

TEACHING PLANE

Semester	Paper	Unit/Module		Teacher	No. of lectures	To be completed by		
Semester-1	CC-1 :ORGANIC CHEMISTRY-I	Basics of Organic Chemistry		Sk.Sarfaraaj Ali	20			
		Bonding and Physical Properties	Valence Bond Theory			1 st Month		
			Electronic displacements			2 nd month		
			MO theory			3 rd month		
			Physical properties			4 th month		
			General Treatment of Reaction Mechanism I	Mechanistic classification: ionic, radical and pericyclic	Asis Rana	20	1 st Month	
				Reactive intermediates			2 nd month	
			Stereochemistry I	Bonding geometries of carbon compounds and representation of molecules			3 rd month	
				Concept of chirality and symmetry			4 th Month	
				Relative and absolute configuration			4 th Month	
				Optical activity of chiral compounds			5 th Month	
		CC1P1 - CHEMISTRY LAB- I		Separation	Sk.Sarfaraaj Ali	20	1 st month	
				Determination of boiling point			2 nd month	
				Identification of a Pure Organic Compound			3 rd and 4 th month	
		CC-2: PHYSICAL CHEMISTRY-I	Kinetic Theory and Gaseous state	Kinetic Theory of gases	Maitreyee Panda	18	1 st month	
							Maxwell's distribution of speed and energy	2 nd month
							Real gas and virial equation	3 rd month
			Chemical Thermodynamics	Zeroth and 1st law of Thermodynamics	Subrata Kumar Sen	29	1 st month	
				Thermochemistry			2 nd month	
		Second Law Thermodynamic		3 rd and 4 th month				

		Chemical kinetics	relations Rate law, order and molecularity Role of T and theories of reaction rate	Deblina De	11	1 st month
			Homogeneous catalysis	Deblina De	2	2 nd month
			Autocatalysis; periodic reactions			3 rd month
	C 2P2 : CHEMISTRY LAB-II		Experiment 1: Determination of pH of unknown solution (buffer), by color matching method	Deblina De	2	1 st month
			Experiment 2: Determination of heat of neutralization of a strong acid by a strong base	Deblina De	2	1 st month
			Experiment 3: Study of kinetics of acid-catalyzed hydrolysis of methyl acetate	Subrata Kumar Sen	2	2 nd month
			Experiment 4: Study of kinetics of decomposition of H ₂ O ₂	Subrata Kumar Sen	2	2 nd month
			Experiment 5: Determination of heat of solution of oxalic acid from solubility measurement	Subrata Kumar Sen	2	3 rd month
	GE-1	Inorganic Chemistry-I	Atomic Structure	Deblina De	18	1 st month
			Chemical Periodicity			2 nd month
			Acids and bases			3 rd month
			Redox reactions			4 th month
		Organic Chemistry-I	Fundamentals of Organic Chemistry			1 st month
			Stereochemistry			2 nd month

			Nucleophilic Substitution and Elimination Reactions	SK Sarfaraj Ali	22	3 rd month
			Aliphatic Hydrocarbons			4 th and 5 th month
			Alkanes			
			Alkenes			
			Alkynes			
			Reactions			
	GE1 P1: LAB	Inorganic Chemistry –LAB	Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture.	Arindam Das	2	1 st month
			Estimation of oxalic acid by titrating it with KMnO ₄	Deblina De	2	1 st month
			Estimation of water of crystallization in Mohr's salt by titrating with KMnO ₄	Maitreyee Panda	2	2 nd month
			Estimation of Fe (II) ions by titrating it with K ₂ Cr ₂ O ₇ using internal indicator	Deblina De	2	2 nd month
			Estimation of Cu (II) ions iodometrically using Na ₂ S ₂ O ₃	Maitreyee Panda	2	3 rd month
		Organic Chemistry- LAB	Experiment A: Detection of special elements (N, Cl, and S) in organic compounds.	SK Sarfaraj Ali	6	1 st , 2 nd and 3 rd month
			Experiment B: Solubility and Classification (solvents: H ₂ O, dil. HCl, dil. NaOH)			
			Experiment C: Detection of functional groups: Aromatic-NO ₂ , Aromatic -NH ₂ , -COOH, carbonyl (no distinction of -CHO and >C=O needed), -OH (phenolic) in solid organic compounds.			

			Experiments A - C with unknown (at least 6) solid samples containing not more than two of the above type of functional groups should be done.	Asis Rana	2	4 th and 5 th month
Semester-II	CC-3: INORGANIC CHEMISTRY-I	INORGANIC CHEMISTRY-I	Extra nuclear Structure of atom	Deblina De	6	1 st and 2 nd month
			Chemical periodicity	Deblina De	4	3 rd month
			Acid-Base reactions	Maitreyee Panda	5	3 rd and 4 th month
			Redox Reactions and precipitation reactions	Arindam Das	6	4 th month
	C3P: CHEMISTRY (LAB)		Acid and Base Titrations	Deblina De	7	1 st , 2 nd and 3 rd month
			Oxidation-Reduction Titrimetric	Subrata Kumar Sen	6	1 st , 2 nd and 3 rd month
	C4T ORGANIC CHEMISTRY-II	Stereochemistry II	Chirality arising out of stereoaxis	Asis Rana	13	1 st month
			Concept of prostereoisomerism: prostereogenic centre			2 nd and 3 rd month
			Conformation: conformational analysis			4 th month
			Reaction thermodynamics			3 rd month
		General Treatment of Reaction Mechanism II	Reaction thermodynamics	Asis Rana	3	3 rd month
			Concept of organic acids and bases	SK Sarfaraj Ali	8	1 st month
			Tautomerism	Asis Rana	5	2 nd and 3 rd month
			Reaction kinetics			
		Substitution and Elimination Reactions	Free-radical substitution reaction	SK Sarfaraj Ali	18	1 st month
			Nucleophilic substitution reactions			2 nd and 3 rd month
			Elimination reactions			4 th and 5 th month
	C4P: CHEMISTRY		Organic Preparations	SK Sarfaraj Ali	10	1 st , 2 nd and 3 rd month

	(LAB)					
			Purification of the crude product	SK Sarfaraj Ali	10	1 st , 2 nd and 3 rd month
			Melting point	Asis Rana	7	1 st , 2 nd and 3 rd month
	GE-2	Physical Chemistry-I	Kinetic Theory of Gases and Real gases	Subrata Kumar Sen	15	1 st , 2 nd and 3 rd month
			Liquids			
			Solids			
			Chemical Kinetics	Deblina De	5	4 th and 5 th month
		Inorganic Chemistry-II	Ionic Bonding	Deblina De	5	
			Covalent bonding			
			Concept of resonance and resonating structures in various inorganic and organic compounds. MO Approach	Arindam Das	2	2 nd and 3 rd month
			Comparative study of p-block elements:	Maitreyee Panda	8	2 nd and 3 rd month
	GE2 P-LAB	Physical Chemistry-LAB	Surface tension measurement	Subrata Kumar Sen	4	1 st and 2 nd month
			Viscosity measurement			
			Study the kinetics of the following reactions	Deblina De	2	1 st month
		Inorganic Chemistry-LAB	Qualitative semimicro analysis of mixtures containing three radicals	Maitreyee Panda	6	1 st , 2 nd and 3 rd month
Semester-III	CC-5: Physical Chemistry-II	Transport processes	Fick's law	Subrata Kumar Sen	10	1 st and 2 nd month
			Viscosity			
			Conductance and transport number			
		Applications of Thermodynamics - I	Partial properties and Chemical potential	Subrata Kumar Sen	14	3 rd , 4 th and 5 th month
			Chemical Equilibrium			
			Nernst's distribution law;			
			Chemical potential and other properties of ideal substances- pure and mixtures			

		Foundation of Quantum Mechanics	Condensed Phase Beginning of Quantum Mechanics	Asis Rana	5	1 st and 2 nd month
			Wave function			
			Concept of Operators	Subrata Kumar Sen	7	2 nd , 3 rd and 4 th month
			Particle in a box			
			Simple Harmonic Oscillator			
	C5P: Physical Chemistry-II Lab		Experiment 1: Study of viscosity of unknown liquid (glycerol, sugar) with respect to water	Subrata Kumar Sen	12	1 st month
			Experiment 2: Determination of partition coefficient for the distribution of I ₂ between water and CCl ₄			1 st month
			Experiment 3: Determination of K _{eq} for KI + I ₂ = KI ₃ , using partition coefficient between water and CCl ₄			2 nd month
			Experiment 4: Conductometric titration of an acid (strong, weak/monobasic, dibasic) against base strong			2 nd month
			Experiment 5: Study of saponification reaction conductometrically			3 rd month
			Experiment 6: Verification of Ostwald's dilution law and determination of K _a of weak acid			3 rd month
	C6T: Inorganic Chemistry-II	Chemical Bonding-I	Ionic bond	Deblina De	8	1 st and 2 nd month
			Covalent bond			2 nd and 3 rd month
		Chemical Bonding-II	Molecular orbital concept of bonding	Maitreyee Panda	6	2 nd and 3 rd month
			Metallic Bond			4 th month

			Weak Chemical Forces			4 th month
			Radioactivity	Arindam Das	6	3 rd month
	C6P: Inorganic Chemistry-II - Lab		Iodo-/ Iodimetric Titrations	Maitreyee Panda	10	1 st and 2 nd and 3 rd month
			Estimation of metal content in some selective samples	Deblina De	6	2 nd month
	C7T: Organic Chemistry-III	Chemistry of alkenes and alkynes	Addition to C=C	SK Sarfaraj Ali	14	1 st , 2 nd and 3 rd month
			Addition to C≡C (in comparison to C=C)			
		Aromatic Substitution	Electrophilic aromatic substitution	SK Sarfaraj Ali	8	4 th and 5 th month
			Nucleophilic aromatic substitution			
		Carbonyl and Related Compounds	Addition to C=O:			1 st month
			Exploitation of acidity of α-H of C=O:	Asis Rana	18	2 nd month
			Elementary ideas of Green Chemistry			3 rd month
			Nucleophilic addition to α,β-unsaturated carbonyl system			4 th month
			Substitution at sp ² carbon (C=O system)			5 th month
			Organometallics	Asis Rana	4	5 th month
	C7P: Organic Chemistry-III – Lab		Qualitative Analysis of Single Solid Organic Compounds	SK Sarfaraj Ali	25	1 st , 2 nd , 3 rd and 4 th month
	SEC-1: Pharmaceutical Chemistry		Drugs & Pharmaceuticals	Asis Rana	15	1 st , 2 nd and 3 rd month
			Fermentation			4 th month
	SEC1P: Pharmaceutical Chemistry		Preparation of Aspirin and its analysis	Maitreyee Panda	4	1 st month
			Preparation of magnesium bisilicate (Antacid).			1 st month
	GE3T: Chemical Energetics,	Physical Chemistry-II	Chemical Energetics	Subrata Kumar Sen	6	1 st Month

		Equilibria	Chemical Equilibrium	Arindam Das	5	2 nd month
			Ionic Equilibria			
		Organic Chemistry-II	Aromatic Hydrocarbons	SK Sarfaraj Ali	4	3 rd month
			Organometallic Compounds	Maitreyee Panda	4	3 rd month
			Aryl Halides	SK Sarfaraj Ali	6	4 th and 5 th month
			Alcohols, Phenols and Ethers			
			Carbonyl Compounds	Asis Rana	4	3 rd and 4 th month
	GE-3P	Physical Chemistry-LAB	Thermochemistry	Subrata Kumar Sen	6	1 st , 2 nd and 3 rd month
			Ionic Equilibria			
		Organic Chemistry-LAB	Identification of a pure organic compound	SK Sarfaraj Ali	10	1 st , 2 nd and 3 rd month
Sem-IV	C8T: PHYSICAL CHEMISTRY-III	Application of Thermodynamics – II	Colligative properties	Subrata Kumar Sen	10	1 st month
			Phase rule			2 nd month
			Binary solutions			3 rd month
		Electrical Properties of molecules	Ionic equilibria	Subrata Kumar Sen	13	1 st and 2 nd month
			Electromotive Force			4 th month
			Dipole moment and polarizability			5 th month
		Quantum Chemistry	Angular momentum	Maitreyee Panda	12	1 st month
			Qualitative treatment of hydrogen atom and hydrogen-like ions			2 nd and 4 th month
			LCAO and HF-SCF			4 th month
	C8P : Lab		Experiment 1: Determination of solubility of sparingly soluble salt in water, in electrolyte with common ions and in neutral electrolyte (using common indicator)			1 st month
			Experiment 2: Potentiometric titration of Mohr's salt solution against standard K ₂ Cr ₂ O ₇ solution			1 st month

			Experiment 3: Determination of K_{sp} for AgCl by potentiometric titration of AgNO ₃ solution against standard KCl solution	Subrata Kumar Sen	12	2 nd month
			Experiment 4: Effect of ionic strength on the rate of Persulphate – Iodide reaction			2 nd month
			Experiment 5: Study of phenol-water phase diagram			3 rd month
			Experiment 6: pH-metric titration of acid (mono- and di-basic) against strong base			3 rd month
	C9T: INORGANIC CHEMISTRY-III		General Principles of Metallurgy	Arindam Das	4	1 st month
			Chemistry of s and p Block Elements	Maitreyee Panda	16	1 st and 2 nd month
			Noble Gases			3 rd month
			Inorganic Polymers	Deblina De	4	1 st month
			Coordination Chemistry-I	Arindam Das	12	3 rd , 4 th and 5 th month
	C9P: LAB		Complexometric titration	Arindam Das	10	1 st , 2 nd and 3 rd month
			Inorganic preparations	Maitreyee Panda	10	1 st , 2 nd and 3 rd month
	C10T: ORGANIC CHEMISTRY-IV	Nitrogen compounds	Amines: Aliphatic & Aromatic	SK Sarfaraj Ali	8	1 st month
			Nitro compounds (aliphatic and aromatic)			1 st month
			Alkyl nitrile and isonitrile			2 nd month
			Diazonium salts and their related compounds			2 nd month
		Rearrangements	Rearrangement to electron-deficient carbon	SK Sarfaraj Ali	10	3 rd month
			Rearrangement to electron-deficient nitrogen			3 rd month

			Rearrangement to electron-deficient oxygen			4 th month
			Aromatic rearrangements			4 th month
			Rearrangement reactions by green approach			5 th month
		The Logic of Organic Synthesis	Retrosynthetic analysis	Asis Rana	10	1 st month
			Strategy of ring synthesis			2 nd month
			Asymmetric synthesis			3 rd month
		Organic Spectroscopy	UV Spectroscopy	Asis Rana	14	4 th month
			IR Spectroscopy			4 th month
			NMR Spectroscopy			5 th month
	C10P : LAB		1. Estimation of glycine by Sørensen's formol method	Asis Rana	6	1 st month
			2. Estimation of glucose by titration using Fehling's solution			1 st month
			3. Estimation of sucrose by titration using Fehling's solution			2 nd month
			4. Estimation of vitamin-C (reduced)			2 nd month
			5. Estimation of aromatic amine (aniline) by bromination (Bromate-Bromide) method			3 rd month
			6. Estimation of phenol by bromination (Bromate-Bromide) method			3 rd month
			7. Estimation of formaldehyde (Formalin)			1 st month
			SK Sarfaraj Ali	4	1 st month	
		8. Estimation of acetic acid in commercial vinegar			1 st month	
		9. Estimation of urea (hypobromite)			2 nd month	

			method)			
			10. Estimation of saponification value of oil/fat/ester			3 rd month
	SEC-2: BASIC ANALYTICAL CHEMISTRY		Introduction	Arindam Das	2	1 st month
			Analysis of soil	Arindam Das	12	1 st month
			Analysis of water			1 st month
			Analysis of food products			2 nd month
			Chromatography			2 nd month
			Ion-exchange			3 rd month
			Analysis of cosmetics			4 th month
	SEC-2P: Practical		Practical	Arindam Das	10	1 st , 2 nd and 3 rd month
	GE4T	Physical Chemistry-III	Solutions	Subrata Kumar Sen	4	1 st month
			Phase Equilibria	Deblina De	3	1 st month
			Conductance	Maitreyee Panda	3	2 nd month
			Electromotive force	Arindam Das	3	2 nd month
		Analytical and Environmental Chemistry	Chemical Analysis	Arindam Das	6	3 rd month
			Environmental Chemistry	Asis Rana	2	2 nd month
	GE4T: Practical		Distribution Law	Subrata Kumar Sen	4	1 st month
			Phase equilibri			1 st month
			Conductance	Deblina De	2	2 nd month
			Potentiometry	Maitreyee Panda	2	2 nd month
			Analytic and Environmental Chemistry-LAB	Arindam Das	4	3 rd month
Semester-V	C11T: Inorganic Chemistry - IV		Coordination Chemistry-II	Maitreyee Panda	20	1 st , 2 nd , 3 rd month
			Transition Elements:	Deblina De	6	1 st and 2 nd month
			Lanthanoids and Actinoids:	Deblina De	4	3 rd and 4 th month
	C11P : LAB		Chromatography of metal ions	Arindam Das	10	1 st month
			Gravimetry			2 nd month
			Spectrophotometry			3 rd month

	C12T: Organic Chemistry - V		Carbocycles and Heterocycles	Asis Rana	16	1 st and 2 nd month
			Cyclic Stereochemistry			3 rd month
			Pericyclic reactions	SK Sarfaraj Ali	10	1 st , 2 nd and 3 rd month
			Carbohydrates	Asis Rana	8	4 th and 5 th month
			Bio-molecules	SK Sarfaraj Ali	8	4 th month
	C12P: LAB		Chromatographic Separations	SK Sarfaraj Ali	6	1 st and 2 nd month
			Spectroscopic Analysis of Organic Compounds	Asis Rana	6	1 st and 2 nd month
	DSE1T: Advanced Physical Chemistry		Crystal Structure	Subrata Kumar Sen	6	1 st , 2 nd and 3 rd month
			Statistical Thermodynamics	Deblina De	6	1 st , 2 nd and 3 rd month
			Special selected topics	Subrata Kumar Sen	8	4 th and 5 th month
	DSE1P: Advanced Physical Chemistry		Programming	Subrata Kumar Sen	10	1 st , 2 nd and 3 rd month
	DSE2T: Analytical Methods in Chemistry		Qualitative and quantitative aspects of analysis	Arindam Das	30	1 st month
		Optical methods of analysis	2 nd month			
		Thermal methods of analysis	3 rd month			
		Electroanalytical methods	4 th month			
		Separation techniques	5 th month			
	DSE2P: Analytical Methods in Chemistry (lab)		Separation Techniques	Arindam Das	24	1 st and 2 nd month
		Solvent Extractions:	3 rd month			
		Spectrophotometry	4 th month			
Sem-VI	C13T: Inorganic Chemistry-V		Organometallic Chemistry	Arindam Das	12	1 st and 2 nd month

		Bioinorganic Chemistry	Maitreyee Panda	12	1 st and 2 nd month
		Catalysis by Organometallic Compounds	Arindam Das	4	3 rd month
		Reaction Kinetics and Mechanism	Deblina De	4	3 rd month
	C13P: LAB	Qualitative semimicro analysis of mixtures containing four radicals. Emphasis should be given to the understanding of the chemistry of different reactions and to assign the most probable composition	Arindam Das Deblina De	20	1 st -5 th month
	C14T: Physical Chemistry-V	Molecular Spectroscopy	Asis Rana	12	1 st and 2 nd month
		Photochemistry	Subrata Kumar Sen	14	1 st month
		Surface phenomenon			2 nd and 3 rd month
	C14P : LAB	Practical	Subrata Kumar Sen Arindam Das Deblina De	12	1 st , 2 nd and 3 rd month
	DSE- 3: Inorganic Materials of Industrial Importance	Silicate Industries	SK Sarfaraj Ali	8	1 st month
		Fertilizer	SK Sarfaraj Ali	14	2 nd , 3 rd and 4 th month
		Surface Coatings			
		Batteries			
		Alloys			
		Catalysis			
		Chemical explosives			
	DSE3P: LAB	Practical	SK Sarfaraj Ali	12	1 st , 2 nd and 3 rd month
	DSE4T: Polymer Chemistry	Introduction and history of polymeric materials			1 st month
		Functionality and its importance			1 st month
		Kinetics of			2 nd month

			Polymerization	Subrata Kumar Sen	27	
			Crystallization and crystallinity			2 nd month
			Nature and structure of polymers:			2 nd month
			Determination of molecular weight of polymers			3 rd month
			Glass transition temperature (Tg) and determination of Tg			3 rd month
			Polymer Solution			4 th month
			Properties of Polymer			4 th month
	DSE4P: LAB		Polymer synthesis			1 st month
			Polymer characterization	2 nd month		
			Polymer analysis	3 rd month		
				Subrata Kumar Sen	12	