Syllabus for Bachelor of Science

Chemistry

Subject Code: 02CY0103

Subject Name: General Chemistry-I

B.Sc. Sem - I

Objectives:

- Comprehend the atomic structure and different atomic structure-related concepts.
- Understand the fundamental concepts of thermodynamics: First and Zeroth law of thermodynamics and practical applications through problem solving.
- Learn the concentrations and various properties of solution based on numericals.
- Explore about important aspects of organic chemistry and the basics of aliphatic hydrocarbons.

Credits Earned: 4 Credits

Course Outcomes: After completion of this course, student will have knowledge and skills about

- Understanding the basic idea of atom and atomic structure.
- Use thermodynamic terminology correctly, and aware with properties, processes and its laws.
- Utilize the knowledge for explanation of unit concentration and concepts of solution.
- The general concepts of organic chemistry and hydrocarbons.

Pre-requisite of course: The beginning to study of general chemistry -I, all students should have basic conceptual of chemistry at 12th standard level. It involves electronic configuration and their active involvement for the formation of orbital structure. This unit also demands the modest knowledge of physical and organic chemistry.

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Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	IA	CSE	Viva (V)	Term work (TW)	
4	0	0	4	50	30	20	0	0	100

Contents:

Unit	Topics	Contact Hours
1	**Atomic structure** Basic introduction, atomic number, atomic mass, isotopes, isobar, isotones, Electromagnetic radiations, Dual nature of electrons, Quantum number, shapes of s, p, d and f orbitals, Heisenberg's uncertainty principle, De-Broglie's equations, Aufbau's principle, Pauli's principle, Hund's rule of maximum multiplicity.	15
2	**Thermodynamics** Definition of thermodynamics term: system, surroundings, types of systems, Intensive and extensive properties, Concept of heat and work, First Law of Thermodynamics: Theory & Mathematical form, Definition of internal energy and enthalpy, Calculation of w, q, ΔE & ΔH for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process, Work obtained during adiabatic and isothermal change, Heat capacity: heat capacities at constant volume and pressure and their relationship $Cp - Cv = R$ Joule's law-joule Thomson coefficient and inversion temperature (only definition), Zeroth Law: mathematical treatment of Zeroth law and its limitation and various statements of law,	15
3	**Solution and their Properties** Solutions, classification of solution, units of concentration, colligative properties, numericals based on concentration and colligative properties, Henry's law, vapour-pressure lowering of solution, Raoult's law, boiling point elevation and freezing point depression of solutions, osmosis, osmotic pressure, problems based on osmotic pressure.	15
4	**Basics in organic chemistry and Aliphatic Hydrocarbons** Hybridization, types of hybridization, Inductive effect, Electronegativity, Electromeric effect, Hyperconjugation, Homolytic and heterolytic fission, Reaction intermediates (carbocation, carbanion and free radicals), Hydrocarbons and its classification, synthesis and reactions of alkanes, alkenes and alkynes, Types of organic reaction, Electrophiles and nucleophiles.	15
Total Hours		**60**

Reference books:

1. E. J. D. Lee, Concise Inorganic Chemistry, 5th edn., Blackwell Science, London.
2. B. R. Puri, L. R. Sharma, Kalia, Principles of Inorganic Chemistry, Milestone Publishers, New Delhi.
3. D. F. Shriver and P. W. Atkins, Inorganic Chemistry, 3rdedn., Oxford University Press.
4. K L Kapoor, A Textbook of Physical Chemistry, Volume 1,3rd Edition, Macmillan India Ltd.
5. P. W. Atkins &J. de Paula, Atkin's Physical Chemistry 8th Ed., Oxford University Press (2006).
6. R. P. Rastogi, R. R. Misra, An Introduction to Chemical Thermodynamics, 6thedn.,Vikas Pub. Pvt. Ltd. (2003).
7. Arun Bahl & J.D Tuli, Physical Chemistry, Multicolour edition, S. Chand Publishing.

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
20%	20%	30%	15%	10%	5%

Instructional Method:

1. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by white board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
2. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
3. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
4. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.

5. Use of hazardous/toxic chemicals should be avoided as far as possible in laboratory.
6. All students in the laboratory must wear lab coats during lab session.
7. During practical and experimental section student must wear shoes to avoid accidents cause by spilling or rush handling of acidic chemicals (Especially during inorganic estimation experiments).

Supplementary Resources:

1. http://ocw.mit.edu/courses/chemistry/
2. https://www.youtube.com/watch?v=OH-aSu-rWgk
3. https://www.youtube.com/watch?v=NyOYW07-L5g
4. https://www.youtube.com/watch?v=5BSQG2sbrQw
5. http://vlab.amrita.edu/index.php?sub=2
6. https://www.youtube.com/watch?v=gyxgVsXMYq0&list=PL7jfMV2bTYmqnYac3pdt9uaDNCXvffayK
7. https://www.youtube.com/watch?v=2iqUB_N-uzw