FACULTY OF SCIENCE
B.Sc. Chemistry (SEM-I)
In Effect from Academic Year 2016-17

Subject Code:1SC1030101	Subject Title: FUNDAMENTALS OF BASIC CHEMISTRY
Course Type: Core Course	

Course Objective:
Generally, awareness with the following areas in chemistry: analytical, inorganic, organic, physical and biochemistry. The capacity to job effectively and safely in a laboratory environment. Opportunities for student and faculty to interact with alumni and with professional chemists. The fundamental analytical and industrial skills to work and industrial skills to work effectively in the different fields of chemistry. The capacity to produce, divide and characterize compounds using published reactions, protocols, normal laboratory equipment, and current instrumentation.

Teaching scheme (hours) per week		Credit			Theory Marks		Practical Marks		Total
Theory	Practical	Theory	Practical	Total	Uni. Assessment	Cont. Assessment	Uni. Assessment	Cont. Assessment	
4	4	4	2	6	70	30	30	20	150

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	***(A) CHEMICAL BONDING*** ↳ Valence bond theory & its application ↳ Directional characteristics of covalent bond ↳ Various types of hybridization and shape of simple inorganic molecules ↳ V.S.E.P.R. theory for NH_3, H_2O ↳ M.O. Theory-Energy level diagram for homo nucleus diatomic ↳ Molecules (N_2 and O_2) and hetero diatomic molecule (CO and NO) ***(B) F–BLOCK ELEMENTS*** ↳ Lanthanide electronic configuration, Oxidation state ↳ Lanthanide contraction, Effect of lanthanide contraction ↳ Separation method a) Solvent extraction methods b) Ion Exchange Method	18	25
2	***(A) STRUCTURE AND PROPERTIES*** **Factors affecting to the properties of organic molecule** ↳ Intramolecular forces (dipol-dipol interaction, vanderwaals forces) ↳ Electromeric effect ↳ Inductive effect ↳ Resonance effect (draw resonating structures of Nitro benzene, Chlorobenzen, Phenoxide ion, Anillinium ion, Acetate ion) ↳ Hyper conjugation (o,p-directing effect of Alkyl group, Stability of Carbonium ion and Free radicals) ***(B) REACTION MECHANISM*** ↳ Fission of Co-Valent bond (Withatleast one example of each ↳ intermediates) ↳ Types of reagents.	14	25

	↳ Types of organic reaction with mechanism. ↳ Substitution reactions (Nucleophillic&Electrophillic) ↳ Addition reactions (Nucleophillic&Electrophillic) ↳ Elimination reactions (E_1 & E_2)		
3	***THERMODYNAMICS*** ↳ Thermodynamics (only introduction) ↳ System and surrounding- work & heat, state function, thermodynamic Process, internal energy, enthalpy, free energy, maximum work function. ↳ First law of thermodynamics ↳ Heat capacity, specific and molar heat capacity, heat capacity at constant Volume and pressure and their relationship ↳ Work done in adiabatic and isothermal reversible expansion of an idealgas. ↳ Second law of thermodynamics ↳ Carnot cycle and its efficiency ↳ Concept of entropy; entropy change for an ideal gas under different Conditions, entropy change for mixture of ideal gases ↳ Gibbs-Helmholtz equation ↳ Want-hoff isotherm and isochors ↳ Numerical	16	25
4	***ANALYTICAL CHEMISTRY*** ↳ Introduction to Analytical Chemistry ↳ Classification of established and Electro analytical Techniques. ↳ Standard for Selection of analytical Techniques. ↳ Analytical Data management ↳ Error, Types of errors, Accuracy and Precission. ↳ Statistical Terms : Mode, Average, Median, Deviation, Average Deviation, Relative Average Deviation, Standard Deviation & Coefficient of variance. ↳ Q-Test for the rejection of result and related numericals.	12	25

Course Outcome:

- ❖ Have solid foundations in the fundamentals and purpose of current chemical and scientific theories.
- ❖ Are capable to design, carry out, record and analyze the results of chemical experiments.
- ❖ Are capable to use current instrumentation and classical techniques, to design experiments, and to properly record the results of their experiment.
- ❖ Are skillful in problems solving, significant thinking and analytical reasoning.
- ❖ Are capable to identify and solve chemical problems and explore new areas of research.
- ❖ Are capable to use up to date library searching and retrieval methods to obtain information about a topic, chemical, chemical technique, or an issue relating to chemistry.

List of References:

Inorganic Chemistry

1. 'Source Book on Atomic Energy' by glastone, 1969.
2. 'Modern Inorganic Chemistry' by G.F.Liporni, ELBS, 4th edn, collingEducational, 1983.
3. 'Inorganic Chemistry' D.F.Shriver, P.W.Atkinss and C.H.Longford, 3rd edn,ELPS Oxford University Press, 1999.

4. 'Nuclear and Redio Chemistry' by G fried lander, J.W.Kennedy, E.S.maciasandJ.M.Miller, 3rd edn, John wiley, 1981.
5. Essentials of Nuclear Chemistry' H.J.Arnical, 4th edn, New Age International,1995.
6. 'Concise Inorganic Chemistry' J.D.Lee, 5th edn.
7. 'Inorganic Chemistry', D.F.Shriver, P.W.Atkinss, 3rd edn, Oxferd, 1999.
8. 'Concise Inorganic Chemistry' J.D.Lee, 4th edn, Champman and Hall ELBS,1991.
9. 'Inorganic Chemistry' by A.G.Sharp, 3rd edn, ELBS, Longman, 1990.

Organic Chemistry

1. 'Organic reaction and mechanism, P.S.Kalsi, New Age internationalPublishers.
2. Text book of organic Chemistry, P.S.Kalsi, New Age international Publishers.
3. Organic Chemistry Vol. I & II, S.M.Mukherji, S.P.Singh, R.P.Kapoor.
4. Reaction mechanism in Organic Chemistry, S.M.Mukhergi, S.P.Singh. 3rdedn, Macmillan.
5. Reaction Mechanism and Reagents in Organic Chemistry, GurdeepR.Chatwal 4th edn, Himalaya Publication House.
6. Text book of Organic Chemistry, ArunBahal, S.Chand.
7. Organic Chemistry, R.Morrison and R.Boyd, 6th edn, Pearson Education 2003.
8. Organic Chemistry, T.W.GrahamSolomons, 4th edn, John Wilay, 1998.

Physical Chemistry

1. Advance Physical Chemistry by Gurdeepraj.
2. Physical Chemistry (Question and Answer) by R.N.Madan, G.D.Tuli, S.Chand.
3. Principal of Physical Chemistry by Puri, Sharma, Pathania.
4. Chemical Thermodynamics by R.P.Rastogi and R.R.Misra.
5. Nuclear Chemistry by C.V.Shekhar, Dominent-Publisher, New Delhi.
6. Essentials of physical Chemistry by B.S.Bahal, ArunBahal, G.D.Tuli.
7. Physical Chemistry by P.W.Atkins, 5th edn, Oxferd 1994 7th edn-2002.
8. Physical Chemistry by R.A.Albert and R.J.Silby, John Wiley1995.
9. Physical Chemistry by G.H.Barrow, 5th edn, Mac Graw Hill, 1988, 6th edn, 1996.
10. Physical Chemistry by W.J.Moore, 4th edn, Orient Longmans 1969.

Analytical Chemistry

1. Fundamentals of Analytical Chemistry by Skoos& West.
2. Analytical Chemistry, Garry D.Christain.
3. Analytical Chemistry, Day & Underwood.
4. Analytical Chemistry by Lerry&Hergins.
5. Qualitative Analysis by A.I.Vogel, 5th edn.

e-Resource:

1. www.google.com
2. http://onlinelibrary.wiley.com/
3. https://en.wikipedia.org/wiki/Main_Page

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List of Experiments:

Note: This syllabus is to be completed by assigning two laboratory Sessions per week, each of two hours. Total laboratory work is 60 hrs/semester (4 hrs/week) or 15 weeks. The number of students in the laboratory batch should not exceed fifteen (15). The medium of instruction should be English in laboratorycourse.

Sr.No	Practical Exercise
1.	**Inorganic qualitative analysis of binary mixture** ❖ Candidate should perform the analysis of at least 10 compounds.
2.	**Standardization** 2.1 Preparation of standard solution of succinic acid and standardization ofNaOH/KOH Soln. 2.2 Preparation of standard solution of $Na_2S_2O_3$ and standardization of I_2 solution. 2.3 Preparation of standard solution of EDTA and estimation of Ca^{+2}/Mg^{+2} in $CaCl_2/MgCl_2$solution. 2.4 Preparation of standard solution of Oxalic acid and standardization of $KMnO_4$ solution. 2.5 Preparation of standard solution of $K_2Cr_2O_7$ and standardization of $FeSO_4$ solution
3.	**Demonstrations** 3.1 Preparation of standard stock solution by w/v method and their different dilutions. 3.2 Preparation of standard stock solution of HCl by v/v method and their different dilutions.

Scheme of Practical Examination

Exam: - 4 Hrs ***Marks:- 50***

Ex.	***Framework for Practical Examination***	***Marks***
Ex.-1	Inorganic Qualitative Analysis of Binary mixture (water soluble & water Insoluble)	15
Ex.-2	**(Any One)** 1. Preparation of standard solution of succinic acid and standardization of NaOH/KOH Soln. 2. Preparation of standard solution of $Na_2S_2O_3$ and standardization of I_2 solution. 3. Preparation of standard solution of EDTA and estimation of Ca^{+2}/Mg^{+2} in $CaCl_2/MgCl_2$soln. 4. Preparation of standard solution of Oxalic acid and standardization of KMnO4 solution. 5. Preparation of standard solution of $K_2Cr_2O_7$ and standardization of $FeSO_4$ solution.	15
Ex.-3	Viva – voce	10
Ex.-4	Journals, Assignment and Routine Performance	10
	Total marks	**50**