Department of Chemistry, College of Basic Science and Humanities

Class: M. Sc.; 1st year (1st Semester)

Course Code: CHE – 4101 **Course Title: Physical Chemistry – I**

Name of the faculty: Dr (Mrs) N. Swain and Dr. S. Muni

Lesson Plan

Unit No	Name of the Chapter	Topic Title	No. of Lectures	Name of the Faculty
I	Classical Thermodynamics	Brief resume of concepts of laws of thermodynamics	3	Dr.(Mrs) N.Swain
		Entropy & free energy	4	
		Chemical potential and partial molar properties	3	
		Concept of fugacity	4	
		Non-ideal systems	2	
II	Statistical Thermodynamics-I	General introduction	2	Dr.(Mrs) N.Swain
		Concept of distribution, ensemble & ensemble averaging	5	
		Probability & thermodynamic probability	4	
		Partition function	5	
III	Statistical Thermodynamics-II	Calculation of thermodynamic properties in terms of partition functions	5	Dr. S. Muni
		Application of partition functions	4	
		Types of statistics	6	
IV	Surface Chemistry	Surface tension and applications	3	Dr. S. Muni
		Gibbs adsorption isotherm	3	
		Surface films on liquids	2	
	Micelles	Micellization and Emulsion	5	

Course Break Up

Unit – I **Chapter Name: Classical Thermodynamics**

Name of the faculty: Dr (Mrs) N. Swain

Lecture No.	Details of the topic to be covered
1.	Macroscopic properties, state functions and first law of thermodynamics
2.	Second law of thermodynamics in terms of efficiency of heat engine
3.	Second law of thermodynamics in terms of entropy change and Clausius inequality
4.	Entropy and variation of entropy with temperature, pressure and volume
5.	Entropy as a measure of disorder of a system, entropy and thermodynamic probability
6.	Free energy, work function and Gibbs-Helmholtz equation
7.	Maxwell's relationships
8.	Chemical potential, partial molar free energy, Gibbs-Duhem equation
9.	Partial molar volume, partial molar entropy, partial molar heat content and their significance
10.	Chemical potential in case of ideal gases
11.	Determination of partial molar quantities: method of intercept, direct method
12.	Concept of fugacity
13.	Determination of fugacity, graphical method
14.	General method and from equation of state
15.	Fugacity of a gas in a gaseous mixture, physical significance of fugacity
16.	Non-ideal systems

Unit-II **Chapter Name: Statistical Thermodynamics–I**

Name of the faculty: Dr(Mrs) N. Swain

Lecture No.	Details of the topic to be covered
1.	Classical thermodynamics and statistical l thermodynamics
2.	Terminology: phase space, unit cell, microstate and macrostate
3.	System, assembly and ensemble
4.	Microcanonical, canonical and grandcanonical ensembles
5.	Distribution, distribution number and combinatory rules
6.	Ensemble averaging
7.	Postulates of ensemble averaging
8.	Thermodynamic probability and most probable distribution
9.	Stirling's theorem
10.	Maxwell-Boltzmann distribution law of energy
11.	Lagrange's method of undermined multipliers
12.	Partition function and physical significance
13.	Partition functions for molecule with different types of energy
14.	Transnational partition function
15.	Rotational partition function
16.	Vibrational and electronic partition functions and Discussion

Unit-III **Chapter Name: Statistical Thermodynamics–II**

Name of the faculty: Dr. S. Muni

Lecture No.	Details of the topic to be covered
1.	Calculation of internal energy and entropy
2.	Calculation of work function, pressure and heat content
3.	Calculation of free energy, heat capacity
4.	Entropy and probability
5.	Boltzmann-Planck equation
6.	Molar partition function
7.	Equilibrium constant and partition function
8.	Heat capacity of solid
9.	Different physical situations and three types of statistics
10.	Most probable distribution and distribution law
11.	Maxwell-Boltzmann statistics
12.	Fermi-Dirac statistics
13.	Application of Fermi-Dirac statistics to metal
14.	Bose-Einstein statistics
15.	Application to Helium and Discussion

Unit-IV **Chapter Name: Surface Chemistry**

Name of the faculty: Dr. S. Muni

Lecture No.	Details of the topic to be covered
1.	Surface tension and capillary action.
2.	Pressure difference across curved surface
3.	Vapour pressure of droplets
4.	Discussion on Gibbs adsorption isotherm and derivation
5.	BET equation- Discussion and derivation
6.	Surface films on liquids
7.	Catalytic activity at surfaces
8.	Surface active agents, Classification

Unit-IV **Chapter Name: Micelles**

Name of the faculty: Mr. S. Muni

Lecture No.	Details of the topic to be covered
1.	Micell formation and hydrophobic interaction
2.	Formation of Critical micellar concentration
3.	Factors affecting it
4.	Thermodynamics of micellization
5.	Emulsion and microemulsion

Course Code: CHE – 4102 **Course Title: Inorganic Chemistry – I**

Name of the faculty: Dr. H. S. Sahoo, Dr.(Mrs) S. Jena and Mr. S. R. Panda

Lesson plan

Unit No	Name of the Chapter	Topic Title	No. of Lectures	Name of the Faculty
I	Geometry and Bonding of Main Group Compounds	VSEPR theory	5	Dr. H. S. Sahoo
		Application of VSEPR theory	4	
	Coordination Compounds – Bonding, Stereochemistry and Structure	Crystal field theory, crystal field diagram, ligand field theory,	4	Dr.(Mrs) S. Jena
		spectrochemical series, nephelauxetic series, structural distortion and lowering of symmetry, electronic, steric and Jahn-Teller effect on energy levels,	5	
		conformation of chelate ring, structural equilibrium, spectral and magnetic properties	4	
II	Molecular Orbital Theory of Metal Complexes	Molecular orbital theory	3	Dr. H. S. Sahoo
		Linear Combination of Atomic orbitals	6	
		Construction of MO for different geometries	6	
III	Reaction Mechanism of Transition Metal Complexes	Energy profile of a reaction, reactivity of metal complexes, inert and labile complexes, kinetic application of valence bond and crystal field theories,	2	Mr. S. R. Panda
		kinetics of octahedral substitution, acid hydrolysis, factors affecting acid hydrolysis	4	
		Base hydrolysis of octahedral complexes conjugate base mechanism, direct and indirect evidences in favour of conjugate mechanism,	3	
		anation reactions, reactions without metal ligand bond cleavage	1	
		substitution reactions in square planar complexes, the trans effect, mechanism of the substitution reaction,	2	
IV	Redox reactions	Electron transfer reactions, mechanism of one electron transfer reactions,	2	Mr. S. R. Panda
		outer sphere type reactions, cross reactions and Marcus-Hush theory, inner sphere type reactions, Application to metal complex reactions.	2	
	Metal – Ligand Equilibria in Solution	Metal-ligand complexes and stability	4	Dr.(Mrs) S. Jena
		Chelate effect	2	
		Determination of binary formation constants	2	

Course Break Up

Unit – I **Chapter Name: Geometry and Bonding of Main Group Compounds, Coordination Compounds –Bonding, Stereochemistry and Structure**

Name of the faculty: Dr. H. S. Sahoo

Lecture No.	Details of the topic to be covered
1.	Concept of VSEPR theory
2.	Electron domain and arrangement around an atom
3.	Geometry of AB_2, AB_3, AB_4 type molecules
4.	Geometry of AB_5 and AB_6 type molecules
5.	Examples of different geometric molecules
6.	Walsh diagrams: tri-atomic molecules and pent atomic molecules
7.	d_π–p_π bonding and Bent rule
8.	Energeticsof hybridization
9.	Simplereactions of covalently bonded molecules

Unit – I **Chapter Name: Coordination Compounds – Bonding, Stereochemistry and Structure**

Name of the faculty: Dr.(Mrs) S. Jena

Lecture No.	Details of the topic to be covered
1.	Crystal field theory
2.	crystal field diagram
3.	ligand field theory
4.	spectrochemical series
5.	spectrochemical series,high spin and low spin complexes
6.	nephelauxetic series
7.	structural distortion and lowering of symmetry
8.	electronic, steric and Jahn-Teller effect on energy levels
9.	Calculation of CFSE in HS and LS complexes
10.	Calculation of Jahn=Teller stabilization energy
11.	conformation of chelate ring
12.	structural equilibrium, spectral properties
13.	magnetic properties

Unit – II **Chapter Name: Molecular Orbital Theory of Metal Complexes**

Name of the faculty: Dr. H. S. Sahoo

Lecture No.	Details of the topic to be covered
1.	Limitations of crystal field theory and introduction to molecular orbital theory
2.	Shape of different atomic orbitals and their group theoretical representation
3.	Symmetry consideration of different geometries
4.	Linear combination of atomic orbitals
5.	Modes of overlap of atomic orbitals
6.	Hybrid orbitals as LCAOs
7.	Integrals and normalization constants
8.	Symmetry of molecular orbital
9.	Reduction formula and irreducible representations
10.	Ligand group orbitals and formation of MO
11.	Construction of MO energy level diagrams, HUMO and LUMO in σ- bonding in tetrahedral complexes
12.	σ- bonding in octahedral complexes
13.	σ- bonding in square planar complexes
14.	π- bonding in tetrahedral complexes
15.	π- bonding in octahedral and square planar complexes

Unit – III Chapter Name: Reaction Mechanism of Transition Metal Complexes

Name of the faculty: Mr. S. R. Panda

Lecture No.	Details of the topic to be covered
1.	Energy profile diagram for nucleophillic substitution reaction,types of intermediate formed during the reaction. Lability& inert ness of complexes
2.	InterpretationLability& inert ness ofcomplexes by VBT & CFT. CFAE of SN1 & SN2 reaction
3.	kinetics of octahedral substitution, acid hydrolysis of octahedral complexes. mechanism of acid hydrolysis when no inert ligand in the complex is a pi donor or a pi acceptor.
4.	Stereochemistry and stability of different intermediates Facters affecting the path way of aquation.
5.	mechanism of acid hydrolysis when inert ligand in the complex is a pi donor
6.	mechanism of acid hydrolysis when no inert ligand in the complex is a pi acceptor
7.	Base hydrolysis of octahedral complexes –mechanism SN1, SN1CB mechanism
8.	Evidences of in favour of the reaction mechanism
9.	Stereochemistry of hydrolysis square pyramidal, trigonalbipyramidal intermediate
10.	anation reactions, reactions without metal ligand bond cleavage mechanism and examples
11.	Substitution reactions in square planar complexes, SN1 SN2 mechanism and its stereo chemistry.
12.	the trans effect, theories to explain it and applications.mechanism of the substitution reaction,

Unit – IV Chapter Name: Redox reactions

Name of the faculty: Mr. S. R. Panda

Lecture No.	Details of the topic to be covered
1.	Oxidation reduction reaction types.Through atom or group transfer, mechanism and example
2.	Oxidation reduction reaction through one and multiple electron transfer reaction mechanism.
3.	Outer sphere and inner sphere transfer mechanism and its charecteristics and examples
4.	Marcus-Hush theory and its Application to metal complex reactions.

Unit – IV Chapter Name: Metal – Ligand Equilibria in Solution

Name of the faculty: Dr.(Mrs) S. Jena

Lecture No.	Details of the topic to be covered
1.	Metal ligand complex and its stability
2.	Stepwise and overall formation constants and their interaction
3.	Trends in stepwise constants
4.	Factors affecting the stability of metal complexes with reference to the nature of metal ion
5.	Factors affecting the stability of metal complexes with reference to the nature of ligand,
6.	Chelate effect and its thermodynamic origin,
7.	Determination of binary formation constants by pH metry
8.	Determination of binary formation constants by spectrophotometric methods

Course Code: CHE – 4103 Course Title: Organic Chemistry – I

Name of the faculty: Dr. P. K. Jena, Dr. H. Nayak and Dr. B. P. Acharya

Lesson plan

Unit No	Name of the Chapter	Topic Title	No. of Lectures	Name of the Faculty
I	Nature of Bonding in Organic Molecules	Electronic effects in Organic molecules	3	Dr. P. K. Jena
		Concept of aromaticity	4	
		Weak bonds and Vanderwaal's molecules	4	
II	Stereochemistry	Conformation and conformational analysis of cyclic systems	7	Dr. H. Nayak
		Molecules with Chiral centres and concept of Topicity	5	
		Optical activity due to chiral axis, Atropisomerism	2	
		stereochemistry of the compounds containing nitrogen, sulphur and phosphorus	1	
III	Reaction Mechanism: Structure and Reactivity	Basic reaction and mechanism	4	Dr. P. K. Jena
		Methods of determining mechanisms	5	
		Reaction intermediates	4	
IV	Aliphatic Nucleophilic Substitution	Types of reaction mechanism	5	Dr. B. P. Acharya
		Substitution at different system	4	
		Reactivity effect	3	
	Aromatic Nucleophilic Substitution	Types of reaction mechanism	3	
		Name reaction	2	

Course Break Up

Unit – I Chapter Name: Nature of Bonding in Organic Molecules

Name of the faculty: Dr. P. K. Jena

Lecture No.	Details of the topic to be covered
1	Localised and Delocalized chemical bond.
2	Conjugation, cross conjugation, resonance
3	Hyperconjugation, tautomerism;
4	Benzenoid aromatics
5	Non-Benzenoid aromatics, annulenes,
6	Alternant and nonalternant hydrocarbons, Huckel's rule, energy level of π-molecular orbitals,
7	Anti aromaticity, homo aromaticity
8	Concept of weaker bonds
9	Crown ether complexes and cryptands,
10	inclusion compounds, cyclodextrins
11	Catenanes and rotaxanes.

Unit – II Chapter Name: Stereochemistry

Name of the faculty: Dr. H. Nayak

Lecture No.	Details of the topic to be covered
1	Conformation and Conformational analysis
2	Conformational analysis of cycloalkanes of 3,4, and 5 membered rings
3	Conformational analysis of cyclohexane
4	Conformational analysis of cyclohexane
5	Conformational analysis of Decalin
6	Conformation and reactivity in cyclohexane system
7	Conformation of sugars, Elements of symmetry
8	Chirality ,molecules with more than one chiral center
9	Threo and erythro isomers, methods of resolution, optical purity

10	Enantiotopic atoms, groups and faces,
11	Diastereotopic atoms, groups and faces,
12	Stereospecific and stereoselective synthesis, asymmetric synthesis
13	Optical activity in the absence of chiral carbon,Allenes and spiranes
14	Optical activity in the absence of chiral carbon,biphenyls
15	Stereochemistry of the compounds containing nitrogen, sulphur and phosphorus

Unit – III Chapter Name: Reaction Mechanism: Structure and Reactivity

Name of the faculty: Dr. P. K. Jena

Lecture No.	Details of the topic to be covered
1	Types of mechanisms, types of reactions
2	thermodynamic and kinetic requirements
3	kinetic and thermodynamic control
4	Hammond's postulate, Potential energy diagrams,
5	transition states and intermediates,
6	Methods of determining mechanisms-product identification,
7	Methods of determining mechanisms- presence of intermediate,
8	Methods of determining mechanisms-isotope labeling,
9	Methods of determining mechanisms-crossover product;
10	study on carbocations - generation, structure, stability and reactivity
11	Carbanions - - generation, structure, stability and reactivity,
12	free radicals- carbenes: generation, structure, stability and reactivity
13	nitrenes – - generation, structure, stability and reactivity

Unit – IV Chapter Name: Reaction Mechanism: Aliphatic Nucleophilic Substitution

Name of the faculty: Dr. B. P. Acharya

Lecture No.	Details of the topic to be covered
1.	Aliphatic Nucleophilic Substitution: The S_N2 mechanism
2.	S_N1 mechanism
3.	mixed S_N1 and S_N2 and SET mechanism.
4.	The S_Ni mechanism, The neighbouring group mechanism,
5.	neighbouring group participation by π and σ bonds
6.	anchimeric assistance; Classical and nonclassical carbocation,
7.	phenonium ions, norbornyl system,
8.	common carbocation rearrangements, Nucleophilic substitution at an allylic carbon
9.	Nucleophilic substitution at aliphatic trigonal and a vinylic carbon.
10.	Reactivity effects of substrate structure, attacking nucleophile,
11.	Reactivity effects of leaving group and reaction medium,
12.	ambident nucleophile, regioselectivity

Unit – IV Chapter Name: Reaction Mechanism: Aromatic Nucleophilic Substitution

Name of the faculty: Dr. Baman P. Acharya

Lecture No.	Details of the topic to be covered
1.	S_NAr, S_N1 mechanism
2.	benzyne and $S_{RN}1$ mechanisms,
3.	reactivity – effect of substrate structure, leaving group and attacking nucleophile,
4.	Von Richter Reactions
5.	Sommelet–Hauser and Smiles rearrangements.

Course Code: CHE – 4104 Course Title: Spectroscopy– I

Name of the faculty:Dr.(Mrs) S. Jena, Dr. H. S. Sahoo and Mr. S. R. Panda

Lesson plan

Unit No	Name of the Chapter	Topic Title	No. of Lectures	Name of the Faculty
I	Group Theory	Basic idea about group theory	2	Mr.S. R. Panda
		Types of symmetry elements:	4	
		Determination of point group	3	
		reducible and irreducible representationthe great Orthogonality theorem	4	
		character tablesymmetry aspects of Molecular orbitals.	3	
II	Unifying Principles	Electromagnetic radiation, interaction of electromagnetic radiation with matter, Uncertainty relation	4	Dr.(Mrs) S. Jena
		transition probability, transition moment, Selection rules, Born – Oppenheimer approximation	3	
	Infrared and Raman Spectroscopy	Molecular vibrations, , Molecular vibrations and absorption of Infrared radiations Raman Spectroscopy, Use of symmetry considerations to determine the no. of lines in IR and Raman Spectra	6	
		Spectra of gases, applications of Raman and Infrared spectroscopy. Selection rule in Inorganic structure determinations	5	
III	Atomic Spectroscopy	Energies of atomic orbitals	2	Dr.(Mrs) S. Jena
		Vector representation of momenta and vector coupling	3	
		spectra of hydrogen atom and alkali metal atoms	3	
	Molecular Spectroscopy	Energy levels,vibronic transitions,	4	
		Franck – Condon principle	1	
		electronic spectra of polyatomic molecules.	3	
IV	Microwave spectroscopy	Concept of microwave spectroscopy	3	Dr. S. Muni
		Interactions and applications of microwave spectroscopy	3	
	Photoelectron & Photo acoustic Spectroscopy	Concepts of photoelectron and photoacoustic spectroscopy	3	
		Koopman'stheorm,ESCA and AES	3	

Course Break Up

Unit – I Chapter Name: Group Theory

Name of the faculty: Mr. S. R.Panda

Lecture No.	Details of the topic to be covered
1.	Introduction & Basic idea about group theory
2.	Concept of symmetry ,Symmetry operation, symmetry elements
3.	inversion center (i), Identity element(E) examples
4.	Axis of symmetry and its types, its examples
5.	Plane of symmetry and its types , its examples
6.	Improper axis of symmetry ,its examples, , Products of operation
7.	Laws of a group and example: symmetry elements forms a group
8.	classification of Molecules into point group ;Flow chart for point group determination
9.	Determination of point group for simple molecules
10.	Matrix representation of symmetry elements axis of symmetry & plane of symmetry
11.	Matrix representation of symmetry elements axis of remaining symmetry elements
12.	reducible and irreducible representation of a representation
13.	the great Orthogonality theorem and its corollary
14.	Rule for deduction of character table
15.	Deduction of Character table of C_{2v} point group
16.	Deduction of Character table of C_{3v} point group,symmetry aspects of Molecular orbitals.

Unit – II Chapter Name: Unifying Principles

Name of the faculty: Dr.(Mrs) S. Jena

Lecture No.	Details of the topic to be covered
1.	Electromagnetic radiation and types
2.	interaction of electromagnetic radiation with matter
3.	Uncertainty relation and natural line width and natural line broadening
4.	transition probability, transition moment, Selection rules,
5.	intensity of spectral lines
6.	Born – Oppenheimer approximation,
7.	rotational, Vibrational and electronic energy levels

Unit – II Chapter Name: Infrared Spectroscopy and Raman Spectroscopy

Name of the faculty: Dr.(Mrs) S. Jena

Lecture No.	Details of the topic to be covered
1.	Molecular vibrations, force constants
2.	Molecular vibrations and absorption of Infrared radiations Raman Spectroscopy
3.	Use of symmetry considerations to determine the no. of lines in IR Spectra
4.	Raman Spectroscopy
5.	polarized Raman lines
6.	Use of symmetry considerations to determine the no. of lines Raman Spectra
7.	Spectra of gases
8.	applications of Infrared spectroscopy
9.	applications of Raman spectroscopy
10.	Selection rule in Inorganic structure determinations
11.	Hydrogen bonding and infrared spectra

Unit – III Chapter Name: Atomic Spectroscopy

Name of the faculty: Dr.(Mrs) S. Jena

Lecture No.	Details of the topic to be covered
1.	Energies of atomic orbitals
2.	Principles and rules for filling up atomic orbitals,
3.	Vector representation of momenta and vector coupling
4.	Term symbol
5.	LS coupling
6.	spectra of hydrogen atom
7.	spectra of alkali metal atoms(Li)
8.	spectra of alkali metal atoms(Na)

Unit – III Chapter Name:Molecular spectroscopy

Name of the faculty: Dr.(Mrs) S. Jena

Lecture No.	Details of the topic to be covered
1.	Energy levels, molecular orbitals
2.	vibronic transitions
3.	vibrational progressions
4.	geometry of the excited states
5.	Franck – Condon principle
6.	electronic spectra of polyatomic molecules
7.	Emission spectra.
8.	Charge transfer spectra.

Unit – IV Chapter Name: Microwave Spectroscopy

Name of the faculty: Dr. S. Muni

Lecture No.	Details of the topic to be covered
1.	Basic concept, rotation spectra of simple inorganic compounds
2.	Classification of molecules, rigid rotor model,
3.	Effectof isotopic substitution on transition frequencies & intensities non rigid rotor
4.	Starkeffect nuclear and electron spin interaction
5.	Applications of Micro wave Spectroscopy
6.	Applications of Micro wave Spectroscopy

Unit – IV Chapter Name: Photoelectron Spectroscopy & Photo acoustic Spectroscopy

Name of the faculty: Dr. S. Muni

Lecture No.	Details of the topic to be covered
1.	Introduction to photoacoustic Spectroscopy
2.	Instrumentation of photoacoustic Spectroscopy
3.	Introduction to photo electron Spectroscopy
4.	Instrumentation of photoelectron Spectroscopy
5.	Koopman'stheorm and ESCA
6.	Auger electron Spectroscopy

Course Code: CHE – 4105 Course Title: Nuclear & Photochemistry

Name of the faculty: Dr(Mrs) N. Swain, Mr. S. R. Panda, Dr. S. Muni and Dr. H. Nayak

Lesson plan

Unit No	Name of the Chapter	Topic Title	No. of Lectures	Name of the Faculty
I	Radioactive Decay Processes	Radioactive decay and Nuclear reactions	4	Dr. S. Muni
		Chemical effect of nuclear transformation-Fission and Fusion	2	
	Nuclear Energy	Nuclear reactors and Reactor safety	2	
		Nuclear waste	1	
II	Photochemistry of Transition Metal Complexes	Photochemistry of Transition Metal Complexes	4	Mr. S. R. Panda
		Photo-substitution and photoredox reactions of Co(III), Ru(II) and Rh(I) complexes	4	
		Applications of quenching and sensitization techniques	4	
III	Photochemical Reactions	General introduction	2	Dr. (Mrs) N. Swain
		Quantum yield and types of excitation	6	
	Determination of Reaction Mechanism	Determination of reaction mechanism	7	
IV	Photochemistry of Alkenes	Alkene geometrical isomerism,Cyclisation and Dimerisation	4	Dr.H. Nayak
	Photochemistry of Carbonyl Compounds	Saturated cyclic and acyclic carbonyls	6	
	Photochemistry of aromatic compounds	Isomerisation,	1	
		addition and substitution	1	

Course Break Up

Unit – I Chapter Name: Radioactive Decay Processes

Name of the faculty: Dr. S. Muni

Lecture No.	Details of the topic to be covered
1.	Different types of radioactive decay and equilibrium
2.	Types of nuclear reactions
3.	Discussion on Q value and related problem
4.	Cross types
5.	Different types of fission products, Fission yield
6.	Types of reactors

Unit – I Chapter Name: Nuclear energy

Name of the faculty: Dr. S. Muni

Lecture No.	Details of the topic to be covered
1.	Reactor safety
2.	Fuel cycle
3.	Nuclear waste

Unit – II Chapter Name: Photochemistry of Transition Metal Complexes

Name of the faculty: Mr. S. R. Panda

Lecture No.	Details of the topic to be covered
1.	Introduction to photochemistry, types of photochemistry reaction.
2.	Photoreactions of complexes of Cr(III) and example
3.	photo-aquation reactions of chromium complexes
4.	Stereochemistry of photo- aquation reaction in chromium complexes
5.	photo-substitution and photo-racemization of chromium complexes

6.	Photo-substitution and photoredox reactions of Co(III) complexes;
7.	photoredox reactions of Co(III) complexes and mechanism
8.	Ru(II) polypyridylcomplexes as sensitizers
9.	dinuclear Rh(I) isocyanide complexes as sensitizers
10.	supramolecular complexes as antenna examples and it uses
11.	Applications of quenchingtechniques in the identification of reactive state in coordination complexes
12.	Applications of sensitization techniques in the identification of reactive state in coordination complexes

Unit – III Chapter Name: Photochemical Reactions

Name of the faculty: Dr. (Mrs) N. Swain

Lecture No.	Details of the topic to be covered
1.	Interaction of electromagnetic radiation with matter
2.	Photochemical reactions and photophysical processes
3.	Laws of photochemistry: Grotthus-Draper law, Stark-Einstein law
4.	Quantum yield
5.	Actinometry
6.	General principles of excitation
7.	Jablonski diagram
8.	Transfer of excitation energy

Unit – III Chapter Name: Determination of Reaction Mechanism

Name of the faculty: Dr. (Mrs) N. Swain

Lecture No.	Details of the topic to be covered
1.	Effect of light intensity on the rate of photochemical reactions
2.	Determination of rate constant of Hydrogen-Bromine reactions
3.	Determination of rate constant of Hydrogen-Chlorine reactions
4.	Photo-dissociation
5.	Gas-phase photolysis
6.	Rate constants and life times of reactive energy states
7.	Rate constants and life times of reactive energy states (continued)

Unit – IV Chapter Name: Photochemistry of Alkenes

Name of the faculty: Dr. H. Nayak

Lecture No.	Details of the topic to be covered
1	Photochemical principles,Intramolecular reactions of the olefinic bond- geometrical isomerism
2	cyclisation and dimerisation reactions
3	rearrangement of 1, 4- dienes.
4	rearrangement of 1, 5-dienes.

Unit – IV Chapter Name: Photochemistry of Carbonyl Compounds

Name of the faculty: Dr. H. Nayak

Lecture No.	Details of the topic to be covered
1	Intramolecular reactions of carbonyl compounds,Norish-I
2	Intramolecular reactions of carbonyl compounds,Norish-II
3	Photochemistry of acyclicβ,γ-unsaturated and α,β-unsaturated compounds,
4	Photochemistry of cyclohexadienones
5	Intermolecular cycloaddition reactions – dimerisations and oxetane formation.
6	Problemsolving and discussion

Unit – IV Chapter Name: Photochemistry of aromatic compounds

Name of the faculty: Dr. H. Nayak

Lecture No.	Details of the topic to be covered
1	Isomerisations
2	Photoadditions and substitutions