

॥अंतरी पेटवूज्ञान ज्योत॥



'A' Grade NAAC Re-Accredited (3rd Cycle)

North Maharashtra University, Jalgaon

Pre Ph.D. Theory Course- II

Syllabus

Subject- Chemistry and Chemical Sciences

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Total Marks: 100

60 Lectures

Unit-I

12 lectures

Thermodynamics and Statistical Mechanics

Ideal solution and non - ideal solution, chemical potential, partial quantities, regular solution theory, thermodynamic of polymer solution, Flory and Mayer-McMillan solution theory, partition function and thermodynamic properties, quantum statistics, application to equilibrium constant and conduction in metals, derivation of Planck equation.

Kinetics of reaction, fast reaction, reaction in solution, photochemistry, surface reaction, electrode at interface, Rotating platinum electrode, electrostatics, Flow technique, Flash Photolysis, Relaxation method

Unit – II

12 lectures

Borazines, Phosphazenes, Synthesis and reactivity of Silicon and Phosphorous polymers, Preparation, properties, structure and bonding in metal carbonyls, metal nitrosyl and metal cluster complexes.

Ionic solids, Classification of ionic structures, radius ratio rules, calculations of some limiting radius ratio value, close packing structures of ionic solids,

Bio-inorganic chemistry- Metalloproteins and metalloenzymes, amino acids in metal binding sites, electron transfer (General considerations, Electron transfer cytochrome, FeS clusters, Copper transfer centers , ionophores.

Unit – III**12 lectures**

Designing in Organic Synthesis by Disconnection Approaches (By using Modern Synthetic Reagents and catalyst), Enzyme catalyzed reactions,

Synthesis of Quinoline, Isoquinoline, Pyridazine, Pyrimidine, Pyrazine.

Photochemistry - General principles, orbital symmetry consideration, Photochemistry of carbonyl groups, alkenes and dienes, aromatic compounds,

UV, IR, ¹H-NMR, ¹³C-NMR and Mass spectroscopy (Principle, instrumentation and problems) ,Interpretation of NMR, IR, Mass spectra .

Unit- IV**12 lectures**

Principles Instrumentation, and applications of cyclic voltammetry, DSC, X-ray crystallography, TGA-DTA, SEM, TEM, Hyphenated techniques, GC-MS, LC-MS Flash chromatography (Application)

Unit - V**12 lectures**

- A. Green chemistry, Introduction, twelve principles and applications of, Sono-chemistry, Microwave chemistry. Catalysis and types of catalysis, Zeolites and their applications.
- B. Application of Computer in Chemistry viz. Advantages of molecular docking.
- C. Types of microorganisms, mechanism of drug action, method of evaluation of biological activity using paper cup diffusion method.

References:

1. Advanced Organic Chemistry: Part A: Structure and Mechanisms; Francis A. Carey, Richard J. Sundberg Springer Science & Business Media
2. Organic Chemistry; Jonathan Clayden, Nick Greeves, Stuart Warren, OUP Oxford.

3. Organic Reaction Mechanisms; V. K. Ahluwalia, Rakesh Kumar Parashar; Edition 4; Publisher: Alpha Science International, 2011.
4. Organic Synthesis: The Disconnection Approach; Stuart Warren, Paul Wyatt; John Wiley & Sons.
5. Organic Chemistry; Robert Thornton Morrison; Pearson Education India.
6. Advanced organic chemistry: reactions, mechanisms, and structure; Jerry March; Wiley
7. Spectrometric Identification of Organic Compounds; Robert M. Silverstein, Francis X. Webster, David J. Kiemle, David L. Bryce; John Wiley & Sons.
8. Principles of Inorganic Chemistry; B.R. Puri, L.R. Sharma & K.C. Kalia, Mildstone publication.
9. Concise Inorganic Chemistry, 5th Ed; J. D. Lee; John Wiley & Sons.
10. Chirality in Transition Metal Chemistry: Molecules, Supramolecular Assemblies and Materials; 1st Edition; Hani Amouri, Michel Gruselle, J. Derek Woollins, David A. Atwood, Robert H. Crabtree, Gerd Mayer; Wiley.
11. Thermodynamics for Chemists; Samuel Glasstone; Read Books.
12. Chemical kinetics; Keith James Laidler; Harper & Row.
13. Principles of Physical Chemistry, 4th edition; S. H. Maron and C.F.Prutton, Oxford and IBH Publishing Co.
14. Atkins' Physical Chemistry, Volume 1; Peter William Atkins, Julio De Paula; Oxford University Press.

15. Fundamentals of Analytical Chemistry; Douglas A. Skoog, Donald M. West, F. James Holler, Stanley R. Crouch; Cengage Learning.
16. Quantitative analysis; Reuben Alexander Day, Arthur Louis Underwood; Prentice-Hall.
17. Green Chemistry and Engineering; MukeshDoble, Ken Rollins, Anil Kumar Academic Press.
18. Green Chemistry 3rd Edition; Mike Lancaster; Royal Society of Chemistry
19. Green Chemistry for Environmental Sustainability; edited by Sanjay K. Sharma, AckmezMudhoo; CRC Press.
20. Essentials of Computational Chemistry- C. J. Cramer - John Wiley & Sons.
21. Supramolecular Chemistry; Jonathan W. Steed, Jerry L. Atwood, John Wiley & Sons.
