DEPARTMENT OF CHEMISTRY
LESSION PLAN
SESSION 2023-24
SEMESTER – IV

NAME OF TEACHER: SUBHOJIT GHOSH

PAPERALLOTTED: CEMACOR10T

Month	Paper	Content	No of classes
March 2024 02.03.2024	CEMACOR10T	UV spectroscopy	8
April 2024	CEMACOR10T	IR spectroscopy	8
May 2024	CEMACOR10T	NMR spectroscopy	7
June 2024 07.06.2024	CEMACOR10T	Problem solving on UV, IR and NMR spectroscopy	8
	CEMACOR10T	Discussion on structure elucidation of organic compounds from spectroscopic data	4
	Internal Examination		
13.07.2024	End Semester Examination		
Total Classes			35

NAME OF TEACHER: DR. MADHUSHREE DAS SARMA

PAPER ALLOTTED: CEMACOR10T, CEMACOR10P, CEMSSEC002

Month	Paper	Content	No of classes
March 2024 02.03.2024	CEMACOR10T	Nitrogen Compounds : Amines, Nitro compounds	6
	CEMACOR10P	Estimation of acetic acid, glycine, vitamin C	12
April 2024	CEMACOR10T	Nitrogen Compounds :Alkyl nitriles and Isonitriles Diazonium salts	6
	CEMACOR10P	Estimation of aniline, phenol , formalin	12
May 2024	CEMACOR10T	Rearrangement reactions: Rearrangement to electron deficient carbon	6
	CEMACOR10P	Estimation of glucose, sucrose , urea	12
June 2024 07.06.2024	CEMACOR10T	Rearrangement reactions: Rearrangement to electron deficient nitrogen and oxygen	6
	CEMACOR10P	Estimation of saponification value of oil	4

	CEMSSEC001: Analytical Clinical Biochemistry (Project)		
	Internal Examination		
July 2024	CEMACOR10T	Rearrangement reactions: Aromatic rearrangement and Rearrangements by green approach	2
13.07.2024	End Semester Examination		
Total Classes			66

Name of Teacher: Dr Nimairatan Adhikari

Paper Allotted: CEMACOR09T, CEMGCOR04T, CEMGCOR04P

Month	Paper	Topic	No of classes
March 2024 (02.03.2024)	CEMACOR09T	Metallurgy:Chief modes of occurrence of metals based on standard electrode potentials. Ellingham diagrams for reduction of metal oxides using carbon and carbon monoxide as reducing agent. Electrolytic Reduction, Hydrometallurgy. Methods of purification of metals: Electrolytic Kroll process, Parting process, van Arkel-de Boer process and Mond‟s process, Zone refining.	8
	CEMGCOR04T	Conductance Conductance, cell constant, specific conductance and molar conductance; Variation of specific and equivalent conductance with dilution for strong and weak electrolytes; Kohlrausch‟s law of independent migration of ions; Equivalent and molar conductance at infinite dilution and their determination for strong and weak electrolytes; Ostwald‟s dilution law; Application of conductance measurement (determination of solubility product and ionic product of water); Conductometric titrations (acid-base) Transport Number and principles of Hittorf‟s and Moving-boundary method	8
April 2024	CEMACOR09T	Chemistry of s and p block elements: Relative stability of different oxidation states, diagonal relationship and anomalous behaviour of first member of each group. Allotropy and catenation. Study of the following compounds with emphasis on structure, bonding, preparation, properties and uses. Beryllium hydrides and halides. Boric acid and borates, boron nitrides, borohydrides (diborane) and graphitic compounds, silanes, Oxides and oxoacids of nitrogen, phosphorus, sulphur and chlorine. Peroxo acids of sulphur, sulphur-nitrogen compounds, interhalogen compounds, polyhalide ions, pseudohalogens, fluorocarbons and basic properties of halogens.	8
May 2024	CEMACOR09T	Types of inorganic polymers, comparison with organic polymers, synthesis, structural aspects and applications of silicones and siloxanes. Borazines, silicates and phosphazenes	6
	CEMACOR09T	Coordinate bonding: double and complex salts. Werner‟s theory of coordination complexes, Classification of ligands, Ambidentate ligands, chelates, Coordination numbers, IUPAC nomenclature of coordination complexes (up to two metal	8

		centers), Isomerism in coordination compounds, constitutional and stereo isomerism, Geometrical and optical isomerism in square planar and octahedral complexes.	
June 2024 07.06.2024		Internal Examination &Class for Slow Learners	7
13.07.2024		END SEMESTER EXAMINATION	
Total Classes			45

NAME OF TEACHER: DR. KALLOL MUKHERJEE

PAPER ALLOTTED:CEMACOR08T, CEMGCOR04T, CEMGCOR04P

Month	Paper	Topic	No of classes
March 2024 (02.03.2024)	CEMACOR08T	Colligative properties: Vapour pressure of solution; Ideal solutions, ideally diluted solutions and colligative properties; Raoult's law; Thermodynamic derivation using chemical potential to derive relations between the four colligative properties [(i) relative lowering of vapour pressure, (ii) elevation of boiling point, (iii) Depression of freezing point, (iv) Osmotic pressure] and amount of solute. Applications in calculating molar masses of normal, dissociated and associated solutes in solution; Abnormal colligative properties	8
	CEMACOR08T	Electrical Properties of molecules : Ionic equilibria: Chemical potential of an ion in solution; Activity and activity coefficients of ions in solution; Debye-Huckel limiting law-brief qualitative description of the postulates involved, qualitative idea of the model, the equation (without derivation) for ion-ion atmosphere interaction potential. Estimation of activity coefficient for electrolytes using Debye-Huckel limiting law; Derivation of mean ionic activity coefficient from the expression of ion-atmosphere interaction potential; Applications of the equation and its limitations	9
	CEMACOR08P	Experiment 1: Determination of solubility of sparingly soluble salt in water, in electrolyte with common ions and in neutral electrolyte (using common indicator) Experiment 2: Potentiometric titration of Mohr’s salt solution against standard K2Cr2O7 solution	6
	CEMACOR08T	Electromotive Force: Quantitative aspects of Faraday‟s laws of electrolysis, rules of oxidation/reduction of ions based on half-cell potentials, applications of electrolysis in metallurgy and industry; Chemical cells, reversible and irreversible cells with examples; Electromotive force of a cell and its measurement, Nernst equation; Standard electrode (reduction) potential and its application to different kinds of half-cells. Application of EMF measurements in determining (i) free energy, enthalpy and entropy of a cell reaction, (ii) equilibrium constants, and	10

April 2024		**(iii) pH values, using hydrogen, quinone-hydroquinone, glass and SbO/Sb2O3 electrodes**	
	CEMACOR08P	**Experiment 3: Determination of Ksp for AgCl by potentiometric titration of AgNO3 solution against standard KCl solution** **Experiment 4: Effect of ionic strength on the rate of Persulphate – Iodide reaction**	**6**
	CEMGCOR04T	**Conductance, cell constant, specific conductance and molar conductance; Variation of specific and equivalent conductance with dilution for strong and weak electrolytes; Kohlrausch‟s law of independent migration of ions; Equivalent and molar conductance at infinite dilution and their determination for strong and weak electrolytes; Ostwald‟s dilution law; Application of conductance measurement (determination of solubility product and ionic product of water); Conductometric titrations (acid-base) Transport Number and principles of Hittorf‟s and Moving-boundary method.**	**8**
May 2024	**CEMACOR08T**	**Concentration cells with and without transference, liquid junction potential; determination of activity coefficients and transference numbers; Qualitative discussion of potentiometric titrations (acid-base, redox, precipitation)** **Dipole moment and polarizability: Polarizability of atoms and molecules, dielectric constant and polarisation, molar polarisation for polar and non-polar molecules; ClausiusMosotti equation and Debye equation (both without derivation) and their application; Determination of dipole moments**	**8**
	CEMACOR08P	**Experiment 5: Study of phenol-water phase diagram** **Experiment 6: pH-metric titration of acid (mono- and di-basic) against strong base**	**6**
	CEMGCOR04T	**Faraday‟s laws of electrolysis, rules of oxidation/reduction of ions based on half-cell potentials, applications of electrolysis in metallurgy and industry; Chemical cells, reversible 78 and irreversible cells with examples; Electromotive force of a cell and its measurement, Nernst equation; Standard electrode (reduction) potential; Electrochemical series; Thermodynamics of a reversible cell, calculation of thermodynamic properties: G, H and S from EMF data Concentration cells with and without transference, liquid junction potential; pH determination using hydrogen electrode and quinhydrone; Qualitative discussion of potentiometric titrations (acid-base, redox, precipitation)**	**6**
June 2024 07.06.2024		**Internal Examination &Class for Slow Learners**	**8**
13.07.2024		**END SEMESTER EXAMINATION**	
Total Classes			**75**

Name of Teacher: Dr. MADHUMITA DANDOPATH PATRA

Paper Allotted: CEMACOR10T, CEMADSE04T

Month	Paper	Topic	No of classes
March 2024 (02.03.2024)	CEMACOR10T	The Logic of Organic Synthesis : Retrosynthetic Analysis	4
April 2024	CEMACOR10T	The Logic of Organic Synthesis : Retrosynthetic Analysis	4
	SEC-2		8
May 2024	CEMACOR10T	The Logic of Organic Synthesis : Strategy of ring synthesis	2
	SEC-2		7
June 2024	CEMACOR10T	The Logic of Organic Synthesis : Asymmetric Synthesis	5
June 2024 07.06.2024		Internal Examination & Class for Slow Learners	6
13.07.2024		END SEMESTER EXAMINATION	
Total Classes			36

Name of Teacher: Mr. AJAY TAMANG

Paper Allotted: CEMACOR08T, CEMGCOR04T, CEMGCOR04P

Month	Paper	Topic	No of classes
March 2024 (02.03.2024)	CEMACOR08T	Quantum Chemistry: Angular momentum: Commutation rules, quantization of square of total angular momentum and z-component; Properties of angular momentum operators; Eigen functions of LZ and LZ2; Rigid rotator model of rotation of diatomic molecule and Schrödinger equation; Transformation to spherical polar coordinates; Separation of variables; Spherical harmonics; Discussion of solution	6
	CEMGCOR04T	Phase Equilibria Phases, components and degrees of freedom of a system, criteria of phase equilibrium; Gibbs' Phase Rule and its thermodynamic derivation; Derivation of Clausius – Clapeyron equation and its importance in phase equilibria; Phase diagrams of one-component systems (water and sulphur) and two component systems involving eutectics, congruent and incongruent melting points (lead silver, FeCl3-H2O and Na-K only)	8
	CEMGCOR04P	a) Determination of dissociation constant of a weak acid (cell constant, equivalent conductance are also determined) b) Perform the following conductometric titrations: (i) Strong	12

		acid vs. strong base (ii) Weak acid vs. strong base	
April 2024	**CEMACOR08T**	**Qualitative treatment of hydrogen atom and hydrogen-like ions: Setting up of S.E. in spherical polar coordinates, radial part, quantization of energy (only final energy expression); Plots of polar parts and radial distributions; Wave –function of one electron atoms; Average and most probable distances of electron from nucleus; Setting up of Schrödinger equation for many-electron atoms (He, Li)**	**6**
	CEMGCOR04T	**Ideal solutions and Raoult's law, deviations from Raoult's law – non-ideal solutions; Vapour pressure-composition and temperature-composition curves of ideal and non-ideal solutions; Distillation of solutions; Lever rule; Azeotropes**	**4**
	CEMGCOR04P	**Potentiometry** **Perform the following potentiometric titrations: (i) Weak acid vs. strong base (ii) Potassium dichromate vs. Mohr's salt**	**12**
May 2024	**CEMACOR08T**	**LCAO and HF-SCF: Born-Oppenheimer approximation; LCAO-MO treatment of H_2^+; Bonding and antibonding orbitals; Qualitative extension to H_2; Comparison of LCAO MO and VB treatments of H_2 and their limitations; Covalent bonding, valence bond and molecular orbital approaches, Hartree-Fock method development, SCF and configuration interaction (only basics)**	**6**
	CEMACOR08T	**Phase rule: Definitions of phase, component and degrees of freedom; Phase rule and its derivations; Definition of phase diagram; Phase diagram for water, CO_2, Sulphur.**	**5**
June 2024 07.06.2024		**Internal Examination & Class for Slow Learners**	**7**
13.07.2024		**END SEMESTER EXAMINATION**	
Total Classes			**66**

Name of Teacher: Dr. Sandip Saha

Paper Allotted: CEMACOR09T, CEMHGEC04T

Month	Paper	Topic	No of classes
March 2024 (02.03.2024)	**CEMACOR09T**	**Chemistry of *s* and *p* Block Elements** **Relative stability of different oxidation states, diagonal relationship and anomalous behaviour of first member of each group. Allotropy and catenation. Study of the following compounds with emphasis on structure, bonding, preparation, properties and uses.**	**10**
	CEMGCOR09T	**Beryllium hydrides and halides. Boric acid and borates, boron nitrides, borohydrides (diborane) and graphitic compounds, silanes, Oxides and oxoacids of nitrogen, phosphorus, sulphur and chlorine.**	**10**

	CEMHGEC04T	**Environmental Chemistry** ***The Atmosphere*: composition and structure of the atmosphere; troposphere, stratosphere, mesosphere and thermosphere; ozone layer and its role; major air pollutants: CO, SO2, NOx and particulate matters – their origin and harmful effects; problem of ozone layer depletion; green house effect; acid rain and photochemical smog; air pollution episodes: air quality 79 standard; air pollution control measures: cyclone collector, electrostatic precipitator, catalytic converter.**	**12**
April 2024	**CEMACOR09T**	**Peroxo acids of sulphur, sulphur-nitrogen compounds, interhalogen compounds, polyhalide ions, pseudohalogens, fluorocarbons and basic properties of halogens.**	**10**
	CEMGCOR09T	**Inorganic Polymers:** **Types of inorganic polymers, comparison with organic polymers, synthesis, structural aspects and applications of silicones and siloxanes. Borazines, silicates and phosphazenes.**	**6**
	CEMHGEC04T	***The Hydrosphere*: environmental role of water, natural water sources, water treatment for industrial, domestic and laboratory uses; water pollutants; action of soaps and detergents, phosphates, industrial effluents, agricultural runoff, domestic wastes; thermal pollution, radioactive pollution and their effects on animal and plant life; water pollution episodes: water pollution control measures : waste water treatment; chemical treatment and microbial treatment; water quality standards: DO, BOD, COD, TDS and hardness parameters; desalination of sea water : reverse osmosis, electrodialysis.** ***The Lithosphere*: water and air in soil, waste matters and pollutants in soil, waste classification, treatment and disposal; soil pollution and control measures.**	**12**
May 2024	**CEMACOR09T**	**Inorganic Polymers:** **Types of inorganic polymers, comparison with organic polymers, synthesis, structural aspects and applications of silicones and siloxanes. Borazines, silicates and phosphazenes.**	**6**
June 2024 07.06.2024		**Internal Examination & Class for Slow Learners**	**7**
13.07.2024		**END SEMESTER EXAMINATION**	
Total Classes			**73**