

**SHAHID MATANGINI HAZRA GOVT. COLLEGE FOR WOMEN**

**Teaching Assignment and Lesson Plan  
Academic Session: 2022-23 (Even Semester)**

**Department: Chemistry**

**2<sup>nd</sup> 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 number of classes required to complete the assignment
Sachinath Bera	<b>(C3T) Inorganic Chemistry-I</b>	Extra nuclear Structure of atom	17 <sup>th</sup> April,2023	16	48
		Chemical periodicity		08	
Basudev Mandal		Acid-Base reactions		14	
		Redox Reactions and precipitation reactions		10	
Sachinath Bera And Basudev Mandal	<b>(C3P) Inorganic Chemistry-I</b>	Acid and Base Titrations: 1. Estimation of carbonate and hydroxide present together in mixture 2. Estimation of carbonate and bicarbonate present together in a mixture  Oxidation-Reduction Titrimetric: 1. Estimation of Fe(II) using standardized $\text{KMnO}_4$ solution 2. Estimation of Fe(II) and Fe(III) in a given mixture using $\text{K}_2\text{Cr}_2\text{O}_7$ solution. 3. Estimation of Fe(III) and Mn(II) in a mixture using standardized $\text{KMnO}_4$ solution 4. Estimation of Fe(III) and Cu(II) in a mixture using $\text{K}_2\text{Cr}_2\text{O}_7$ . 5. Estimation of Fe(III) and Cr(III) in a mixture using $\text{K}_2\text{Cr}_2\text{O}_7$ .		42	42

Sayanwita Panja	(C4T) Organic Chemistry-II	Stereochemistry II	17 <sup>th</sup> April,2023	16	48
Rathin Jana		General Treatment of Reaction Mechanism II		18	
Mitali Dewan		Substitution and Elimination Reactions		14	
Rathin Jana Sayanwita Panja	(C4P) Organic Chemistry-II	<p>A. Reactions performed and noting the yield of the crude product:</p> <ol style="list-style-type: none"> <li>1. Nitration of aromatic compounds</li> <li>2. Condensation reactions</li> <li>3. Hydrolysis of amides/imides/esters</li> <li>4. Acetylation of phenols/aromatic amines</li> <li>5. Benzoylation of phenols/aromatic amines</li> <li>6. Diazo coupling reactions of aromatic amines</li> <li>7. Bromination of anilides using green approach (Bromate-Bromide method)</li> <li>8. Selective reduction of <i>m</i>-dinitrobenzene to <i>m</i>-nitroaniline</li> </ol> <p>Calculation of percentage yield, based upon isolated yield (crude) and theoretical yield.</p> <p>B. Purification of the crude product is made by crystallisation from water/alcohol, crystallization after charcoal treatment, or sublimation, whichever is applicable.</p> <p>C. Melting point of the purified product is to be noted.</p>		45	45

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Basudev Mandal	GE2 T	Section A: Physical Chemistry-I	Kinetic Theory of Gases and Real gases		17 <sup>th</sup> April,2023	08	48
			Liquids			04	
Sachinath Bera			Solids			06	
			Chemical Kinetics			06	
Basudev Mandal		Section B: Inorganic Chemistry-II	Chemical Bonding			12	
Sachinath Bera	Comparative study of p-block elements and Molecular Structure				12		
Basudev Mandal	GE2 P	Section A: Physical Chemistry	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 c) Determination of the relative and absolute viscosity of a liquid or dilute solution using an Ostwald's viscometer d) Study of the variation of viscosity of an aqueous solution with concentration of solute e) Acid hydrolysis of methyl acetate with hydrochloric acid			30	30
Sachinath Bera			Section B: Inorganic Chemistry	Qualitative semimicro analysis of mixtures containing three radicals. Acid Radicals: Cl <sup>-</sup> , Br <sup>-</sup> , I <sup>-</sup> , NO <sub>2</sub> <sup>-</sup> , NO <sub>3</sub> <sup>-</sup> , S <sup>2-</sup> , SO <sub>4</sub> <sup>2-</sup> , PO <sub>4</sub> <sup>3-</sup> , BO <sub>3</sub> <sup>3-</sup> , H <sub>3</sub> BO <sub>3</sub> . Basic Radicals: Na <sup>+</sup> , K <sup>+</sup> , Ca <sup>2+</sup> , Sr <sup>2+</sup> , Ba <sup>2+</sup> , Cr <sup>3+</sup> , Mn <sup>2+</sup> , Fe <sup>3+</sup> , Ni <sup>2+</sup> , Cu <sup>2+</sup> , NH <sub>4</sub> <sup>+</sup> .			

2<sup>nd</sup> Semester (Gen)

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Sayanwita Panja	C4T (DSC-1B)	Section A: Physical Chemistry	Chemical Energetic		17 <sup>th</sup> April,2023	09	45
			Chemical Equilibrium			06	
			Ionic Equilibria			06	
Mitali Dewan		Section B: Organic Chemistry-2	Aromatic hydrocarbons		09		
			Alkyl and Aryl Halides		06		
			Alcohols, Phenols and Ethers		09		
Sayanwita Panja	DSC1BP	Section A: Physical Chemistry	1. Measurement of pH of different solutions like aerated drinks, fruit juices, shampoos and soaps (use dilute solutions of soaps and shampoos to prevent damage to the glass electrode) using pH-meter. 2. Preparation of buffer solutions: (i) Sodium acetate-acetic acid (ii) Ammonium chloride-ammonium hydroxide Measurement of the pH of buffer solutions and comparison of the values with theoretical values.			24	24
Mitali Dewan		Section B: Organic Chemistry	1. Purification of organic compounds by crystallization (from water and alcohol) and distillation. 2.Criteria of Purity: Determination of melting and boiling points. 3.Preparations: Mechanism of various reactions involved are discussed. Recrystallisation, determination of melting point and calculation of quantitative yields. (a) Bromination of Phenol/Aniline (b) Benzoylation of amines/phenols (c) Oxime and 2,4-dinitrophenylhydrazone of aldehyde/ketone			30	30

4<sup>th</sup> Semester (Hons)

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Mitali Dewan	(C8T) Physical Chemistry-III	Application of Thermodynamics – II	11 <sup>th</sup> March,2023	15	48
Rathin Jana		Electrical Properties of molecules		15	
Basudev Mandal		Quantum Chemistry		18	
Basudev Mandal And Mitali Dewan	C8P	1: Determination of solubility of sparingly soluble salt in water, in electrolyte with common ions and in neutral electrolyte (using common indicator) 2: Potentiometric titration of Mohr's salt solution against standard $K_2Cr_2O_7$ solution 3: Determination of $K_{sp}$ for AgCl by potentiometric titration of $AgNO_3$ solution against standard KCl solution 4: Study of phenol-water phase diagram 5: pH-metric titration of acid (mono- and di-basic) against strong base		30	30
Basudev Mandal	(C9T) Inorganic Chemistry-III	Inorganic Polymers	11 <sup>th</sup> March,2023	04	48
Sachinath Bera		Coordination Chemistry-I		14	
		General Principles of Metallurgy		05	
		Chemistry of <i>s</i> and <i>p</i> Block Elements		22	
		Noble Gases		03	
Sachinath Bera and Basudev Mandal	C9P	Complexometric titration 1. Zn(II) 2. Ca(II) and Mg(II) in a mixture. 3. Hardness of water. Inorganic preparations 1. Potassium diaquadioxalatochromate(III) 2. Tetraamminecarbonatocobalt (III) ion 3. Potassium tris(oxalato)ferrate(III) 4. Tris-(ethylenediamine) nickel(II) chloride. 5. $[Mn(acac)_3]$ and $Fe(acac)_3$		48	48

<b>Rathin Jana</b>	<b>(C10T) Organic Chemistry-IV</b>	Nitrogen compounds	11 <sup>th</sup> March,2023	10	54
		Rearrangements		10	
<b>Sayanwita Panja</b>		The Logic of Organic Synthesis		16	
<b>Mitali Dewan</b>		Organic Spectroscopy		18	
<b>Rathin Jana Mitali Dewan</b>	<b>(C10P)</b>	Quantitative Estimations: 1. Estimation of glycine by Sørensen's formol method 2. Estimation of glucose by titration using Fehling's solution 3. Estimation of sucrose by titration using Fehling's solution 4. Estimation of vitamin-C (reduced) 5. Estimation of aromatic amine (aniline) by bromination (Bromate-Bromide) method 6. Estimation of phenol by bromination (Bromate-Bromide) method 7. Estimation of formaldehyde (Formalin) 8. Estimation of acetic acid in commercial vinegar 9. Estimation of urea (hypobromite method) 10. Estimation of saponification value of oil/fat/ester		60	60
<b>Basudev Mandal</b>	<b>Skill Enhancement Course SEC 2T</b>	Pesticide Chemistry	11 <sup>th</sup> March,2023	30	30
<b>Basudev Mandal and Rathin Jana</b>	<b>SEC2P</b>	1. To calculate acidity/alkalinity in given sample of pesticide formulations as per BIS specifications. 2.Preparation of simple organophosphates, phosphonates and thiophosphates		15	15

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Mitali Dewan	GE4 T	Section A: Physical Chemistry-III	Solutions	11 <sup>th</sup> March,2023	10	26
			Phase Equilibria		06	
			Conductance		06	
			Electromotive force		04	
Sayawita Panja		Section-B: Analytical and Environmental Chemistry	Chemical Analysis		10	24
			Environmental Chemistry		14	
Mitali Dewan Sayawita Panja	GE4 P	Section A: Physical Chemistry	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 c) Determination of dissociation constant of a weak acid (cell constant, equivalent conductance are also determined) d) Perform the following conductometric titrations: Strong acid vs. strong base e) Potentiometric titrations of: (i) Weak acid vs. strong base (ii) Potassium dichromate vs. Mohr's salt		30	30
		Section B: Analytical and Environmental Chemistry	1. Total hardness of water by EDTA titration. 2. PH of an unknown solution by comparing color of a series of HCl solutions + 1 drop of methyl orange, and a similar series of NaOH solutions + 1 drop of phenolphthalein. 3. To determine the rate constant for the acid catalysed hydrolysis of an ester. 4. Determination of the strength of the H <sub>2</sub> O <sub>2</sub> .		24	

4<sup>th</sup> Semester (Gen)

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Sachinath Bera	Core-10 (DSC-1D)	Section A: Inorganic Chemistry	Transition Elements (3d series) and f-block	11th March,2023	15	50
Basudev Mandal			Coordination Chemistry		10	
			Crystal field theory		05	
		Section B: Physical Chemistry	Kinetic Theory of Gases		08	
Basudev Mandal			Liquids		03	
Sachinath Bera			Solids		03	
		Chemical Kinetics		06		
Sachinath Bera	DSC-1DP	Section A: Inorganic Chemistry	<p>Qualitative semimicro analysis of mixtures containing four radicals.</p> <p>Basic radicals: <math>Pb^{2+}</math>, <math>Cu^{2+}</math>, <math>Cd^{2+}</math>, <math>Bi^{3+}</math>, <math>As^{3+/5+}</math>, <math>Sb^{3+/5+}</math>, <math>Sn^{2+/4+}</math>, <math>Fe^{2+/3+}</math>, <math>Al^{3+}</math>, <math>Cr^{3+}</math>, <math>Ni^{2+}</math>, <math>Co^{2+/3+}</math>, <math>Mn^{2+/4+}</math>, <math>Zn^{2+}</math>, <math>Ba^{2+}</math>, <math>Sr^{2+}</math>, <math>Ca^{2+}</math>, <math>Na^{+}</math>, <math>K^{+}</math>, <math>NH_4^{+}</math>, <math>Mg^{2+}</math></p> <p>Acid radicals: <math>F^{-}</math>, <math>Cl^{-}</math>, <math>Br^{-}</math>, <math>I^{-}</math>, <math>BrO_3^{-}</math>, <math>IO_3^{-}</math>, <math>S^{2-}</math>, <math>SO_3^{2-}</math>, <math>SO_4^{2-}</math>, <math>S_2O_3^{2-}</math>, <math>SCN^{-}</math>, <math>[Fe(CN)_6]^{3-}</math>, <math>[Fe(CN)_6]^{4-}</math>, <math>NO_3^{-}</math>, <math>NO_2^{-}</math>, <math>CrO_4^{-}</math>, <math>BO_3^{3-}</math>, <math>PO_4^{3-}</math>, <math>AsO_4^{3-}</math></p> <p>1. Estimate the amount of nickel present in a given solution as bis (dimethylglyoximato) nickel(II) in a given solution gravimetrically.</p> <p>2. Draw calibration curve (absorbance at <math>\lambda_{max}</math> vs. concentration) for various concentrations of a given coloured compound <math>KMnO_4</math> and estimate the concentration of the same in a given solution.</p> <p>4. Estimation of <math>Mg^{2+}</math> by complexometric titrations using EDTA.</p> <p>5. Estimation of total hardness of a given sample of water by complexometric titration.</p>		40	40

<b>Basudev Mandal</b>		<b>Section B: Physical Chemistry</b>	(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. (III) Chemical Kinetics Study the kinetics of the following reactions. 1. Initial rate method: Iodide-persulphate reaction 2. Integrated rate method: a. Acid hydrolysis of methyl acetate with hydrochloric acid. b. Saponification of ethyl acetate.		<b>42</b>	<b>42</b>
<b>Sachinath Bera</b>	<b>Skill Enhancement Course SEC 2</b>	<b>Analytical Clinical Biochemistry</b>	Carbohydrate, Proteins, Enzymes, Lipids, Hormone, Structure of DNA, Blood, Urine	11 <sup>th</sup> March,2022	<b>30</b>	<b>30</b>
<b>Sachinath Bera And Rathin Jana</b>	<b>SEC2P</b>		1. Carbohydrates – qualitative and quantitative. 2. Lipids – qualitative. 3. Determination of the iodine number of oil. 4. Determination of saponification number of oil. 5. Proteins – qualitative. 6. Determination of protein by the Biuret reaction. 7. Determination of nucleic acids		<b>28</b>	<b>28</b>

6<sup>th</sup> Semester (Hons)

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Basudev Mandal	(C13T) Inorganic chemistry-V	Bioinorganic Chemistry	6 <sup>th</sup> February,2023	20	60
		Catalysis by Organometallic Compounds		10	
Sachinath Bera		Organometallic Chemistry		18	
		Reaction Kinetics and Mechanism		12	
Sachinath Bera And Basudev Mandal	C13P	Qualitative semimicro analysis of mixtures containing four radicals. Basic radicals: $Pb^{2+}$ , $Cu^{2+}$ , $Cd^{2+}$ , $Bi^{3+}$ , $As^{3+/5+}$ , $Sb^{3+/5+}$ , $Sn^{2+/4+}$ , $Fe^{2+/3+}$ , $Al^{3+}$ , $Cr^{3+}$ , $Ni^{2+}$ , $Co^{2+/3+}$ , $Mn^{2+/4+}$ , $Zn^{2+}$ , $Ba^{2+}$ , $Sr^{2+}$ , $Ca^{2+}$ , $Na^+$ , $K^+$ , $NH_4^+$ , $Mg^{2+}$ Acid radicals: $F^-$ , $Cl^-$ , $Br^-$ , $I^-$ , $BrO_3^-$ , $IO_3^-$ , $S^{2-}$ , $SO_3^{2-}$ , $SO_4^{2-}$ , $S_2O_3^{2-}$ , $SCN^-$ , $[Fe(CN)_6]^{3-}$ , $[Fe(CN)_6]^{4-}$ , $NO_3^-$ , $NO_2^-$ , $CrO_4^-$ , $BO_3^{3-}$ , $PO_4^{3-}$ , $AsO_4^{3-}$ Insoluble Materials: $Al_2O_3(ig)$ , $Fe_2O_3(ig)$ , $Cr_2O_3(ig)$ , $SnO_2$ , $SrSO_4$ , $BaSO_4$ , $CaF_2$ , $PbSO_4$ .		60	60
Rathin Jana	(C14T) Physical Chemistry-V	Molecular Spectroscopy	6 <sup>th</sup> February,2023	24	52
Rathin Jana		Photochemistry		12	
Sachinath Bera		Surface phenomenon		16	
Sachinath Bera And Rathin Jana	C14P	1: Determination of surface tension of a liquid using Stalagmometer 2: Determination of CMC from surface tension measurements 3: Verification of Beer and Lambert's Law for $KMnO_4$ and $K_2Cr_2O_7$ solution 4: Study of kinetics of $K_2S_2O_8 + KI$ reaction,		30	30

		spectrophotometrically 5: Determination of pH of unknown buffer, spectrophotometrically				
<b>Sayanwita Panja</b>	<b>DSE -3: Green Chemistry</b>	Introduction to Green Chemistry Principles of Green Chemistry and Designing a Chemical synthesis Examples of Green Synthesis/ Reactions and some real-world cases Future Trends in Green Chemistry		06 <sup>th</sup> February,2023	<b>48</b>	<b>48</b>
<b>Sayanwita Panja And Mitali Dewan</b>	<b>DSE3P</b>	1. Preparation of propene by two methods Triethylamine ion + OH <sup>-</sup> → propene + trimethyl propene + water 1-propanol $\xrightarrow{\text{H}_2\text{SO}_4, \Delta}$ propene + water 2. Benzoin condensation using Thiamine Hydrochloride as a catalyst instead of cyanide. 3. Solvent free, microwave assisted one pot synthesis of phthalocyanine complex of copper (II). 4. Photoreduction of benzophenone to benzopinacol in the presence of sunlight.			<b>36</b>	<b>36</b>
<b>Mitali Dewan</b>	<b>DSE-4: Polymer Chemistry</b>	a) Introduction and history of polymeric materials b)Functionality and its importance c)Kinetics of Polymerization d)Crystallization and crystallinity e)Nature and structure of polymers f)Determination of molecular weight of polymers g)Glass transition temperature (Tg) and determination of Tg h)Polymer Solution i)Properties of Polymer		06 <sup>th</sup> February,2023	<b>54</b>	<b>54</b>

<p><b>Mitali Dewan And Rathin Jana</b></p>	<p><b>DSE4P</b></p>	<ol style="list-style-type: none"> <li>1. Free radical solution polymerization of styrene (St) / Methyl Methacrylate (MMA) / Methyl Acrylate (MA) / Acrylic acid (AA).</li> <li>2. Preparation of nylon 66/6</li> <li>3.Redox polymerization of acrylamide</li> <li>4. Precipitation polymerization of acrylonitrile</li> <li>5. Preparation of urea-formaldehyde resin</li> <li>6. Preparations of novalac resin/ resold resin.</li> <li>7. IR studies of polymers</li> </ol>		<p><b>42</b></p>	<p><b>42</b></p>
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6<sup>th</sup> Semester (Gen)

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Sayanwita Panja	DSE 1B/2B/3B	Green Chemistry	Introduction to Green Chemistry Principles of Green Chemistry and Designing a Chemical synthesis Examples of Green Synthesis/ Reactions and some real-world cases Future Trends in Green Chemistry	6 <sup>th</sup> February,2023	42	42
Sayanwita Panja and Mitali Dewan	DSE1BP		1. Preparation of propene by two methods Triethylamine ion + OH <sup>-</sup> → propene + trimethyl propene + water 1-propanol $\xrightarrow{\text{H}_2\text{SO}_4, \Delta}$ propene + water 2. Benzoin condensation using Thiamine Hydrochloride as a catalyst instead of cyanide. 3. Solvent free, microwave assisted one pot synthesis of phthalocyanine complex of copper (II). 4. Photoreduction of benzophenone to benzopinacol in the presence of sunlight.		36	36
Rathin Jana	Skill Enhancement Course SEC 4T	Pesticide Chemistry		6 <sup>th</sup> February,2023	24	24
Rathin Jana and Basudev Mandal	SEC4P		1. To calculate acidity/alkalinity in given sample of pesticide formulations as per BIS specifications. 2. Preparation of simple organophosphates, phosphonates and thiophosphates		18	18