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

NAME OF TEACHER: SUBHOJIT GHOSH

PAPERALLOTTED: CEMADSE04T, CEMGDSE03P

Month	Paper	Content	No of classes
March 2024 02.03.2024	CEMADSE04T	Green Chemistry: Introduction & various definitions	4
	CEMGDSE03P	Analysis of Cu, Ni in alloy and Cement	8
April 2024	CEMADSE04T	Green synthesis, Microwave and sonochemistry	4
	CEMGDSE03P	Determination of Composition of Dolomite	4
May 2024	CEMADSE04T	Supercritical carbon dioxide, marine antifoulants, right fit pigments	4
	CEMGDSE03P	Estimation of calcium in calcium ammonium nitrate fertilizer and phosphoric acid in superphosphate fertilizer.	8
June 2024	CEMGDSE03P	Determination of free acidity in ammonium sulphate fertilizer	4
	CEMADSE04T	Polylactic acid, fats and oils, cradle to cradle carpeting	4
	CEMSSEC004: Inorganic Materials of Industrial Importance (Project)		
June 2024 03.06.2024		Internal Examination	
	CEMGDSE03P	Preparation of zinc oxide	4
14.06.2024	End Semester Examination		
Total Classes			44

NAME OF TEACHER: DR. MADHUSHREE DAS SARMA

PAPER ALLOTTED: CEMADSE04T, CEMGDSE03P, CEMSSEC004

Month	Paper	Content	No of classes
March 2024 02.03.2024	CEMADSE04T	Future Trends in Green Chemistry: Introduction & various aspects	04
	CEMGDSE03P	Analysis of Cu, Ni in alloy and Cement	08
April 2024	CEMADSE04T	Future Trends in Green Chemistry:Various aspects	04
	CEMGDSE03P	Determination of Composition of Dolomite	04
May 2024	CEMADSE04T	Future Trends in Green Chemistry:Various aspects	02
	CEMGDSE03P	Estimation of calcium in calcium ammonium nitrate fertilizer and phosphoric acid in superphosphate fertilizer.	08
June 2024		Internal Examination	
	CEMGDSE03P	Determination of free acidity in ammonium sulphate fertilizer	04

03.06.2024	**CEMSSEC004: Inorganic Materials of Industrial Importance (Project)**		
	CEMGDSE03P	**Preparation of zinc oxide**	**04**
14.06.2024	**End Semester Examination**		
Total Classes			**38**

Name of Teacher: Dr Nimairatan Adhikari

Paper Allotted: CEMACOR13T, CEMADSE05T, CEMADSE05P

Month	Paper	Topic	No of classes
March 2024 (02.03.2024)	**CEMACOR13T**	**Elements of life: essential and beneficial elements, major, trace and ultratrace elements. Basic chemical reactions in the biological systems and the role of metal ions (specially Na+, K+, Mg2+, Ca2+, Fe3+/2+, Cu2+/+, and Zn2+). Metal ion transport across biological membrane Na+/ K+-ion pump. Dioxygen molecule in life. Dioxygen management proteins: Haemoglobin, Myoglobin, Hemocyanine and Hemerythrin.**	**5**
April 2024	**CEMACOR13T**	**Electron transfer proteins: Cytochromes and Ferredoxins. Hydrlytic enzymes: carbonate bicarbonate buffering system and carbonic anhydrase and carboxyanhydrase A. Biological nitrogen fixation, Photosynthesis: Photosystem-I and Photosystem-II. Toxic metal ions and their effects, chelation therapy (examples only), Pt and Au complexes as drugs (examples only), metal dependent diseases (examples only)**	**8**
	CEMADSE05T	***Glass:* Glassy state and its properties, classification (silicate and non-silicate glasses).Manufacture and processing of glass. Composition and properties of the following types of glasses: Soda lime glass, lead glass, armoured glass, safety glass, borosilicate glass, fluorosilicate, coloured glass, photosensitive glass.** ***Ceramics:* Important clays and feldspar, ceramic, their types and manufacture. Hightechnology ceramics and their applications, superconducting and semiconducting oxides, fullerenes carbon nanotubes and carbon fibre.** ***Cements:* Classification of cement, ingredients and their role, Manufacture of cement and thesetting process, quick setting cements.**	**8**
	CEMACOR13T	**Catalysis by Organometallic Compounds Study of the following industrial processes 1. Alkene hydrogenation (Wilkinson‟s Catalyst) 2. Hydroformylation 3. Wacker Process 4. Synthetic gasoline (Fischer Tropsch reaction) 5. Ziegler-Natta catalysis for olefin polymerization.**	**8**
	CEMADSE05P	**1. Determination of free acidity in ammonium sulphate fertilizer. 2. Estimation of Calcium in Calcium ammonium nitrate**	**16**

May 2024		**fertilizer. 3. Estimation of phosphoric acid in superphosphate fertilizer. 4. Electroless metallic coatings on ceramic and plastic material. 5. Determination of composition of dolomite (by complexometric titration). 6. Analysis of (Cu, Ni); (Cu, Zn) in alloy or synthetic samples. 7. Analysis of Cement. 8. Preparation of pigment (zinc oxide**	
	CEMADSE05T	**Classification of alloys, ferrous and non-ferrous alloys, Specific properties of elements in alloys. Manufacture of Steel (removal of silicon decarbonization, demanganization, desulphurization dephosphorisation) and surface treatment (Ar and heat treatment, nitriding, carburizing). Composition and properties of different types of steels.**	**6**
June 2024 03.06.2024		**Internal Examination& Class for Slow Learners**	**6**
	CEMADSE05T	**General principles and properties of catalysts, homogenous catalysis (catalytic steps and examples) and heterogenous catalysis (catalytic steps and examples) and their industrial applications, Deactivation or regeneration of catalysts. Phase transfer catalysts, application of zeolites as catalysts**	**6**
14.06.2024		**END SEMESTER EXAMINATION**	
Total Classes			**66**

NAME OF TEACHER: DR. KALLOL MUKHERJEE

PAPER ALLOTTED:CEMACOR14T, CEMADSE06T, CEMADSE06P

Month	Paper	Topic	No of classes
March 2024 (02.03.2024)	**CEMACOR14T**	**Molecular Spectroscopy : Interaction of electromagnetic radiation with molecules; Transition between two states and time-dependent S.E.; Transition moment integral and selection rules; Various types of spectra Rotation spectroscopy: Selection rules, intensities of spectral lines, determination of bond lengths of diatomic and linear triatomic molecules, isotopic substitution**	**8**
	CEMACOR14T	**Vibrational spectroscopy: Classical equation of vibration, computation of force constant, amplitude of diatomic molecular vibrations, anharmonicity, Morse potential, dissociation energies, fundamental frequencies, overtones, hot bands, degrees of freedom for polyatomic molecules, modes of vibration, concept of group frequencies; Diatomic vibrating rotator, P, Q, R branches**	**8**

April 2024	**CEMACOR14T**	**Raman spectroscopy: Qualitative treatment of Rotational Raman effect; Effect of nuclear spin, Vibrational Raman spectra, Stokes and anti-Stokes lines; their intensity difference, rule of mutual exclusion Nuclear Magnetic Resonance (NMR) spectroscopy: Principles of NMR spectroscopy, Larmor precession, chemical shift and low resolution spectra, different scales, spin-spin coupling and high resolution spectra, interpretation of PMR spectra of organic molecules**	**9**
		Electron Spin Resonance (ESR) spectroscopy: Its principle, hyperfine structure, ESR of simple radicals Surface phenomenon: Surface tension and energy: Surface tension, surface energy, excess pressure, capillary rise and surface tension; Work of cohesion and adhesion, spreading of liquid over other surface; Vapour pressure over curved surface; Temperature dependence of surface tension.	**8**
May 2024	**CEMACOR14T**	**Adsorption: Physical and chemical adsorption; Freundlich and Langmuir adsorption isotherms; multilayer adsorption and BET isotherm (no derivation required); Gibbs‟ adsorption isotherm and surface excess; Heterogenous catalysis (single reactant).**	**6**
		Colloids: Lyophobic and lyophilic sols, Origin of charge and stability of lyophobic colloids, Coagulation and Schultz-Hardy rule, Zeta potential and Stern double layer (qualitative idea), Tyndall effect; Electrokinetic phenomena (qualitative idea only); Determination of Avogadro number by Perrin‟s method; Stability of colloids and zeta potential; Micelle formation .	**7**
June 2024 03.06.2024		**Internal Examination & Class for Slow Learners**	**6**
14.06.2024		**END SEMESTER EXAMINATION**	
Total Classes			**54**

Name of Teacher: Dr. MADHUMITA DANDOPATH PATRA

Paper Allotted: CEMADSE04T, CEMADSE04P

Month	Paper	Topic	No of classes
March 2024 (02.03.2024)	**CEMADSE04T**	**Principles of Green Chemistry and Designing a Chemical synthesis: Designing a Green Synthesis, Green solvent**	**8**
	CEMADSE04P	**Alternative sources of energy: Photoreduction of benzophenone to benzopinacol in the presence of sunlight**	**4**
April 2024	**CEMADSE04T**	**Principles of Green Chemistry and Designing a Chemical synthesis: Energy requirements of reactions, Selection of starting materials**	**8**

	CEMADSE04P	**Alternative Green solvents: Mechanochemical solvent free synthesis of azomethines Use of enzymes as catalysts: Benzoin condensation using thiamine hydrochloride as a catalyst instead of cyanide**	**8**
May 2024	**CEMADSE04T**	**Principles of Green Chemistry and Designing a Chemical synthesis: Use of catalytic reagents, Prevention of chemical accidents, Strengthening of analytical techniques**	**10**
	CEMADSE04P	**Using renewable resoures: Preparation of biodesel from vegetable/waste cooking oil**	**4**
1st Week of June 2024 03.06.2024		**Internal Examinations & Class for Slow Learners**	**11**
14.06.2024		**END SEMESTER EXAMINATION**	
Total Classes			**53**

Name of Teacher: Mr. AJAY TAMANG

Paper Allotted: CEMACOR14T, CEMACOR14P, CEMADSE06T, CEMADSE06P

Month	Paper	Topic	No of classes
March 2024 (02.03.2024)	**CEMACOR14T**	**Photochemistry: Lambert-Beer's law: Characteristics of electromagnetic radiation, Lambert-Beer's law and its limitations, physical significance of absorption coefficients; Laws of photochemistry, Stark-Einstein law of photochemical**	**5**
	CEMACOR14P	**Experiment 1: Determination of surface tension of a liquid using Stalagmometer. Experiment 3: Verification of Beer and Lambert's Law for KMnO4 and K2Cr2O7 solution**	**8**
April 2024	**CEMACOR14T**	**Photochemistry: Potential energy curves (diatomic molecules), Frank-Condon principle and vibrational structure of electronic spectra; Bond dissociation and principle of determination of dissociation energy (ground state); Decay of excited states by radiative and non-radiative paths; Pre-dissociation; Fluorescence and phosphorescence, Jablonskii diagram**	**8**
		Experiment 4: Study of kinetics of K2S2O8 + KI reaction, spectrophotometrically Experiment 5: Determination of pH of unknown buffer, spectrophotometrically	**14**
	CEMADSE06T	**Polymer Chemistry: Different schemes of classification of polymers, Polymer nomenclature, Molecular forces and chemical bonding in polymers, Texture of Polymers.**	**6**
May 2024	**CEMACOR14T**	**Photochemistry: Rate of Photochemical processes: Photochemical equilibrium and the differential rate of photochemical reactions, Photostationary state; HI**	**4**

		decomposition, H2-Br2 reaction, dimerisation of anthracene; photosensitised reactions, quenching; Role of photochemical reactions in biochemical processes, photostationary states, chemiluminescence	
	CEMADSE06T	**Polymer Chemistry: Relationships between functionality, extent of reaction and degree of polymerization. Bifunctional systems, Poly-functional systems.**	**6**
June 2024 03.06.2024		**Internal Examination& Class for Slow Learners**	**6**
June 2024	**CEMADSE06T**	**Polymer Chemistry: Mechanism and kinetics of step growth, radical chain growth, ionic chain (both cationic and anionic) and coordination polymerizations, Mechanism and kinetics of copolymerization, polymerization techniques.**	**8**
14.06.2024		**END SEMESTER EXAMINATION**	
Total Classes			**65**

NAME OF TEACHER: DR. SANDIP SAHA

PAPER ALLOTTED: CEMACOR13T, CEMACOR13P

Month	Paper	Topic	No of classes
March 2024 (02.03.2024)	**CEMACOR13P**	**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. Cation Radicals: Na+,K+, Ca2+, Sr2+, Ba2+, Al3+, Cr3+, Mn2+/Mn4+, Fe3+, Co2+/Co3+, Ni2+, Cu2+, Zn2+, Pb2+, Cd2+, Bi3+, Sn2+/Sn4+, As3+/As5+, Sb3+/5+, NH4+, Mg2+. Anion Radicals: F-, Cl-, Br-, BrO3-, I-, IO3-, SCN-, S2-, SO42-, NO3-, NO2-, PO43-, AsO43--, BO33-, CrO42- / Cr2O72-, Fe(CN)64-, Fe(CN)63-. Insoluble Materials: Al2O3(ig), Fe2O3(ig), Cr2O3(ig), SnO2, SrSO4, BaSO4, CaF2, PbSO4.**	**15**
April 2024	**CEMACOR13T**	**Biological nitrogen fixation, Photosynthesis: Photosystem-I and Photosystem-II. Toxic metal ions and their effects, chelation therapy (examples only), Pt and Au complexes as drugs (examples only), metal dependent diseases (examples only)**	**10**
	CEMACOR13P	**Anion Radicals: F-, Cl-, Br-, BrO3-, I-, IO3-, SCN-, S2-, SO42-, NO3-, NO2-, PO43-, AsO43--, BO33-, CrO42- / Cr2O72-, Fe(CN)64-, Fe(CN)63-.**	**15**
	Organometallic Chemistry	**Zeise‟s salt: Preparation, structure, evidences of synergic effect. Ferrocene: Preparation and reactions (acetylation, alkylation, metallation, Mannich Condensation).**	**5**
May 2024		**Reactions of organometallic complexes: substitution, oxidative addition, reductive elimination and insertion reactions**	**5**

	CEMACOR13T	**Insoluble Materials: Al_2O_3(ig), Fe_2O_3(ig), Cr_2O_3(ig), SnO_2, $SrSO_4$, $BaSO_4$, CaF_2, $PbSO_4$.**	**15**
June 2024 03.06.2024	**CEMACOR13T**	**Qualitative Analysis of Unknown Inorganic Samples**	**15**
		Internal Examination	
14.06.2024		**END SEMESTER EXAMINATION**	
Total Classes			**80**