

Program Outcomes (POs), Program
Specific Outcomes (PSOs) and Course
Outcomes (COs)

Program: B.Sc. Chemistry



**RIZVI COLLEGE OF ARTS, SCIENCE
AND COMMERCE**

DEPARTMENT OF CHEMISTRY

RIZVI COLLEGE OF ARTS, SCIENCE AND COMMERCE

DEPARTMENT OF CHEMISTRY

Chemistry-Outcome Based Education and Assessment

Program Objectives (POs)

- PO 1** : To enable learners to have comprehensive knowledge and understanding of major and basic concepts in chemistry, theoretical principles, etc.
- PO 2** : Enable learners to develop cognitive research skills at a level required to pursue higher education.
- PO 3** : To enable learner to employ critical thinking and the scientific knowledge to design, carry out, record and analyze the results of chemical reactions.
- PO 4** : To train the students to get equipped with ICT and digital literacy.
- PO 5** : To enable learners to have ethical awareness in usage of chemicals, procedures, research and impact on the environment.
- PO 6** : Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change
- PO 7** : To develop professional and communication skills required to acquire global competencies.

Program Specific Outcomes (PSOs)

At the end of the B.Sc. Chemistry program the graduate will be able to:

- PSO 1** : Apply the basic knowledge of chemistry to perform various tasks assigned at the workplace in industry and academia to meet the global standards.
- PSO 2** : Undertake research activities and use modern scientific tools to analyse and solve various topics in the research field.
- PSO 3** : Design system reactions with appropriate considerations in industries and laboratories with respect to safety, economy, health and environment.
- PSO 4** : Use the subject knowledge, communication and ICT skills to be an effective team leader/team member in the interdisciplinary fields.
- PSO 5** : Understand, Manage and contribute to solve basic societal issues and environmental concerns ethically based on principles of scientific knowledge gained.
- PSO 6** : Practice the art of scientific approach and analytical reasoning to become lifelong learners.
- PSO 7** : Enhance the professional and communication skills of students and acquire the ability to pursue careers in the ever growing field of Chemistry

Course Learning Outcomes (CO) of F.Y.B. Sc Chemistry (Paper I, Sem-I)**At the end of the course the learner will be able to**

- 1 The learners will be aware of different terms used in thermodynamics and learn the first law of thermodynamics.
- 2 The learners will be able to understand and prepare solution of different concentration (normality, molality, molarity, formality, mole fraction, ppm, ppb etc.)
- 3 The learner will be able to understand the physical significance of the mathematical statements/expression of the models used for description of the atomic structure.
- 4 The learner will be able to give the distribution of the electrons in various shells of an atom by Aufbau's principle and calculate the electronegativity, effective nuclear charge etc.
- 5 The learners will be able to understand Common and IUPAC nomenclature of different types of organic compounds.
- 6 The learners will be able to explain the bonding and structure of various organic compounds.
- 7 The learners will be able to understand various fundamentals of organic reaction mechanisms (electronic effects, cleavage of bonds, structure, and stability of organic intermediates) and common types of organic reactions.

Mapping of PSOs and COs (F.Y.B.Sc Paper I, Chemistry, Sem- I)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✗	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✗	✓	✓	✗	✓
4	✓	✓	✓	✗	✗	✗	✓
5	✓	✓	✗	✗	✓	✗	✓
6	✓	✓	✓	✓	✓	✗	✓
7	✓	✓	✓	✓	✓	✗	✓

Mapping of POs and COs (F.Y.B.Sc Paper I, Chemistry, Sem- I)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✗	✓	✓	✗	✗	✗
2	✓	✓	✓	✓	✗	✗	✗
3	✓	✓	✓	✓	✗	✗	✗
4	✓	✗	✓	✓	✗	✗	✗
5	✓	✓	✓	✓	✗	✓	✗
6	✓	✓	✓	✓	✓	✓	✗
7	✓	✓	✓	✓	✓	✓	✗

Course Learning Outcomes (CO) of F.Y.B. Sc Chemistry (Paper II, Sem-I)

At the end of the course the learner will be able to

- 1 Learners will be able to understand the basic aspects of chemical kinetics such as rates, molecularity, rate constants and order of reactions.
- 2 Learners will be able to determine the order of reaction from a given data using integration, graphical, Ostwald's isolation and half-time method.
- 3 Learners will understand the concepts of surface tension, viscosity, and refractive index of liquids thoroughly along with expertise in quantitative analysis from numerical data.
- 4 Learners will understand the fundamentals of liquid crystal display, classification, and its applications.
- 5 Learners will be able to distinguish between metals and nonmetals. Learners will also get along with the concepts of catenation, allotropy, diagonal relationship, electronegativity, etc. with periodic trends.
- 6 By the end of the course, learners will get aware of oxides and oxyacid of N and S with their environmental aspects.
- 7 They will be introduced to various terms of stereochemistry (stereogenic centre/asymmetric carbon, chirality, etc.) and will learn drawing and interconversion of various projection formulae.
- 8 Learners will also learn to find out absolute configuration and to distinguish between enantiomers and diastereomers.
- 9 More importantly, by the end of the course, learners will understand the effect of strain on relative stability of conformations and basis of resolution of racemic mixture.

Mapping of PSOs and COs (F.Y.B. Sc Paper I, Chemistry, Sem- I)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✗	✓
2	✓	✓	✗	✓	✗	✓	✓
3	✓	✓	✗	✓	✗	✓	✓
4	✓	✓	✓	✓	✗	✓	✓
5	✓	✓	✓	✓	✓	✗	✓
6	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✗	✓	✗	✓	✓
8	✓	✓	✗	✓	✗	✓	✓
9	✓	✓	✓	✓	✗	✓	✓

Mapping of POs and COs (F.Y.B. Sc Paper I, Chemistry, Sem- I)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✗
2	✓	✓	✓	✓	✗	✓	✗
3	✓	✓	✓	✓	✓	✗	✗
4	✓	✓	✓	✓	✗	✗	✗
5	✓	✓	✓	✓	✓	✗	✗
6	✓	✗	✓	✓	✓	✗	✗
7	✓	✓	✓	✓	✗	✗	✗
8	✓	✓	✓	✓	✗	✓	✗
9	✓	✓	✓	✓	✗	✓	✗

F.Y.B.Sc Course code: USCHP1

COs for F.Y.B. Sc Sem- I Practical

At the end of the course the learner will be able to

- 1 Learners will be able to prepare solutions of different concentrations and standardize the given solutions.
- 2 Learners will be able to determine heat of solution and rate constant of areaction.
- 3 Learners will be able to perform quantitative commercial analysis of compounds by volumetric titration method.
- 4 Learners will be able to calculate the percent purity of samples by gravimetric method.
- 5 Learners will be able to purify various organic compounds by recrystallization technique.
- 6 Learners will be able to calibrate the thermometer and determine physical constants such as M.P. and B.P.
- 7 Learners will be able to perform the technique of thin layer and paper chromatography for separation of components in the mixture.

Mapping of PSOs and COs (F.Y.B. Sc Sem- I Practical)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✗	✓
3	✓	✓	✓	✓	✓	✗	✓
4	✓	✓	✓	✓	✓	✗	✓
5	✓	✓	✓	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	✓	✓	✓

Mapping of POs and COs (F.Y.B. Sc Sem- I Practical)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✗	✓	✗
2	✓	✓	✓	✓	✓	✓	✗
3	✓	✓	✓	✓	✗	✗	✗
4	✓	✓	✓	✓	✓	✗	✗
5	✓	✓	✓	✓	✗	✓	✗
6	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	✓	✗	✗

F.Y.B. Sc Course code: USCH201**Course Learning Outcomes (CO) of F.Y.B. Sc Chemistry (Paper I, Sem-II)****At the end of the course the learner will be able to**

- 1 The learners will be able to distinguish between real gas and ideal gas along with understanding of different Gas laws.
- 2 The learners will be able to derive Ideal gas law, understand the reason for deviation of real gas from ideal behavior and understand the Joule Thomson effect.
The learners will be able to distinguish between reversible and irreversible reactions,
- 3 understand Le Chatelier's principle along with understanding the second law of thermodynamics and different terms involved in it.
The learner will be able to distinguish between the acids and bases on the basis of the
- 4 various theories involved and apply the knowledge in understanding the organic reactions and volumetric analysis involving acid base reactions

- The learner will be able to perform the qualitative test for the testing of analyte ions and
- 5 calculate the solubility and solubility product of sparingly soluble salts or weak electrolytes.
 - 6 The learners will be able to understand various preparations and reactions of alkanes, alkenes and alkynes.
 - 7 The learners will be able to learn some important name reactions in organic chemistry (oxymercuration-demercuration), hydroboration-oxidation and Diels-Alder reaction).
 - 8 The learners will be able to understand Mechanism of E1, E2, E1cb reactions.

Mapping of PSOs and COs (F.Y.B. Sc Paper-I, Chemistry, Sem- II)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✗	✓
2	✓	✓	✗	✓	✗	✓	✓
3	✓	✓	✗	✓	✗	✓	✓
4	✓	✓	✓	✓	✗	✓	✓
5	✓	✓	✓	✓	✓	✗	✓
6	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✗	✓	✗	✓	✓
8	✓	✓	✗	✓	✗	✓	✓

Mapping of POs and COs (F.Y.B. Sc Paper-I, Chemistry, Sem- II)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✗	✗	✓	✓	✗	✗
2	✓	✗	✓	✓	✗	✗	✗
3	✓	✗	✓	✓	✗	✗	✗
4	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✗	✗	✗
6	✓	✗	✓	✓	✓	✗	✗
7	✓	✗	✓	✓	✓	✗	✗
8	✓	✓	✓	✓	✓	✓	✗

Course Learning Outcomes (CO) of F.Y.B. Sc Chemistry (Paper II, Sem- II)

At the end of the course the learner will be able to

- 1** Learners will be able to understand the terms involved in chemical equilibria of different electrolytes thoroughly along with expertise in quantitative analysis from numerical data.
- 2** Learners will be able to understand the types of buffer solution and will be able to prepare the buffer solution using Henderson's equation
- 3** Learners will be able to understand the concept of spectroscopy and different types of interaction such as electronic, vibrational, and rotational transitions
- 4** Learners will be able to understand phenomena such as absorption, emission, scattering and fluorescence.
- 5** Learners will be able to understand different types of solids and the terms involved such as crystal lattice, lattice points, unit cell, space lattice and lattice plane.
- 6** Learners will be able to understand the laws of crystallography such as constancy of interfacial angle, symmetry and rational indices.
- 7** Learners will understand the basic concepts under reduction potential such as half reactions, balancing redox reactions and net reaction.
- 8** Learners will be able to interpret the Latimer and Frost diagrams and the understanding of the effect of pH on redox potential.
- 9** Learners will also be able to interpret and plot titration curves for single and multielectron systems.
- 10** Learners will also gain knowledge of the extraction of elements and the role of redox reagents in volumetric analysis.
- 11** Learners will be able to draw and compare the relative stabilities of various conformations of cycloalkanes and cyclohexane (in details).
- 12** Learners will get knowledge of Baeyer strain theory and their applications.
- 13** Learners will be able to apply the concepts of aromaticity in finding out nature (aromatic/nonaromatic/antiaromatic) of a given new molecule.
- 14** Learners will also understand the mechanism of various electrophilic aromatic substitution reactions along with related concepts.

Mapping of PSOs and COs (F.Y.B.Sc, Paper II, Chemistry, Sem- II)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✗	✓	✓	✗	✓
2	✓	✓	✗	✓	✗	✓	✓
3	✓	✓	✗	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✗
5	✓	✓	✗	✓	✗	✓	✓
6	✓	✓	✗	✓	✗	✓	✓
7	✓	✓	✗	✓	✗	✓	✓
8	✓	✓	✗	✓	✗	✓	✓
9	✓	✓	✗	✓	✗	✓	✓
10	✓	✓	✓	✓	✓	✓	✓
11	✓	✓	✓	✓	✓	✓	✓
12	✓	✓	✓	✓	✓	✓	✓
13	✓	✓	✓	✓	✓	✓	✓
14	✓	✓	✓	✓	✓	✓	✓

Mapping of POs and COs (F.Y.B.Sc, Paper II, Chemistry, Sem- II)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✗	✓	✗
2	✓	✗	✓	✓	✗	✗	✗
3	✓	✓	✓	✓	✗	✓	✗
4	✓	✓	✓	✓	✗	✓	✗
5	✓	✗	✓	✓	✗	✗	✗
6	✓	✓	✓	✓	✗	✗	✗
7	✓	✓	✓	✓	✗	✓	✗
8	✓	✗	✓	✓	✓	✗	✗
9	✓	✗	✓	✓	✗	✗	✗
10	✓	✓	✓	✓	✓	✓	✓
11	✓	✗	✗	✓	✗	✗	✗
12	✓	✗	✓	✓	✗	✗	✗
13	✓	✓	✓	✓	✓	✓	✗
14	✓	✓	✓	✓	✗	✓	✗

F.Y.B.Sc. Course code: USCHP2**COs for F.Y.B. Sc Sem- II Practical****At the end of the course the learner will be able to**

- 1 Learners will be able to perform kinetic investigation for saponification reactions.
- 2 Learners will understand principle and working of pH-meter and determine the dissociation constant of any given acid pH-metrically.
- 3 Learners will understand principle, working and operation of colorimeter and verify Beer-Lambert's law calorimetrically
- 4 Learners will be able to perform standardization of the given acid sample and learn safety measures for various chemicals.
- 5 Learners will be able to analyze cations and anions in each mixture qualitatively.
- 6 Learners will be able to understand the principle of redox titration and estimate copper in a given sample quantitatively by iodometric method.
- 7 Learners will be able to identify an unknown organic compound by analysing its chemical nature, elements, functional group and physical constant.

Mapping of PSOs and COs (F.Y.B. Sc Sem- II Practical)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✗	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✗	✓
6	✓	✓	✓	✓	✓	✗	✓
7	✓	✓	✓	✓	✓	✓	✓

Mapping of POs and COs (F.Y.B. Sc Sem- II Practical)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✗	✗	✓	✓	✗	✗
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✗
4	✓	✓	✓	✓	✗	✗	✗
5	✓	✓	✓	✓	✓	✗	✗
6	✓	✗	✗	✓	✗	✗	✗
7	✓	✓	✓	✓	✓	✓	✗

S. Y. B. Sc Course code: USCH301**Course Learning Outcomes (CO) of S.Y.B. Sc Chemistry (Paper I, Sem-III)****At the end of the course the learner will be able to**

- 1 Apply the laws of thermodynamics to a chemical reaction by studying the spontaneous nature of a chemical process, changes in its free energy and variation in chemical potential and partial molal quantities with respect to temperature and pressure.
- 2 Learn about the interrelation of chemical and electrical changes by studying the conductivity of different electrolytes with its application to determine ionization constant, solubility, solubility product and ionic product of water.
- 3 Apply the knowledge of chemical bonding in calculating the lattice energy of the ionic crystals.
- 4 Predict the nature of magnetism and calculate the bond order of homonuclear diatomic molecules.
- 5 Write a mechanism of nucleophilic substitution reaction.
- 6 Know the method of preparation of organomagnesium and organolithium compounds and their reaction with organic compounds.
- 7 Know the method of preparation of alcohol, phenol and epoxide and their reaction.

Mapping of PSOs and COs (S.Y.B. Sc Sem- III Paper-I)

Cos	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✗	✓
5	✓	✓	✓	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	✓	✓	✓

Mapping of POs and COs (S.Y.B. Sc Sem- III Paper-I)

Cos	POs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✗	✗
3	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓
5	✓	✗	✓	✓	✓	✓	✗
6	✓	✓	✓	✓	✓	✗	✗
7	✓	✓	✓	✓	✓	✓	✓

S. Y. B. Sc Course code: USCH302**Course Learning Outcomes (COs) of S.Y.B. Sc Chemistry (Paper II, Sem-III)****At the end of the course the learner will be able to**

- 1 Apply the knowledge of collision and transition state theories of elementary and composite reactions to calculate energy.
- 2 Differentiate between different liquid system based on the vapour pressure-composition (and temperature) and critical solution temperature
- 3 Apply the knowledge of Nernst distribution law to calculate the extraction efficiency of completely immiscible liquids.
- 4 Understand the chemistry of Boron compounds and the preparation, structure and applications of Boron compounds.
- 5 Acknowledge the chemistry of Silicon and germanium along with extraction process of Germanium
- 6 Comment on the structure, occurrence and inert nature of silica and lay out the method for preparation of extra pure Silicon Germanium.
- 7 Conceptualize the chemical reactivity trends in various hydrides and halides compounds and understand the Bosch - Haber process.
- 8 Give nomenclature of aliphatic, alicyclic and aromatic carbonyl compounds along with their method of preparation.
- 9 Write general mechanisms of nucleophilic addition to carbonyl compounds and acid catalyzed nucleophilic addition reactions.
- 10 Write actions of different reagents on aldehyde and ketone.
- 11 Write mechanisms of Benzoin condensation, Knoevenagel condensation, Claisen Schmidt and Cannizzaro reaction.
- 12 Know about keto enol tautomerism and active methylene compounds.

Mapping of PSOs and COs (S.Y.B. Sc Sem- III Paper-II)

Cos	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	✓	✓	✓
8	✓	✓	✓	✓	✓	✓	✓
9	✓	✓	✓	✓	✓	✓	✓
10	✓	✓	✓	✓	✓	✓	✓
11	✓	✓	✓	✓	✓	✓	✓
12	✓	✓	✓	✓	✓	✓	✓
13	✓	✓	✓	✓	✓	✓	✓
14	✓	✓	✓	✓	✓	✓	✓

Mapping of POs and COs (S.Y.B. Sc Sem- III Paper-II)

Cos	POs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✗	✓	✓	✓	✗
3	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	✓	✓	✓
8	✓	✓	✓	✓	✓	✓	✓
9	✓	✓	✓	✓	✓	✓	✓
10	✓	✓	✓	✓	✓	✓	✓
11	✓	✓	✓	✓	✓	✓	✓
12	✓	✓	✓	✓	✓	✓	✓
13	✓	✓	✓	✓	✓	✓	✓
14	✓	✓	✓	✓	✓	✓	✓

S. Y. B. Sc Course code: USCH303**Course Learning Outcomes (COs) of S.Y.B. Sc Chemistry (Paper III, Sem-III)****At the end of the course the learner will be**

- 1 Able to understand the concept, perform calculations and prepare the solutions of different concentrations (Normality, Molarity, Molality, ppm, percentage and interconversions).
- 2 Able to differentiate between classical and instrumental methods of analysis.
- 3 Able to distinguish between gravimetric and titrimetric analysis along with understanding of associated errors.
- 4 Able to understand the principle, construction, working and application of colorimeter/spectrophotometer and also differentiate between the two.
- 5 Able to understand the process of sampling, analysis and interpretation of the results.
- 6 Aware of the different types of analytical instruments.
- 7 Able to identify, choose and apply the appropriate technique that could be used to analyse the given samples.

Mapping of PSOs and COs (S.Y.B. Sc Sem- III Paper-III)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✗	✓
2	✓	✓	✓	✓	✓	✗	✓
3	✓	✓	✓	✓	✓	✗	✓
4	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	✓	✓	✓

Mapping of POs and COs (S.Y.B. Sc Sem- III Paper-III)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	✓	✓	✓

S. Y. B. Sc Course code: USCHP1**Course Learning Outcomes (COs) of S.Y.B. Sc Chemistry (Sem-III, Practical Paper II)**

At the end of the course the learner will be to

- 1 Perform various experiments and analyze samples using a conductometer.
- 2 Perform Kinetic investigations of various reactions.
- 3 Separate and identify cations and anions from the given unknown mixtures.

Mapping of PSOs and COs (S.Y.B. Sc Sem- III Practical Paper I)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓

Mapping of POs and COs (S.Y.B. Sc Sem- III Practical Paper I)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓

S. Y. B. Sc Course code: USCHP2**Course Learning Outcomes (COs) of S.Y.B. Sc Chemistry (Sem-III, Practical Paper II)**

At the end of the course the learner will be to

- 1 Perform Complexometric Titrations and determine the hardness of given water sample.
- 2 Prepare and purify various Organic compounds.

Mapping of PSOs and COs (S.Y.B. Sc Sem- III Practical Paper II)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓

Mapping of POs and COs (S.Y.B. Sc Sem- III Practical Paper II)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓

S. Y. B. Sc Course code: USCHP3**Course Learning Outcomes (COs) of S.Y.B. Sc Chemistry (Sem-III, Practical Paper III)**

At the end of the course the learner will be to

- 1 Identify all the apparatus and instruments used in chemical laboratory.
- 2 Perform gravimetric estimation and calculate percentage error
- 3 Determination of copper ions in an unknown solution using colorimetry.
- 4 Determination of buffer capacity using pH meter.
- 5 Quantify the amount of aspirin present in the given aspirin sample.

Mapping of PSOs and COs (S.Y.B. Sc Sem- III Practical Paper III)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓

Mapping of POs and COs (S.Y.B. Sc Sem- III Practical Paper III)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓

S. Y. B. Sc Course code: USCH401**Course Learning Outcomes (COs) of S.Y.B. Sc Chemistry (Paper I, Sem-IV)****At the end of the course the learner will be able to**

- 1 Apply the knowledge of working of a galvanic cell, with importance of Nernst equation, electrochemical series and calculations of thermodynamic properties like ΔG , ΔH , ΔS , *EMF* and its applications to pH determinations and various concentration cells.
- 2 Study the physical equilibria between different states of matter, made up of one or more chemical constituents by means of applying principles of Phase rule.
- 3 Find the type of hybridization present in the central metal ion/atom in a complex and predict whether the complex will be inner orbital complex or outer orbital complex.
- 4 Apply the knowledge in performing the qualitative tests for the various transition metal ions.
- 5 Explain acidity of carboxylic acid and effect of substituent on the strength of aliphatic and aromatic carboxylic acid.
- 6 Explain different methods of preparation of carboxylic acid and action of different reagents on carboxylic acid.
- 7 Explain the method of preparation of aromatic sulphonic acid, reaction of sulfonic acid and IPSO substitution.

Mapping of PSOs and COs (S.Y.B. Sc Sem- IV, Paper I)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	✓	✓	✓

Mapping of POs and COs (S.Y.B. Sc Sem- IV, Paper I)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✗
2	✓	✓	✓	✓	✓	✓	✗
3	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✗
5	✓	✓	✓	✓	✓	✗	✓
6	✗	✓	✗	✓	✗	✓	✓
7	✗	✓	✓	✗	✓	✗	✓

S. Y. B. Sc Course code: USCH402**Course Learning Outcomes (COs) of S.Y.B. Sc Chemistry (Sem-IV, Paper II)****At the end of the course the learner will be able to**

- 1 Understand the features simple cubic crystal system and predict its type based on interplanar distance in crystal structure
- 2 Understand the use of x-rays in Bragg's diffraction method to elucidate the structure of crystals
- 3 Understand the mechanism acid- base and enzyme catalysis and the factors affecting such as catalytic activity, specificity selectivity, inhibitors, catalyst poisoning and deactivation
- 4 Understand the nature of ions in aqueous solutions and predict the degree of hydrolysis
- 5 Classify the cations on the basis of acidity and anions on the basis of basicity
- 6 Reason the effect of charge and radius on hydration energy and lay out the predominance diagram for various ions

- 7 Understand the properties of concentrated oxo-acids and suggest the measures to curb their ill effects on the environment
- 8 Know different methods of preparation of amine and its reaction.
- 9 Different methods of preparation of diazonium salt and its application.
- 10 The structure, reactivity, methods of preparation and reaction of heterocyclic compounds such as furan, pyrrole, thiophene and pyridine.

Mapping of PSOs and COs (S.Y.B. Sc Sem- IV, Paper II)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	✓	✓	✓
8	✓	✓	✓	✓	✓	✓	✓
9	✓	✓	✓	✓	✓	✓	✓
10	✓	✓	✓	✓	✓	✓	✓

Mapping of POs and COs (S.Y.B. Sc Sem- IV, Paper II)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✗	✗
2	✓	✓	✓	✓	✗	✗	✗
3	✓	✓	✓	✓	✓	✗	✗
4	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✗	✓	✗
6	✓	✓	✓	✓	✓	✓	✗
7	✓	✓	✓	✓	✓	✓	✗
8	✓	✓	✓	✓	✗	✗	✗
9	✓	✓	✓	✓	✓	✗	✗
10	✓	✓	✓	✓	✓	✗	✓

S. Y. B. Sc Course code: USCH403**Course Learning Outcomes (COs) of S.Y.B. Sc Chemistry (Paper III, Sem-IV)****At the end of the course the learner will be able to**

- 1 Know the different types of techniques of separation
- 2 Understand the principle, working and applications as well as be able to distinguish between the techniques of chromatography, centrifugation and solvent extraction.
- 3 Learn the principles, construction and working of various types of electrodes, conductometry, potentiometry, pH-metry, colorimetry and viscometry
- 4 Understand to perform conductometric, potentiometric and photometric titrations
- 5 Understand the concept of errors, their types and will be able to distinguish between different types of errors.
- 6 Know the available statistical tests to validate the data and its application in analysis of the data.
- 7 Solve the numerical related to statistics w.r.t. mean mode, median, standard deviation, average deviation, variance, range confidence limit and confidence interval.

Mapping of PSOs and COs (S.Y.B. Sc Sem- IV, Paper III)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✗	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✗	✓	✓	✓

Mapping of POs and COs (S.Y.B. Sc Sem- IV, Paper III)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✗	✗
2	✓	✓	✓	✓	✗	✗	✗
3	✓	✓	✓	✓	✓	✓	✗
4	✓	✓	✓	✓	✓	✗	✗
5	✓	✓	✓	✓	✗	✗	✗
6	✓	✓	✓	✓	✓	✗	✗
7	✓	✓	✓	✓	✓	✓	✓

S. Y. B. Sc Course code: USCHP4**Course Learning Outcomes (COs) of S.Y.B. Sc Chemistry (Sem-IV, Practical Paper I)****At the end of the course the learner will be to**

- 1 To determine standard e.m.f. and standard free energy change of Daniel cell potentiometrically.
- 2 Compare the strengths of HCl and H₂SO₄ by studying chemical kinetics of acid hydrolysis of methyl acetate.
- 3 Inorganic preparations of complexes and calculate the percentage yield of complexes.

Mapping of PSOs and COs (S.Y.B. Sc Sem-IV, Practicals Paper I)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✗	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓

Mapping of POs and COs (S.Y.B. Sc Sem-IV, Practicals Paper I)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✗	✗
2	✓	✓	✓	✓	✓	✗	✗
3	✓	✓	✓	✓	✓	✓	✗

S. Y. B. Sc Course code: USCHP5**Course Learning Outcomes (COs) of S.Y.B. Sc Chemistry (Sem-IV, Practical Paper II)****At the end of the course the learner will be to**

- 1 Qualitative analysis of organic compounds that containing two functional groups.

Mapping of PSOs and COs (S.Y.B. Sc Sem-IV, Practicals Paper II)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓

Mapping of POs and COs (S.Y.B. Sc Sem-IV, Practicals Paper II)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✗

S. Y. B. Sc Course code: USCHP6**Course Learning Outcomes (COs) of S.Y.B. Sc Chemistry (Sem-IV, Practical Paper III)**

At the end of the course the learner will be to

- 1 Identify all the apparatus and instruments used in chemical laboratory.
- 2 Separation of cations in a sample by using paper chromatography.
- 3 To determine the distribution ratio of two immiscible solvent by using solvent extraction.
- 4 Perform conductometric titration for strong bases.
- 5 Estimate Fe(II) in the given solution potentiometrically.
- 6 Gravimetric estimation of sulphate.

Mapping of PSOs and COs (S.Y.B. Sc Sem-IV, Practicals Paper III)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓

Mapping of POs and COs (S.Y.B. Sc Sem-IV, Practicals Paper III)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✗	✗
2	✓	✓	✓	✓	✓	✗	✗
3	✓	✓	✓	✓	✓	✓	✗
4	✓	✓	✓	✓	✗	✗	✓
5	✓	✓	✓	✓	✗	✓	✗
6	✓	✓	✓	✓	✓	✗	✓

T. Y. B. Sc Course code: USCH501**Course Learning Outcomes (COs) of T. Y. B. Sc Physical Chemistry (Paper I, Sem-V)****At the end of the course the learner will be able to**

- 1 Understand the basic aspects and applications of molecular spectroscopy such as rotational, vibrational, electronic and Raman spectroscopy.
- 2 Determine rotational constant, rotational energy, vibrational energy, optical activity and Raman shift from the given information
- 3 Understand the basic aspects of chemical kinetics such as rates, molecularity, rate constants and order of reactions, also to understand the different theories of chemical kinetics.
- 4 Determine the thermodynamic parameter such like activation of free energy, enthalpy and entropy, also understand the spontaneity of the reaction
- 5 Understand the concepts of natural radioactivity, artificial radioactivity, G.M. counter and Scintillation counter technique thoroughly along with expertise to their calculation of rate of disintegration, decay constant, Q value and threshold energy from numerical data.
- 6 Distinguish between physical and chemical adsorption also understands the different types of adsorption. Learners will also get along with the concepts of Langmuir adsorption isotherm, Gibbs adsorption isotherm and BET adsorption isotherm.
- 7 Understand the effect of radioactive material and nuclear reactions on environmental aspects.
- 8 Understand the concept of surfactant, classification of surfactant and Applications of surfactant in daily life and chemical industries.

Mapping of PSOs and COs (T. Y. B. Sc Sem- V, Paper I)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	✓	✓	✓
8	✓	✓	✓	✓	✓	✓	✓

Mapping of POs and COs (T. Y. B. Sc Sem- V, Paper I)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✗	✗	✗	✓
2	✓	✓	✓	✗	✗	✗	✗
3	✓	✓	✓	✗	✓	✓	✓
4	✓	✓	✓	✓	✗	✓	✓
5	✓	✓	✓	✓	✓	✗	✗
6	✓	✓	✓	✓	✗	✓	✗
7	✓	✓	✓	✗	✓	✓	✗
8	✓	✓	✓	✓	✓	✓	✗

T. Y. B. Sc Course code: USCH502

Course Learning Outcomes (COs) of T. Y. B. Sc Inorganic Chemistry (Paper II, Sem-V)

At the end of the course the learner will be able to

- 1 Understand the concept of symmetry element, symmetry operation and point groups.
- 2 Classify & recognize the symmetry elements and their operations as required to specify molecular symmetry & possible point groups from symmetry elements & be able to find point group of molecule by systemic procedure
- 3 Understand the concept of molecular orbital theory applied to heteronuclear diatomic molecules and polyatomic species.
- 4 Apply the basic concepts of solid state chemistry, such as unit cells, lattice parameters and crystal systems.
- 5 Learn stoichiometric Point and structure-property correlations of various inorganic solids.
- 6 Understand the superconductivity phenomenon and classification and application of superconductors
- 7 Learn the Chemistry of Lanthanides with reference to Occurrence, extraction, separation of individual lanthanides, properties and applications.
- 8 Gain an understanding of solutions which have water as a solvent are called aqueous solutions and those with solvent other than water are called non-aqueous solutions.
- 9 Compare the Chemistry of Group 16 and group 17 elements and will also learn different properties
- 10 Learn the chemistry of interhalogens with reference to preparations, properties and structures on the basis of VSEPR theory.

Mapping of PSOs and COs (T. Y. B. Sc Sem- V, Paper II)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✗	✗	✗	✓	✓
2	✓	✓	✓	✓	✗	✓	✓
3	✓	✓	✓	✓	✗	✓	✓
4	✓	✓	✓	✓	✗	✓	✓
5	✓	✓	✓	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	✗	✗	✓
8	✓	✓	✓	✓	✓	✓	✓
9	✓	✓	✓	✗	✓	✓	✓
10	✓	✓	✓	✗	✓	✓	✓

Mapping of POs and COs (T. Y. B. Sc Sem- V, Paper II)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✓	✗	✗	✗	✗	✗
2	✓	✓	✓	✗	✗	✗	✗
3	✓	✓	✓	✓	✗	✗	✗
4	✓	✓	✓	✗	✗	✓	✗
5	✓	✓	✓	✗	✓	✓	✗
6	✓	✓	✓	✗	✓	✓	✗
7	✓	✓	✓	✗	✓	✗	✗
8	✓	✓	✓	✗	✓	✗	✗
9	✓	✓	✓	✗	✓	✗	✗
10	✓	✓	✓	✗	✓	✗	✗

T. Y. B. Sc Course code: USCH503**Course Learning Outcomes (COs) of T. Y. B. Sc Organic Chemistry (Paper III, Sem-V)****At the end of the course the learner will be able to**

- 1 Understand the basic terms and concepts involved in the study of the mechanism of Organic Reactions and will be able to distinguish between polar, non-polar and pericyclic reactions.
- 2 Understand the basic principles and types of Photochemical reactions and the fate of photochemically excited states. It will promote the appreciation of the photochemical processes in nature.
- 3 Apply the concept of chirality without a carbon atom and be able to predict optical activity based on the structural features.
- 4 Understand the advantages and disadvantages of agrochemicals and the need for environmentally friendly agrochemicals like biopesticides.
- 5 Synthesize and analyze reactivity of different heterocyclic compounds along with their applications.
- 6 Grasp the IUPAC Nomenclature and to classify various bicyclic compounds, biphenyls, cumulenes and quinolines. They will be able to create organic compounds using the principles of Green Chemistry
- 7 Apply the spectroscopic techniques used to study conjugation. It will enable them to understand and will be able to solve how exact molecular weight and isotopic abundance is determined
- 8 Evaluate structural diversity and complexity of naturally occurring organic compounds and the efforts put in by the chemists to decipher their structure.

Mapping of PSOs and COs (T. Y. B. Sc Sem- V, Paper III)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	✓	✓	✓
8	✓	✓	✓	✓	✓	✓	✓

Mapping of POs and COs (T. Y. B. Sc Sem- V, Paper III)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✗	✓	✓	✓
2	✓	✓	✓	✗	✓	✗	✗
3	✓	✓	✓	✓	✓	✗	✗
4	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✗
6	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	✓	✓	✓
8	✓	✓	✓	✓	✗	✓	✓

T. Y. B. Sc Course code: USCH504**Course Learning Outcomes (COs) of T. Y. B. Sc Analytical Chemistry (Paper IV, Sem-V)****At the end of the course the learner will be able to**

- 1 Keep quality checks using chemical calculations and also able to monitor various parameters involving sampling
- 2 Comprehend the origin and processes of optical radiation, as well as its propagation and the phenomena that occur when light interacts with a substance.
- 3 Select the type of indicator which should be used for performing the redox titrations.
- 4 Choose the type of EDTA titration for estimating the metal ions and control the factors affecting the titration.
- 5 The concept of solvent extraction, Craig's counters current extraction, solid-phase extraction and their comparison.
- 6 Understand the principle, instrumentation and application of High performance liquid chromatography (HPLC).
- 7 Understand the principle of high performance thin layer chromatography (HPTLC) , different type of detectors used, their advantages, disadvantages and applications

Mapping of PSOs and COs (T. Y. B. Sc Sem- V, Paper IV)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	✓	✓	✓

Mapping of POs and COs (T. Y. B. Sc Sem- V, Paper IV)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✗
3	✓	✓	✓	✗	✓	✗	✗
4	✓	✓	✓	✓	✓	✓	✗
5	✓	✓	✓	✗	✓	✓	✗
6	✓	✓	✓	✓	✗	✓	✗
7	✓	✓	✓	✓	✗	✓	✗

T. Y. B. Sc Course code: USACDD501

Course Learning Outcomes (COs) of Applied Chemistry-Drugs & Dyes (Paper V, Sem-V)

At the end of the course the learner will be able to

- 1 Understand the General introduction to drugs
- 2 Understand the various routes of Drug Administration.
- 3 Understand pharmacodynamic agents.
- 4 Study the examples of CNS drugs & learn the synthesis of some CNS drugs.
- 5 Understand the definition along with examples and synthesis of some pharmacodynamic agents.
- 6 Acquire knowledge about the types of fibers and classification of dyes based on application and dyeing methods.
- 7 Understand the basic terms and concepts used in dye stuff industry & Types of dyes
- 8 Understand the concept of color and chemical constitution of dyes.
- 9 Grasp the different unit processes and apply the acquired knowledge to synthesize some dye intermediates

Mapping of PSOs and COs Applied Chemistry-Drugs & Dyes (T. Y. B. Sc Paper V, Sem-V)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	✓	✓	✓
8	✓	✓	✓	✓	✓	✓	✓

Mapping of POs and COs Applied Chemistry-Drugs & Dyes (T. Y. B. Sc Paper V, Sem-V)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✗	✓	✓	✓
3	✓	✓	✓	✗	✗	✗	✗
4	✓	✓	✓	✗	✓	✓	✗
5	✓	✓	✓	✗	✓	✓	✗
6	✓	✓	✓	✗	✗	✗	✗
7	✓	✓	✓	✓	✗	✗	✗
8	✓	✓	✓	✓	✓	✓	✓

T. Y. B. Sc Course code: USCHP01

Course Learning Outcomes (COs) of Physical Chemistry Practical (T. Y. B. Sc Paper I Sem-V)

At the end of the course the learner will be able to

- 1 Identify all the apparatus and instruments used in chemical laboratories.
- 2 Perform various experiments and analyze samples using a conductometer, pH meter and potentiometer.
- 3 Perform kinetic investigations of various reactions and also able to understand the effect of ionic strength on reactions.
- 4 Investigate the adsorption of acetic acid on activated charcoal and test the validity of Freundlich adsorption isotherm.
- 5 Demonstrate the spectrometer to others confidently.

Mapping of PSOs and COs Physical chemistry Practical (T. Y. B. Sc Paper I Sem-V)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✗	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓

Mapping of POs and COs Physical chemistry Practical (T. Y. B. Sc Paper I Sem-V)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✗	✓	✓	✗
3	✓	✓	✓	✗	✓	✗	✓
4	✓	✓	✓	✓	✗	✓	✗
5	✓	✓	✓	✗	✓	✓	✓

T. Y. B. Sc Course code: USCHP05**Course Learning Outcomes (COs) of Inorganic Chemistry Practical (T. Y. B. Sc Paper II Sem-V)****At the end of the course the learner will be able to**

- 1 Understand key concepts of inorganic chemistry including those related to synthesis, reaction chemistry, and structure and bonding.
- 2 Understand the communication of the results of scientific experiments in oral reports, technical graphics, and written reports.
- 3 Know how to follow chemical literature and to read and understand technical literature related to the qualitative analysis.
- 4 Perform different types of titrimetric analysis-iodometry titration, redox titration and complexometric titration.
- 5 Prepare various inorganic coordination complexes.

Mapping of PSOs and COs Inorganic chemistry Practical (T. Y. B. Sc Paper II Sem-V)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✗	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✗	✗	✗	✓
4	✓	✓	✓	✓	✓	✗	✓
5	✓	✓	✓	✓	✓	✓	✓

Mapping of POs and COs Inorganic chemistry Practical (T. Y. B. Sc Paper II Sem-V)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✗	✓
2	✓	✓	✓	✗	✓	✓	✓
3	✓	✓	✓	✗	✗	✗	✓
4	✓	✓	✓	✓	✓	✗	✓
5	✓	✓	✓	✗	✓	✓	✓

T. Y. B. Sc Course code: USCHP09**Course Learning Outcomes (COs) of Organic Chemistry Practical (T. Y. B. Sc Paper III Sem-V)****At the end of the course the learner will be able to**

- 1 Identify the nature of a solid, binary mixture and will be able to separate it by chemical method.
- 2 Characterize the compounds based on the elemental analysis, functional group detection and confirmation of structure by determination of physical constants.

Mapping of PSOs and COs Organic chemistry Practical (T. Y. B. Sc Paper III Sem-V)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓

Mapping of POs and COs Organic chemistry Practical (T. Y. B. Sc Paper III Sem-V)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓

T. Y. B. Sc Course code: USCHP13**Course Learning Outcomes (COs) of Analytical Chemistry Practical (T. Y. B. Sc Paper IV Sem-V)****At the end of the course the learner will be able to**

- 1 Be familiar with laboratory equipment, glass wares and will be competent to perform calculations in preparing solutions of various concentrations and standardize solutions of approximate strengths.
- 2 Operate and analyze the sample like water and other commercial samples like talcum powder, fertilizers using instruments like, spectrophotometer/ colorimeter, Turbidimeter, flame photometer and equipment like reflux condenser.
- 3 Gain competency in performing non instrumental methods of quantitative analysis like acid base titration, redox titration and complexometric titrations.

Mapping of PSOs and COs Analytical chemistry Practical (T. Y. B. Sc Paper IV Sem-V)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓

Mapping of POs and COs Analytical chemistry Practical (T. Y. B. Sc Paper IV Sem-V)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓

T. Y. B. Sc Course code: USACDD5P1**Course Learning Outcomes (COs) of Applied Chemistry Practical-Drugs & Dyes (Sem-V)****At the end of the course the learner will be able to**

- 1 Estimate Ibuprofen by back titration method.
- 2 Estimate Acid neutralizing capacity of a drug.
- 3 Prepare Aspirin from salicylic acid.
- 4 Separate the components of natural pigments like chlorophyll by paper chromatography method.
- 5 Preparation of Orange II dye and its use for dyeing cotton fabrics.

Mapping of PSOs and COs Applied Chemistry Practical-Drugs & Dyes (T. Y. B. Sc Sem-V)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓

Mapping of POs and COs Applied Chemistry Practical-Drugs & Dyes (T.Y.B.Sc Sem-V)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓

T. Y. B. Sc Course code: USCH601

Course Learning Outcomes (COs) of T. Y. B. Sc Physical Chemistry (Paper I, Sem-VI)

At the end of the course the learner will be able to

- 1 Understand the basic aspects activity, activity coefficient and able to distinguish between chemical cells and concentration cells along with expertise to their calculation on emf of the cell, activity and activity coefficient.
- 2 Understand the basic aspects and applications of polarization, decomposition potential and overvoltage potential.
- 3 Understand the basic aspects and applications of molar mass of polymers, light emitting polymers, antioxidants and stabilizers
- 4 Understand the basic aspects and applications of classical mechanics, quantum mechanics, different types of operators and Eigen value equation.
- 5 Understand the basic aspects of polymers, classification of polymers and method of determining molar masses of polymers.
- 6 Gain awareness about solar cells, photovoltaic effect, silicon solar cell, fuel of the future and advantages of hydrogen as a universal energy medium.
- 7 Understand the basic aspects and applications of chemical shift, spin - spin relaxation, spin-lattice relaxation from NMR spectroscopy and also g- factor, hyperfine splitting and ESR spectrum of hydrogen and deuterium.
- 8 Distinguish between NMR spectroscopy technique and ESR Spectroscopy technique and also learners will interpret the NMR, ESR spectrum of Organic and Inorganic compounds.

Mapping of PSOs and COs (T. Y. B. Sc Sem- VI, Paper I)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	✓	✓	✓
8	✓	✓	✓	✓	✓	✓	✓

Mapping of POs and COs (T. Y. B. Sc Sem- VI, Paper I)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✗	✗	✓
2	✓	✓	✓	✓	✗	✗	✗
3	✓	✓	✓	✓	✗	✗	✗
4	✓	✓	✓	✗	✗	✗	✓
5	✓	✓	✓	✓	✗	✗	✗
6	✓	✓	✓	✗	✗	✗	✗
7	✓	✓	✓	✓	✗	✗	✓
8	✓	✓	✓	✓	✗	✗	✓

T. Y. B. Sc Course code: USCH602

Course Learning Outcomes (COs) of T. Y. B. Sc Inorganic Chemistry (Paper II, Sem-VI)

At the end of the course the learner will be able to

- 1 Understand limitations of Valence Bond Theory and Crystal Field Theory and effect of crystal field on central metal valence orbitals in various geometries from linear to octahedral (from coordination number 2 to coordination number 6).
- 2 Learn the consequences of crystal field splitting on various properties such as ionic radii, hydration energy and enthalpies of formation of metal complexes and limitations of CFT
- 3 Gain an understanding of molecular orbital theory for coordination compounds by construction of ligand group orbitals and s-molecular orbitals for an ML₆ complex with various examples.
- 4 Compare the stability of Metal-Complexes with respect to Thermodynamic and kinetic perspectives of metal complexes with examples
- 5 Know reactivity of metal complexes and different types of substitution reaction like SN₁ and SN₂, and difference between acid hydrolysis & base hydrolysis and anation reactions.
- 6 Learn the types of electronic transitions in coordination compounds, Electronic configuration and electronic micro states, Terms and Term symbols for transition metal ions, rules for determination of ground state term.
- 7 Describe different types and general steps of metallurgies.
- 8 Gain an understanding of Chemistry of Group 18 w.r.t General characteristics, trends in physical and chemical properties and Uses of noble gases.
- 9 Learn Compounds of Xenon (oxides and fluorides) with respect to preparation and be able to predict the geometry by using VSEPR.
- 10 Gain basic knowledge of Bioinorganic Chemistry and Biological importance of metal ions such as Na⁺, K⁺, Fe⁺²/Fe⁺³ and Cu⁺² (Role of Na⁺ and K⁺ w.r.t ion pump).
- 11 Understand general characteristics, various types, synthetic methods and reactions of organometallic compounds of main group elements.
- 12 Have the knowledge and skills to explain and rationalize the synthesis, structure, bonding, properties and reactivity of ferrocene.
- 13 Understand the classification and processes of catalytic reactions and the role of Wilkinson's catalyst in hydrogenation of alkenes.

Mapping of PSOs and COs (T. Y. B. Sc Sem- VI, Paper II)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✗	✓	✓
2	✓	✓	✗	✓	✓	✓	✓
3	✓	✓	✗	✓	✓	✗	✓
4	✓	✓	✓	✗	✓	✓	✓
5	✓	✓	✓	✓	✗	✓	✓
6	✓	✗	✓	✓	✗	✓	✓
7	✓	✗	✓	✓	✓	✓	✓
8	✓	✓	✓	✗	✓	✓	✓
9	✓	✓	✓	✗	✓	✓	✓
10	✓	✓	✓	✓	✓	✓	✓
11	✓	✓	✓	✓	✗	✓	✓
12	✓	✓	✓	✓	✗	✓	✓
13	✓	✓	✓	✓	✗	✓	✓

Mapping of POs and COs (T. Y. B. Sc Sem- VI, Paper II)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✗	✗	✓	✓
2	✓	✓	✗	✓	✓	✓	✓
3	✓	✓	✗	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✗
5	✓	✓	✓	✗	✓	✓	✓
6	✓	✗	✓	✗	✓	✓	✓
7	✓	✗	✓	✓	✓	✓	✓
8	✓	✓	✓	✓	✓	✓	✗
9	✓	✓	✓	✓	✓	✓	✗
10	✓	✓	✓	✓	✓	✓	✓
11	✓	✓	✓	✗	✓	✓	✓
12	✓	✓	✓	✗	✗	✗	✓
13	✓	✓	✓	✗	✗	✗	✓

T. Y. B. Sc Course code: USCH603**Course Learning Outcomes (COs) of T. Y. B. Sc Organic Chemistry (Paper III, Sem-VI)****At the end of the course the learner will be able to**

- 1 Understand the concept of enantioselectivity, enantiospecificity, diastereoselectivity and diastereospecificity and will also be able to distinguish between enantiotopic and diastereotopic faces of different atoms, groups and faces.
- 2 Apply the above concepts in understanding the stereochemistry of different substitution, elimination and addition reactions.
- 3 Explore the general structure of the building blocks of life supporting proteins, their configuration, properties and synthesis.
- 4 Understand and will be able to identify different types of rearrangement reactions along with their stereochemistry, and synthetic utility of conjugate addition and Wittig reaction
- 5 Draw the structure of carbohydrates using the Fischer projection and Haworth formula along with understanding the synthesis, reactions and stereochemistry of carbohydrates.
- 6 Understand the basic principles and theory of IR and NMR spectroscopy and will be able to elucidate the architecture of an organic compound using UV-Visible, Mass, IR, and NMR Spectroscopic techniques.
- 7 Derive and draw the structure of DNA and the genetic code on a molecular level.
- 8 Understand the concept of polymers along with their stereochemistry, design the synthesis of eco-friendly polymers based on their classification.
- 9 Distinguish between the uses and applications of various reagents and catalysts with respect to functional group transformations and their selectivity.

Mapping of PSOs and COs (T. Y. B. Sc Sem- VI, Paper III)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	✓	✓	✓
8	✓	✓	✓	✓	✓	✓	✓
9	✓	✓	✓	✓	✓	✓	✓

Mapping of POs and COs (T. Y. B. Sc Sem- VI, Paper III)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✗	✓	✓
2	✓	✓	✓	✗	✓	✓	✓
3	✓	✓	✓	✗	✓	✓	✓
4	✓	✓	✓	✓	✗	✓	✓
5	✓	✓	✓	✓	✓	✗	✗
6	✓	✓	✓	✓	✗	✓	✓
7	✓	✓	✓	✗	✓	✓	✗
8	✓	✓	✓	✓	✓	✓	✗
9	✓	✓	✓	✗	✗	✗	✗

T. Y. B. Sc Course code: USCH604

Course Learning Outcomes (COs) of T. Y. B. Sc Analytical Chemistry (Paper IV, Sem-VI)

At the end of the course the learner will be able to

- 1 Apply the concept of Polarography in determining the qualitative and quantitative.
- 2 Use the knowledge of polarography in understanding the recent techniques of voltammetry.
- 3 Understand the principle, instrumentation and applications of gas chromatography (GC).
- 4 Understand the principle, types and mechanism of Ion exchange chromatography and its applications.
- 5 Use the concepts for food processing and storage processes in industry.
- 6 Investigate the sensory properties of cosmetics and their sensory assessment in manufacturing units.
- 7 Analyse solid samples such as inorganic precipitates, glass materials, and ceramics using various techniques of thermal methods in chemical laboratories and industries.

Mapping of PSOs and COs (T. Y. B. Sc Sem- VI, Paper IV)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	✓	✓	✓

Mapping of POs and COs (T. Y. B. Sc Sem- VI, Paper IV)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✗	✗	✗
2	✓	✓	✓	✗	✗	✗	✗
3	✓	✓	✓	✗	✓	✓	✗
4	✓	✓	✓	✗	✓	✓	✗
5	✓	✓	✓	✓	✗	✗	✗
6	✓	✓	✓	✗	✗	✓	✓
7	✓	✓	✓	✓	✗	✓	✓

T. Y. B. Sc Course code: USACDD601**Course Learning Outcomes (COs) of Applied Chemistry-Drugs & Dyes
(T. Y. B. Sc Paper V, Sem-VI)****At the end of the course the learner will be able to**

- 1 The learner will understand about Drug ,discovery, design development & drug metabolism
- 2 The learner will understand about chemotherapeutics agent with respect to chemical class therapeutic uses side effects & MDR.
- 3 Understand about the concept of nanoparticles in medicinal chemistry.
- 4 Understand about the synthesis & uses of few drugs intermediates
- 5 Grasp the knowledge of drug & environmental aspects
- 6 Understand the classification of dyes based on chemical constitution & learn synthesis of selected dyes.
- 7 Understand the health & environmental hazards of synthetic dyes along with their

remediation processes.

- 8 Understand the non-textile uses of dyes
- 9 Learn about pigments with respect to examples properties & difference between dyes & pigments, he will also learn the definition of lakes & toners.
- 10 Grasp the knowledge of the dyestuff industry in Indian scenario

Mapping of PSOs and COs Applied Chemistry-Drugs & Dyes (T. Y. B. Sc Paper V, Sem-VI)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	✓	✓	✓
8	✓	✓	✓	✓	✓	✓	✓
9	✓	✓	✓	✓	✓	✓	✓
10	✓	✓	✓	✓	✓	✓	✓

Mapping of POs and COs Applied Chemistry-Drugs & Dyes (T. Y. B. Sc Paper V, Sem-VI)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✗	✓	✗
3	✓	✓	✓	✗	✗	✗	✓
4	✓	✓	✓	✓	✓	✗	✓
5	✓	✓	✓	✗	✓	✗	✗
6	✓	✓	✓	✓	✗	✓	✗
7	✓	✓	✓	✓	✓	✗	✗
8	✓	✓	✓	✓	✓	✓	✓
9	✓	✓	✓	✗	✗	✗	✓
10	✓	✓	✓	✓	✓	✓	✓

T. Y. B. Sc Course code: USCHP02**Course Learning Outcomes (COs) of T. Y. B. Sc Physical Chemistry Practical (Paper I Sem-VI)****At the end of the course the learner will be able to**

- 1 Identify all the apparatus and instruments used in chemical laboratories.
- 2 Perform conductometric titration for acids mixtures and strong bases.
- 3 Determine the amount of halides, emf of a cell and number of electrons involved in a redox reaction by potentiometrically.
- 4 Determine the molecular weight of polymers by using Ostwald's viscometer.
- 5 Understand the calculation of thermodynamic activation parameters with the help of kinetic parameters.

Mapping of PSOs and COs Physical chemistry Practical (T. Y. B. Sc Paper I Sem-VI)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✗	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓

Mapping of POs and COs Physical chemistry Practical (T. Y. B. Sc Paper I Sem-VI)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✗	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✗
3	✓	✓	✓	✓	✗	✗	✗
4	✓	✓	✓	✓	✗	✗	✗
5	✓	✓	✓	✗	✓	✓	✓

T. Y. B. Sc Course code: USCHP06**Course Learning Outcomes (COs) of T. Y. B. Sc Inorganic Chemistry Practical (Paper II Sem-VI)****At the end of the course the learner will be able to**

- 1 Earn the key concepts of inorganic chemistry including those related to synthesis, reaction chemistry, and structure and bonding.
- 2 Understand the communication of the results of scientific experiments in oral reports, technical graphics, and written reports
- 3 Follow chemical literature and to read and understand technical literature related to the qualitative analysis.
- 4 Perform complexometric titrations by using different indicators and various conditions
- 5 Prepare various inorganic coordination complexes.
- 6 Understand and design a green synthesis using principles of prevention of waste/by-products/toxic products and atom economy.

Mapping of PSOs and Cos Inorganic chemistry Practical (T. Y. B. Sc Paper II Sem-VI)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✗	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✗	✗	✗	✓
4	✓	✓	✓	✓	✓	✗	✓
5	✓	✓	✓	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓

Mapping of POs and Cos Inorganic chemistry Practical (T. Y. B. Sc Paper II Sem-VI)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✗	✓	✗	✓
2	✓	✓	✓	✓	✓	✓	✗
3	✓	✓	✓	✗	✗	✗	✓
4	✓	✓	✓	✓	✓	✗	✗
5	✓	✓	✓	✗	✓	✓	✓
6	✓	✓	✓	✓	✓	✗	✗

T. Y. B. Sc Course code: USCHP10**Course Learning Outcomes (COs) of T. Y. B. Sc Organic Chemistry Practical (Paper III Sem-V)****At the end of the course the learner will be able to**

- 1 Identify the nature of a liquid, binary mixture and will be able to separate it by a physical method.
- 2 Characterize separated solid and volatile liquid based on the elemental analysis, functional group detection and confirmation of structure by determination of physical constants.

Mapping of PSOs and COs Organic chemistry Practical (T. Y. B. Sc Paper III Sem-VI)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓

Mapping of POs and COs Organic chemistry Practical (T. Y. B. Sc Paper III Sem-VI)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓

T. Y. B. Sc Course code: USCHP14**Course Learning Outcomes (COs) of T. Y. B. Sc Analytical Chemistry Practical (Paper IV Sem-VI)****At the end of the course the learner will be able to**

- 1 Gain expertise to operate and analyze the sample like water and other commercial samples like vinegar and cola, using instrumental methods of quantitative analysis like, spectrophotometer/colorimeter, pH meter and potentiometer.
- 2 Perform technique like ion exchange chromatography using exchange resins and carry out separation and quantification.
- 3 Analyse sugar content in food sample like honey by titration using iodine and principle of redox reaction such as Wilstatter method.

Mapping of PSOs and COs Analytical chemistry Practical (T. Y. B. Sc Paper IV Sem-VI)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓

Mapping of POs and COs Analytical chemistry Practical (T. Y. B. Sc Paper IV Sem-VI)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✗
2	✓	✓	✓	✗	✗	✓	✓
3	✓	✓	✓	✓	✗	✓	✓

T. Y. B. Sc Course code: USACDD6P1

Course Learning Outcomes (COs) of T. Y. B. Sc Applied Chemistry Practical-Drugs & Dyes (Sem-V)

At the end of the course the learner will be able to

- 1 Learn the preparation of nerolin by o-methylation of β -naphthol.
- 2 Learn the preparation of paracetamol from p-aminophenol.
- 3 Learn the preparation of fluorescein from phthalic anhydride.
- 4 Learn the separation of a mixture of dyes by tlc method.
- 5 Learn to prepare a monograph of any one drug from syllabus by i.p. method.

Mapping of PSOs and COs Applied Chemistry Practical-Drugs & Dyes (T. Y. B. Sc Sem-VI)

COs	PSOs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓

Mapping of POs and COs Applied Chemistry Practical-Drugs & Dyes (T. Y. B. Sc Sem-VI)

COs	POs						
	1	2	3	4	5	6	7
1	✓	✓	✓	✓	✓	✗	✓
2	✓	✓	✓	✗	✓	✓	✗
3	✓	✓	✓	✗	✓	✗	✓
4	✓	✓	✓	✓	✗	✓	✗
5	✓	✓	✓	✗	✓	✓	✓