

SHAHID MATANGINI HAZRA GOVT. COLLEGE FOR WOMEN

Teaching Assignment and Lesson Plan

Academic Session: 2023-24 (Odd Semesters)

Department: Chemistry

1st Semester (Hons)

Name of the Teacher	Title of the Teaching Assignment	Dividing the Assignment into Number of Units along with detailed lesson plan as per the University Syllabus		Date of Commencement of the Assignment	Number of classes required to complete each unit	Total no of class required to complete the assignment
Mitali Dewan	(MJ1T) Organic Chemistry-I	Bonding and Physical properties	Valence Bond Theory, Electronic Displacements	1 st Sept,2023	08	45
Rathin Jana			MO Theory, Physical properties		12	
Rathin Jana		General Treatment of Reaction Mechanism	Mechanistic classification		03	
Mitali Dewan			Relative intermediates		02	
Sayanwita Panja		Stereochemistry	Bonding geometries of carbon compounds and representation of molecules, Concept of chirality and symmetry, Relative and absolute configuration, Optical activity of chiral compounds		20	
Mitali Dewan, Sayanwita Panja,	MJ1P	1. Separation, based upon solubility, by using common laboratory reagents like water (cold, hot), dil. HCl, dil. NaOH, dil. NaHCO ₃ , etc., of components of a binary solid mixture; purification of any one of the Separated components by crystallization and determination of its melting point. The composition of the mixture may be of the following types: Benzoic acid/ <i>p</i> -Toluidine; <i>p</i> -Nitrobenzoic acid/ <i>p</i> -Aminobenzoic acid; <i>p</i> -Nitrotolune/ <i>p</i> -Anisidine; etc. 2. Determination of boiling point of common organic liquid compounds e.g., ethanol, cyclohexane, chloroform, ethyl methyl ketone, cyclohexanone, acetylacetone, anisole, crotonaldehyde, mesityl oxide, etc. [Boiling point of the chosen organic compounds should preferably be less than 160 °C]		1 st Sept,2023	30	30

		<p>3. Identification of a Pure Organic Compound</p> <p><i>Solid compounds:</i> oxalic acid, tartaric acid, citric acid, succinic acid, resorcinol, urea, glucose, cane sugar, benzoic acid and salicylic acid</p> <p><i>Liquid Compounds:</i> formic acid, acetic acid, methyl alcohol, ethyl alcohol, acetone, aniline, dimethylaniline, benzaldehyde, chloroform and nitrobenzene</p>			
Basudev Mandal	SEC1P	<p>Part-A:</p> <p>i) Preparation of talcum powder. ii) Preparation of shampoo. iii) Preparation of enamels. iv) Preparation of hair remover. v) Preparation of face cream. vi) Preparation of nail polish and nail polish remover. vii) Preparation of Lipstick.</p>	1 st Sept,2023	30	40
		<p>Part-B: Field visit and submission of the Report</p>		10	

Name of the Teacher	Title of the Teaching Assignment		Dividing the Assignment into Number of Units along with detailed lesson plan as per the University Syllabus		Date of Commencement of the Assignment	Number of classes required to complete each unit	Number of classes taken
Sachinath Bera	MI-1T	Section A: Inorganic Chemistry-I	Atomic Structure		1 st Sept,2023	08	20
Basudev Mandal			Acids and Bases			06	
			Redox Reactions			06	
Mitali Dewan		Section B: Physical-I Chemistry	Kinetic Theory of Gases and Real gases			10	25
			Liquids			08	
			Solids			07	
Sachinath Bera & Basudev Mandal	MI-1P	Section A: Inorganic Chemistry-LAB	1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture. 2. Estimation of oxalic acid by titrating it with KMnO_4 . 3. Estimation of water of crystallization in Mohr's salt by titrating with KMnO_4 . 4. Estimation of Fe (II) ions by titrating it with $\text{K}_2\text{Cr}_2\text{O}_7$ using internal indicator. 5. Estimation of Cu (II) ions iodometrically using $\text{Na}_2\text{S}_2\text{O}_3$.		1 st Sept,2023	15	15
Mitali Dewan & Sayanwita Panja		Section B: Physical Chemistry-LAB	(I) Surface tension measurement (use of organic solvents excluded) a) Determination of the surface tension of a liquid or a dilute solution using a Stalagmometer b) Study of the variation of surface tension of a detergent solution with concentration			15	15

			(II) Viscosity measurement (use of organic solvents excluded) a) Determination of the relative and absolute viscosity of a liquid or dilute solution using an Ostwald's viscometer b) Study of the variation of viscosity of an aqueous solution with concentration of solute			
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Name of the Teacher	Title of the Teaching Assignment	Dividing the Assignment into Number of Units along with detailed lesson plan as per the University Syllabus		Date of Commencement of the Assignment	Number of classes required to complete each unit	Number of classes required to complete the assignment
Sachinath Bera	MJA1/B1 T (CEMP MJ101)	Section A: Inorganic Chemistry-1	Atomic Structure	1 st Sept,2023	10	20
Basudev Mandal			Redox Reactions and precipitation reactions		10	
Mitali Dewan		Section B: Organic Chemistry-1	Fundamentals of Organic Chemistry		05	25
Sayanwita Panja			Stereochemistry		10	
Rathin Jana			Aliphatic Hydrocarbons: Alkanes, alkenes, alkynes		10	
Basudev Mandal	MJA1/B1 P	Section A: Inorganic Chemistry-Volumetric Analysis	1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture. 2. Estimation of oxalic acid by titrating with KMnO ₄ . 3. Estimation of water of crystallization in Mohr's salt by titrating with KMnO ₄ . 4. Estimation of Fe (II) ions by titrating it with K ₂ Cr ₂ O ₇ using internal indicator. 5. Estimation of Cu (II) ions iodometrically using Na ₂ S ₂ O ₃ .	1 st Sept,2023	15	15
Mitali Dewan		Section B: Organic Chemistry	1. Detection of extra elements (N, S, Cl, Br, I) in organic compounds 2. Separation of mixtures by Chromatography: Measure the R _f value in each case (combination of two compounds) (a) Identify and Separate the components of a given mixture of 2 amino acids (glycine, aspartic acid, glutamic acid, tyrosine) by paper chromatography (b) Identify and Separate the sugars present in the given mixture by paper chromatography.		15	15
Sachinath Bera	MI-1/C1 T		Atomic Structure	1 st Sept,2023	08	

Basudev Mandal		Section A: Inorganic Chemistry-I	Acids and Bases			06	20
			Redox Reactions			06	
Mitali Dewan		Section B: Physical-I Chemistry	Kinetic Theory of Gases and Real gases			10	25
			Liquids			08	
			Solids			07	
Sachinath Bera & Basudev Mandal	MI-1/C1P	Section A: Inorganic Chemistry- LAB	1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture. 2. Estimation of oxalic acid by titrating it with KMnO_4 . 3. Estimation of water of crystallization in Mohr's salt by titrating with KMnO_4 . 4. Estimation of Fe (II) ions by titrating it with $\text{K}_2\text{Cr}_2\text{O}_7$ using internal indicator. 5. Estimation of Cu (II) ions iodometrically using $\text{Na}_2\text{S}_2\text{O}_3$.	1 st Sept, 2023		15	15
Mitali Dewan & Sayanwita Panja		Section B: Physical Chemistry- LAB	(I) Surface tension measurement (use of organic solvents excluded) a) Determination of the surface tension of a liquid or a dilute solution using a Stalagmometer b) Study of the variation of surface tension of a detergent solution with concentration (II) Viscosity measurement (use of organic solvents excluded) a) Determination of the relative and absolute viscosity of a liquid or dilute solution using an Ostwald's viscometer b) Study of the variation of viscosity of an aqueous solution with concentration of solute			15	15

3rd Semester (Hons)

Name of the Teacher	Title of the Teaching Assignment	Dividing the Assignment into Number of Units along with detailed lesson plan as per the University Syllabus		Date of Commencement of the Assignment	Number of classes required to complete each unit	Total no of class required to complete the assignment
Rathin Jana	(C5T) Physical Chemistry	Transport process		13 th Oct,2023	12	45
Mitali Dewan		Application of Thermodynamics-I	Partial properties and Chemical potential, Chemical potential and other properties of ideal substances- pure and mixtures		10	
Sayanwita Panja			Chemical Equilibrium		08	
Basudev Mandal		Foundation of quantum mechanics			15	
Mitali Dewan, Rathin Jana	C5P	1: Study of viscosity of unknown liquid (glycerol, sugar) with respect to water 2: Determination of partition coefficient for the distribution of I ₂ between water and CCl ₄ 3: Determination of K _{eq} for KI + I ₂ = KI ₃ , using partition coefficient between water and CCl ₄ 4: Conductometric titration of an acid (strong, weak/monobasic, dibasic) against base strong 5: Study of saponification reaction conductometrically 6: Verification of Ostwald's dilution law and determination of K _a of weak acid		13 th Oct,2023	18	18
Basudev Mandal	(C6T) Inorganic Chemistry	Chemical Bonding-I		13 th Oct,2023	20	45
Sachinath Bera		Chemical Bonding-II			18	
		Radioactivity			07	
Basudev Mandal, Sachinath Bera	C6P	Iodo-/ Iodimetric Titrations 1. Estimation of Cu(II) 2. Estimation of Vitamin C 3. Estimation of available chlorine in bleaching powder.		13 th Oct,2023	18	18

		Estimation of metal content in samples 1. Estimation of Cu in brass. 2. Estimation of Cr and Mn in Steel. 3. Estimation of Fe in cement				
Sayanwita Panja	(C7T) Organic Chemistry	Chemistry of alkenes and alkynes	Addition to alkenes and alkynes	13 th Oct,2023	10	45
Sayanwita Panja		Organometallics	Grignard Reagents		04	
Rathin Jana		Aromatic Substitution	Electrophilic and nucleophilic substitution		09	
Mitali Dewan		Carbonyl and Related compound			22	
Rathin Jana, Mitali Dewan	C7P	Qualitative Analysis of Single Solid Organic Compounds a) Detection of special elements (N, S, Cl, Br) by Lassaigne's test b) Solubility and classification (solvents: H ₂ O, 5% HCl, 5% NaOH and 5% NaHCO ₃) c) Detection of the following functional groups by systematic chemical tests: aromatic amino (-NH ₂), aromatic nitro (-NO ₂), amido (-CONH ₂ , including imide), phenolic -OH, carboxylic acid (-COOH), carbonyl (-CHO and >C=O). d) Melting point of the given compound e) Preparation, purification and melting point determination of a crystalline derivative of the given compound f) Identification of the compound through literature survey.		13 th Oct,2023	30	30
Sachinath Bera	Skill Enhancement Course SEC 1T	Analytical Clinical Biochemistry	Carbohydrates, Proteins, Enzymes, Lipids, hormones, DNA & RNA, Biochemistry of disease	13 th Oct,2023	30	30
Sachinath Bera	SEC 1P	Identification and estimation of the following: 1. Carbohydrates – qualitative and quantitative. 2. Lipids – qualitative. 3. Determination of the iodine number of oil.		13 th Oct,2023	18	18

		4. Determination of the saponification number of oil. 5. Proteins – qualitative. 6. Determination of protein by the Biuret reaction.			
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3rd Semester (General Elective)

Name of the Teacher	Title of the Teaching Assignment	Dividing the Assignment into Number of Units along with detailed lesson plan as per the University Syllabus	Date of Commencement	Number of classes required	Total no of class required to
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				of the Assignment	to complete each unit	complete the assignment
Sayanwita Panja	GE T3	Section A: Physical Chemistry	Chemical Energetics	13 th Oct,2023	10	20
			Chemical Equilibrium		05	
			Ionic Equilibrium		05	
Sayanwita Panja		Section-B: Organic Chemistry	Aromatic Hydrocarbon		04	25
			Organometallic Compounds		03	
			Aryl Halides		03	
			Alcohols, phenol, ether		08	
	Carbonyl compound	07				
Sayanwita Panja	GE3P	Section A: Physical Chemistry	1. Determination of enthalpy of neutralization of hydrochloric acid with sodium Hydroxide 2. Measurement of pH of different solutions like aerated drinks, fruit juices, shampoos and soaps using pH-meter and compare it with the indicator method 3. Preparation of buffer solutions and find the pH of an unknown buffer solution by colour matching method (i) Sodium acetate-acetic acid (ii) NH ₄ Cl-NH ₄ OH c) Study of solubility of benzoic acid in water	13 th Oct,2023	15	15
			Section B: Organic Chemistry	Identification of a pure organic compound <i>Solid compounds:</i> oxalic acid, tartaric acid, succinic acid, resorcinol, urea, glucose, benzoic acid and salicylic acid. <i>Liquid Compounds:</i> methyl alcohol, ethyl alcohol, acetone, aniline, dimethylaniline, benzaldehyde, chloroform and nitrobenzene		15

3rd Semester (DSC)

Name of the Teacher	Title of the Teaching Assignment	Dividing the Assignment into Number of Units along with detailed lesson plan as per the University Syllabus		Date of Commencement of the Assignment	Number of classes required to complete each unit	Total no of class required to complete the assignment			
Basudev Mandal	Core-7-(DSC-1C)	Section A: Physical Chemistry	Solutions		13 th Oct,2023	06	20		
			Phase Equilibrium			04			
			Conductance			04			
			Electrochemistry			06			
Rathin Jana		Core-7-(DSC-1C)	Organic Chemistry	Carboxylic acids and their derivatives			13 th Oct,2023	06	25
				Amines and Diazonium Salts				05	
				Amino Acids, Peptides and Proteins				09	
				Carbohydrates				05	
Basudev Mandal Rathin Jana	DSC-1CP		Section A: Physical Chemistry	Phase equilibria a) Construction of the phase diagram of a binary system (simple eutectic) using cooling curves. b) Determination of the critical solution temperature and composition of the phenol water system and study of the effect of impurities on it. Conductance I. Determination of cell constant II. Determination of equivalent conductance, degree of dissociation and dissociation constant of a weak acid. III. conductometric titrations: i. Strong acid vs. strong base ii. Weak acid vs. strong base Potentiometric titrations: i. Strong acid vs. strong base ii. Weak acid vs. strong base iii. Potassium dichromate vs. Mohr's salt	13 th Oct,2023	15		15	

Rathin Jana		Section B: Organic Chemistry	I. Systematic Qualitative Organic Analysis of Organic Compounds possessing monofunctional groups (-COOH, phenolic, aldehydic, ketonic, amide, nitro, amines) and preparation of one derivative. II) 1. Separation of amino acids by paper chromatography 2. Determination of the concentration of glycine solution by formylation method. 3. Titration curve of glycine 4. Differentiation between a reducing and a nonreducing sugar.		15	15
Rathin Jana	Skill Enhancement Course SEC 1T	Basic Analytical Chemistry	Introduction, Analysis of soil, Analysis of water, Analysis of food products, Chromatography, Ion-exchange, Analysis of cosmetics	13 th Oct, 2023	30	30
Basudev Mandal Sachinath Bera	SEC 1P		1. Determination of pH of soil samples. 2. Estimation of Calcium and Magnesium ions as Calcium carbonate by complexometric titration. 3. Determination of pH, acidity and alkalinity of a water sample. 4. Determination of dissolved oxygen (DO) of a water sample. 5. Paper chromatographic Separation of mixture of metal ion (Fe ³⁺ and Al ³⁺). 6. Determination of ion exchange capacity of anion/cation exchange resin (using batch procedure if use of column is not feasible).		30	30

5th Semester (Hons)

Name of the Teacher	Title of the Teaching Assignment	Dividing the Assignment into Number of Units along with detailed lesson plan as per the University Syllabus	Date of Commencement of the Assignment	Number of classes required to	Total no of class required to
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				complete each unit	complete the assignment	
Basudev Mandal	(C11T) Inorganic chemistry	Coordination chemistry-II		18 th Sept, 2023	24	24
Sachinath Bera		Chemistry of d- and f- block elements			30	30
Sachinath Bera, Basudev Mandal	C11P	Chromatography of metal ions Paper chromatographic Separation of following metal ions: 1. Ni (II) and Co (II) 2. Fe (III) and Al (III) Gravimetry 1. Estimation of Ni(II) using Dimethylglyoxime (DMG). 2. Estimation of copper as CuSCN. 3. Estimation of Al(III) by precipitating with oxine and weighing as Al(oxine) ₃ (aluminium oxinate). 4. Estimation of chloride. Spectrophotometry 1. Measurement of 10Dq by spectrophotometric method. 2. Determination of λ_{\max} of [Mn(acac) ₃] and [Fe(acac) ₃].		18 th Sept, 2023	30	30
Sayanwita Panja, Rathin Jana	(C12T) Organic Chemistry	Carbocycles and Heterocycles		18 th Sept, 2023	08	45
Mitali Dewan		Cyclic Stereochemistry			14	
Sayanwita Panja		Pericyclic reactions			10	
Mitali Dewan		Carbohydrates			08	
Rathin Jana		Biomolecules			05	
Sayanwita Panja, Rathin Jana	C12P	A. Chromatographic Separations 1. TLC Separation of a mixture containing 2/3 amino acids 2. TLC Separation of a mixture of dyes (fluorescein and methylene blue) 3. Column chromatographic Separation of mixture of dyes 4. Paper chromatographic Separation of a mixture containing 2/3 amino acids 5. Paper chromatographic Separation of a mixture containing 2/3 sugars		18 th Sept, 2023	30	30

		<p>B. Spectroscopic Analysis of Organic Compounds</p> <p>1. Assignment of labelled peaks in the ¹H NMR spectra of the known organic compounds explaining the relative δ-values and splitting pattern.</p> <p>2. Assignment of labelled peaks in the IR spectrum of the same compound explaining the relative frequencies of the absorptions (C-H, O-H, N-H, C-O, C-N, C-X, C=C, C=O, N=O, C\equivC, C\equivN stretching frequencies; including bending vibrations).</p> <p>3. The students must record full spectral analysis of compounds (i) 4-Bromoacetanilide (ii) 2-Bromo-4'-methylacetophenone (iii) Vanillin (iv) 2'-Methoxyacetophenone (v) 4-Aminobenzoic acid (vi) Salicylamide (vii) 2'-Hydroxyacetophenone (viii) 1,3-Dinitrobenzene (ix) <i>trans</i>-Cinnamic acid (x) <i>trans</i>-4- Nitrocinnamaldehyde (xi) Diethyl fumarate (xii) 4-Nitrobenzaldehyde (xiii) 4'-Methylacetanilide (xiv) 2-Hydroxybenzaldehyde (xv) 4-Nitroaniline</p>				
Sayanwita Panja	DSE -1: Advanced Physical Chemistry	Crystal Structure		18 th Sept, 2023	18	45
Sachinath Bera		Statistical Thermodynamics			12	
Mitali Dewan		Special selected topics			15	
Mitali Dewan, Sachinath Bera	DSE1P	<p>Computer programs based on numerical methods for 1: Roots of equations: (e.g. volume of van der Waals gas and comparison with ideal gas, pH of a weak acid)</p> <p>2: Numerical differentiation (e.g., change in pressure for small change in volume of a van der Waals gas, potentiometric titrations)</p> <p>3: Numerical integration (e.g. entropy/ enthalpy change from heat capacity data), probability distributions (gas kinetic theory) and mean values</p> <p>4: Matrix operations (Application of Gauss-Siedel method in colourimetry)</p> <p>5: Simple exercises using molecular visualization software</p>		18 th Sept, 2023	30	30

Sachinath Bera	DSE-2: Analytical Methods in Chemistry	Qualitative and quantitative aspects of analysis		18 th Sept, 2023	06	50
		UV-Visible Spectrometry			02	
		Atomic Absorption and Emission Spectrometry			04	
		Thermal methods of analysis			02	
		Electro-analytical methods			08	
		Infrared Spectrometry			03	
		Separation techniques	Solvent extraction Chromatography Stereoisomeric Separation and analysis		25	
Basudev Mandal						
Sayanwita Panja						
Basudev Mandal, Rathin Jana	DSE2P	I. Separation Techniques Chromatography: (a) Separation and identification of the monosaccharides present in the given mixture (glucose & fructose) by paper chromatography. Reporting the R _f values. (b) Separate a mixture of Sudan yellow and Sudan Red by TLC technique and identify them on the basis of their R _f values. II. Solvent Extractions: To Separate a mixture of Ni ²⁺ & Fe ²⁺ by complexation with DMG and extracting the Ni ²⁺ -DMG complex in chloroform, and determine its concentration by spectrophotometry. Analysis of soil: (i) Determination of pH of soil. (ii) Estimation of calcium, magnesium, phosphate Ion exchange: Determination of exchange capacity of cation exchange resins and anion exchange resins. III. Spectrophotometry 1. Determination of pK _a values of indicator using spectrophotometry. 2. Determination of chemical oxygen demand (COD). 3. Determination of Biological oxygen demand (BOD).		18 th Sept, 2023	30	30

5th Semester (DSE)

Name of the Teacher	Title of the Teaching Assignment		Dividing the Assignment into Number of Units along with detailed lesson plan as per the University Syllabus	Date of Commencement of the Assignment	Number of classes required to complete each unit	Total no of class required to complete the assignment
Mitali Dewan	DSE 1A/2A/3A	Polymer Chemistry	Introduction and history of polymeric materials, Functionality and its importance, Kinetics of Polymerization, Crystallization and crystallinity, Nature and structure of polymers, Determination of molecular weight of polymers, Glass transition temperature (T _g) and determination of T _g , Polymer Solution, Properties of Polymer	18 th Sept, 2023	45	45
Mitali Dewan Sachinath Bera	DSE1AP		1. Free radical solution polymerization of styrene (St) / Methyl Methacrylate (MMA) / Methyl Acrylate (MA) / Acrylic acid (AA). 2. Preparation of nylon 66/6 3.Redox polymerization of acrylamide 4. Precipitation polymerization of acrylonitrile 5. Preparation of urea-formaldehyde resin 6. Preparations of novalac resin/ resold resin. 7. IR studies of polymers	18 th Sept, 2023	30	30
Sayanwita Panja	Skill Enhancement Course SEC 3T	Chemistry of Cosmetics & Perfumes	A general study including preparation and uses of the following: Hair dye, hair spray, shampoo, suntan lotions, face powder, lipsticks, talcum powder, nail enamel, creams (cold, vanishing and shaving creams), antiperspirants and artificial flavours. Essential oils and their importance in cosmetic industries with reference to Eugenol, Geraniol, sandalwood oil, eucalyptus, rose oil, 2- phenyl ethyl alcohol, Jasmone, Civetone, Muscone.	18 th Sept, 2023	30	30

Sayanwita Panja	SEC 3P		<ol style="list-style-type: none">1. Preparation of talcum powder.2. Preparation of shampoo.3. Preparation of enamels.4. Preparation of hair remover.5. Preparation of face cream.6. Preparation of nail polish and nail polish remover.	18 th Sept, 2023	20	20
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