TEACHING PLAN (SYNOPSIS)

Month : August Subject : Chemistry

TOPIC : Inorganic Chemistry Paper : I

Hours Required	24
Learning Objectives	To know about the P-block elements
Previous Knowledge to be reminded	Telugu acadamy, Vivek
Topic Synopsis	P- block elements

Unit - I

1. P- block elements

(I) Structure and synthesis of diborane

(II) Structure and synthesis of Higher boranes

(III) Boran nitrogen compounds

(IV) Preparation of Silanes and applications

(V) Preparation and applications of Silicones

(VI) Preparation and reactions of Hydratine & Hydroxyl amine

Unit - II

1. P- block elements

(1) classification of oxides based on chemical behaviour and oxygen content

(2) Inter halogen compounds & Pseudo halogens

2. Organo Metallic Chemistry

(A) Definition, nomanclature, classification o.m.c

(B) Properties, Preparation & applications of alkyls of Li & Mg

Thrust areas	—
Skill to be learnt by Student	They know about P-block elements
Examples/Illustrations	which related to text-book examples
Additional Inputs	Some properties of elements

Teaching Models used	Lecture Method
Teaching Aids used	Black board
References cited	Telugu Academy
Student Activity planned after the teaching	Assignments
Activity planned outside classes	—
Any other	—

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TEACHING PLAN (SYNOPSIS)

Month : August Subject : Chemistry

TOPIC : Inorganic chemistry Paper : 3

Hours Required	24
Learning Objectives	To know about d-block elements
Previous Knowledge to be reminded	Telugu academy, Vivek
Topic Synopsis	Chemistry of d-block elements

Unit-I

1. Chemistry of d-block elements

(1) Characteristics of d-block elements with special refrence to electronic configuration, Vorible valence

(2) magnetic properties, Catalytic properties and complexes

(3) Stability of various oxidation states

2. Theories of bonding in metals.

(1) Valency bond Theory, free electron theory

(2) Thermal and electrical conductivity of metals

(3) Band theory, Conductors, Semiconductors

Unit-II

1. metal Carbonyls

(1) EAN rule, classification of metal carbonyls

(2) Shapes of metal carbonyls of V, Cr, Mn, Fe, Co and Ni

2. Chemistry of f-block elements

(1) Chemistry of Lanthanides, Lanthanide Contraction

(2) Chemistry of Actinides.

(3) Separation of Lanthanides & Actinides

Thrust areas	Theories of bonding in metals
Skill to be learnt by Student	They know about f-block & d-block elements
Examples/Illustrations	which related to text book examples
Additional Inputs	Valency, shell electron pair repulsion theory

Teaching Models used	Lecture method
Teaching Aids used	Black board
References cited	Telugu Academy, Vogel's Text book
Student Activity planned after the teaching	Assignment
Activity planned outside classes	–
Any other	–

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J. B. D.

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TEACHING PLAN (SYNOPSIS)

Month : August Subject : Chemistry

TOPIC : Inorganic, Organic, Physical Chem. Paper : V

Hours Required	24
Learning Objectives	To know about Coordination chemistry,
Previous Knowledge to be reminded	Telugu Academy, Vivek text book
Topic Synopsis	Co-ordination chemistry & Spectral & magnetic Prop.

Unit-I - Co-ordination chemistry

(1) Werner's theory & sidwick's concept of Co-ordination
(2) Valency, bond theory, Crystal-field theory
(3) Splitting of d-orbitals in octahedrals, tetrahedral, and square planar Complexes
(4) Low spin and high spin complexes, factors effecting Crystal field splitting energy.
(5) Iso merism of Co-ordination compounds.

Unit-II

1 Spectral & magnetic Properties of metal Complexes
(1) Types of magnetic behaviour, Spin only formula
(2) Experimental determination of magnetic Susceptibility - Gouy method.
2 Stability of metal Complexes
(1) Thermodynamic stability and kinetic Stability
(2) Chelate effect
(3) Determination of Composition of Complexes by Jobs method and mole ratio method.

Thrust areas	Crystal-field-theory, factors effecting CFSE
Skill to be learnt by Student	They know about Co-ordination chemistry
Examples/Illustrations	Which related to text books
Additional Inputs	Isomerism of Organic Compounds

Teaching Models used	Lecture method
Teaching Aids used	Black board
References cited	Telugu Academy; C.C by Gopalan & Ramalingam
Student Activity planned after the teaching	Assignments
Activity planned outside classes	—
Any other	—

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J.B Rao

Lecturer

TEACHING PLAN (SYNOPSIS)

Month : August Subject : Chemistry

TOPIC : Inorganic, Organic & physical paper : VI

Hours Required	2Hr
Learning Objectives	To know about Heterocyclic Compounds
Previous Knowledge to be reminded	Telugu Academy, Vivek
Topic Synopsis	Reactivity of metal complexes & Heterocyclic Compounds

Unit-I

1. Reactivity of metal complexes
   (1) Labile and inert Complexes, ligand substitution reactions.
   (2) SN^1 and SN^2 substitution reactions of square planar complexes
   (3) Trans effect and applications of trans effect
2. Bioinorganic chemistry
   (1) Essential Elements, biological significance of Na, K, Mg, Ca, Fe, Co, Ni, Cu, Zn, and Cl
   (2) metalloporphyrins

Unit-II - Heterocyclic Compounds

(1) Simple five membered ring compounds with one hetero atom Ex Furan, Thiophene, and Pyrrole
(2) Preparation of 1,4-dicarbonyl Compounds, Paul-knorr Synthesis
(3) Acid character of Pyrrole - electrophilic substitution at 2 and 5th position
(4) Pyridine - Structure - Basicity - Aromaticity - Comparation with pyrrole.

Thrust areas	Trans effect and applications of trans effect
Skill to be learnt by Student	They know about Heterocyclic Compounds
Examples/Illustrations	which related to text book.
Additional Inputs	SN^1 and SN^2 for Halogen compounds

Teaching Models used	Lecture method
Teaching Aids used	Black board
References cited	Telugu Academy
Student Activity planned after the teaching	Assignments
Activity planned outside classes	–
Any other	–

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Lecturer

TEACHING PLAN (SYNOPSIS)

Month : September Subject : Chemistry

TOPIC : Organic Chemistry Paper : I

Hours Required	22
Learning Objectives	To know about Structural theory of O C
Previous Knowledge to be reminded	Telugu Academy, Kalyani Series, Uvele
Topic Synopsis	O C - Structural theory of O Chemistry

Unit-III

1 Structural Theory of Organic Chemistry

- Types of bond - Ionic and organic reagents
- Electrophilic, Nucleophic, free radical reagents
- Bond Polarisation, Inductive effect
- Applications of Inductive effect
  (a) Basicity of Amines, (b) Acidity of acids (c)
- free radicals, alkanes, carbanions, carbenes, nitrenes
- Types of O C reactions - with examples

Unit-IV

1 Hydrocarbons

- Alkenes, Preparation, Properties
- Dienes

2 Alkynes Preparation, Properties

3 Cycloalkanes - Baeyer Strain, Preparation, Properties

Unit-V

4 Benzene and its reactivity

- Concept of resonance, resonance energy, concept of aromaticity, Friedel Craft's alkylation & Arylation
- Orientations of various groups

Thrust areas	Aromaticity
Skill to be learnt by Student	They know about Benzene reactivity
Examples/Illustrations	which related to Textbook
Additional Inputs	- Addition, substitution reactions

Teaching Models used	Lecture method
Teaching Aids used	Black Board
References cited	Telugu-Academy, Kalyani
Student Activity planned after the teaching	Assignments, Projects
Activity planned outside classes	—
Any other	—

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Lecturer

TEACHING PLAN (SYNOPSIS)

Month : September Subject : Chemistry

TOPIC : Paper : III

Hours Required	22
Learning Objectives	To know about Halogen Compounds & Hydroxy Compounds
Previous Knowledge to be reminded	Telugu Academy.
Topic Synopsis	Halogen, Hydroxy, carbonyl compounds

Unit-III.

5. Halogen Compounds

→ * Nomenclature classification of alkyl, aryl, allyl, vinyl Halides

→ * SN^1, SN^2 reactions with examples

6. Hydroxy Compounds

→ * Nomenclature and classification of Hydroxy Compounds

→ * Alcohols & Phenol Preparation, Chemical properties

Unit-IV

7. Carbonyl Compounds

→ * Nomenclature of aliphatic, aromatic Carbonyl Compounds

→ * Named reactions

Unit-V

8. Carboxylic acids and derivatives

→ * Nomenclature, classification and structure of acids

9. Active methylene Compounds

→ * Acetoacetic ester, * malonic ester.

Thrust areas	Named reactions
Skill to be learnt by Student	They know about carbonyl compounds
Examples/Illustrations	which related to text book
Additional Inputs	Hydroxy Compounds

Teaching Models used	Lecture method
Teaching Aids used	Black Board
References cited	Telugu Academy, Kalyani
Student Activity planned after the teaching	Assignments, Projects
Activity planned outside classes	—
Any other	—

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TEACHING PLAN (SYNOPSIS)

Month: September Subject: Chemistry

TOPIC: Inorganic, Organic, physical Paper V

Hours Required	22
Learning Objectives	They know about Nitro hydrocarbons
Previous Knowledge to be reminded	Telugu Academy, Vivek, Kalyani
Topic Synopsis	Nitrogen Compounds, Thermodynamics

Unit – III :

4 Nitro Hydrocarbons

* Nomenclature and classification, nitro carbons

Unit – IV

5 Nitrogen Compounds

* Amines Preparation, classification, separation
* Aromatic Amines Preparation. Diazotisation
* Electrophilic substitution of Aromatic Amines

Unit – V

6 Thermodynamics

* The first law of Tds
* Joule-Thomson effect
* Reversible & Irreversible reactions
* Kirchoff's Equation
* Second law of Tds
* Concept of Entropy
* Carnot's Cycle – Engine

Focus areas	Carnot's cycle
Skill to be learnt by Student	They know about Thermodynamics
Examples/Illustrations	Which related to text book
Additional Inputs	First law of Tds

Teaching Models used	Lecture method
Teaching Aids used	Black Board
References cited	Telugu-Academy, Kalyani
Student Activity planned after the teaching	Projects
Activity planned outside classes	-
Any other	-

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TEACHING PLAN (SYNOPSIS)

Month : September Subject : Chemistry

TOPIC : Inorganic, Physical, Organic Paper : VI

Hours Required	22
Learning Objectives	They know about Aminoacids
Previous Knowledge to be reminded	Telugu-Academy, Vivek, kalyani
Topic Synopsis	Chemical kinetics, Photo chemistry

Unit - II

3. Chemical kinetics:-

* Rate of reaction, Definition of order and molecularity
* 1st, 2nd, 3rd, Zero order reactions.
* Arhenious equation, concept of activation energy.

4. Photo chemistry

* Diffences blw Thermal & photochemical Process
* Laws of Photo chemistry
* Quantum yield
* fluorescence, Phosphorescence Photosensitized reacts

Unit - IV.

6. carbohydrates

* Glucose - Structure, Pyranose Structures
* Fructose - Structure
* Osazones - formation

Unit - V

7. Amino acids & Proteins

* classification, Natural and essential amino acids, Zwitter ion structure, chemical Property

Thrust areas	Amino acids Preparation
Skill to be learnt by Student	They Learn about physical chemistry
Examples/Illustrations	Phosphorescence, Chemiluminescence
Additional Inputs	1st, 2nd, 3rd order reactions

Teaching Models used	Lecture method
Teaching Aids used	Black Board
References cited	Telugu Academy, physical chem
Student Activity planned after the teaching	Projects
Activity planned outside classes	—
Any other	—

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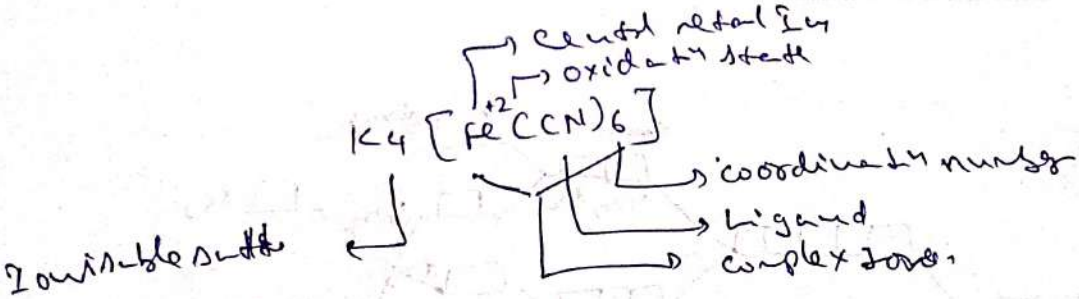
TEACHING PLAN (SYNOPSIS)

Month : From 20th October-2021 Subject : Chemistry

TOPIC : UNIT-I : Complex compounds. Paper : V, III SEM

Hours Required	08
Learning Objectives	1. Students understands the theory of complex compounds, 2. Students explains the CFSE, ligands.
Previous Knowledge to be reminded	single salts, double salts, Inorganic compounds,
Topic Synopsis	Werner's theory, Sidgwick's theory, VBT, CFT, Isomerism

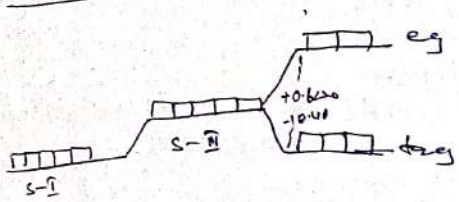
→ IUPAC Nomenclature
→ Werner's theory → limitations
→ Sidgwick's theory → limitations
→ Valence bond theory - limitations
→ Crystal field theory → Application to octahedral, tetrahedral and square planar
→ Crystal field splitting energy.
→ Factors affecting crystal field splitting energy.
→ Merits and demerits of CFT
→ Isomerism in coordination compounds.
→ Structural isomerism
→ Stereo isomerism.



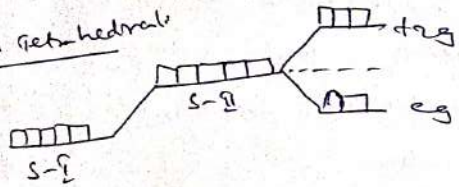
Thrust areas	EAN effect, V.B.T, C.F.T, optical Isomerism.
Skill to be learnt by Student	CFSE, Calculation of oxidation number.
Examples/Illustrations	Complex compounds, ligands,
Additional Inputs	principle of Jahn teller effect

Teaching Models used	Octahedral, tetrahedral models.
Teaching Aids used	Black board, chart.
References cited	J.D. Lee, M.M.Q.
Student Activity planned after the teaching	Assignment.
Activity planned outside classes	Student seminar
Any other	

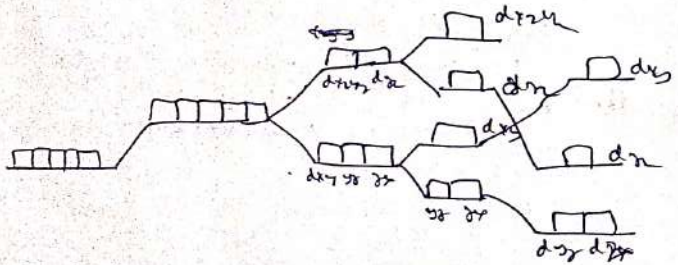
C.F.T.T → Octahedral.



C.F.T.T → Tetrahedral.



C.F.T.T → Square planar:



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TEACHING PLAN (SYNOPSIS)

Month : Oct 2021 (two lots) Subject : Chemistry

TOPIC : Heterocyclic compounds Paper : VI III Sem

Hours Required	7 h
Learning Objectives	Knowledge about the preparation methods, understanding the properties, Aromatic nature.
Previous Knowledge to be reminded	Classification of hydrocarbons, Aromatic nature of benzene.
Topic Synopsis	Preparations, properties, Aromatic nature.

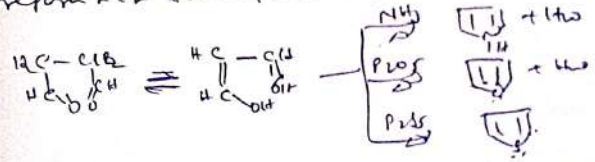
The most common heterocycles are those having five or six membered rings and containing heteroatoms of (N), (O), or (S).

The best known of the simple heterocyclic compounds are pyridine, pyrrole, furan and thiophene.

→ classification of Heterocyclic compounds

→ five membered, six membered & condensed

preparation of Heterocyclic compound:



→ physical and chemical properties of Heterocyclic compounds.

→ Aromaticity of Heterocyclic compounds.

→ Resonance structures of Heterocyclic compounds.

Synthesis and structure of pyridine:

→ Basic nature of pyridine

Thrust areas	Aromatic & Resonance structures of Heterocyclic compounds.
Skill to be learnt by Student	Resonance structures
Examples/Illustrations	Heterocyclic compounds.
Additional Inputs	Resonance structures of pyridine

Teaching Models used	
Teaching Aids used	black board, charts
References cited	
Student Activity planned after the teaching	Assignment, group discussion.
Activity planned outside classes	
Any other	

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TEACHING PLAN (SYNOPSIS)

Month : November - 21 Subject : Chemistry

TOPIC : 1. magnetic properties of metal complexes, 2. Stability of metal complexes. Paper : V, Ep 9

Hours Required	08
Learning Objectives	Knowledge : types of magnetic behaviour; understanding : factors affecting the stability of metal complexes
Previous Knowledge to be reminded	Types of magnets, chelates.
Topic Synopsis	Calculation of magnetic moment, Gouy method, Job's method.

→ magnetic properties:-
→ Types of magnetic behaviour.
→ 1) Diamagnetism 2) paramagnetism 3) ferro and anti ferro magnetism
→ calculation of magnetic moment (spin only formula)

$$\mu = \mu_L + \mu_S = \sqrt{L(L+1) + 4S(S+1)}\ BM.$$

magnetic susceptibility · $\mu_{spin\ only} = \sqrt{4S(S+1)}$ or $\sqrt{n(n+2)}$ BM.

→ Experimental determination of magnetic susceptibility.

$$\chi_M = \frac{\alpha + \Delta(\Delta w + \delta) \times M}{w}$$

→ Stability of metal complexes:
→ Kinetic stability
→ thermodynamic stability.
→ Chelate effect
→ Factors affecting the stability of chelates.
→ Factors affecting the stability of metal complexes.
1) Environmental factor.
2) concentration factor
3) Effect of central Ion
4) Effect of ligands
5) Role of solvent on pH.
→ Determination of the composition of a complex by Job's method.
→ mole ratio method

Thrust areas	Gouy's method, Job's method.
Skill to be learnt by Student	calculation of magnetic moment.
Examples/Illustrations	Types of magnetic materials, chelates.
Additional Inputs	Factors affecting the stability of chelates.

Teaching Models used	
Teaching Aids used	black board chart
References cited	J D Lee, MMT.
Student Activity planned after the teaching	Assignment.
Activity planned outside classes	
Any other	

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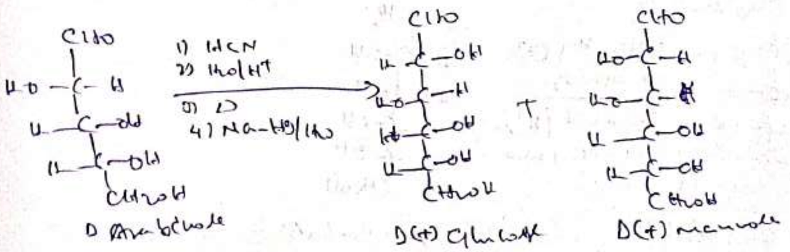
TEACHING PLAN (SYNOPSIS)

Month : November-21 Subject : chemistry

TOPIC : Carbohydrates. Paper : VI, III B.Sc.

Hours Required	8h
Learning Objectives	Knowledge → Def, classification; understanding synthesis; Application chemical property; skills conversion
Previous Knowledge to be reminded	Photosynthesis, glucose, sugars, light reaction
Topic Synopsis	Constitution of glucose, Osazone, Conversion.

→ Definition of carbohydrates
→ Classification of carbohydrates.
→ Synthesis of carbohydrates $6CO_2 + 6H_2O \xrightarrow[\text{Sunlight}]{\text{Chlorophyll}} C_6(H_2O)_6 + 6O_2$
→ Constitution of glucose.
→ open chain structure, configuration struct, cyclic structure
→ chemical properties of glucose.
→ Identification tests for glucose
→ mutarotation
→ formation of osazone
→ constitution of fructose
→ Interconversion carbohydrates.
→ ① conversion of D-Arabinose to D(+) glucose & D(+) mannose (Kiliani – Fischer method)

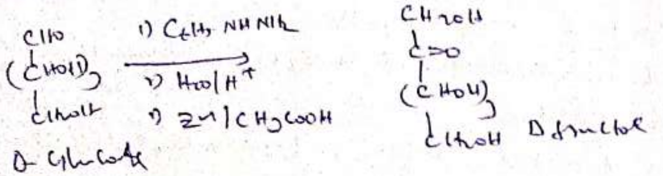


→ Epimers & Anomers

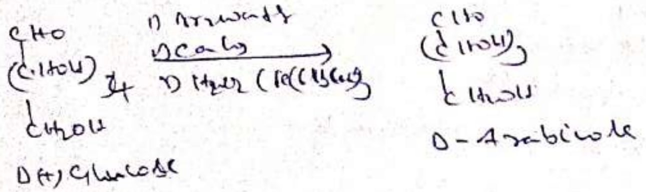
Thrust areas	Constitution of glucose, mutarotation, Interconversion.
Skill to be learnt by Student	mechanism & Inter conversion
Examples/Illustrations	carbohydrates.
Additional Inputs	Structure & Analysis cellulose, Starch.

Teaching Models used	Glucose, Sugars, fructose.
Teaching Aids used	chart.
References cited	
Student Activity planned after the teaching	Assignment, class seminar
Activity planned outside classes	Exe.
Any other	

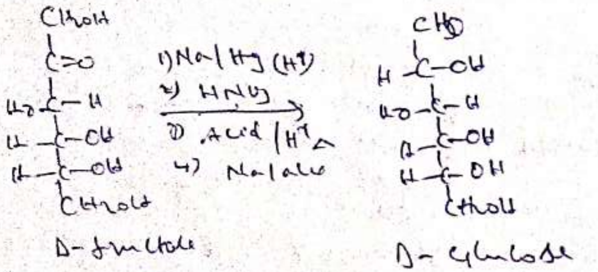
2) Conversion of an Aldose into ketose (Glucose to Fructose)



3) Conversion of Aldohexose into Aldopentose.
[Ruff's degradation method]



4) Conversion of Fructose into Glucose.



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TEACHING PLAN (SYNOPSIS)

Month : Oct/Nov 2024 Subject : Chemistry

TOPIC : Unit-I – Alkyl halides – Alcohols Paper : III

Hours Required	10
Learning Objectives	Knowledge → preparation of R-X and R-OH; Understanding → properties of R-X, R-OH; Skills → [illegible]
Previous Knowledge to be reminded	Classification and physical properties of R-X & R-OH
Topic Synopsis	Preparation & properties of R-X & R-OH, Phenols

Unit-I: Chemistry of Halogenated Compounds

Alkyl halides:

→ methods of preparation and properties of R-X.

→ Nucleophilic substitution reactions of S_N1 & S_N2 mechanism.

→ Elimination reactions.

→ Williamson synthesis

Aryl halides:

→ preparation & properties, Nucleophilic aromatic substitution reaction

→ Relative reactivity of alkyl, allyl, benzyl, vinyl and aryl halides.

Alcohols:

→ preparation & properties of 1°, 2° & 3° alcohols.

→ Bouveault Blanc reduction

→ oxidation of diols by periodic acid and lead tetra acetate,

→ pinacol – pinacolone rearrangement.

Phenols:

→ preparation & properties.

→ Acidic nature of phenols

→ Reimer – Tiemann reaction.

→ Kolbe's – Schmidt reaction

→ Fries & Claisen rearrangement.

Thrust areas	S_N1 & S_N2 mechanism – pinacol-pinacolone
Skill to be learnt by Student	Stereo chemistry of S_N1 & S_N2 mechanism.
Examples/Illustrations	Aryl halides, phenols.
Additional Inputs	

Teaching Models used	Phenol, Resorcinol, CCl_4, $CHCl_3$.
Teaching Aids used	Chart.
References cited	T.L. Finar - I.
Student Activity planned after the teaching	Assignment
Activity planned outside classes	Handout
Any other	

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TEACHING PLAN (SYNOPSIS)

Month : Dec-2021 Subject : chemistry

TOPIC : UNIT-II. Carbonyl compounds
III. Carboxylic acids. Paper : II. BSc Paper III.

Hours Required	10 + 12 = 22
Learning Objectives	knowledge → structure, preparation understanding → property skill → mechanism
Previous Knowledge to be reminded	Definition, >C=O group, classification.
Topic Synopsis	properties, reactivity, Active methylene group.

UNIT II: Carbonyl compounds:

→ structure, reactivity, preparation & properties.
→ Nucleophilic addition, - elimination reaction.
→ mechanisms of aldol, benzoin condensation.
→ Claisen - Schmidt, Perkin, Cannizzaro.
→ Wittig, Mckenna, haloform reaction.
→ Baeyer - Villiger reaction.
→ α-substitution reaction
→ oxidation & reduction reaction
→ Addition reaction - michael addition.
→ Active methylene compounds.
→ Enol tautomerism, preparation & synthetic application of diethyl malonate & ethyl acetoacetate.

UNIT-III: Carboxylic acids & their derivatives.
→ General methods of preparation, physical properties of reaction of monocarboxylic acids, effects of substituent acidic strength
→ Typical reaction of carboxylic acids hydroxyacids and unsaturated acids. preparation & reaction of acid chlorides anhydrides, esters and amides. Comparative study of N.S. at acyl group - mechanism of acidic and alkaline hydrolysis of esters, Claisen condensation, Reformatsky & curtius rearrangement. Acid & amide formation. Hunsdiecker, Schmidt, Arndt - Eistert synthesis, halogenation H-V-Z reaction.

Thrust areas	Aldol, benzoin, A.A.E, Carboxylic acid reactions
Skill to be learnt by Student	practice the mechanism
Examples/Illustrations	Aromatic carboxylic acids.
Additional Inputs	mechanism & some named reactions

Teaching Models used	Chart.
Teaching Aids used	Virtual class room.
References cited	I. L. Finar.
Student Activity planned after the teaching	Assignment Seminar.
Activity planned outside classes	Tenth
Any other	

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TEACHING PLAN (SYNOPSIS)

Month : December - 2021 Subject : chemistry V & VI

TOPIC : Nitro & Nitrogen Compounds & Amino acids Paper : V III & VI [illegible]

Hours Required	14 + 8 = 22
Learning Objectives	knowledge → preparation; understanding → chemical property; skill → Application, Equation
Previous Knowledge to be reminded	Functional groups, Amino Acids.
Topic Synopsis	preparation & properties of Nitrogen compounds, classification & properties of Amino acids.

UNIT-III: Nitrogen compounds.
→ Nomenclature and classification of Nitro compounds
→ Structure - Tautomerism of nitroalkanes leading to aci and keto form.
→ preparation of Nitroalkanes, reactivity - halogenation
→ Reaction of HONO, Nef reaction
→ Reaction & Michael addition reaction
→ Mannich reaction - leading to [illegible]

UNIT-IV. Nitrogen compounds.
→ Amines (Aliphatic & Aromatic)
→ Nomenclature, classification of 1°, 2°, 3° amines & 4°.
→ preparative methods → (i) Ammonolysis of alkyl halides
(ii) Gabriel synthesis (iii) Hoffmann's bromamide.
→ Reduction of Amides and Schmidt reaction.
→ basic character of Amines, comparative
→ chemical properties: a) Alkylation b) Acylation.
c) carbylamine reaction d) Hinsberg separation.
e) Reaction with nitrous acid of 1°, 2°, 3°.
e) Reaction with [illegible] Aromatic amines
→ Electrophilic substitution reaction
→ * Bromination (i) Nitration (ii) oxidation
and on Tertiary (i) Diazotization

Thrust areas	Reaction of nitro compounds, Names reaction
Skill to be learnt by Student	practice chemical reaction & mechanism
Examples/Illustrations	Amines, chemical reaction oxidation
Additional Inputs	mechanism of chemical reaction

Teaching Models used	charts
Teaching Aids used	videos
References cited	Organic chemistry by G. Marc Loudon, Pursuit Unit
Student Activity planned after the teaching	Assignment, Seminar, Quiz
Activity planned outside classes	Project work
Any other	

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TEACHING PLAN (SYNOPSIS)

Month : December 2021 Subject : Chemistry Paper-VI

TOPIC : Amino acids & Proteins Paper : VI

Hours Required	08
Learning Objectives	classification, preparation, properties
Previous Knowledge to be reminded	Definition, uses, functions.
Topic Synopsis	classification, Zwitter ion, isoelectric point

→ Amino acids & proteins: UNIT-IV

→ Definition, classification of Amino acids

→ Natural and essential Amino acids

→ methods of Synthesis

→ i) From halogenated carboxylic acids

→ Malonic ester Synthesis

→ Strecker Synthesis

→ physical properties of amino acids

i) Zwitter ion structure

ii) Salt like structure

iii) solubility, melting point.

iv) amphoteric character

v) isoelectric point

→ chemical properties:

→ General reactivity due to amino and carboxyl group – lactams from gamma and delta amino acids on heating peptide bond.

→ Structural nomenclature of peptides of proteins

Thrust areas	classification, Synthesis of Amino acids
Skill to be learnt by Student	classification
Examples/Illustrations	Different types of Amino acids
Additional Inputs	

Teaching Models used	Charts
Teaching Aids used	PPT
References cited	Ahler, S.R.J. R. Thomas, J. Schwartz, D. Shurtleff
Student Activity planned after the teaching	Assignment, Quiz
Activity planned outside classes	Test, Home Work
Any other	

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TEACHING PLAN (SYNOPSIS)

Month : January

Subject : II-Sem III Gener

TOPIC : UNIT-IV Spectroscopy

Paper : III

Hours Required	12
Learning Objectives	molecular spectroscopy, UV, NMR spectroscopy.
Previous Knowledge to be reminded	Atoms, molecules, Rotation, vibration, spectroscopy
Topic Synopsis	molecular, vibration, UV, IR, NMR spectroscopy

UNIT-IV molecular spectroscopy:

→ Interaction of E.M.R with molecules and various types of spectra

→ Rotation spectroscopy- selection rules.

→ Vibrational spectroscopy:

→ Electronic spectroscopy: Energy levels of molecular orbitals, selection rules for electronic spectra. Types of electronic transitions in molecules effect of conjugation. chromophore, bathochromic and hypsochromic shifts.

→ Nuclear magnetic resonance Spectroscopy (NMR):-

→ principles of NMR, equivalent and non-equivalent protons,

→ position of signals, chemical shift

→ NMR splitting of signals.

→ spin-spin coupling, coupling constants.

→ Applications of NMR with examples.

→ Ethyl bromide, ethanol, acetaldehyde, 1,1,2-tribromo ethane, ethyl acetate, toluene, acetophenone.

Thrust areas	Types of electronic transitions, NMR principles, Applications
Skill to be learnt by Student	chemical shift, chromophore
Examples/Illustrations	Applications of NMR.
Additional Inputs	

Teaching Models used	chart ;
Teaching Aids used	video, PPt
References cited	spectrochs by william kemp.
Student Activity planned after the teaching	Assignment, Seminar, Quiz
Activity planned outside classes	project
Any other	

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TEACHING PLAN (SYNOPSIS)

Month : NOV/DEC-2021 Subject : chemistry-I

TOPIC : chemistry of p-block elements, chemistry of d-block elements. Paper : I - I Sch I Sem.

Hours Required	12+4=16
Learning Objectives	Siloxane, Silicate, Inter halogen compounds. d-block
Previous Knowledge to be reminded	periodic table,
Topic Synopsis	Silicone, $(NPCl_2)_4$, d-block elements.

UNIT-I.

Group-13: preparation and structure of diborane, borazine.

Group-14: preparation & structure of Silicones.

Group-15: preparation & structure of $(NCl_2)_x$.

Group-16: oxides & oxoacids of Sulphur

Group-17: pseudohalogens, structure of Inter halogen compounds

UNIT II:

→ chemistry of d-block elements;

→ Characteristics of d-block elements with special reference to electronic configuration, variable Valence, magnetic properties, Catalytic properties, ability to form complexes, Stability & various oxidation states.

Thrust areas	Silicones, Inter halogen compounds, magnetic properties
Skill to be learnt by Student	Electronic configuration, Inter halogen Compounds
Examples/Illustrations	pseudohalogens, d-block elements.
Additional Inputs	

Teaching Models used	Chalk,
Teaching Aids used	PPT
References cited	J.E. Huheey, Cotton & Wilkinson.
Student Activity planned after the teaching	Seminar, Quiz
Activity planned outside classes	Assignment
Any other	

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TEACHING PLAN (SYNOPSIS)

Month : January - 2021 Subject : Chemistry-I

TOPIC : f-block, bonding in metals, Paper : I - I yr I Sem I

Hours Required	10
Learning Objectives	chemistry of lanthanides, band theory.
Previous Knowledge to be reminded	f-block elements
Topic Synopsis	Lanthanide contraction, V.B. theory

→ chemistry of f-block elements
→ chemistry of Lanthanides,
→ electronic structure, oxidation states
→ Lanthanide contraction
→ consequences of lanthanide contraction
→ magnetic properties,
→ chemistry of actinides.
→ electronic configuration, oxidation states,
→ actinide contraction,
→ comparison of lanthanides and actinides.

→ Theories of bonding in metals.
→ Valency bond theory
→ Free electron theory
→ Band theory — formation of bands
→ Explanation of conductors, Semiconductors & Insulators.

Thrust areas	Lanthanide contraction, V.B theory
Skill to be learnt by Student	Electronic configuration, Band theory
Examples/Illustrations	Lanthanides, actinides.
Additional Inputs	

Teaching Models used	chart
Teaching Aids used	PPt, videos.
References cited	J.E. Huheey, Cotton - Wilkinson
Student Activity planned after the teaching	mid Exam.
Activity planned outside classes	Assignment
Any other	

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TEACHING PLAN (SYNOPSIS)

Month : January - 2022 (Feb.)

Subject : III BSc, Chemistry

TOPIC : Thermodynamics

Paper : V, Sem-V

Hours Required	15
Learning Objectives	First law, second law, Joule-Thomson effect.
Previous Knowledge to be reminded	zeroth law of thermodynamics,
Topic Synopsis	Joule-Thomson effect, Entropy, carnot cycle,

UNIT-V:- Thermodynamics

→ The first law of thermodynamics
→ Internal energy, enthalpy - Heat capacities
→ Joule-Thomson effect - coefficients
→ Isothermal, adiabatic conditions for reversible processes
→ State function
→ Temperature dependence of enthalpy of formation.
→ Kirchoff's equation
→ Second law of thermodynamics
→ Different statements of the law.
→ Carnot cycle and its efficiency.
→ Carnot theorem.
→ Concept of entropy, entropy as a state function
→ entropy changes in reversible and irreversible processes
→ Entropy changes in spontaneous and equilibrium processes.

Thrust areas	Kirchoff's law, carnot cycle,
Skill to be learnt by Student	derivations, Joule-Thomson effect.
Examples/Illustrations	first law & second law of thermodynamics
Additional Inputs	

Teaching Models used	Chart
Teaching Aids used	Pedial
References cited	Advanced physical chemistry by Gurudeep Raj
Student Activity planned after the teaching	Assignments, group discussion, quiz
Activity planned outside classes	Tests & Seminars.
Any other	participated in Science days Celebrations

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TEACHING PLAN (SYNOPSIS)

Month : January/Feb- 2022 Subject : III.B.Sc, Chemistry

TOPIC : ① Chemical kinetics ② photochemistry Paper : VI

Hours Required	13
Learning Objectives	first law, quantum yield,
Previous Knowledge to be reminded	Rate law, photochemical reaction,
Topic Synopsis	Methods to determine the order of reaction HBr, HCl formation

1. chemical kinetics:
- → Rate of reaction - order of reaction - molecularity,
- → Derivation of rate ~~of reaction~~ constants
- → first, second third order reaction
- → half life reaction - problems
- → methods to determine the order of reaction
- → Effect of temperature on rate of reaction.
- → Arrhenius equation, concept of activation energy.

2. photo chemistry:
- → Difference between thermal and photochemical processes.
- → Laws of photochemistry - Grotthus-Draper's law - Stark-Einstein law
- → Laws of photochemical equivalence.
- → quantum yield - photochemical reaction mechanism.
- → Hydrogen - chlorine ($H_2 + Cl_2 \rightarrow 2HCl$)
- → Hydrogen - bromine ($H_2 + Br_2 \rightarrow 2HBr$)
- → qualitative description of Fluorescence
- → phosphorescence
- → photosensitized reactions.
- → Energy transfer processes.

Thrust areas	first and second order theory HBr, HCl formation
Skill to be learnt by Student	Arrhenius equation, fluorescence, phosphorescence
Examples/Illustrations	Zero, first, second order reaction, photochemical reaction
Additional Inputs	

Teaching Models used	chart,
Teaching Aids used	ppt,
References cited	puri & Sharma kurudeep Raj.
Student Activity planned after the teaching	group discussion, quiz
Activity planned outside classes	Assignment
Any other	participated in Science day celebration

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TEACHING PLAN (SYNOPSIS)

Month : February/March 2022 Subject : II. B.Sc chemistry

TOPIC : Applications of spectroscopy to simple organic molecules Paper : III - Sem - III

Hours Required	10
Learning Objectives	UV-visible light, woodward rules.
Previous Knowledge to be reminded	wavelength, frequency, λ max
Topic Synopsis	Application of visible, ultraviolet spec, IR spec, woodward rules.

→ Application of visible, ultraviolet and IR spectroscopy in organic molecules.

→ Applications of electronic spectroscopy

→ woodward rules for calculating λmax of conjugated diens.

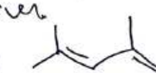
→ α, β - unsaturated compounds.

→ Infrared radiation and types of molecular vibration, functional group and finger print region.

→ IR spectra of alkanes, alkenes, and simple alcohols.

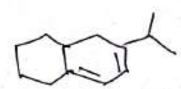
→ Aldehydes, ketones, carboxylic acids and their derivatives

→ Examples ①



Base value : 217 nm
alkyl group 3×5 = 15 nm
calculated : = 232 nm
observed ~ 234 nm

②

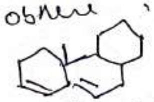


Base value : 253 nm
alkyl group 4×5 = 20 nm
Exocyclic = 5 n
calculated : 278 nm
observed : 275 nm

③

Base value : 202 nm
five membered ring presence
β-alkyl group 2×12 = 24 nm
Exocyclic 1×5 = 5 nm
calc = 226 nm 231 nm

④



Base value 214 nm
alkyl group 3×5 = 15 nm
Exocyclic = 5 nm
234 nm
observed 235 nm

Thrust areas	woodward rules - λmax calculation
Skill to be learnt by Student	λmax calculation
Examples/Illustrations	α, β unsaturated dienes.
Additional Inputs	different examples

Teaching Models used	chem.
Teaching Aids used	PPt,
References cited	Spectroscopy by William Kemp, P.S. Kalsi.
Student Activity planned after the teaching	Discussion, practice.
Activity planned outside classes	Assignment
Any other	participated in Science day celebrations

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TEACHING PLAN (SYNOPSIS)

Month : February - 2021 Subject : I BSc Sem I. chemistry

TOPIC : Solid State. Paper : I

Hours Required	8
Learning Objectives	Symmetry in crystals, Bragg's equation, Defects
Previous Knowledge to be reminded	States of matter.
Topic Synopsis	Bragg's Law, Defects in crystals.

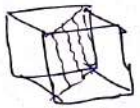
→ Symmetry in crystals
→ Law of constancy of interfacial angles.
→ The Law of rationality of indices.
→ The law of Symmetry, Miller indices
→ Definition of lattice point, space lattice, unit cell
→ Six each lattices and crystal systems.
→ X-ray diffraction and crystal structure.
→ Bragg's Law. → $n\lambda = 2d \sin\theta$.
→ Powder method.
→ Defects in crystals.
→ Stoichiometric & non-stoichiometric defects.

Symmetry in crystals

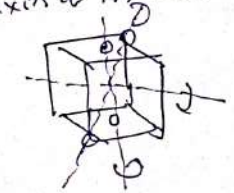
I. plane of Symmetry.

① Rectangular:

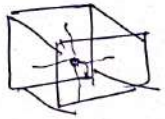
② Diagonal:



II. Axis of Symmetry.



③ Centre of Symmetry



Total, (13)

Thrust areas	Bragg's Equation, Defects in crystals
Skill to be learnt by Student	Draw the Symmetry in crystals.
Examples/Illustrations	Defects in crystals
Additional Inputs	

Teaching Models used	Chalk, models & Issues
Teaching Aids used	PPT
References cited	Solid state chemistry and its applications by Anthony R. West
Student Activity planned after the teaching	Quiz, Seminar
Activity planned outside classes	Assignment
Any other	participation in Science day celebrations

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TEACHING PLAN (SYNOPSIS)

Month : March-2020 Subject : I. B.Sc - I Sem.

TOPIC : Gaseous state & Liquid state Paper : I.

Hours Required	10
Learning Objectives	vanderwaal's equation, critical constants, Application of liquid crystals
Previous Knowledge to be reminded	State of matter
Topic Synopsis	vanderwaal's constant, Joule-Thomson effect, LCD devices

→ Gaseous state

→ Vander waal's equation of state.

→ Andrew's isotherms of carbon dioxide, continuity of state.

→ critical phenomena.

→ Relationship between critical constants and vander waal's constants.

→ Law of corresponding states.

→ Joule-Thomson effect. Inversion temperature.

→ Liquid state:

→ Liquids crystals, mesomorphic state.

→ Difference between liquid with and solid/liquid.

→ Classification of liquid crystals into smectic and nematic.

smectic and nematic.

→ Application of liquid crystals as LCD devices.

Thrust areas	critical phenomena, liquid crystals,
Skill to be learnt by Student	Solved problems, derivation equations.
Examples/Illustrations	LCD devices
Additional Inputs	

Teaching Models used	chart
Teaching Aids used	ppt
References cited	S. Chand, K.L. Kapoor, Manoson.
Student Activity planned after the teaching	Seminar.
Activity planned outside classes	Assignment
Any other	

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TEACHING PLAN (SYNOPSIS)

Month : April/2022 Subject : I-BSc Sem I

TOPIC : Solution, Ionic equilibrium, dilute solution Paper : I.

Hours Required	10
Learning Objectives	Azeotropes, common ion effect, colligative prop.
Previous Knowledge to be reminded	Solute, colligative properties.
Topic Synopsis	

Thrust areas	
Skill to be learnt by Student	
Examples/Illustrations	
Additional Inputs	

Teaching Models used	
Teaching Aids used	
References cited	
Student Activity planned after the teaching	
Activity planned outside classes	
Any other	

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TEACHING PLAN (SYNOPSIS)

Month : April-May-2022 Subject : Chemistry, III-Bsc, Sem-VI

TOPIC : UNIT-I & II: Introduction, Air Pollution. Paper : VII (B) Environmental Chemistry

Hours Required	18
Learning Objectives	Segments of environment, Natural resources, Green house effect, Acid rain
Previous Knowledge to be reminded	Importance of Environment, Activities related to environment
Topic Synopsis	Natural resources, Bhopal disaster, Acid rain

UNIT-I: Introduction.

→ Concept of environmental chemistry
→ Scope and importance of environment in Now a days
→ Segments of environment
→ Natural resources
→ Renewable Resources - Solar and biomass energy
→ non Renewable resources -
→ Thermal power and atomic energy.
→ Reactions of atmospheric oxygen
→ Hydrological cycle.

UNIT-II: Air Pollution:

→ Definition - Sources of air pollution
→ classification of air pollution.
→ Acid rain
→ photochemical smog
→ Green house effect
→ Formation and depletion of ozone
→ Bhopal gas disaster
→ controlling methods of air pollution.

Thrust areas	Segments of environment, Acid rain, C.H.C.
Skill to be learnt by Student	Nature resources, Bhopal gas disaster.
Examples/Illustrations	With Pollutants, Different methods,
Additional Inputs	

Teaching Models used	charts
Teaching Aids used	ppt. online teaching
References cited	
Student Activity planned after the teaching	Assignment,
Activity planned outside classes	
Any other	

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TEACHING PLAN (SYNOPSIS)

Month : April/May-2022 Subject : III BSc, Sem VI, Chemistry

TOPIC : polymers Paper : VIII A. Polymer Chemistry

Hours Required	18
Learning Objectives	classification of polymers, Techniques of polymerisation
Previous Knowledge to be reminded	Def of polymers, PVC, Polyethylene
Topic Synopsis	Types of polymers Techniques of polymerisation,

UNIT-I: Introduction to polymers.

→ Basic definitions degree of polymerisation,
→ classification of polymers → Natural – organic – Inorganic
→ Thermoplastic & Thermosetting.
→ Copolymers – Types.
→ Addition polymers, – condensation polymers.
→ Free radical, Ionic & Ziegler – Natta polymerisation

UNIT-II.

→ Techniques of polymerisation.
  1) Bulk polymerisation
  2) Solution
  3) Suspension
  4) emulsion polymerisation
→ molecular weight of polymers:
→ Number average m. wt, weight average m. wt
→ Determination of molecular weight of polymers by
  Viscometry, Osmometry.
→ Light scattering methods,

Thrust areas	mechanisms of addition polymerisation Viscometry, Osmometry methods,
Skill to be learnt by Student	mechanisms, Diagram skills,
Examples/Illustrations	polymers, different mfg, mfg.
Additional Inputs	

Teaching Models used	Different polymers.
Teaching Aids used	Black board, chart
References cited	
Student Activity planned after the teaching	Assignments, Seminar
Activity planned outside classes	
Any other	

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TEACHING PLAN (SYNOPSIS)

Month : April/May-2022 Subject : II BSc (MPCA BSc) Chemistry Sem-IV

TOPIC : Organometallic compounds, carbohydrates Paper : IV. [Inorganic, Organic & physical]

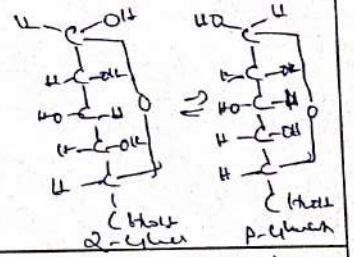
Hours Required	14
Learning Objectives	Metal carbonyls, preparation & structure, Structure of Glucose & interconversions.
Previous Knowledge to be reminded	Organometallic compounds, Carbohydrates,
Topic Synopsis	preparation of metal carbonyls & structure. Structure of Glucose.

UNIT-I: Organometallic compounds

→ Definition & classification of O.M.C on the basis of bond type,
→ Concept of hapticity of organic ligands.
→ Metal carbonyls: 18-electron rule, electron counting of mononuclear, poly nuclear & substituted metal carbonyls of 3d series.
→ General methods of preparation of mono & binuclear carbonyls
→ π-acceptor behaviour of carbon monoxide.

UNIT-II: Carbohydrates:

→ Detail classification of carbohydrates, biological importance
→ Constitution of Glucose
→ Constitution & functions.
→ Haworth projection and conformational structures.
→ Inter conversion of aldoses & ketoses.
→ Kiliani-fischer synthesis and Ruff degradation.
→ Disaccharides → Elementary treatment of maltose.



Thrust areas	Structures of $Ni(CO)_4$, $Cr(CO)_6$, Structure of Glucose
Skill to be learnt by Student	Structure, conversions of carbohydrates,
Examples/Illustrations	Metal carbonyls, Saccharides,
Additional Inputs	

Teaching Models used	Chalk, duster.
Teaching Aids used	Charts.
References cited	
Student Activity planned after the teaching	Assignments,
Activity planned outside classes	practice the problems in this.
Any other	

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TEACHING PLAN (SYNOPSIS)

Month : April/May-2022 Subject : II Sc Chemistry-Sem IV

TOPIC : Complex Compounds, UNIT II. Paper : V (Inorganic & Physical chem)

Hours Required	14
Learning Objectives	Theories of Coordination Compounds
Previous Knowledge to be reminded	Double salts.
Topic Synopsis	Theories of coordination Compounds & Stereochemistry.

→ Complex Compounds.
→ IUPAC nomenclature of coordination compounds.
→ Structural and stereoisomerism in complexes with coordination numbers 4 and 6.
→ Valence bond theory - Inner and outer orbital complexes.
→ Limitations of VBT.
→ Crystal field theory
→ Octahedral symmetry.
→ Crystal field stabilization energy.
→ Tetrahedral symmetry, factors affecting the magnitude of crystal field splitting energy.
→ Spectrochemical series
→ Comparison of CFSE for Octahedral & Tetrahedral Complexes.
→ Jahn-Teller distortion.

UNIT-II Inorganic reaction mechanism

→ Introduction to Inorganic reaction mechanism.
→ Concept of pathways transition state, intermediate and activated complex.
→ Labile and inert complexes, Ligand substitution reactions
→ SN1 & SN2.
→ Substitution reactions in square planar complex.
→ Trans effect - Applications.

Thrust areas	C.F.T, V.B.T, SN1, SN2 mechanism.
Skill to be learnt by Student	CFT, SN1, SN2 mechanism.
Examples/Illustrations	Double salts, Labile, Inert complexes
Additional Inputs	

Teaching Models used	Some complex compounds.
Teaching Aids used	chart
References cited	J. D. Lee, HW
Student Activity planned after the teaching	Seminar,
Activity planned outside classes	Assignment
Any other	

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TEACHING PLAN (SYNOPSIS)

Month : May/June 2022 Subject : I. Inorganic chemistry - Sem II.

TOPIC : Alkanes & cycloalkanes, Alkenes. Paper : II. Organic chemistry

Hours Required	
Learning Objectives	
Previous Knowledge to be reminded	
Topic Synopsis	
Thrust areas	
Skill to be learnt by Student	
Examples/Illustrations	
Additional Inputs	

Teaching Models used	
Teaching Aids used	
References cited	
Student Activity planned after the teaching	
Activity planned outside classes	
Any other	

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TEACHING PLAN (SYNOPSIS)

Month : June/July 2022 Subject : V Sem, III B.Sc.

TOPIC : water pollution, Toxic colors & ecosystem Paper : VII B.1 Environmental chemistry

Hours Required	25
Learning Objectives	water quality, some metal toxicity & ecosystem.
Previous Knowledge to be reminded	Alkalinity pH, metal effects, biodiversity
Topic Synopsis	Hardness of water, Toxic chemicals, Ecosystems

→ UNIT-III: water pollution

→ water quality criteria for binding of water quality

→ D.O, BOD, COD, TDS, Alkalinity -

→ Hardness of water - method.

→ Eutrophication & its effects,

→ principal wastage degradation.

→ Industrial wastewater treatment

UNIT-IV: (chemical Toxicology)

→ Effects of toxic chemicals - cyanide & its toxic effects,

→ pesticides & its biochemical effects.

→ Toxicity of lead, mercury, arsenic & cadmium.

UNIT-V: Ecosystem & Biodiversity

→ Structure - Function - Types of Ecosystem.

→ Abiotic & biotic components.

→ Energy flow and Energy dynamics of ecosystem

→ Food chain - Food web - Trophic levels -

→ Biochemical cycles. (C, N, P)

Biodiversity → Level & types of biodiversity

→ Significance - magnitude & distribution of biodiversity

→ biographical classification of India.

→ biodiversity at national, global & regional level.

Thrust areas	Eutrophication - Industrial wastewater.
Skill to be learnt by Student	Effects of toxic chemicals, Hardness water
Examples/Illustrations	Toxic metals.
Additional Inputs	

Teaching Models used	calculating H.W.
Teaching Aids used	charts, videos.
References cited	
Student Activity planned after the teaching	Seminar, &
Activity planned outside classes	Assignment
Any other	

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TEACHING PLAN (SYNOPSIS)

Month : June/July 2022

Subject : VI Sem (III BZCPC)

TOPIC : polymers.

Paper : VIII A, polymers (Chem)

Hours Required	20
Learning Objectives	kinetics of polymers, polymer additives, applications
Previous Knowledge to be reminded	Application of polymers.
Topic Synopsis	Tg, lubricants, polymers their applications.

UNIT-III

→ kinetics of free radical polymerisation. Tg.
→ Determination of Tg - free volume theory
→ WLF equation.
→ Factors affecting glass transition temperature

UNIT-IV.

polymer additives

→ Introduction to plastic additives
→ fillers, plasticizers, and softeners.
→ lubricants and flow promoters
→ Anti aging additives - flame retardants.
→ colourants - blowing agents.
→ cross linking agents, photo stabilizers
→ Nucleating agents.

UNIT-V: polymers their applications.

→ preparation & Industrial applications of following

(1) polyethylene
(2) polyvinyl chloride
(3) Teflon
(4) Terylene
(5) polyacrylonitrile
6) Nylon 6,6
(7) silicones.

Thrust areas	Tg, polymer additives, Nylon 6,6, silicones
Skill to be learnt by Student	Equations in polymer applications
Examples/Illustrations	polymers additives, Terylene, silicons.
Additional Inputs	

Teaching Models used	Different polymers.
Teaching Aids used	Chart,
References cited	Odian, G. principles of polymerization, Ghosh, P. Polymer science etc.
Student Activity planned after the teaching	
Activity planned outside classes	
Any other	

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TEACHING PLAN (SYNOPSIS)

Month : Oct / Nov - 2022   Subject : chemistry

TOPIC : S & P block elements   Paper : I

Hours Required	12
Learning Objectives	chemistry of S-block & P-block Elements.
Previous Knowledge to be reminded	Electronic configuration, Symbols, formulas.
Topic Synopsis	Diborane, Silicones, $(PNCl_2)_n$, Interhalogen compd

First five classes conducted the bridge classes on

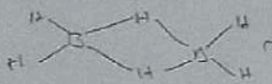
→ Symbols, formulas, Atomic number, Atomic weight, General properties

→ Isotopes in chemistry.

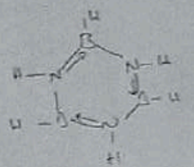
→ S-block elements:
I A & II A group elements.

→ P-block elements

Group - 13: preparation & structure of diborane & borazine



→ B_2H_6

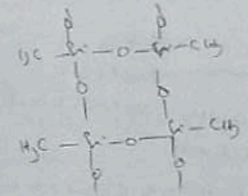


borazine $B_3N_3H_6$.

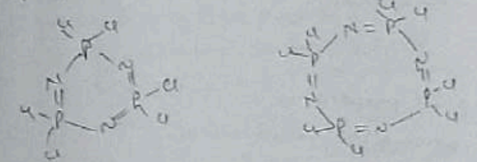
Thrust areas	Diborane, Silicones, Interhalogen compounds
Skill to be learnt by Student	Structures of P-block compounds.
Examples/Illustrations	borane, pseudohalogens
Additional Inputs	Selenium oxides.

Teaching Models used	Chart.
Teaching Aids used	periodic table
References cited	The chemistry of the P-block elements - Anil - J - Elias
Student Activity planned after the teaching	Assignment
Activity planned outside classes	
Any other	

→ preparation, classification and uses of silicones:



→ preparation & structure of phosphonitrilic halides $(PNCl_2)_n$.



→ oxides & oxy acids of sulphur
SO_2, SO_3, $H_2S_2O_3$, $H_2S_2O_4$, H_2SO_3, H_2SO_4, $H_2S_2O_7$, H_2SO_5

→ pseudohalogens. $(SCN)_2$ $(CN)_2$ $(SeCN)_2$,

→ Interhalogen compounds: types & Examples.

AX	AX_3	AX_5	AX_7
ClF	ClF_3		
BrF	BrF_3	BrF_5	IF_7
IF			
ICl	ICl_3	IF_5	
IBr	IF_3		

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TEACHING PLAN (SYNOPSIS)

Month : NOV/2022 Subject : Organic chemistry & Spectroscopy

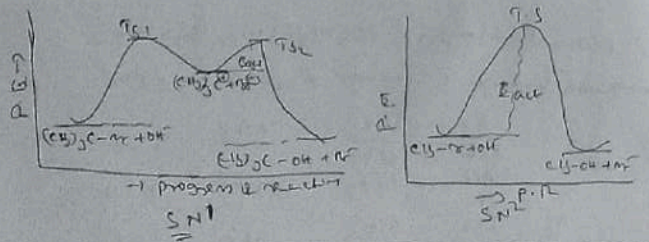
TOPIC : Alkyl halides & Alcohols. Paper : I.

Hours Required	12
Learning Objectives	Chemistry of halogenated hydrocarbons, Alcohols, phenols.
Previous Knowledge to be reminded	Saturated hydrocarbons, functional groups.
Topic Synopsis	S_N1 & S_N2, preparation & properties of -OH, ϕ-OH.

→ Alkyl halides:
- → methods of preparation and properties.
- → Nucleophilic substitution reactions
- → S_N1 & S_N2 mechanism with stereochemical aspects and effects of solvent etc.
- → Nucleophilic substitution & elimination.
- → williamson's synthesis.

Aryl halides:
- → preparation and properties.
- → Nucleophilic aromatic substitution.
- → Relative reactivity of alkyl, allyl, benzyl, vinyl and aryl halides towards nucleophilic substitution reaction.

2. Ad

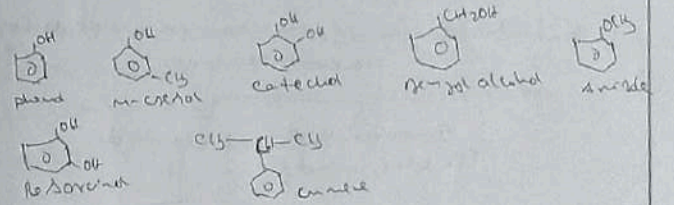


Thrust areas	S_N1 & S_N2, Named reactions,
Skill to be learnt by Student	Synthesis, Organic reactions,
Examples/Illustrations	Alcohols, Alkyl halides phenols - derivatives
Additional Inputs	preparations of Aryl halides.

Teaching Models used	C_2H_5OH, liquids, phenol bottles, Resorcinol.
Teaching Aids used	Audio-visual aids - videos.
References cited	I.L. Finar → organic chemistry Vol-I
Student Activity planned after the teaching	Assignment,
Activity planned outside classes	practice the named reactions,
Any other	

2. Alcohols:
- → preparation and properties and relative activities of 1°, 2° and 3° alcohols.
- → Sonvaldt Blanc reduction.
- → oxidation of diols by periodic acid and lead tetra-acetate, pinacol - pinacolone rearrangement.

phenols:
- → preparation properties,
- → Acidity and factors effecting,
- → Kiley Schotten reaction,
- → Reimer-Tiemann and Kolbe's - Schmidt - reaction
- → Fries and claisen rearrangements with mechanism.



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TEACHING PLAN (SYNOPSIS)

Month : NOV/2022 Subject : Environmental chemistry/ green chemistry

TOPIC : Introduction Paper : V / VI.

Hours Required	10
Learning Objectives	Scope and importance of environment in society natural resources.
Previous Knowledge to be reminded	Branches of chemistry, Basic Environment.
Topic Synopsis	Segments of environment, natural resources.

UNIT-I: Introduction:

→ Environment definition

→ concept of Environmental chemistry

→ Scope and importance of environment in society.

→ Nomenclature of environmental chemistry.

pollutant, sink, COD, BOD, DO

→ Segments of environment

→ Atmosphere, Lithosphere, Hydrosphere, Biosphere.

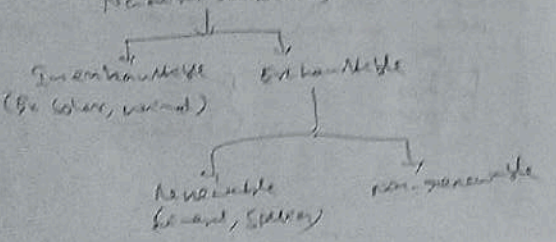
→ Natural resources

→ Renewable resources

→ Solar and biomass energy and non-renewable resources

→ Thermal power and atomic energy

→ Reactions of atmospheric oxygen and Hydrological cycle.



Thrust areas	Segments of environment / natural resources pollutants & green chemistry
Skill to be learnt by Student	Classification, principles of green chemistry, toxicity
Examples/Illustrations	pollutants, green chemicals products.
Additional Inputs	

Teaching Models used	chart
Teaching Aids used	Board, PPT, Projector
References cited	Environmental chemistry - Sharma, Anamika, Environmental chemistry - V.K. Ahluwalia.
Student Activity planned after the teaching	Group discussion.
Activity planned outside classes	AAM's - mind
Any other	

Paper-VIII Green chemistry

UNIT-I Part-I

→ Introduction. Definition of green chemistry.

→ Need for green chemistry.

→ Basic principles of green chemistry.

→ Green synthesis - Balanced & its type of the reaction

i) Rearrangement (100% atom economy)

ii) Addition reaction (100% atom economy)

→ Organic reactions by conventional methods.

→ Apparatus required and examples for monochemical reaction (Hoch, Knoevenagel reaction)

→ 12 principles

① Prevent waste ② Design safer chemicals and products

③ Design less hazardous chemical synthesis

④ Use renewable feed stocks.

⑤ Use catalysts, not stoichiometric reagents.

⑥ Avoid chemical derivatives

⑦ Maximize atom economy

⑧ Use safer solvents and reaction conditions

⑨ Increase energy efficiency

⑩ Design chemicals and products to degrade after use.

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TEACHING PLAN (SYNOPSIS)

Month : NOV/DEC – 2022 Subject : Inorganic Physical Chemistry

TOPIC : Chemistry of d,f block elements, Solid state Paper : I

Hours Required	12+10
Learning Objectives	chemistry of d&f block elements, Solid state.
Previous Knowledge to be reminded	General properties of elements, States of matter
Topic Synopsis	Special properties, consequences of Lanthanide contraction

→ Chemistry of d-block elements

characteristics of d-block elements with special reference to electronic configuration, etc.

→ variable valence, magnetic properties

→ catalytic properties and ability to form complexes.

→ Stability of various oxidation states.

→ Chemistry of f-block elements

→ Chemistry of Lanthanides.

→ Electronic structure, oxidation states.

→ Lanthanide contraction.

→ Consequences of lanthanide contraction.

→ magnetic properties

→ Chemistry of Actinides → Electronic configuration, Oxidation states, actinide contraction.

→ Comparison of Lanthanides and actinides.

→ Theories of bonding in metals:

→ Valence bond theory and free electron theory

→ Explanation of thermal & electrical conductivity of metals based on these theories

→ Band theory

Thrust areas	Valence, magnetic, defects in crystals
Skill to be learnt by Student	Draw the symmetry in crystals
Examples/Illustrations	d & f block elements, Structure of crystals
Additional Inputs	

Teaching Models used	Crystals, Plaster of Paris Solid state.
Teaching Aids used	chart, periodic table, white board
References cited	Inorganic chemistry standard P, D, F & block elements
Student Activity planned after the teaching	Seminar, Quiz
Activity planned outside classes	Assignment
Any other	

Solid state:

→ Symmetry in crystals

→ Law of constancy of interfacial angles.

→ Rule law of rational indices.

→ The law of symmetry, miller indices, derivation of lattice point, space lattice, unit cell, Bravais lattices of crystal systems.

→ X-ray diffraction and crystal structure.

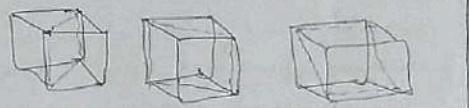
→ Bragg's law – powder method.

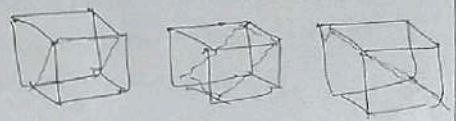
→ Defects in crystals.

Plane of symmetry

A cuboid has 3 planes of symmetry

Diagonal plane





Centre of symmetry

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TEACHING PLAN (SYNOPSIS)

Month : DEC | 2021 Subject : Organic & Spectroscopy

TOPIC : Carbonyl Compounds Paper : III

Hours Required	16
Learning Objectives	preparation, properties of >C=O & -COOH group Compounds
Previous Knowledge to be reminded	Alcohols, >C=O group
Topic Synopsis	Active methylene compounds, Mixed reaction.

UNIT-III: Carbonyl Compounds

→ Structure, reactivity, preparation & properties
→ Nucleophilic additions, elimination reactions
→ mechanism of aldol and benzoin condensation.
→ Claisen - Schmidt, Perkin,
→ Cannizzaro and related reactions,
→ Beckmann, haloform reactions and Baeyer-Villiger oxidation, α-substitution reactions
→ Oxidations and reductions (Clemmensen, Wolff-Kishner, with LiAlH4 and NaBH4)

→ Active methylene compounds.

→ Enol tautomerism.
→ preparation and synthetic applications of diethyl malonate and ethyl acetoacetate.

$CH_3-\overset{O}{\overset{\|}{C}}-CH_2-\overset{O}{\overset{\|}{C}}-OC_2H_5$ Aceto acetic ester

$C_2H_5O-\overset{O}{\overset{\|}{C}}-CH_2-\overset{O}{\overset{\|}{C}}-OC_2H_5$ Malonic ester

Thrust areas	Aldol, perkin, AAE, carboxilic acid derivatives
Skill to be learnt by Student	Reactions mechanism
Examples/Illustrations	Carbonyl compounds, RCOOH.
Additional Inputs	

Teaching Models used	Acetone, benzaldehyde, RCOOH, Amides.
Teaching Aids used	Chart, Models,
References cited	Organic Chemistry I. L. Finar
Student Activity planned after the teaching	practice the mechanism, Revision.
Activity planned outside classes	mid Exam.
Any other	

UNIT-III: Carboxilic acids and derivatives.

→ General methods of preparation,
→ physical properties and reactions of monocarboxylic acids,
→ Effects of substituents on acidic strength.
→ Typical reactions of dicarboxylic acids, Hydroxy acids
→ preparation and reactions of acids chlorides, anhydrides, esters and amides, Comparative study of nucleophilic substitutions at acyl group, mechanisms of acidic and alkaline hydrolysis of esters.
→ Claisen condensation, Reformatsky reaction, & curtius rearrangement
→ Reactions involving H, OH and COOH groups - salt formation, anhydride formation, acid chloride formation, amide formation and esterification.
→ Degradations of carboxilic acids by Hunsdiecker reaction, decarboxylation of Schmidt reaction, Arndt-Eistert synthesis)
→ Halogenation by Hell-Volhard-Zelinsky reaction, R-COOH, RCOOR', RCONH2, RCOX

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TEACHING PLAN (SYNOPSIS)

Month : Dec/2022
Subject : Environmental chemistry / Green chemistry
TOPIC : Air pollution / Green chemistry part-II
Paper : Environmental che / UNIT-II Green chemistry

Hours Required	10 + 10 = 20
Learning Objectives	sources, classification, green house effect, controlling methods, named reactions
Previous Knowledge to be reminded	Types of pollution, ozone.
Topic Synopsis	classification, controlling methods, named reactions

Air pollution:

→ Definition, sources of air pollution.
→ Classification of air pollution
→ Ambient air quality standards.
→ Climate change - Global warming
→ pollution from combustion systems.
→ Acid rain - photochemical smog
→ Green house effect
→ formation and depletion of ozone
→ Bhopal gas disaster
→ Instrumental techniques to monitor pollution.
→ controlling methods of air pollution.

Acid rain. $SO_2 + H_2O \rightarrow H_2SO_3 \xrightarrow{O_2} H_2SO_4$
$NO + NO_2 + H_2O \rightarrow 2HNO_2 \xrightarrow{O_2} 2HNO_3$
Ozone formation: $O_2 \xrightarrow{h\nu} O + O$
$O + O_2 + M \rightarrow O_3 + M$
CFC,

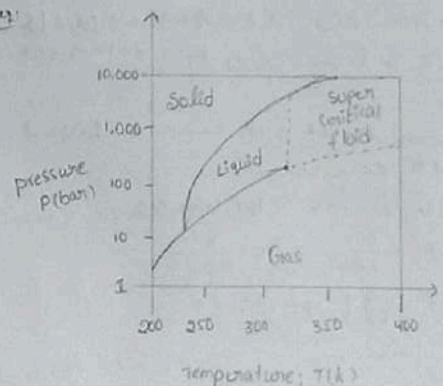
Thrust areas	Ozone, controlling methods. SCF, Ionic liquids
Skill to be learnt by Student	Air pollution, Acid rain, ozone, SCF graph
Examples/Illustrations	Pollutants
Additional Inputs	Air analysis methods.

Teaching Models used	Chart, Lecturing, Seminar
Teaching Aids used	ICT, PPT
References cited	E.C. Stanley Manahan, G.C.: V.K. Ahluwalia
Student Activity planned after the teaching	PPT
Activity planned outside classes	Mid Exam
Any other	

UNIT-II Green chemistry part-II.

→ selection of solvent
i) Aqueous phase reactions.
ii) Reactions in Ionic liquids, Heck reaction, Suzuki reaction
iii) solid supported synthesis
→ Supercritical CO2:
preparation, properties and applications
→ Green chemistry & sustainability.

SCF:



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TEACHING PLAN (SYNOPSIS)

Month : Jan 2022 Subject : Inorganic physical chemistry

TOPIC : Gases, Vander Waals, Liquid state & Solubility Paper : I

Hours Required	10+6=16
Learning Objectives	Vander waals Equation, Joule Thomson effect, Liquid & Crystals
Previous Knowledge to be reminded	Boyle's law, Charles law, Ideal gas equation
Topic Synopsis	Critical phenomena, Vander equation, Refrig.

1. Gaseous state:
   - → Vander waals equation of state
   - → Andrews isotherms of carbon dioxide.
   - → Critical phenomena.
   - → Relationship between critical constants and Vander waals constants.
   - → Law of Corresponding states.
   - → Joule-Thomson Effect — Inversion temperature

2. Liquid state:
   - → Liquid crystals — mesomorphic state
   - → Difference between liquid crystals and solid / liquid.
   - → classification of liquid crystals into smectic and nematic.
   - → Boyle — Thomson effect Application of liquid crystals and LED devices.

V.D.W: $\left(P+\frac{a}{V^2}\right)(V-b)=nRT$ (for 1 mole gas)

C.E: $V_c=3b$, $P_c=\frac{a}{27b^2}$, $T_c=\frac{8a}{27Rb}$

On reduction: $\left(\pi+\frac{3}{\rho^2}\right)(3\rho-1)=8\theta$.

Thrust areas	Critical constants, Application liquid crystals, Azeotropes, Types of P.M.L.
Skill to be learnt by Student	Device keys, Diagrams.
Examples/Illustrations	Azeotropes, Types of Solubility
Additional Inputs	CST - explained

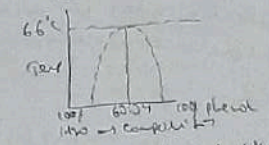
Teaching Models used	CST
Teaching Aids used	Lecture.
References cited	A text book of physical chemistry - Gurudeep Raj.
Student Activity planned after the teaching	Quiz, C.A.
Activity planned outside classes	Assignment
Any other	

Solubility:

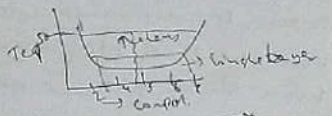
- → Azeotropes — HCl-H₂O system and ethanol-water system.
- → partially miscible liquids — phenol-water system.
- → critical solution temperature (CST)
- → Effect of impurities on consolute temperature.
- → Immiscible liquids and its distillation.
- → Nernst distribution law.
- → Calculation of the partition coefficient
- → Applications of distribution law.

Types of partially miscible liquids:

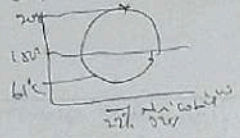
1. upper critical solution temp. (phenol - water system)



2. Lower critical solution temp. system



3. upper & Lower CST:



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TEACHING PLAN (SYNOPSIS)

Month : Jan 2023 Subject : Spectroscopy / UNIT-IV

TOPIC : Spectroscopy. Paper : III

Hours Required	18
Learning Objectives	molecular spectroscopy, Electronic, NMR.
Previous Knowledge to be reminded	EMR, water, circuit current
Topic Synopsis	molecular, Electronic, NMR spectroscopy

UNIT-IV Spectroscopy

→ molecular spectroscopy:

→ Interaction of electromagnetic radiation with molecules and various types of spectra.

→ Rotational spectroscopy:

selection rules, intensities of spectral lines, determination of bond length of diatomic and linear triatomic molecules, isotopic substitution.

→ Vibrational spectroscopy:

classical equation of vibration & computation of force constant, harmonic and anharmonic oscillator, morse potential curve, vibrational degrees of freedom for polyatomic molecules, modes of vibration. Selection rules for vibrational transitions, fundamental frequencies, overtones and hot bands.

→ Electronic spectroscopy:

→ Energy levels of molecular orbitals (σ, π, n).

→ Selection rules for electronic spectra.

→ Types of electronic transitions in molecules, effect of conjugation. Concept of chromophore, bathochromic and hypsochromic shifts. Beer Lambert's Law

Thrust areas	UV-visible spectrophotometer, NMR spectroscopy
Skill to be learnt by Student	mechanism, Reagents, analysis.
Examples/Illustrations	molecular spectroscopy, types & spectra
Additional Inputs	MCQs spectroscopy.

Teaching Models used	Charts for UV-visible, NMR, IR & problems.
Teaching Aids used	Charts.
References cited	Fundamentals of molecular spectroscopy by Colin N. Banwell & Elaine M. McCash
Student Activity planned after the teaching	Assignment
Activity planned outside classes	Seminar
Any other	

→ I.R. Spectroscopy

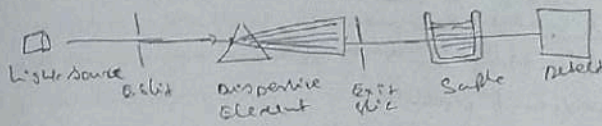
→ N.M.R. Spectroscopy:

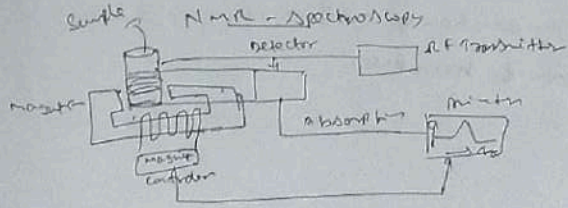
principle, position of signals, chemical shift, splitting of signals, spin-spin coupling, coupling constants.

→ Applications of NMR with suitable examples.

→ ethyl bromide, ethanol, acetaldehyde, 1,1,2-tribromoethane, ethyl acetate, toluene, benzene

Instrumentation of UV-visible spectrophotometer





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TEACHING PLAN (SYNOPSIS)

Month : Jan/2023 Subject : Environmental chemistry/ Green chemistry

TOPIC : water pollution/ Microwave & ultrasound assisted green [illegible] Paper : V/G (2018)

Hours Required	10h + 10h = 20h
Learning Objectives	water quality standards, BOD, Industrial waste water, selection of solvent, [illegible], reactions.
Previous Knowledge to be reminded	Sources of water. EMR.
Topic Synopsis	Hardness of water, Green reactions

water pollution.

→ unique physical and chemical properties of water.

→ water quality standards and parameters

→ Turbidity – pH, Dissolved oxygen

→ BOD, COD, suspended solids, TDS

→ alkalinity – Hardness of water

→ Eutrophication and its effects.

→ Industrial waste water treatment

Temporary hardness removal.

1) boiling 2) clark's method 3) ~~washing soda~~

permanent hardness removal

1) By adding washing soda

2) permutit process

3) Calgon process

4) Ion exchange resins

→ Degree of hardness

Thrust areas	Hardness of water, MAOS
Skill to be learnt by Student	mechanisms in purification of water
Examples/Illustrations	water analysis, microwave reactions
Additional Inputs	

Teaching Models used	Ion exchange [illegible], microwave
Teaching Aids used	video, PPT, ICT
References cited	E.C. Stanley Manahan, & C.V. K. Ahluwalia
Student Activity planned after the teaching	presentation PPT / seminar
Activity planned outside classes	mid Exam.
Any other	

UNIT-III: Microwave and ultrasound assisted green synthesis

→ (1) selection of solvent

i) Aqueous phase reactions.

ii) Reactions in ionic liquids, Heck reaction

Suzuki reactions, epoxidation.

iii) Solid supported synthesis.

iv) supercritical CO2 (SCF)

preparation, properties & applications

c) green energy and sustainability (Revised)

→ Apparatus required, Examples of MAOS

→ Advantages and disadvantages of MAOS.

→ Aldol condensation, Cannizzaro reaction

→ Diels – Alder reaction

→ Strecker synthesis.

D.A:

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TEACHING PLAN (SYNOPSIS)

Month : April-2023 Subject : II B.Sc (IV Sem) Chemistry

TOPIC : Thermodynamics (UNIT-V) Paper : IV

Hours Required	12
Learning Objectives	Laws of thermodynamics, Thomson effect, carnot theorm
Previous Knowledge to be reminded	System, Isothermal, adiabatic, Internal energy.
Topic Synopsis	Heat capacities, kirchoff's law, carnot cycle.

UNIT-V

Thermodynamics

→ The third law of thermodynamics.
→ Statement, definition of internal energy and enthalpy
→ Heat capacities and their relationship
→ Joule-Thomson effect - coefficient
→ Calculation of work for the expansion of perfect gas under isothermal and adiabatic conditions for reversible processes.
→ State functions.
→ Temperature dependence of enthalpy of formation.
→ Kirchoff's equation.
→ Second law of thermodynamics - different statements
→ of the law
→ Carnot cycle and its efficiency.

Thrust areas	kirchoff's law, carnot cycle
Skill to be learnt by Student	Derive the equations & solved the problems.
Examples/Illustrations	Thermodynamic laws.
Additional Inputs	

Teaching Models used	
Teaching Aids used	Black board
References cited	Advanced physical Chemistry by Gurdeep 354
Student Activity planned after the teaching	practice the equation-derivation
Activity planned outside classes	Assignment
Any other	

→ Carnot theorm.
→ Concept of entropy
→ Entropy as a state function
→ Entropy changes in reversible and irreversible processes
→ Entropy changes in spontaneous and equilibrium processes.
→ Third law of thermodynamics
→ Nernst heat theorm.
→ Spontaneous and non-spontaneous process.
→ Helmholtz and gibbs energies -
→ Criteria for spontaneity.

Important

1) $C_P - C_V = R$
2) $P_1V_1^\gamma = P_2V_2^\gamma$
3) $\frac{\Delta E_2 - \Delta E_1}{T_2 - T_1} = C_V(2) - C_V(1) = \Delta C_V$
4) Efficiency $= \frac{w}{q} = \frac{q_2 - q_1}{q_2} = \frac{T_2 - T_1}{T_2}$.

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TEACHING PLAN (SYNOPSIS)

Month : APRIL-2023 Subject : II BSc (IV Sem) Chemistry

TOPIC : Chemical Kinetics Paper : V

Hours Required	14
Learning Objectives	Order of reactions, Arrhenius equation.
Previous Knowledge to be reminded	Rate of reaction, Types of reactions.
Topic Synopsis	Methods of Order of reaction, Derivations.

Chemical Kinetics (UNIT-V)

→ The Concept of reaction rates.
→ Effect of temperature, pressure, catalyst and other factors.
→ Order and molecularity of a reaction.
→ Derivation of integrated rate equations for first order, second order reactions
→ General methods for determination of order of a reaction.
→ Concept of activation energy its calculation from Arrhenius equation.
→ Theories of reaction rates.
→ Collision theory and activated complex theory of bimolecular reactions.

Thrust areas	Derivations of order reactions, Theories of reaction rates
Skill to be learnt by Student	practice the derivations, graphs.
Examples/Illustrations	Order of reactions, types of reactions
Additional Inputs	1st order reactions

Teaching Models used	
Teaching Aids used	Black board.
References cited	Advanced physical Chemistry, Gurdeep Raj.
Student Activity planned after the teaching	Solved the equations
Activity planned outside classes	Seminar
Any other	

→ Comparison of the two theories (Qualitative treatment only)
→ Enzyme catalysis
→ Specificity factors, effective enzyme catalysis.
→ Inhibitors and Lock & key.

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TEACHING PLAN (SYNOPSIS)

Month : April - 2023 Subject : II year (IPE) Chemistry

TOPIC : Electrochemistry Paper : IV

Hours Required	14h
Learning Objectives	Kohlrausch's law, transport number, Electrochemical cells.
Previous Knowledge to be reminded	Electrolytes, Electrodes, Electrolytic cells.
Topic Synopsis	Definition, Kohlrausch's law, transport number, Debye-Huckel-onsagers equation.

→ Introduction to Electrochemistry.
→ Specific conductance, equivalent conductance.
→ molar conductance.
→ Effect of dilution.
→ Cell constant
→ Strong and weak electrolytes.
→ Kohlrausch's law and its application.
→ Definition of transport number,
→ Determination of transport number by Hittorf's method.
→ Debye - Huckel - onsagers equation for strong electrolytes.
→ Application of conductivity measures.
→ Conductometric titrations.
→ Electrochemical cells.

Thrust areas	Transport number, Debye-Huckel-onsagers.
Skill to be learnt by Student	Equations, Diagrams.
Examples/Illustrations	Electrolytes
Additional Inputs	

Teaching Models used	Electrolytic cells, Salt bridge
Teaching Aids used	Black board, Videos.
References cited	Advanced physical chemistry by Gurdeep Raj.
Student Activity planned after the teaching	Practicable cell reactions.
Activity planned outside classes	Assignments
Any other	

→ Single electrode potential.
→ Types of electrodes - Reference - Salt bridge.
→ Determination of EMF of a cell.
→ Nernst equation.
→ Applications of EMF measurements.
→ Potentiometric titrations
→ Fuel cells.
→ Basic concepts, examples,
→ Applications

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TEACHING PLAN (SYNOPSIS)

Month : April 2023 Subject : II year (IV) Chemistry

TOPIC : Carbohydrates Paper : IV

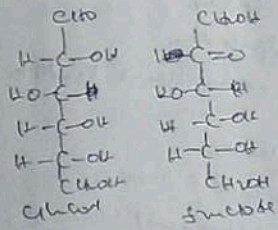
Hours Required	8h
Learning Objectives	Sugars & non sugars, classification of carbohydrates.
Previous Knowledge to be reminded	Sugars, classification of carbohydrates.
Topic Synopsis	configuration of glucose, fructose, conversion

→ Sources of carbohydrates
→ classification and their importance of carbohydrates
→ monosaccharides.
→ constitution and absolute configuration of glucose and fructose
→ Epimers and Anomers
→ Mutarotation
→ Determination of ring size of glucose and fructose
→ Haworth projection and conformational structure
→ Interconversion of aldose and ketoses.
→ Kiliani-Fischer synthesis.
→ Ruff degradation.
→ Disaccharides

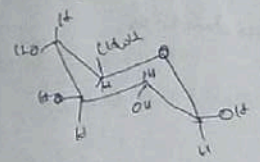
Thrust areas	Conversion, Epimers & Anomers.
Skill to be learnt by Student	Structure of Glucose
Examples/Illustrations	Carbohydrates, Cannizaro.
Additional Inputs	

Teaching Models used	Chart Glucose, Sucrose, Fructose
Teaching Aids used	Black board
References cited	Unified chemistry.
Student Activity planned after the teaching	Seminar
Activity planned outside classes	Practice the Nomenclature.
Any other	

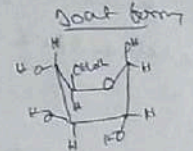
→ Elementary treatment of maltose,
→ Lactose and sucrose
→ polysaccharides.



Chair form of Glucose



Boat form



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TEACHING PLAN (SYNOPSIS)

Month : May [202] Subject : I MSC (IV Sem) Chemistry

TOPIC : Nitrogen compounds Paper : IV

Hours Required	14h
Learning Objectives	Nitro hydrocarbons, Amines,
Previous Knowledge to be reminded	functional groups, classification of organic compounds
Topic Synopsis	Synthesis & properties of Nitro & Amine groups.

UNIT-IV Nitrogen containing functional groups.

→ preparation, properties and important reactions of Nitro Compounds, amines and diazonium salts.

→ 1. Nitro hydrocarbons:

→ Nomenclature of Nitro hydrocarbons.

→ classification of Nitro hydrocarbons.

→ Structure - Tautomerism of nitroalkanes leads to aci and keto form.

→ preparation of Nitro alkanes.

→ Reactivity - halogination

→ Reaction with HONO (Nitrous acid)

→ Nef Reaction of Mannich reaction leading to michal addition & reduction.

— Amines:

→ Introduction to amines

→ classification of amines

→ Importance and general methods of preparation.

Thrust areas	Named reactions,
Skill to be learnt by Student	practice the reactions,
Examples/Illustrations	Nitro group & Amine group compounds,
Additional Inputs	

Teaching Models used	
Teaching Aids used	Black board.
References cited	A text book of organic chemistry - I L Finar-5th Ed
Student Activity planned after the teaching	Assignment
Activity planned outside classes	practice the concepts.
Any other	

physical properties

→ Basicities of amines - Effect of substituent, solvent and steric effects

→ Distinction between primary, secondary & tertiary amines using Hinsberg's method & nitrous acid.

→ Discussion of the following reactions with emphasis on the mechanistic pathways Diazotization - Sandmeyer reaction, Carbylamine reaction

→ Hoffmann exhaustive methylation.

→ Hoffmann elimination reaction.

→ Diazonium Salts:

→ preparation and synthetic applications of diazonium salts.

→ Coupling reactions.

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TEACHING PLAN (SYNOPSIS)

Month : May/2023 Subject : I BSc (II Sem) Chemistry

TOPIC : Stereo chemistry of carbon compounds Paper : II

Hours Required	10h
Learning Objectives	Molecular representations - wedge, Fischer, Newman, Sawhorse formulae, optical isomerism,
Previous Knowledge to be reminded	chiral molecule, Enantiomers.
Topic Synopsis	Optical Isomerism, D,L, R,S configurations

→ Molecular representations

→ wedge, Fischer, Newman and Saw-Horse formulae.

→ Optical Isomerism:-

Optical activity, wave nature of light

→ plane polarised light, optical rotation & specific rotation.

→ chiral molecules - definition and criteria.

→ Definition of enantiomers and diastereomers

→ Explanation of optical isomerism with examples

→ Glyceraldehyde - Lactic acid, Tartaric acid, Tartaric acid, 2,3-dibromopentane

→ D,L R,S and E,Z - Configuration with Examples

→ Definition of racemic mixture - Resolution of racemic mixture.

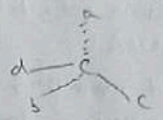
Thrust areas	Molecular representations, DL & RS configuration
Skill to be learnt by Student	Draw the structures
Examples/Illustrations	chiral molecules
Additional Inputs	

Teaching Models used	Chart, models
Teaching Aids used	Black board, videos
References cited	Organic reaction Mechanism and stereochemistry and Peter Sykes
Student Activity planned after the teaching	Q & A
Activity planned outside classes	Problems for Numericals
Any other	

→ Different planer representations of 3-D Formulae.

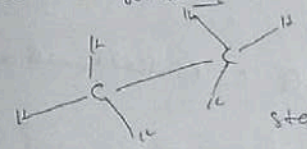
1) Flying wedge formula: ||||||||| a broken wedge. ▬ Solid wedge

Eg: Cabcd



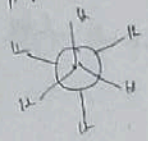
2) Fischer projection formulae:

3) Sawhorse formulae:



staggered (21%)

4) Newman projection formulae:



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TEACHING PLAN (SYNOPSIS)

Month : June /2023 Subject : I BSc(BZC) Chemistry

TOPIC : C–C (Alkanes, Alkenes, Cycloalkanes) Paper : II

Hours Required	12
Learning Objectives	preparation of alkanes & cycloalkanes properties.
Previous Knowledge to be reminded	classification of organic compounds Alkane, Alkene
Topic Synopsis	preparation & properties, stability theory

→ Alkanes:

→ General methods of preparation of alkanes

— Wurtz, Wurtz Fittig reaction

→ Corey–House synthesis

→ physical and chemical properties of alkanes

→ Isomerism and its effect on properties.

→ Free radical substitution

→ Halogination. Concept of relative reactivity

→ Conformational analysis of alkanes

→ Ethane, butane,

Cyclo alkanes:

→ General molecular formula of cycloalkanes and relative stability.

→ Baeyer's theory,

→ cyclohexane conformation with energy diagram

→ Conformation of monosubstituted cyclohexane,

Thrust areas	cycloalkane property Alkenes
Skill to be learnt by Student	chemical equation
Examples/Illustrations	Alkane, cycloalkane, Alkenes
Additional Inputs	

Teaching Models used	Ball & Model.
Teaching Aids used	Chart
References cited	T.L Ring
Student Activity planned after the teaching	Assignment
Activity planned outside classes	practice the equation.
Any other	

UNIT-II– C–C π bonds

Alkenes.

→ General methods of preparation of alkenes

→ physical properties

→ chemical properties – mechanism.

→ E_1, E_2 reaction

→ Saytzeff and Hoffmann elimination.

→ Electrophilic addition.

→ Markownikoff / Anti-Markownikoff addition

→ Syn & anti addition

→ Addition of H_2, X_2, HX, H_2O, NH_3, oxymercuration, oxidation.

→ Diels Alder reaction.

→ 1,2– and 1,4–addition reactions in conjugated dienes.

→ Alkynes:

→ preparation & properties of alkynes

→ Acidic nature of Ethyne,

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TEACHING PLAN (SYNOPSIS)

Month : Jul / 2023 Subject : Engl (IV Sem) Chem

TOPIC : Organometallic compounds Paper : IV.

Hours Required	
Learning Objectives	preparation, classification, structure of metal carbonyls
Previous Knowledge to be reminded	Ligand, NiBz, amino acids definition.
Topic Synopsis	preparation, properties of metal carbonyls, Chemical properties.

Organometallic Compounds

→ Definition classification of organometallic compounds.
→ Concept of hapticity of organic ligands.
→ metal carbonyls: 18-electron rule
→ Electron count of mononuclear, polynuclear and substituted metal carbonyls of 3d-series
→ Current methods of preparation of mononuclear carbonyls of 3d series,
→ π-acceptor behaviour of carbon monoxide
→ Synergic effect (VB approach)
→ MO diagram of CO
→ Structure $Ni(CO)_4$, $Mn_2(CO)_{10}$, $Co_2(CO)_8$, $Cr(CO)_6$, $Fe(CO)_5$

Thrust areas	Structure of metal carbonyls, properties & amino acids.
Skill to be learnt by Student	practice the structures of metal carbonyls
Examples/Illustrations	Different types metal carbonyls, amino acids
Additional Inputs	polynuclear metal carbonyls

Teaching Models used	Natural products
Teaching Aids used	Chart.
References cited	Advanced Inorganic Chemistry, Vol I & II, Satya prakash, Tuli, Basu
Student Activity planned after the teaching	Assignment
Activity planned outside classes	practice the structures
Any other	

Amino acids - proteins:

→ Introduction → definition, classification.
→ Natural & Synthetical amino acids
→ methods of synthesis:
→ Halogenated carboxylic acids
→ Gabriel phthalimide synthesis & Strecker's
→ physical properties
  → Zwitter ion structure - Salt like characters
  → Solubility, melting point, amphoteric character
  → Isoelectric point
→ Chemical properties
  → Current reactions due to amino & carboxylic groups.
  → Lactams from gamma & delta amino acids by heating
  → Peptide bond. polypeptide bond.
  → Structural nomenclature of peptide and protein.

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TEACHING PLAN (SYNOPSIS)

Month : June/2017 Subject : I year (IV sem) chemistry

TOPIC : Coordination Compounds Paper : V

Hours Required	12+4+2 = 18
Learning Objectives	IUPAC nomenclature, VBT, CFT, Stereochemistry, Isomerism
Previous Knowledge to be reminded	werner theory, EAN.
Topic Synopsis	VBT, CFT, stereochemistry, SN1 & SN2 mechanisms

Coordination chemistry

→ IUPAC nomenclature of coordination compounds.
→ Structural and Inner and outer orbital complexes
→ Limitations of VBT.
→ Crystal field theory - effect on Octahedral symmetry, crystal field stabilization energy.
→ Crystal field effects for weak and strong fields.
→ Tetrahedral symmetry.
→ Factors affecting the magnitude of CFSE.
→ Spectrochemical series.
→ Comparison of CFSE for octahedral tetrahedral complexes.
→ Tetragonal distortion of octahedral geometry.
→ Jahn-Teller distortion.
→ Square planar coordination.

Thrust areas	VBT, CFT, SN1 SN2, IUPAC method
Skill to be learnt by Student	Diagonal Isomers, CFT, Jahn teller.
Examples/Illustrations	complex compounds, Labile and Inert reactions
Additional Inputs	Jahn-Teller effect.

Teaching Models used	Chalk
Teaching Aids used	Black board
References cited	Concise Inorganic Chemistry: J.D. Lee.
Student Activity planned after the teaching	Seminar
Activity planned outside classes	Class Test, Quizzes
Any other	

UNIT-I Inorganic reaction mechanisms

→ Introduction to inorganic reaction mechanisms
→ Concept of reaction pathways.
→ Transition state.
→ Intermediate and activated complex.
→ Labile and inert complexes.
→ Trans-effect.
→ Theories of trans effect and its application
- Stability of metal complexes.
→ Thermodynamic stability and kinetic stability
→ Factors affecting the stability of metal complexes
→ Chelate effect
→ Determination of composition of complex by Job's method
→ mole ratio method.

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TEACHING PLAN (SYNOPSIS)

Month : July | 2021 Subject : B.Sc (IV sem) chemistry

TOPIC : Aromatic and its reactivity & Surface chemistry Paper : IV

Hours Required	12 + 6 = 18
Learning Objectives	Aromatic & Aliphatic reactivity, LCAO
Previous Knowledge to be reminded	Aromatic compound, hydrocarbons, adsorption
Topic Synopsis	Friedel craft reaction, colloids, M.O theory

→ Nomenclature & its reactivity

→ Concept of aromaticity.

→ Huckel's rule

→ Application to benzenoid & non-benzenoid compounds

→ Reactions

→ General mechanism of electrophilic aromatic substitution

→ mechanism of Nitration

→ Friedel – Crafts alkylation & acylation.

→ Orientation of aromatic substitution.

→ Ortho para and meta directing groups.

→ Ring activating & deactivating groups

→ Orientation of i) amino, methoxy & alkyl groups ii) Carboxy, nitro, nitrile, carbonyl and sulphonic acid groups.

iii) Halogens.

Thrust areas	chemical property, LCAO theory, colloids
Skill to be learnt by Student	colloids, Aromatic Compounds, mechanism
Examples/Illustrations	Aromatic Compounds - LCAO.
Additional Inputs	LCAO to Ions molecule

Teaching Models used	
Teaching Aids used	Relief
References cited	I. L. Finar, Advanced physical chem, Surendra Rai
Student Activity planned after the teaching	Assignment, Review
Activity planned outside classes	Quiz & oral questions
Any other	

Unit II : Surface chemistry & chemical bonding

Colloids :-

→ Coagulation of colloids.

→ Hardy – Schulze rule

→ Stability of colloids

→ protection of colloids, Gold number

Adsorption :

→ physical & chemical adsorption

→ Langmuir adsorption isotherm

→ Applications of adsorption.

chemical adsorption.

→ Applications of adsorption.

chemical bonding :

→ valence bond theory, Hybridization.

→ V. Bond theory. – CH_4, NH_3, H_2O

→ M.O theory – LCAO method.

→ Homo nuclear & hetero nuclear diatomic molecules.

[N_2, O_2, CO, NO]

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TEACHING PLAN (SYNOPSIS)

Month : July (2017) Subject : B.Sc (IV sem) Chemistry

TOPIC : Bio inorganic chemistry, Phase rule. Paper : IV

Hours Required	8 + 6 = 14 H
Learning Objectives	Toxicity of metals, Haemoglobin, water & As-Pb system
Previous Knowledge to be reminded	Biological system, components, water phases
Topic Synopsis	uses & chelating agents in medicine, Haemoglobin, Pb-As system

Bio inorganic Chemistry

→ metal ions present in biological systems.
→ classification of elements according to their action in biological system.
→ Geochemical effect on the distribution of metals Na / K.
→ Excess and deficiency of some toxic metals.
[Hg, Pb, Cd & As] – Reasons for toxicity.
→ uses of chelating agents in medicine.
→ cis-platin as an anticancer drug.
→ Ionic application in bio-systems.
→ Haemoglobin, myoglobin.
→ Storage and transfer of O2

Thrust areas	Haemoglobin, myoglobin, water & As-Pb system.
Skill to be learnt by Student	Structure of Haemoglobin, myoglobin, As-Pb system
Examples/Illustrations	Toxic trace elements, chelates, compounds
Additional Inputs	

Teaching Models used	Lecture,
Teaching Aids used	Black board, Lecture,
References cited	Advanced physical chemistry by Gurudeep Raj
Student Activity planned after the teaching	Group discussion
Activity planned outside classes	Learning the some practically.
Any other	

Phase rule

→ concept of phase components
→ Degrees of freedom,
→ Thermodynamic derivation of Gibbs phase rule
→ phase diagram of one component system.
→ water (H_2O) system)
→ Studies of phase diagrams of simple eutectic systems i) Pb-Ag system, desilverisation of lead.
→ Nacl-water system.
→ congruent and incongruent melting point
→ Freezing mixtures.

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TEACHING PLAN (SYNOPSIS)

Month : July(102) Subject : II BSc (IV Sem) chemistry

TOPIC : Heterocyclic compounds Paper : IV
photochemistry

Hours Required	7+5=12h
Learning Objectives	preparation & properties of Heterocyclic compounds. HCl, HNO formation.
Previous Knowledge to be reminded	Examples of Heterocyclic compounds Photochemistry.
Topic Synopsis	properties of Heterocyclic compounds. HCl, HNO formation

Hetero cyclic Compounds:

→ Simple five membered ring compounds with one heteroatom

Ex: Furan, thiophene and pyrrole

→ Aromatic character.

→ preparation from 1,4 dicarbonyl compounds.

→ Paul – knorr Synthesis

Properties:

→ Acidic character of pyrrole

→ Electrophilic substitution at 2 or 5 positions.

→ Halogenation, Nitration and Sulphonation.

→ Under mild condition.

→ Diels – Alder reaction in furan.

→ Pyridine – Structure – Aromaticity

→ comparison with pyrrole.

→ One method of preparation & properties

→ Reactivity towards nucleophilic substitution reaction.

Thrust areas	Synthesis of Heterocyclic comps, HCl, HNO formation
Skill to be learnt by Student	mechanism of chemical reactions Tautomerism, diazo
Examples/Illustrations	Hetero cyclic Compounds, Uses of Quinoline
Additional Inputs	

Teaching Models used	
Teaching Aids used	Black board
References cited	Advanced physical chemistry - Gurudeep Raj
Student Activity planned after the teaching	Assignment
Activity planned outside classes	
Any other	

photochemistry:

→ Difference between thermal & photochemical processes.

→ Laws of photochemistry.

→ Grotthus: Draper's Law & Stark – Einstein law of photochemical equivalence

→ Quantum yield – photochemical reactions

→ Hydrogen – Chlorine

→ Hydrogen – bromine reaction

→ Qualitative description of fluorescence

→ phosphorescence

→ Jablonski diagram.

→ photosensitized reactions & energy transfer process.

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