



(Bachelor of Science) (Undergraduate) (NEP-2020)

B. Sc. (UG) Semester-II

Course Code	US02MACHE01	Title of the Course	GENERAL CHEMISTRY- II
Total Credits of the Course	4	Hours per Week	4

Course Objectives:	To make students familiar with: 1. Some advanced topics of basic chemistry. 2. Historic development and scope of various branches of chemistry. 3. Basic concepts related to alkyl and aryl halides, bonding in inorganic compounds and fundamental aspects of chemical aspects.
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Course Content		
Unit	Description	Weightage* (%)
1.	ALKYL AND ARYL HALIDES Homolytic and Heterolytic chemistry, Classification, Preparation, Reaction: Nucleophilic aliphatic substitution, SN^2 Reaction: Mechanism, kinetics and stereochemistry, Reactivity and steric hindrance, SN^1 Reaction: Mechanism, kinetics, stereochemistry, Carbocation, Structure of carbocation, Relative stability of carbocations, Stability of carbocation: polar effect, Rearrangement of carbocation, Reaction, Low reactivity of aryl and vinyl halides, Structure of aryl and vinyl halides, Nucleophilic aromatic substitution, Bimolecular displacement for nucleophilic aromatic substitution, Reactivity in nucleophilic aromatic substitution, Orientation in nucleophilic aromatic substitution, Electron withdrawal by resonance, Elimination-Addition mechanism, Benzyne.	25
2.	CHEMICAL BONDING Valence bond theory and its limitation, The Lewis Theory and exceptions to the octet rule, Sidgwick-Powell Theory, Valence shell Electron pair Repulsion Theory (VSEPR), Effect of Lone Pair, Effect of electron negativity, Isoelectronic molecules and principle, shape and hybridization of some molecules based on VSEPR theory like BeF_2 , BF_3 (or BH_3), $[BF_4]^-$ ion, NH_3 , H_2O , PCl_5 , ClF_3 , SF_4 , SF_6 , I_3 and IF_7 . Hybridization, Types of hybridisation (sp , sp^2 , sp^3). Molecular orbital method LCAO method, s-s combination of orbitals,	25



	s-p combination of orbitals, p-p combination of orbitals, Rules of linear combination of atomic orbitals, Examples of molecular orbital treatment for HOMO Nuclear Diatomic Molecules (H_2^+ , He_2 , B_2 , C_2 , N_2 , O_2 , O_2^- , O_2^{2-} , F_2). Treatment for Hetero Nuclear Diatomic Molecules (CO , CO^+ , NO).	
3.	<p>[A] FUNDAMENTAL CONCEPT OF COORDINATION CHEMISTRY Definition of some terms, Classification of ligands, Chelate, chelating ligand and Chelation, Classification of chelates, Uses of Chelates, Co-ordination number and Stereochemistry including distortion of complexes having coordination number 7, Nomenclature of coordination compounds, Stability of complexes, Detail factors affecting the stability of complexes.</p> <p>[B] BENZENE AND THEIR DERIVATIVES Classification of substituent group, Mechanism of nitration, Sulphonation, Friedal-Craft alkylation, Friedal-Craft acylation and Halogenation of benzene, Limitations of Friedal-Craft alkylation, Halogenation of alkyl benzene: ring Vs side chain, Side-chain halogenations of alkyl benzene.</p>	25
4.	<p>CHEMICAL KINETICS Introduction, Concentration Effects, Differential Rate Laws, The Integrated Rate Laws, Experimental Determination of rate laws, Reaction Mechanisms, Elementary Processes, Mechanism and rate laws, Collision Theory of Gaseous Reactions, Temperature effects, Numerical Problems based on above topics.</p>	25

Teaching-Learning Methodology	Conventional method (classroom blackboard teaching), ICT. Courses for B. Sc. Chemistry programme are delivered through classroom, laboratory work in a challenging, engaging, and inclusive manner that accommodates a variety of learning styles and tools (PowerPoint presentations, audio visual resources, e-resources, seminars, workshops, models).
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage (%)
1.	Internal Continuous Assessment in the form of Class test/Internal	50

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Syllabus effective from the Academic Year 2024-2025



	Written test 15 Marks (30%), Quiz 15 Marks (30%) Active learning 05 Marks (10%), Home Assignments 05 Marks (10%), Class Assignments 05 Marks (10%), Attendance 05 Marks (10%), (As per SPU Letter No. E-3/2748 dated 02/02/2024) [Total 50 Marks (100%)].	
2.	Semester End Examination [Total 50 Marks (100%)].	50

Course Outcomes: Having completed this course, the learner will be able to

1.	Gain the knowledge of Chemistry using various fundamental aspects of all four major branches of chemical sciences.
2.	Explain nomenclature, stereochemistry, structures, reactivity, and mechanism of the several chemical reactions.
3.	To have knowledge of basic aspects of inorganic chemistry comprising of various aspects of periodic table.
4.	Gain knowledge about various acid base theory and their applications.
5.	Know about use of various theoretical analytical methods and their applications.

Suggested References:

Sr. No.	References
1.	Morrison, R. T. & Boyd, R. N., <i>Organic chemistry</i> (6 th edition). (unit- 1 & 3)
2.	Clayden, J., Greeves, N., Warren, S., <i>Organic Chemistry</i> 2 nd Edition, Oxford University Press. (unit- 1)
3.	Prakash S., Tuli, G. D., Basu, S. K., Madan R. D., <i>Advance inorganic chemistry</i> (Vol. - I). (unit- 2 & 3)
4.	Lee J. D., <i>Concise Inorganic Chemistry</i> (4 th Edition). (unit-2 & 3)
5.	Cotton, F.A. & Wilkinson, G. <i>Basic Inorganic Chemistry</i> , Wiley. (unit- 2 & 3)
6.	Selected Topics in Inorganic Chemistry, Wahid U. Malik, G. D. Tuli, R. D. Madan. (unit- 2 & 3)



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7.	Mahan, B.H. <i>University Chemistry</i> , 3 rd Edition Narosa. (unit- 4)
8.	Sharma K. K and Sharma L. K. <i>A Text Book of Physical chemistry</i> , (5 th Edition), Vikas Publishing House. (unit- 4)
9.	Bahl, B.S., Tuli J. D., and Bahl, A, <i>Essentials of Physical Chemistry</i> . 25 th Edition, S. Chand and Co. (unit- 4)
10.	Barrow, G. M., <i>Physical chemistry</i> (6 th Edition). (unit- 4)

On-line resources to be used if available as reference material

On-line Resources : Google books, INFLIBNET, Google Web.
