

Dr. B.R. AMBEDKAR UNIVERSITY

B.Sc. Chemistry Syllabus

Paper – III 90 hrs (3h / w)

Inorganic Chemistry, Organic Chemistry, physical chemistry, General Chemistry

Unit – I (Inorganic Chemistry-III) 22 hrs (1 h/w)

1.Coordination Chemistry: 10h

IUPAC nomenclature, bonding theories – review of Werner's theory and Sidgwick's concept of coordination, Valence bond theory, geometries of coordination numbers 4-tetrahedral and square planar and 6-octahedral and its limitations, crystal field theory, splitting of d-orbitals in octahedral, tetrahedral and square-planar complexes – low spin and high spin complexes – factors affecting crystal-field splitting energy, merits and demerits of crystal-field theory. Isomerism in coordination compounds – structural isomerism and stereo isomerism, stereochemistry of complexes with 4 and 6 coordination numbers.

2. Spectral and magnetic properties of metal complexes: 4h

Electronic absorption spectrum of $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ ion. Types of magnetic behavior, spin-only formula, calculation of magnetic moments, experimental determination of magnetic susceptibility – Gouy method.

3. Reactivity of metal complexes: 4h

Labile and inert complexes, ligand substitution reactions – $\text{S}_{\text{N}}1$ and $\text{S}_{\text{N}}2$, substitution reactions of square planar complexes – Trans effect and applications of trans effect.

4. Stability of metal complexes: 4h

Thermodynamic stability and kinetic stability, factors affecting the stability of metal complexes, chelate effect, determination of composition of complex by Job's method and mole ratio method.

UNIT – II (Organic Chemistry – III) 23 hrs (1h/w)

1. Nitrogen compounds 8 h

Nitro hydrocarbons: Nomenclature and classification – nitro hydrocarbons – structure. Tautomerism of nitroalkanes leading to aci and keto form. Preparation of Nitroalkanes. Reactivity – halogenation, reaction with HONO (Nitrous acid), Nef reaction and Mannich reaction leading to Michael addition and reduction. Amines (Aliphatic and Aromatic): Nomenclature, Classification into 1° , 2° , 3° Amines and Quarternary ammonium compounds. Preparative methods -1. Ammonolysis of alkyl halides 2. Gabriel synthesis 3. Hoffman's bromamide reaction (mechanism). 4. Reduction of Amides and Schmidt reaction. Physical properties and basic character – Comparative basic strength of Ammonia,

methyl amine, dimethyl amine, trimethyl amine and aniline – comparative basic strength of aniline, N-methylaniline and N,N-dimethyl aniline (in aqueous and non-aqueous medium), steric effects and substituent effects. Use of amine salts as phase transfer catalysts. Chemical properties: a) Alkylation b) Acylation c) Carbylamine reaction d) Hinsberg separation e) Reaction with Nitrous acid of 1^o, 2^o, 3^o (Aliphatic and aromatic amines). Electrophilic substitutions of Aromatic amines – Bromination and Nitration. oxidation of aryl and 3^o Amines. Diazotization
Cyanides and isocyanides: Nomenclature (aliphatic and aromatic) structure. Preparation of cyanides from a) Alkyl halides b) from amides c) from aldoximes. Preparation of isocyanides from Alkyl halides and Amines. Properties of cyanides and isocyanides, a) hydrolysis b) addition of Grignard reagent iii) reduction iv) oxidation.

2. Heterocyclic Compounds

5 h

Introduction and definition: Simple 5 membered ring compounds with one hetero atom Ex. Furan. Thiophene and pyrrole. Importance of ring system – presence in important natural products like hemoglobin and chlorophyll. Numbering the ring systems as per Greek letter and Numbers. Aromatic character – 6- electron system (four-electrons from two double bonds and a pair of non-bonded electrons from the hetero atom). Tendency to undergo substitution reactions.

Resonance structures: Indicating electron surplus carbons and electron deficient hetero atom. Explanation of feebly acidic character of pyrrole, electrophilic substitution at 2 or 5 position, Halogenation, Nitration and Sulphonation under mild conditions. Reactivity of furan as 1,3-diene, Diels Alder reactions (one example). Sulphonation of thiophene purification of Benzene obtained from coal tar). Preparation of furan, Pyrrole and thiophene from 1,4,- dicarbonyl compounds only, Paul-Knorr synthesis, structure of pyridine, Basicity – Aromaticity – Comparison with pyrrole – one method of preparation and properties – Reactivity towards Nucleophilic substitution reaction – chichibabin reaction.

3. Carbohydrates

6 h

Monosaccharides: All discussion to be confined to (+) glucose as an example of aldo hexoses and (-) fructose as example of ketohexoses. Chemical properties and structural elucidation: Evidences for straight chain pentahydroxy aldehyde structure (Acetylation, reduction to n-hexane, cyanohydrin formation, reduction of Tollen's and Fehling's

reagents and oxidation to gluconic and saccharic acid). Number of optically active isomers possible for the structure, configuration of glucose based on D-glyceraldehyde as primary standard (no proof for configuration is required). Evidence for cyclic structure of glucose (some negative aldehydes tests and mutarotation). Cyclic structure of glucose. Decomposition of cyclic structure (Pyranose structure, anomeric Carbon and anomers). Proof for the ring size (methylation, hydrolysis and oxidation reactions). Different ways of writing pyranose structure (Haworth formula and chair conformationa formula). Structure of fructose: Evidence of 2 – ketohexose structure (formation of penta acetate, formation of cyanohydrin its hydrolysis and reduction by HI to give 2-Carboxy-n-hexane). Same osazone formation from glucose and fructose, Hydrogen bonding in osazones, cyclic structure for fructose (Furanose structure and Haworth formula).

Interconversion of Monosaccharides: Aldopentose to aldo hexose – eg: Arabinose to D-Glucose, D-Mannose (Kiliani - Fischer method). Epimers, Epimerisation – Lobry de bruyn van Ekenstein rearrangement. Aldohexose to Aldopentose eg: D-glucose to D-arabinose by Ruff's degradation. Aldohexose (+) (glucose) to ketohexose (-) (Fructose) and Ketohexose (fructose) to aldohexose (Glucose)

4. Amino acids and proteins

4 h

Introduction: Definition of Amino acids, classification of Amino acids into alpha, beta, and gama amino acids. Natural and essential amino acids – definition and examples, classification of alpha amino acids into acidic, basic and neutral amino acids with examples. Methods of synthesis: General methods of synthesis of alpha amino acids (specific examples – Glycine, Alanine, valine and leucene) by following methods: a) from halogenated carboxylic acid b) Malonic ester synthesis c) strecker's synthesis.

Physical properties: Optical activity of naturally occurring amino acids: L-configuration, irrespective of sign rotation, Zwitterion structure – salt like character - solubility, melting points, amphoteric character , definition of isoelectric point.

Chemical properties: General reactions due to amino and carboxyl groups – lactams from gamma and delta amino acids by heating peptide bond (amide linkage). Structure and nomenclature of peptides and proteins.

Unit-III (physical chemistry-III) 234hrs (1 h / w)

1. Chemical kinetics

8 h

Rate of reaction, factors influencing the rate of a reaction-concentration, temperature, pressure, solvent, light, catalyst. Experimental methods to determine the rate of reaction. Definition of order and molecularity. Derivation of rate constants for first, second, third and zero order reactions and examples. Derivation for time half change. Methods to determine the order of reactions. Kinetics of complex reactions (first order only): opposing reactions, parallel reactions, consecutive reactions and chain reactions. Effect of temperature on rate of reaction, Arrhenius equation, concept of activation energy. Theories of reaction rates-

collision theory-derivation of rate constant for bimolecular reaction. The transition state theory (elementary treatment).

2. Photochemistry

4 h

Difference between thermal and photochemical processes. Laws of photochemistry-Grothus-Draper's law and Stark-Einstein's law of photochemical equivalence. Quantum yield. Ferrioxalate actinometry. Photochemical hydrogen- chlorine, hydrogen-bromine reaction. Jablonski diagram depicting various processes occurring in the excited state, qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing). Photosensitized reactions- energy transfer processes (simple example)

3. Thermodynamics

11 h

The first law of thermodynamics-statement, definition of internal energy and enthalpy. Heat capacities and their relationship. Calculation of w , q , dU and dH for the expansion of perfect gas under isothermal and 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 cyclic, reversible, and irreversible processes and reversible phase change. Calculation of entropy changes with changes in V & T and P & T . Entropy changes in spontaneous and equilibrium processes. The Gibbs (G) and Helmholtz (A) energies. A & G as criteria for thermodynamic equilibrium and spontaneity-advantage over entropy change.

Unit – IV (General Chemistry-III) 22 hrs (1 h/w)

1. Hard and soft acids bases (HSAB):

2h

Classification, Pearson's concept of hardness and softness, application of HSAB principles – Stability of compounds / complexes, predicting the feasibility of a reaction.

2. Biological Significance of metals

4h

Essential elements, biological significance of Na, K, Mg, Ca, Fe, Co, Ni, Cu, Zn. Metalloporphyrins – hemoglobin, structure and function, Chlorophyll, structure and role in photosynthesis. Toxicity of Lead, Arsenic, Mercury and Cadmium

3. Named Reactions

10h

Bayer Villiger oxidation, Clemmensen Reduction, Birch Reduction, Claisen Rearrangement, Beckmann Rearrangement, Benzoin condensation, Wittig reaction, Reformatsky reaction,

4. Green Chemistry

6h

Introduction: Definition of green Chemistry, need of green chemistry, basic principles of green chemistry

Green synthesis: Evaluation of the type of the reaction i) Rearrangements (100% atom economic), ii) Addition reaction (100% atom economic), Pericyclic reactions (no by-product).

Selection of solvent:

i) Aqueous phase reactions ii) Reactions in ionic liquids iii) Solid supported synthesis

iv) Solvent free reactions (solid phase reactions)

ii) Green catalysts: i) Phase transfer catalysts (PTC) ii) Biocatalysts

Microwave and Ultrasound assisted green synthesis:

1. Aldol condensation

2. Cannizzaro reaction

3. Diels-Alder reactions

4. Strecker synthesis

5. Willaimson synthesis

6. Dieckmann condensation

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B.Sc. Chemistry Syllabus

Paper – IV 90 hrs (3h / w)

Separation Techniques, Molecular spectroscopy, Drugs, formulations and pesticides and green chemistry, Macromolecules, materials Science and catalysis.

**Unit – I Separation Techniques
(1 h / w)**

22 hrs

1. **Solvent extraction:**
4h

Principle and process, Batch extraction, continuous extraction and counter current extraction.

2. **Chromatography:**
12h

Classification of chromatography methods, principles of differential migration
adsorption phenomenon, Nature of adsorbents, solvent systems, Rf values, factors effecting Rf values.

- a. Paper Chromatography: Principles, Rf values, experimental procedures, choice of paper and solvent systems, developments of chromatogram – ascending, descending and radial. Two dimensional chromatography, applications.
- b. Thin layer Chromatography (TLC): Advantages. Principles, factors effecting Rf values. Experimental procedures. Adsorbents and solvents. Preparation of plates. Development of the chromatogram. Detection of the spots. Applications.
- c. Column Chromatography: Principles, experimental procedures, Stationary and mobile Phases, Separation technique. Applications
- d. High Performance Liquid Chromatography (HPLC): Principles and Applications.

3. **Spectrophotometry**
6 h

General features of absorption – spectroscopy, Beer-Lambert's law and its limitations, transmittance, Absorbance, and molar absorptivity. Single and double beam spectrophotometers. Application of Beer-Lambert law for quantitative analysis of

1. Chromium in $K_2Cr_2O_7$

2. Manganese in manganous sulphate
3. Iron (III) with thiocyanate.

**Unit – II Molecular spectroscopy
(1 h / w)**

23 hrs

1. Electronic spectroscopy:

3h

Interaction of electromagnetic radiation with molecules and types of molecular spectra. Potential energy curves for bonding and antibonding molecular orbitals. Energy levels of molecules (σ, π, n). Selection rules for electronic spectra. Types of electronic transitions in molecules effect of conjugation. Concept of chromophore.

2. Infra red spectroscopy

5h

Energy levels of simple harmonic oscillator, molecular vibration spectrum, selection rules. Determination of force constant. Qualitative relation of force constant to bond energies. Anharmonic motion of real molecules and energy levels. Modes of vibrations in polyatomic molecules. Characteristic absorption bands of various functional groups. Finger print nature of infrared spectrum.

3. Raman spectroscopy

4h

Concept of polarizability, selection rules, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules.

4. Proton magnetic resonance spectroscopy (¹H-NMR)

5h

Principles of nuclear magnetic resonance, equivalent and non-equivalent protons, position of signals. Chemical shift, NMR splitting of signals – spin-spin coupling, coupling constants. Applications of NMR with suitable examples – ethyl bromide, ethanol, acetaldehyde, 1,1,2-tribromo ethane, ethyl acetate, toluene and acetophenone.

5. Mass Spectrometry:

4h

Basic principles – Molecular ion / parent ion, fragment ions / daughter ions. Theory – formation of parent ions. Representation of mass spectrum. Identification of parent ion, (M+1), (M+2), base peaks (relative abundance 100%) Determination of molecular formula – Mass spectra of ethylbenzene, acetophenone, n-butyl amine and 1-propanal.

6. Spectral interpretation

2h

Interpretation of IR, UV-Visible, ¹H-NMR and mass spectral data of the following compounds 1. Phenyl acetylene 2. Acetophenone 3. Cinnamic Acid 4. para-nitro aniline.

Unit – III (Drugs, formulations and pesticides and green chemistry) 23 hrs (1 h / w)

1. Drugs

15 h

- a. Introduction: Drug, disease (definition), Historical evolution, Sources – Plant, Animal synthetic, Biotechnology and human gene therapy
- b. Terminology: Pharmacy, Pharmacology, Pharmacophore, Pharmacodynamics, Pharmacokinetics (ADME, Receptors – brief treatment) Metabolites and Anti metabolites.
- c. Nomenclature: Chemical name, Generic name and trade names with examples
- d. Classification: Classification based on structures and therapeutic activity with one example each.
- e. Synthesis: Synthesis and therapeutic activity of the following drugs., L-Dopa, Chloroquin, Omeprazole, Albuterol and ciprofloxacin.
- f. Drug Development: Pencillin, Separation and isolation, structures of different pencillins
- h. HIV-AIDS: Immunity – CD-4 cells, CD-8 cells Retrovirus, replication in human body. Investigation available, prevention of AIDS. Drugs available – examples with structures: PIS: Indinavir (Crixivan), Nelfinavir (Viracept), NNRTIS: Efavirenz (Susrtiva), Nevirapine (Viramune) NRTIs: Abacavir (Ziagen), Lamivudine (EpiVir, 3TC) Zidovudine (Retravir, AZT, ZDV)
- i. Monographs of drugs: Eg Paracetamol, Sulpha methoxazole (Tablets)

2.

Formulations

3h

- a. Need of conversion of drugs into medicine. Additives and their role (brief account only)
- b. Different types of formulations

3.

Pesticides

5h

- a. Introduction to pesticides – types – Insecticides, Fungicides, Herbicides, Weedicides, Rodenticides plant growth regulators, Pheromones and Hormones. Brief discussion with examples, Structure and uses.
- b. Synthesis and present status of the following. DDT, BHC, Malathion, Parathion, Endrin, Baygon, 2,4-D and Endo-sulphon

Unit-III: (Macromolecules, materials Science and catalysis) 22 hrs (1 h / w)

1. Macromolecules

8h

Classification of polymers, chemistry of polymerization, chain polymerization, step polymerization, coordination polymerization – tacticity. Molecular weight of polymers-number average and weight average molecular weight, degree of polymerization, determination of

molecular weight of polymers by viscometry, Osmometry and light scattering methods. Kinetics of free radical polymerization, derivation of rate law. Preparation and industrial application of polyethylene, PVC, Teflon, polyacrylonitrile, terelene and Nylon66. Introduction to biodegradability.

2. Materials science
6h

Superconductivity, characteristics of superconductors, Meissner effect, types of superconductors and applications. Nanomaterials- synthetic techniques, bottom-up-sol-gel method, top-down- electro deposition method. Properties and applications of nano-materials. Composites- definition, general characteristics, particle reinforce and fiber reinforce composites and their applications.

3. Catalysis
8h

Homogeneous and heterogeneous catalysis, comparison with examples. Kinetics of specific acid catalyzed reactions, inversion of cane sugar. Kinetics of specific base catalyzed reactions, base catalyzed conversion of acetone to diacetone alcohol. Acid and base catalyzed reactions- hydrolysis of esters, mutarotation of glucose. Catalytic activity at surfaces. Mechanisms of heterogeneous catalysis. Langmuir-Hinshelwood mechanism.

Enzyme catalysis: Classification, characteristics of enzyme catalysis. Kinetics of enzyme catalyzed reactions-Michaelis Menton law, significance of Michaelis constant (K_m) and maximum velocity (V_{max}). Factors affecting enzyme catalysis- effect of temperature, pH, concentration and inhibitor. Catalytic efficiency. Mechanism of oxidation of ethanol by alcohol dehydrogenase.

LABORATORY COURSE – III

Practical Paper – III (Organic Chemistry) 90 hrs (3 h / w)

1. Synthesis of Organic Compounds

- i. Aromatic electrophilic substitution Nitration: Preparation of nitro benzene and p-nitro acetanilide, Halogenation: Preparation of p-bromo acetanilide – preparation of 2,4,6-tribromo phenol.
- ii. Diazotization and coupling: Preparation of phenyl azo β -naphthol
- iii. Oxidation: Preparation of benzoic acid from benzoyl chloride
- iv. Reduction: Preparation of m-nitro aniline from m-dinitro benzene
- v. Esterification: Preparation of methyl p-nitro benzoate from p-nitro benzoic acid.
- vi. Methylation: Preparation of β -naphthyl methyl ether
Condensation: Preparation of benzilidine aniline and Benzoyl aniline.

2. Thin layer Chromatography & Column Chromatography

- i. Preparation of the TLC plates. Checking the purity of the compounds by TLC:
Acetylation of salicylic acid, aniline, Benzoylation of Aniline and Phenol
Determination of R_f values and identification of organic compounds by TLC: preparation and separation of 2,4-dinitrophenyl hydrazones of acetone and 2-butanone using toluene and light petroleum(40:60)
- ii. Separation of ortho & para nitro aniline mixture by column chromatography

3. Organic Qualitative Analysis:

- i. Identification of an organic compound through the functional group analysis, determination of melting point and preparation of suitable derivatives.
- ii. Separation of two component mixtures
1) Aniline + Naphthalene 2) Benzoic acid + Benzophenone 3) p-Cresol + Chlorobenzene.

4. Demonstration experiments:

1. Steam distillation experiment: separation of ortho and para nitro phenols 2) Microwave assisted Green synthesis, two examples: 1. Hydrolysis of Benzamide 2. Oxidation of Toluene

LABORATORY COURSE – IV

Practical Paper IV (Physical Chemistry) 90hrs (3 h / w)

1. Chemical kinetics

- i. Determination of specific reaction rate of the hydrolysis of methyl acetate catalyzed by hydrogen ion at room temperature.
- ii. Determination of rate of decomposition of hydrogen peroxide.
- iii. Determination of overall order of saponification of ethyl acetate

2. Distribution law

- i. Determination of distribution coefficient of iodine between water and carbon Tetrachloride.
- ii. Determination of molecular status and partition coefficient of benzoic acid in Toluene and water.

3. Electrochemistry

- i. Determination of concentration of HCl conductometrically using standard NaOH solution.
- ii. Determination of concentration of acetic acid conductometrically using standard NaOH solution.
- iii. Determination of dissociation constant (K_a) of acetic acid by conductivity measurements.
- iv. Determination of solubility and solubility product of $BaSO_4$.
- v. Determination of redox potentials of Fe^{2+}/Fe^{3+} by potentiometric titration of ferrous ammonium sulphate vs. potassium dichromate.
- vi. Determination of Cell Constant

4. pH metry

- i. Preparation phosphate buffer solutions
- ii. pH metric titration of weak acid, acetic acid with strong base NaOH and calculation of dissociation constant.

5. Colorimetry

- i. Verification of Beer-Lambert law for $KMnO_4$, $K_2Cr_2O_7$ and determination of concentration of the given solution.
- ii. Verification of Beer-Lambert law for $CuSO_4$ and determination of concentration of the given solution.
- iii. Composition of complex of Cu^{2+} - EDTA disodium salt
- iv. Determination of Nitrate in water

6. Critical Solution Temperature- Phenol-Water System

7. Adsorption

Adsorption of acetic acid on animal charcoal, verification of Freundlich isotherm.

7. Project Work:

Collection of spectral data of a minimum of six compounds belonging to different functional groups (other than those included in the syllabus) and submission of the report.

NOTE: Apart from the experiments (1 to 7) the project work (8) shall also be included in the University Examination.

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BSc IIIrd Year CHEMISTRY

PAPER-3

CHEMISTRY PRACTICAL

Max. Marks: 50

Max. Time : 3 hours

Identification of functional group and naming of organic compound

Systematic procedure must be adopted

Record and Viva- 10 Marks

Practicals – 35 Marks

Project-5 Marks

Break up of Practical (35 MARKS)

Colour	: 2 Marks
Physical State	: 1 Mark
Odour	: 1 Mark
M.P/B.P	: 1 Mark
Ignition test	: 2 Marks
Litmus Test	: 1 Mark
Solubility & Classification based on solubility data	: 3 Marks
Detection of extra elements	: 4 Marks
Unsaturation test with bromine water	: 2 Marks
Permanganate	: 2 Marks
Identification of functional group	: 4 Marks
Confirmatory test for functional group (1 test)	: 3 Marks
Naming of Compound	: 1 Mark
Conformational test for the compound (2 tests) 2x3M	: 6 Marks
Report	: 2 Marks

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BSc IIIrd Year CHEMISTRY

PAPER-4

CHEMISTRY PRACTICAL

Max. Marks: 50

Max. Time : 3 hours

Record and Viva- 10 Marks

Practicals – 40 Marks

Systematic procedure must be adopted

Break up of Practical (40 MARKS)

Procedure in first 10 minutes	:	5 Marks
Formula & units with representation of each term	:	5 Marks
Tabulation & Calculation	:	10 Marks
For result <10%	:	20 Marks
10 to 15%	:	15 Marks
above 15%	:	10 Marks

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BSc IIIrd Year CHEMISTRY

PAPER-3

Model Question Paper

Marks: 100

Time: 03

hours

SECTION-A

Answer the following questions

4 x 15 Marks = 60

Marks

1. (a) Explain the Crystal Field Theory. Explain the splitting of d- orbitals in octahedral and tetrahedral field with suitable examples

(3+6)

స్వీటిక క్షేత్ర సిద్ధాంతములోని ముఖ్యాంశములను తెలిపి, ఆక్టా హెడ్రల్ మరియు

టెట్రాహెడ్రల్ క్షేత్రంలో ఆర్బి టాక్స విభజనను సరైన ఉదాహరణముతో వి

వరించండి?

(b) Explain the determination of composition of a complex compound b

Job's

method.

(6)

జాబ్ పద్ధతి ద్వారా సంక్లిష్ట సమ్మేళనాల సంఘటనాన్ని ఎట్లు నిర్ణయిస్తారు?

or

(c) Explain the Valence Bond Theory and its consequences.

(8+2)

సింక్లిష్ట సమ్మేళనాల వేలన్టీబంధ సిద్ధాంతాన్ని వివరించి, దాని పరిమితులను

తెలపండి?

(d) Explain the factors influencing the stability of complexes.

(5)

సంక్లిష్టాల స్థిరత్వాన్ని ప్రభావితం చేసే అంశాలను వివరించుము

2. (a) Explain the Aromaticity of heterocyclic compounds

(5)

విజాతీయ వలయ సమ్మేళనాల ఏరోమాటి ధర్మాన్ని వివరించండి

(b) Write the method of preparation of aryl diazonium salt. Write any four synthetic applications of aryl diazonium salts

(2+8)

ఎరైల్ డయాజోనియం లవణాల తయారీ పద్ధతిని తెలిపి, దాని ఏవైనా నాలుగు సంశ్లేషణ అనువర్తనాలను వ్రాయండి?

or

(c) Discuss the Structure of Glucose

(6) గ్లూకోజ్ నిర్మాణాన్ని వివరించండి.

(d) Write short notes on the following

(3+3+3)

క్రింది వాటిపై లఘు వ్యాఖ్యలు వ్రాయండి.

(i) Muta rotation

క్షీణభ్రమణ

(ii) Osazone Formation

ఓసజోన్ ఏర్పరచుట

(iii) Ruff Degradation

రఫ్ విచ్ఛేదనం

3. (a) Derive the rate constant for second order reaction in which the concentration

of both the reactants is same and write the characteristics of rate constant for

second order reaction

(2+4+2)

సమాన ప్రారంభగాఢతలుగల క్రియాజనకాలు పాల్గొన్న ద్వితీయ క్రమాంక చర్యరేటు స్థిరాంకానికి సమీకరణాన్ని ఉత్పాదించి దాని లక్షణాలను వ్రాయండి?

(b) Explain the Fluorescence and Phosphorescence by using the Jablonski

Diagram

(7)

'ప్రతి దీప్తి' మరియు 'స్వరదీప్తి'లను జాబ్లోస్కో చిత్రం ఆధారంగా వివరించండి?

or

(c) Explain the temperature dependence of enthalpy of formation by using the

Kirchoff's equation

(6)

ఉష్ణోగ్రత ఆధారిత రసాయన చర్మలలో ఎంథాల్పీ మార్పును గణించడానికి "కిర్ థొఫ్" సమీకరణాన్ని రాబట్టండి.

(d) Write the second law of thermodynamics. Explain the Carnot cycle and its

efficiency

(2+7)

ఉష్ణగతికశాస్త్ర రెండవ నియమమును తెలిపి కార్నోచలయం ఆధారంగా ఉష్ణ యంత్రము యొక్క దక్షతను లెక్కకట్టడానికి సమీకరణాన్ని రాబట్టండి?

4. (a) State and explain the mechanism of the following reactions

(5+5)

క్రింది చర్మలను తెలిపి, వాటి చర్యా విధానాన్ని వివరించండి?

(i) Bayer Villiger oxidation

బేయర్ విల్లిగర్ ఆక్సికరణం

(ii) Birch reduction

బర్చ్ క్షయకరణం

(b) Write the principles of green chemistry

(5)

హరిత రసాయనశాస్త్ర సూత్రాలను వ్రాయండి.

or

(c) State and explain the mechanism of the following reactions
(5+5)

క్రింది చర్యలను వ్రాసి, చర్య విధానాన్ని వివరించండి

(i) Claisen rearrangement

క్లైజెన్ పునరమలక

(ii) Wittig reaction

విట్టింగ్ చర్య

(d) State and explain HSAB principle with examples
(5)

సిద్ధాంతాన్ని సోదాహరణంగా వివరించండి.

SECTION-B

Answer any 06 (SIX) questions

6 X 4 Marks = 24

Marks

క్రింది వాటిలో ఆరింటికి సమాధానాలు వ్రాయండి

5. Explain the Sidgwick's concept of coordination.

సిడ్విక్ సమన్వయ భావనను వివరించండి?

6. Write about ionization and ligand isomerism with examples

అయనీకరణ మరియు లైగాండ్ అణుసాధ్యశాలను తెలపండి.

7. Explain the physical properties of amino acids by using Zwitter ion

Structure

ఎమిన్ ఆమ్ల జ్విట్టర్ అయాన్ నిర్మాణం, దాని భౌతిక ధర్మాలను ఎట్లు వివరిస్తారు.

8. Write the synthesis of five membered Heterocyclic using Paul-Knorr method

పాల్-నోర్ సంశ్లేషణ ఆధారంగా పంచపరమాణులక విజాతీయ వలయ సమ్మేళనాలను ఎట్లు తయారు చేస్తారు.

9. Define the Quantum yield and explain the reasons for its deviation
క్వాంటమ్ ప్రొఫిని నిర్వచించి, దాని విచలనాలకు కారణాలు తెలపండి?
10. Derive Gibbs Helmholtz equation
గిబ్స్-హెల్మ్హోల్ట్జ్ సమీకరణం ఉత్పాదించండి?
11. Explain the biological significance of Na^+ and K^+
 Na^+ మరియు K^+ లజీవ ప్రాముఖ్యతను తెలపండి
12. Explain the green catalysts with examples
హరిత ఉత్ప్రేరకాలను ఉదాహరణములతో వివరించండి.

SECTION-C

Answer the following questions
Marks

8 x 2 Marks = 16

13. What is EAN and give an example
EAN అనగానేమి? సరియైన ఉదాహరణనివ్వండి.
14. What is Trans effect?
ట్రాన్స్ ప్రభావం అనగానేమి.
15. What is Chichibabin Reaction?
చిచిబాబిన్ చర్య గూర్చి వ్రాయండి.
16. Pyridine is more basic than pyrrole why?
పిర్రిడ్రిన్ కన్న పిర్రిడ్రిన్ కు ఊరధర్మం అధికం ఎందువలన.

17. State Grothus Draper Law

గ్రోథన్ డ్రాపర్ నియమాన్ని తెలపండి.

18. Give two examples for Zero order reaction

శూన్యక్రమాంక చర్యకు రెండు ఉదాహరణలివ్వండి.

19. What is Clemmensen Reduction?

క్లెమెన్సన్ క్షయకరణం అనగానేమి.

20. What is atom economy?

పరమాణుమితవ్యయం అనగానేమి.

Dr.B.R. Ambedkar University, SRIKAKULAM

BSc IIIrd Year CHEMISTRY

PAPER-4

Model Question Paper

Marks: 100

Time: 03

hours

SECTION-A

Answer the following questions

4 x 15 Marks = 60

Marks

1. (a) Write the Principles and advantages of TLC

(10)

TLC మూల సూత్రములు మరియు ఉపయోగములు వ్రాయము

(b) Explain the Batch solvent extraction
(5)

బ్యాచ్ నిష్కర్షణ గురించి వ్రాయుము

or

(c) Write the principle and experimental procedure of Column Chromatography

(10)

స్థంబ క్రొమటోగ్రఫీలో ఇమిడి ఉన్న సూత్రము మరియు ప్రయోగాత్మక వివరణలను తెలుపుము

(d) Write the difference between continuous solvent extraction and counter

current solvent extraction

(5)

ద్రావణితో అవిరళ నిష్కర్షణ మరియు ప్రతి ఘాతక ప్రవాహిక నిష్కర్షణల మధ్య తేడా వ్రాయుము

2. (a) Write the principle of NMR spectroscopy and the spectral details of Ethyl

bromide and 1,1,2-Tribromoethane (5+2+2)

NMR వర్ణ పటమూల సూత్రములను మరియు (5+2+2) ఇథైల్ బ్రోమైడ్ మరియు 1,1,2- ట్రి బ్రోమో ఈథేన్ యొక్క

NMR వర్ణ పటములను గూర్చి వ్రాయుము

- (b) Write the fragmentation pattern of Ethyl benzene
(6)

ఇథైల్ బెంజీన్ విచ్ఛేదనము తీరును వివరింపుము

or

- (c) Write the principles and applications of IR spectroscopy
(4+4)

IR వర్ణ పటశాస్త్రములోని సూత్రములను మరియు అనువర్తనములను వ్రాయుము

- (d) Explain the pure rotational Raman spectra of diatomic molecules
(7)

ద్వి పరమాణుక అణువుల పరిశుద్ధ ధ్రువణ రామన్ వర్ణ పటమును గురించి వ్రాయుము

3. (a) Write the synthesis and therapeutic activity of Albuterol
(6+2)

ఆల్ బ్యుటీరోల్ యొక్క సంశ్లేషణమును మరియు ఔషధక్రియాశీలతను తెలుపుము

- (b) Write the structure and isolation of Penicillin
(7)

పెన్సిలిన్ నిర్మాణము మరియు వేరు చేయు విధానమును తెలుపుము

or

- (c) Write the synthesis of D.D.T and Malathion
(5+5)

డి.డి.టి మరియు మలథియాన్ల సంశ్లేషణలను వ్రాయుము

- (d) Write the second the different types of formulations
(5)

వివిధ రకముల ఫార్ములేషన్లను గూర్చి వ్రాయుము

4. (a) Explain the general acid base catalysis and specific acid base catalysis with

suitable examples

(5+5)

సాధారణ ఆమ్ల, క్షార ఉత్తేరణము మరియు విశిష్ట ఆమ్ల, క్షార ఉత్తేరణములను సోదాహరణముగా వివరించుము.

(b) Write Michaelis Menten Law. Write the significance of Michaelis constant (5)

మైకేలిస్-మెంటెన్ నియమమును వ్రాయుము. మైకేలిస్ స్థిరాంకము యొక్క ప్రాముఖ్యతను వ్రాయుము

or

(c) What is polymerization and explain different types of polymerization with

suitable examples

(2+10)

పాలిమరీకరణము అనగానేమి? వివిధ రకముల పాలిమరీకరణములను సోదాహరణ-ముగా వివరింపుము.

(d) What is Meissner effect

(3)

మీస్నర్ ప్రభావము అనగానేమి?

SECTION-B

Answer any **06 (SIX)** questions
Marks

6 X 4 Marks = 24

5. State and derive Beer-Lambert's law

బీర్-లాంబర్ట్ నియమమును తెలిపి. సంబంధితనియమము నుండి సమీకరణము
ను ఉత్పాదించుము

6. Write any four applications of HPLC

HPLC యొక్క నాలుగులను వర్తనములను వ్రాయుము

7. Write various types of electronic transitions in the molecules

అణుములలో జరిగే వివిధ ఎలక్ట్రానిక్ పరివర్తనములను వ్రాయుము

8. What is Chemical shift? Explain the factors affecting the chemical shift

రసాయన స్థానాంతరీకరణములనగానేమి? దానిని ప్రభావితము చేసే అంశములను
వివరింపుము

9. Write about CD-4 and CD-8 cells

CD-4 మరియు **CD-8** కణములు గురించి వ్రాయుము

10. Write the synthesis of Paracetamol

పారాసిటమాల్ యొక్క సంశ్లేషణమును తెలుపుము

11. Define the number average and weight average molecular weights of polymers.

సంఖ్యాసగటు అణుభీరము మరియు భారసగటు అణుభీరములను నిర్వచించు
యి.

12. Write any two synthetic techniques to prepare nanomaterials

నానోపదార్థములను తయారుచేయు రెండు సంశ్లేషక పద్ధతులను వ్రాయుము

SECTION-C

Answer the following questions
Marks

8 x 2 Marks = 16

13. What is retention factor?

రిటెన్షన్ ఫాక్టర్ అనగానేమి?

14. What is molar absorptivity and write its units

మోలార్ శోషణత్వము అనగానేమి? దాని యొక్క యూనిట్లను తెలుపుము.

15. What is bathochromic shift?

బాత్ క్రోమిక్ షిఫ్ట్ అనగానేమి?

16. What is base peak in mass spectrum?

ద్రవ్యరాశి వర్ణపటములోని ఆధారశిఖరము అనగానేమి?

17. Write any two examples of PIS drugs

PIS జెషడమునకు సంబంధించిన రెండు ఉదాహరణములు వ్రాయుము

18. What are Pheromones?

ఫెరోమోన్లనగా నేమి?

19. What is degree of polymerization?

పాలిమరీకరణ అవధి అనగానేమి?

20. Write any two characteristics of super conductors

సూపర్ వాహకము యొక్క రెండు అభిలాక్షణికములైన లక్షణములను తెలుపుము

Recommended Text Books and Reference Books

Inorganic Chemistry

1. Concise Inorganic Chemistry by J.D.Lee
2. Basic Inorganic Chemistry by Cotton and Wilkinson
3. Advanced Inorganic Chemistry Vol-I by Satyaprakash, Tuli, Basu and Madan
4. Qualitative Inorganic analysis by A.I.Vogel
5. A textbook of qualitative inorganic analysis by A.I. Vogel
6. Inorganic Chemistry by J.E.Huheey
7. Inorganic Chemistry by Chopra and Kapoor
8. Coordination Chemistry by Basalo and Johnson
9. Organometallic Chemistry – An introduction by R.C.Mehrotra and A.Singh
10. Inorganic Chemistry by D.F.Shriver, P.W.Atkins and C.H.Langford
11. Theoretical inorganic chemistry by McDay and J.Selbi
12. Advanced Inorganic Chemistry By Gurudeep Raj
13. Selected topics in inorganic chemistry by W.D.Malik, G..D.Tuli, R.D.Madan
14. Concise coordination chemistry by Gopalan and Ramalingam
15. Satyaprakash's modern inorganic chemistry by R.D.Madan.

Recommended Text Books and Reference Books

Organic Chemistry

1. Organic Chemistry By R T Morrison and R.N.Boyd
2. Organic Chemistry by T.J.Solomons
3. Text book of Organic Chemistry by Ferguson
4. Problems and their solutions in organic Chemistry by I.L.Finar
5. Reaction mechanisms in Organic Chemistry by S.M.Mukherji and S.P.Singh
6. A guide book to mechanisms in Organic Chemistry by Peter Sykes
7. Organic spectroscopy by J.R.Dyer
8. Organic Spectroscopy by William Kemp
9. Fundamentals of organic synthesis amd retrosynthetic analysis by Ratna Kumar Kar
10. Comprehensive practical organic qualitative analysis by V.K.Ahluwalia & Sumta Dhingra
11. Comprehensive practical organic chemistry: Preparation and quantitative analysis by V.K.Ahluwalia and Reena Agarwal.
12. Comprehensive practical organic chemistry: Preparation and quantitative analysis by V.K.Ahluwalia and Reena Agarwal.
13. Text book of Organic Chemistry by K.S.Mukherjee
14. Organic Chemistry by Bhupinder Meha & Manju Mehta
15. Elementary organic spectroscopy by Y.R. Sharma
16. Chemistry & Industry by Gurdeep R. Chatwal
17. Drugs by David Krupadanam
18. Pharmacodynamics by R.C.Srivastava, Subit Ghosh
19. Analytical Chemistry by David Krupadanam
20. Green Chemistry – V.K.Ahluwalia
21. Vogel's Qualitative organic analysis.
22. Laboratory manual of Organic Chemistry by Raj K Bansal
23. Medicinal Chemistry by Ashutoshkar

Recommended Text Books and Reference Books

Physical Chemistry

1. Physical chemistry by G M Barrow
2. Principles of physical chemistry by Prutton and Marron
3. Physical chemistry by Peter Atkins, Julio D. Paula
4. Text book of Physical Chemistry by P.L.Soni, O.P.Dharmarha and Q.N.Dash
5. Solid State Chemistry and its applications by Anthony R. West
6. Text book of physical chemistry by K L Kapoor 10. Thermodynamics for Chemists by S Glasston
7. Chemical Kinetics by K J Laidler
8. An Introduction to Electrochemistry by S Glasston
9. Physical chemistry through problems By S K Dogra
10. Thermodynamics by J Jayaram and J C Kuriakose
11. Introductory Quantum Chemistry by A K Chandra
12. Physical Chemistry by J W Moore
13. Kinetics and mechanism by J W Moore and R G Pearson
14. Fundamentals of photochemistry by K K Rohtagi Mukharjee
15. Chemical thermodynamics by R P Rastogi and S S Misra
16. Advanced physical chemistry by Gurudeep Raj
17. Physical chemistry by G W castellan
18. Text book of physical chemistry by S Glasstone
19. Fundamentals of Molecular spectroscopy by C.N.Banwell and E.M.McCash
20. Polymer Science by Gowriker, Viswanathan and Jayadev Sridhar
21. Senior practical physical chemistry by Khosla
22. Catalysis: Concepts and green applications by Gadi Rotherberg

