

University of Calcutta under Graduate Curriculum under Choice Based Credit System (CBCS)

Lesson Plan with Syllabus for Chemistry (G) Semester-II

Total Marks-100 (Credits: Theory-04, Practical-02)

(Theory: 50; Practical: 30; Internal Assessment: 10; Attendance: 10)

[Marks obtained in this course will be taken to calculate SGPA & CGPA]

Tentative, may subject to change:						
Months	Week	Unit	Topic	No. of Lectures for Each Section	Teacher	
March	3 rd	1	<p align="center"><i>Thermodynamics</i></p> <ul style="list-style-type: none"> Some basic concepts and the zeroth law of thermodynamics 	2	PKD	
		2	<p align="center"><i>Chemical Equilibrium</i></p> <ul style="list-style-type: none"> Thermodynamic conditions for equilibrium, degree of advancement Variation of free energy with the degree of advancement 	1	SM	
		6	<p align="center"><i>Aliphatic Hydrocarbons</i> <i>Alkanes</i></p> <ul style="list-style-type: none"> <i>Preparation:</i> catalytic hydrogenation, Wurtz reaction, Kolbe's synthesis 	1	TKL	
	4 th	1	<p align="center"><i>Thermodynamics</i></p> <ul style="list-style-type: none"> Concept of heat and work in different processes Joule's experiment and the first law of thermodynamics 	2	PKD	
		2	<p align="center"><i>Chemical Equilibrium</i></p> <ul style="list-style-type: none"> Equilibrium constant and standard Gibbs free energy change Definitions of K_p, K_c, and K_x and relation among them 	1	SM	
		6	<p align="center"><i>Aliphatic Hydrocarbons</i> <i>Alkenes</i></p> <ul style="list-style-type: none"> <i>Preparation:</i> elimination reactions: dehydration of alcohols and dehydrohalogenation of alkyl halides 	1	TKL	
	April	1 st	1	<p align="center"><i>Thermodynamics</i></p> <ul style="list-style-type: none"> Joule-Thomson experiment and the concept of enthalpy Concept of Standard states 	2	PKD
			2	<p align="center"><i>Chemical Equilibrium</i></p> <ul style="list-style-type: none"> Van't Hoff's reaction isotherm, isobar, and isochoric from different standard states 	1	SM
			6	<p align="center"><i>Aliphatic Hydrocarbons</i> <i>Alkenes</i></p> <ul style="list-style-type: none"> <i>Reactions:</i> addition of bromine, the addition of HX [Markownikoff's addition (with mechanism)] 	1	TKL
2 nd		1	<p align="center"><i>Thermodynamics</i></p> <ul style="list-style-type: none"> Laws of Thermochemistry The physical concept of entropy and the 2nd law of thermodynamics 	2	PKD	
		2	<p align="center"><i>Chemical Equilibrium</i></p> <ul style="list-style-type: none"> Shifting of equilibrium due to change in external parameters e.g., temperature and pressure 	1	SM	
		6	<p align="center"><i>Aliphatic Hydrocarbons</i> <i>Alkenes</i></p> <ul style="list-style-type: none"> <i>Reactions:</i> anti-Markownikoff's addition, hydration, ozonolysis 	1	TKL	

3 rd	1	<p style="text-align: center;"><i>Thermodynamics</i></p> <ul style="list-style-type: none"> ▪ Concept of heat reservoirs, heat engines, and Carnot cycle 	1+1	PKD	
	2	<p style="text-align: center;"><i>Chemical Equilibrium</i></p> <ul style="list-style-type: none"> ▪ variation of the equilibrium constant with addition to inert gas 	1	SM	
	6	<p style="text-align: center;"><i>Aliphatic Hydrocarbons</i> <i>Alkynes</i></p> <ul style="list-style-type: none"> ▪ <i>Preparation:</i> acetylene from CaC₂, by dehalogenation of tetra halides and dehydrohalogenation of vicinal dihalides 	1	TKL	
	4 th	1	<p style="text-align: center;"><i>Thermodynamics</i></p> <ul style="list-style-type: none"> ▪ Criteria for spontaneity and equilibrium 	2	PKD
	2	<p style="text-align: center;"><i>Chemical Equilibrium</i></p> <ul style="list-style-type: none"> ▪ Le Chatelier's principle 	1	SM	
	6	<p style="text-align: center;"><i>Aliphatic Hydrocarbons</i> <i>Alkynes</i></p> <ul style="list-style-type: none"> ▪ <i>Reactions:</i> formation of metal acetylides, the hydration reaction 	1	TKL	
	1	**Student Lecture: On 2nd law of thermodynamics (Carnot Cycle)		1	PKD, SM, TKL

Months	Week	Unit	Topic	No. of Lectures for Each Section	Teacher
May	1 st	3	<p style="text-align: center;"><i>Solutions</i></p> <ul style="list-style-type: none"> ▪ Ideal solutions and Raoult's law 	1	SM
		4	<p style="text-align: center;"><i>Phase Equilibria</i></p> <ul style="list-style-type: none"> ▪ Concept of Phases, Components, and degrees of freedom of a system ▪ Criteria of phase equilibrium and Gibbs Phase rule 	2	PKD
		7	<p style="text-align: center;"><i>Error Analysis and Computer Applications</i></p> <ul style="list-style-type: none"> ▪ <i>Error analysis:</i> accuracy and precision of quantitative analysis, determinate, indeterminate 	1	TKL
	2 nd	3	<p style="text-align: center;"><i>Solutions</i></p> <ul style="list-style-type: none"> ▪ deviations from Raoult's law- non-ideal solutions 	1	SM
		4	<p style="text-align: center;"><i>Phase Equilibria</i></p> <ul style="list-style-type: none"> ▪ Criteria of phase equilibrium and Gibbs Phase rule ▪ Derivation of Clausius-Clapeyron equation and its importance 	2	PKD
		7	<p style="text-align: center;"><i>Error Analysis and Computer Applications</i></p> <ul style="list-style-type: none"> ▪ <i>Error analysis:</i> systematic and random errors 	1	TKL
			McQ based Assessment for all 3-section on Unit-1, 2 & 6		1

	3 rd	3	<p style="text-align: center;">Solutions</p> <ul style="list-style-type: none"> ▪ Vapour pressure-composition and temperature-composition curves of ideal and non-ideal solutions ▪ Distillation of solutions 	1	SM	
		4	<p style="text-align: center;">Phase Equilibria</p> <ul style="list-style-type: none"> ▪ Derivation of Clausius-Clapeyron equation and its importance 	1	PKD	
		7	<p>Error Analysis and Computer Applications</p> <ul style="list-style-type: none"> • Error analysis: methods of least squares and standard deviations 	1	TKL	
	4 th	3	<p style="text-align: center;">Solutions</p> <ul style="list-style-type: none"> ▪ Lever rule ▪ Azeotropes 	1	SM	
		4	<p style="text-align: center;">Phase Equilibria</p> <ul style="list-style-type: none"> • Phase diagrams of one-component systems (water and CO₂) 	2	PKD	
		7	<p>Error Analysis and Computer Applications</p> <ul style="list-style-type: none"> • Computer applications: general introduction to computers, different components of a computer 	1	TKL	
	June	1 st		** Guest Lecture on 04.06.2022		PKD, TKL, SM
				McQ based Assessment for all 6-section on Unit-6 & 7		
		2 nd	3	<p style="text-align: center;">Solutions</p> <ul style="list-style-type: none"> ▪ Nernst distribution law and its applications ▪ solvent extraction 	1	SM
			Library work assignment			
8			<p style="text-align: center;">Redox Reactions</p> <ul style="list-style-type: none"> ▪ Ion electron method of balancing reaction ▪ Concept of Standard Redox potentials and Nernst equation 	2	PKD	
3 rd		7	<p>Error Analysis and Computer Applications</p> <ul style="list-style-type: none"> ▪ Computer applications: hardware and software; input and output devices 	1	TKL	
		5	<p style="text-align: center;">Solids</p> <ul style="list-style-type: none"> ▪ Forms of solids, crystal systems, unit cells, Bravais lattice types, Symmetry elements 	1	SM	
		8	<p style="text-align: center;">Redox Reactions</p> <ul style="list-style-type: none"> ▪ Influence of complex formation, precipitation, and change of pH on redox potentials 	2	PKD	
		7	<p>Error Analysis and Computer Applications</p> <ul style="list-style-type: none"> ▪ binary numbers and arithmetic 	1	TKL	
		4 th	5	<p style="text-align: center;">Solids</p> <p>Laws of Crystallography-Law of constancy of interfacial angles, Law of rational indices</p>	1	SM

		8	<p style="text-align: center;"><i>Redox Reactions</i></p> <ul style="list-style-type: none"> ▪ Influence of complex formation, precipitation, and change of pH on redox potentials ▪ Formal potential, the feasibility of redox titration 	2	PKD
		7	<p style="text-align: center;"><i>Error Analysis and Computer Applications</i></p> <ul style="list-style-type: none"> ▪ Introduction to computer languages 	1	TKL
			Quiz competition for all semester students on 30.06.2022		
July	1 st	5	<p style="text-align: center;"><i>Solids</i></p> <ul style="list-style-type: none"> ▪ Miller indices of different planes and interplanar distance ▪ Bragg's law 	1	SM
		8	<p style="text-align: center;"><i>Redox Reactions</i></p> <ul style="list-style-type: none"> ▪ Redox potential at the equivalence point and redox indicators 	2	PKD
	2 nd	Internal Assessment	McQ based Internal Assessment for all sections		PKD, SM, TKL

Tentative may subject to change: Practical Class

Months	Weeks	Topic	Teacher
September	3 rd	<ul style="list-style-type: none">▪ Laboratory work discussion	SM
	4 th to 5 th	<ul style="list-style-type: none">• Experiment 1: Study of the kinetics of acid-catalyzed hydrolysis of methyl acetate	
October	1 st to 2 nd	<ul style="list-style-type: none">• Experiment 2: Study of the kinetics of decomposition of H₂O₂ (Clock Reaction)	
November	1 st to 2 nd	<ul style="list-style-type: none">• Experiment 3: Study of viscosity of unknown liquid (glycerol, sugar) with respect to water	
	3 rd to 4 th	<ul style="list-style-type: none">• Experiment 4: Determination of solubility of sparingly soluble salt in water, in electrolyte with common ions, and in the neutral electrolyte (using a standard indicator)	
December	1 st to 2 nd	<ul style="list-style-type: none">• Experiment 4: Determination of solubility of sparingly soluble salt in water, in electrolyte with common ions, and in the neutral electrolyte (using a standard indicator)...continue	
	3 rd to 4 th	<ul style="list-style-type: none">• Experiment 5: Preparation of buffer solutions and finding the pH of an unknown buffer solution by color matching method	
January	1 st to 2 nd	<ul style="list-style-type: none">• Experiment 6: Determination of surface tension of a liquid using a Stalagmometer	
	3 rd to 4 th	<ul style="list-style-type: none">• Repeat of experiments	
