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| Name of Faculty | Science and Technology |
| Name of the Department | Chemistry |
| UG Programme | B. Sc |
| **Programme Specific Outcome(PSO)** |
| 1. To understand basic concept/principles of Physical, Analytical, Organic and Inorganic chemistry. 2. To impart practical skills and learn basics behind experiments. 3. To prepare background for advanced and applied studies in chemistry. |
| **Course Outcomes (CO) S. Y. B. Sc (CBCS 2019 Pattern)** |
| **Semester-III****CH-301 : Physical and Analytical Chemistry** After the completion of this course students will be to 1. Understand concept of kinetics, terms used, and rate laws, molecularity and order.
2. Understand factors affecting rate of reaction, integrated rate laws, characteristics, expression for half-life and examples of zero order, first order, and second order reactions.
3. Understand order of reaction by integrated rate equation method, graphical method, half-life method and differential method.
4. Understand temperature coefficient and effect of temperature on rate constant
5. Understand derivation of Arrhenius equation and evaluation of energy of activation graphically.
6. Understand collision theory and transition state theory of bimolecular reaction and comparison.
7. Understand adsorption, classification of given processes into physical and chemical adsorption.
8. Understand classification of Adsorption Isotherms, explanation of adsorption results in the light of Langmuir adsorption isotherm, Freundlich’s adsorption Isotherm and BET theory.
9. Understand how to apply adsorption process to real life problem?
10. Understand how to explain and compare meaning of accuracy and precision?
11. Understand different terms related to errors in quantitative analysis.
12. Understand how to apply statistical methods to express his / her analytical results in laboratory?
13. Understand different terms in volumetric analysis such as units of concentration, indicator, equivalence point, end point, standard solutions, primary and secondary standards, complexing agent, precipitating agent, oxidizing agent, reducing agent, redox indicators, acid base indicators, metallochome indicators, etc.
14. Understand how to perform calculations involved in volumetric analysis?
15. Understand the explanation of acid-base titrations, complexometric titration / precipitation titration / redox titration.
16. Understand how to apply volumetric methods of analysis to real problem in analytical chemistry / industry?
17. Understand how to solve / discuss problems using theory.

**CH-302 : Inorganic and Organic Chemistry**On successful completion of this course the students will be able to 1. Understand terms related to molecular orbital theory (AO, MO, sigma bond, pi bond, bond order, magnetic property of molecules, etc).
2. Understand how to apply LCAO principle for the formation of MO’s from AO’s.?
3. Understand formation of different types of MO’s from AO’s, formation of different types of MO’s from AO’s.
4. Understand how to draw and explain MO energy level diagrams for homo and hetero diatomic molecules?
5. Understand how to apply MOT to explain bonding in diatomic molecules other than explained in syllabus?
6. Understand different terms related to the coordination chemistry (double salt, coordination compounds, coordinate bond, ligand, central metal ion, complex ion, coordination number, magnetic moment, crystal field stabilization energy, types of ligand, chelate effect, etc.)
7. Understand Werner’s theory of coordination compounds,differentiate between primary and secondary valency, correlate coordination number and structure of complex ion.
8. Understand how to identify and draw the structures aromatic hydrocarbons from their names or from structure name can be assigned?
9. Understand how to explain / discuss synthesis of aromatic hydrocarbons, the mechanism of reactions involved, important reactions of aromatic hydrocarbon, correlate reagent and reactions?
10. Understand how to identify and draw the structures alkyl / aryl halides from their names or from structure name can be assigned?
11. Understand synthesis of alkyl / aryl halides, the mechanism of Nucleophilic Substitution (SN1, SN2 and SNi) reactions, important reactions of alkyl / aryl halides
12. Understand difference between alcohols and phenols, synthesis of alcohols / phenols.

**CH-303 : Chemistry Practical - III** After the completion of this practical course students will be to  1. Understand theoretical principles experimentally.  2. Understand how to interpret the experimental data on the basis of theoretical principles.  3. Understand/verify theoretical principles by experiment observations, explain practical  output  / data with the help of theory.  4. Understand systematic methods of identification of substance by chemical methods.  5. Write balanced equation for the chemical reactions performed in the laboratory.  6. Perform organic and inorganic synthesis and is able to follow the progress of the  chemical reaction by suitable method (colour change, ppt. formation, TLC).  7. Understand set up of the apparatus ,preparation the solutions properly for the designed  experiments.  8. Understand how to perform the quantitative chemical analysis of substances explain  principles behind it.  9. Understand systematic working skill in laboratory will be imparted in student. |
| **Semester-IV** **CH-401 : Physical and Analytical Chemistry** On successful completion of this course the students will be able to 1. Understand the terms in phase equilibria such as- system, phase in system, components in

 system, degree of freedom, one / two component system, phase rule, etc. 1. Understand types of equilibrium such as true or static, metastable and unstable

 equilibrium.  3. Understand meaning of phase, component and degree of freedom, phase rule 4. Understand terms, laws, difference between ideal and no-ideal solutions, Raoult’s law.  5. Understand azeotropes, Lever rule, Henrys law and its application.  6. Understand upper **c**ritical. Solution temperature, lower critical solution temperature and  having both UCST and LCST. 7.Understand distribution law and its thermodynamic proof, 8.Understand different terms in Colorimetry such as radiant power, transmittance,  absorbance, molar, Lamberts Law, Beer’s Law, molar absorptivity  9. Understand different terms in column chromatography such as stationary phase,  mobile phase, elution, adsorption, ion exchange resin, adsorbate, etc.  10. Understand the properties of adsorbents, ion exchange resins, , separation of ionic  substances using resins, separation of substances using silica gel / alumina.  11. Understand applications of column chromatographic process for real analysis in  analytical laboratory.  12. Understand how to solve problem by applying theory?**CH-402 : Inorganic and Organic Chemistry** On successful completion of this course the students will be able to 1.Understand isomerism in coordination complexes, different types of isomerism in  coordination complexes. 2.Understand principles of VBT to explain bonding in coordination compound of  different geometries, inner and outer orbital complexes, limitation of VBT.1. Understand principle of CFT, different type of complexes (Td, Oh, Sq. Pl complexes)
2. Understand strong field and weak field ligand approach in Oh complexes, magnetic properties of coordination compounds on the basis of weak and strong ligand field ligand concept, origin of colour of coordination complex.
3. Understand spectrochemical series, tetragonal distortion / Jahn-Teller effect in Cu (II) Oh complexes only.
4. Understand how to identify and draw the structures aldehydes, ketones, amines and carboxylic acids from their names or from structure name can be assigned?
5. Understand synthesis and mechanism reactions of aldehydes, ketones, amines and carboxylic acid
6. Understand important reactions of aldehydes, ketones, amines and carboxylic acids and their derivatives.
7. Understand conversion of functional groups.
8. Understand the structures of different conformations of cyclohexane.
9. Understand as axial hydrogen, equatorial hydrogen, confirmation, substituted cyclohexane, etc.
10. Understand stability with respect to potential energy of different conformations of cyclohexane.

**CH-403 : Chemistry Practical - IV** After the completion of this practical course students will be to1. Understand theoretical principles experimentally
2. Understand to interpret the experimental data on the basis of theoretical principles.
3. Understand / verify theoretical principles by experiment or explain practical output with the
4. help of theory.

4. Understand systematic methods of identification of substance by chemical methods.  5. Understand to balanced equation for all the chemical reactions performed in the laboratory. 6. Understand how to perform organic and inorganic synthesis and able to follow the progress of  the chemical reaction? 7. Understand how to set up the apparatus properly for the designed experiments? 8. Understand quantitative chemical analysis of substances and able to explain principles behind  it. ` .  |