistry, John Wiley, 1982
7. Chatwal, G. and Anand, S., Instrumental methods of chemical analysis, Himalayan Publishing House, New Delhi, 2005.