FOURTH SEMESTER

1. Course Code :
2. Course Name : **M.Sc. Chemistry**
3. Total Paper : **5**
4. Compulsory Paper : **3**
5. Optional Paper : **2**
6. Project : **Y**
7. Maximum marks : **350**
8. Minimum Passing percentage : **36**
9. Project work : **50**
10. Project Passing Marks : **18**
11. Practical : **2**
12. Practical Passing Marks : **18 Marks each**

Sub. code	Subject Name	Theory									Practical		
		Paper					CCE		Total Marks				
		1st	2nd	3rd	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Compulsory paper													
	Application of Spectroscopy-II	35	0	0	35	13	15	5	50	18	0	0	50
	Solid State Chemistry	35	0	0	35	13	15	5	50	18	0	0	50
	Biochemistry	35	0	0	35	13	15	5	50	18	0	0	50
Optional paper (select any two)													
	Organic Synthesis	35	0	0	35	13	15	5	50	18	0	0	50
	Chemistry of Natural Products												
	Analytical Chemistry	35	0	0	35	13	15	5	50	18	0	0	50
	Electrochemistry	35	0	0	35	13	15	5	50	18	0	0	50
	Medicinal Chemistry	35	0	0	35	13	15	5	50	18	0	0	50
	Pesticites & Glass Industries	35	0	0	35	13	15	5	50	18	0	0	50
	Practical (I) Inorganic chemistry	0	0	0	0	0	0	0	0	0	33	12	33
	Practical (II)Organic chemistry	0	0	0	0	0	0	0	0	0	33	12	33
	Practical (III) Physical chemistry	0	0	0	0	0	0	0	0	0	34	12	34
	Project work	0	0	0	0	0	0	0	50	18	0	0	50

विशेष टीपः- विद्वत परिषद की स्थाई समिति की बैठक दिनांक 26/12/08 के पद कमांक 8/13/43 के लिये गये निर्णय अनुसार स्नातकोत्तर में प्रोजेक्ट कार्य में 36 प्रतिशत उत्तीर्णांक अंक प्राप्त करना अनिवार्य होगा। तदानुसार प्रोजेक्ट के अंकों को श्रेणी प्रदाय हेतु गणना में नही लिया जावेगा।

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M. Sc. Chemistry

SEMESTER – IV

Paper	Comp/Opt	Paper Title	Code (MCH)	Max. Marks
I	Compulsory	APPLICATION OF SPECTROSCOPY-II	511	35+ 15 (CCE) = 50
II	Compulsory	SOLID STATE CHEMISTRY	512	35+ 15 (CCE) = 50
III	Compulsory	BIOCHEMISTRY	513	35+ 15 (CCE) = 50
IV	Optional	ANY TWO From MCH 514-518A	514-518 & 518 A	35+ 15 (CCE) = 50
V	Optional			35+ 15 (CCE) = 50
		PRACTICAL -1. Inorganic 2. Organic 3. Physical		33 33 34 =100
		Project Work		50
		Total		400

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Class / कक्षा	: M.Sc.
Semester / सेमेस्टर	: IV
Subject / विषय	: Chemistry
Title of Subject Group	: APPLICATION OF SPECTROSCOPY
विषय समूह का शीर्षक	:
Paper No. / प्रश्नपत्र क्रमांक	: I (Code- MCH-511)
Compulsory / अनिवार्य या Optional / वैकल्पिक अनिवार्य	: Compulsory
Max. Marks अधिकतम अंक	: 35

Particulars/विवरण

Unit-1	**Ultraviolet and Visible spectroscopy** Various electronic transitions (185-800 nm) Beer-Lambert law, Effect of solvent on electronic transitions, ultraviolet bands for carbonyl compounds, unsaturated carbonyl compounds, dienes, conjugated polyenes, Fieser Woodward rules for conjugated dienes and carbonyl compounds, ultraviolet spectra of aromatic compounds. Steric effect in biphenyls.
Unit-2	**Infrared Spectroscopy** Characteristic vibrational frequencies of alkanes, alkenes, alkynes, aromatic compounds, alcohols, ethers, phenols and amines. Detailed study of vibrational frequencies of carbonyl compounds (ketones, aldehydes, esters, amides, acids, anhydrides, lactones, lactams and conjugated carbonyl compounds). Effect of hydrogen bonding and solvent effect on vibrational frequencies, overtones, combination bands and fermi resonance.
Unit - 3	**Nuclear Magnetic Resonance of Paramagnetic Substances in Solution** The contact and Pseudo contact shifts, factors affecting nuclear relaxation, some applications including biochemical systems, an overview of NMR of metal nuclide with emphasis on ^{195}Pt and ^{119}Sn NMR.
Unit-4	**Carbon-13 NMR Spectroscopy** General considerations, chemical shift (aliphatic olefinic, alkyne, aromatic, heteroaromatic and carboynl carbon), coupling constants. Two dimension NMR spectroscopy-COSY, NOESY, DEPT, HMBC and HMQC techniques.

Unit-5	**Mass Spectrometry** Introduction ion production EI, CI FD, ESI and FAB, factors affecting fragmentation, ion analysis, ion abundance Mass spectral fragmentation of organic compounds, common functional groups, molecular ion peak, metastable peak. Mc Lafferty rearrangement. Nitrogen rule. High resolution mass spectrometry. Structure elucidation of simple molecules using UV – Visible, IR, NMR and mass spectral techniques.

Suggested Readings:

1. Physical Methods for Chemistry, R.S. Drago, Saunders Compnay.
2. Structural Methods in Inorganic Chemistry, E.A.V. Ebsworth, D.W.H. Rankin and S. Cradock, ELBS.
3. Infrared and Raman Spectral : Inorganic and Coordination Compounds K. Nakamoto, Wiley.
4. Progress in Inorganic Chemistry vol., 8, ed., F.A. Cotton, vol., 15 ed. S.J. Lippard, Wiley.
5. Transition Metal Chemistry ed. R.L. Carlin vol. 3 dekker.
6. Inorganic Electronic Spectroscopy, A.P.B. Lever, Elsevier.
7. NMR, NQR, EPR and Mossbauer Spectroscopy in Inorganic Chemistry, .V. Parish, Ellis Haywood.
8. Practical NMR Spectroscopy, M.L. Martin. J.J. Deepish and G.J. Martin, Heyden.
9. Spectrometric Identification of Organic Compounds, R.M. Silverstein, G.C. Bassler adn T.C. Morrill, John Wiley.
10. Introduction to NMR spectroscopy, R.J. Abraham, J. Fisher and P. Loftus, Wiley.
11. Application of Spectroscopy of Organic Compounds, J.R. Dyer Prentice Hall.
12. Spectroscopic Methods in Organic Chemistry D.H. Williams, I. Fleming, Tata McGraw-Hill.
13. Structural Methods in Inorganic Chemistry, E.A.V. Ebsworth, D.W.H. Rankin and S. Cradock, ELBS.
14. Introduction to NMR spectroscopy, R.J. Abraham, J. Fisher and P. Loftus, Wiley.

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Class / कक्षा	: M.Sc.
Semester / सेमेस्टर	: IV
Subject / विषय	: Chemistry
Title of Subject Group विषय समूह का शीर्षक	: **SOLID STATE CHEMISTRY**
Paper No. / प्रश्नपत्र कमांक	: **II (Code- MCH-512)**
Compulsory / अनिवार्य या Optional / वैकल्पिक अनिवार्य	: Compulsory
Max. Marks अधिकतम अंक	: 35

	Particulars / विवरण
Unit-1	**Solid State Reactions** General principles, experimental procedure, co-precipitation as a precursory to solid state reactions, kinetics of solid state reactions.
Unit-2	**Crystal Defects and Non-Stoichiometry** Perfect and imperfect crystals, intrinsic and extrinsic defects-point defects, line and plane defects, vacancies-Schottky detects and Frenkel defects. Thermodynamics of Schottky and Frenkel defect formation, colour centres, non-stoichiometry and defects.
Unit-3	**Electronic Properties and Band Theory** Metals insulators and semiconductors, electronic structure of solidsband theory band structure of metals, insulators and semiconductors, Intrinsic and extrinsic semiconductors, doping semiconductors, p-n junctions, super conductors. Optical properties-Application of optical and electron microscopy. Magnetic Properties-Classification of materials : Effect of temperature calculation of magnetic moment, mechanism of ferro and anti ferromagnetic ordering super exchange.
Unit-4	**Organic Solids** Electrically conducting solids. organic charge transfer complex, organic metals, new superconductors.
Unit-5	**Liquid Crystals**: Types of liquid crystals: Nematic, Smectic, Ferroelectric, Antiferroelectric, Various theories of LC, Liquid crystal display, New materials.

BOOKS SUGGESTED.

1. Solid state chemistry and its applications, A.R. West. Peenum.
2. Principles of the Solid State, H.V. Keer, Wiley Eastern.
3. Solid State Chemistry, N.B. Hannay.
4. Solid State Chemistry, D.K. Chakrabarty, New Wiley Eastern.

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Class / कक्षा	: M.Sc.
Semester / सेमेस्टर	: IV
Subject / विषय	: Chemistry
Title of Subject Group विषय समूह का शीर्षक	: **BIOCHEMISTRY**
Paper No. / प्रश्नपत्र कमांक	: **III (Code- MCH-513)**
Compulsory / अनिवार्य या Optional / वैकल्पिक अनिवार्य	: Compulsory
Max. Marks अधिकतम अंक	: 35

Particulars / विवरण

Unit-1	**Metal Ions in Biological Systems** Bulk and trace metals with special reference to Na, K, Mg, Ca, Fe, Cu, Zn, Co, and K+/Na+ pump. **Bioenergetics and ATP Cycle.** DNA polymerisation, glucose storage, metal complexes in transmission of energy; chlorophyll's, photosystem I and photosystem II in cleavage of water. **Transport and Storage of Dioxygen** Heam proteins and oxygen uptake structure and function of haemoglobin's, mygolobi haemocyanms and hemerythrin, model synthetic complexes of iron, cobalt and copp
Unit-2	**Electron Transfer in Biology** Structure and function of metal of proteins in electron transport processes cytochron and ion-sulphure proteins, synthetic models. **Nitrogen fixation** Biological nitrogen fixation, and its mechanism, nitrogenase, Chemical nitrogen fi
Unit-3	**Enzymes** Introduction and historical perspective, chemical and biological catalysis, remark properties of enzymes like catalytic power, specificity and regulation. Nomencla classification, extraction and purification. Fischer's lock and key and Koshalnd's fit hypothesis, concept and identification of active site by the use of inhibitors, a labeling and enzyme modification by site-directed mutagenesis. Enzyme kinetic Michael's-Menten and Lineweaver Burk plots, reversible and irreversible inhibi **Mechanism of Enzyme Action**

	Transition-state theory, orientation and Steric effect, acid-base catalysis, covalent catalysis, strain or distortion. Examples of some typical enzyme mechanisms for chemotrypsin, ribonuclease, lysozyme and carboxypeptidase. **Kinds of Reactions Catalysed by Enzymes** Nucleophilic displacement on a phosphorus atom, multiple displacement reactions, coupling of ATP cleavage to endergonic processes. Transfer of sulphate, addition, elimination reactions, enolic intermediates in Isomerisations reactions, b-Cleavage, condensation, some isomerization and rearrangement reactions. Enzyme catalyzed carboxylation and decarboxylation.
Unit-4	**Co-Enzyme Chemistry** Cofactors as derived from vitamines, coenzymes, prosthetic groups, apoenzymes. Structure and biological functions of coenzyme A, thiamine pyrophosphate, pyridoxal phosphate, NAD+, NADP+, FMN, FAD, lipoic acid, vitamin B12. Mechanisms of reactions catalyzed by the above cofactors. **Enzyme Models** Host-guest chemistry, chiral recognition and catalysis, molecular recognition, molecular asymmetry and prochirality Biometric chemistry, crown ether, cryptates. Cyclodextrins, cyclodextrion-based enzyme models, clixarenes, ionospheres, micelles synthetic enzymes or synzymes. **Biotechnological Applications of Enzymes** large-scale prodcution and purification of enzymes, techniques and methods of immobilization of enzymes, effect of immobilization on enzyme activity, application of immobilized enzymes, use of enzymes in food and drink industry-brewing and cheese making, syrups from cron starch, enzymes as targets for drug design. Clinical uses of enzymes, enzyme therapy, enzymes and recombinant DNA Technology.
Unit-5	**Biological Cell and its Constituents** Biological cell, structure and functions of proteins, enzymes, DNA and RNA in living systems. Helix coils transition. **Bioenergetics** Standard free energy change in biochemical reactions, exergonic, endergonic. Hydro of ATP, synthesis of ATP from ADP. **Biopolymer Interactions** Forces involved in biopolymer interactions. Electrostatic charges and molecular expansion, hydrophobic forces, dispersion force interactions. Multiple equilibrium a various types of bidning processes in biological systems. Hydrogen ion titration curv

	Cell Membrane and Transport of Ions Structure and functions of cell membrane, ion transport through cell membrane, irreversible thermodynamic treatment of membrane transport, Nerve conduction.

Book Suggested

1. Principles of Bioinorganic Chemistry, S.J. Lippard and J.M. Berg, University Science Books.
2. Bioinorganic Chemistry, I. Bertini, H.B. Gray, S.J. Lippard and J.S. Valentine, University Science Books.
3. Inorganic biochemistry vol. I and II ed. G.L. Eichhorn, Elsever.
4. Progress in Inorganic Chemistry, Vol 18 and 38 ed J.J. Lippard, Wiley.
5. Bioorganic Chemistry : A chemical Approach to Enzyme Action, Hermann Dugas and C. Penny, Springer Verlag.
6. Understanding Enzymes, Trevor Palmer, Prentice Hall.
7. Enzyme Chemistry : Impact and applications, Ed. Collin J suckling, chemistry.
8. Enzyme Mechanisms Ed. M.I. Page and A Williams, Royal Society of Chemistry.
9. Fundamentals of Enzymology, N.C. Price and L. Stevens. Oxford University Pres
10. Immobilized Enzymes : An Introduction and Applications in Biotechnology, Mic ID. Trevan, Hohn Wiley.
11. Enzymatic Reaction Mechanisms. C. Walsh. W.H. Freeman.
12. Enzyme Structure and Mechanism, A Fersht, W.H. Freeman
13. Biochemistry : The Chemical Reactions of Living Cells, D.E. Metzler, Acader Press.

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Class / कक्षा	: M.Sc.
Semester / सेमेस्टर	: IV
Subject / विषय	: Chemistry
Title of Subject Group विषय समूह का शीर्षक	: **Organic Synthesis**
Paper No. / प्रश्नपत्र कमांक	: **OPT-1 (Code- MCH-514)**
Compulsory / अनिवार्य या Optionnl / वैकल्पिक अनिवार्य	: Optional
Max. Marks अधिकतम अंक	: 35

Particulars / विवरण

t-1	**Disconnection Approach** An introduction to synthons and synthetic equivalents. Disconnection approach, functio group inter-conversions, the importance of the order of events in organic synthesis, co group C-X and two group C-X disconnections, chemoselectivity, reversal of polarity cyclisation reaction, amine synthesis. Protection of groups, chemo, region and stere selectivity.
lt-2	**One Group C-C Disconnections** Alcohols and carbonyl compounds, regioselectivity, alkene synthesis, use of acetylene and aliphatic Nitro compounds in organic synthesis. **Two Group C-C Disconnections** Diels-Alder Reaction, 1,3-difunctionalised compounds, a-b- unsaturated carbonyl compounds, control in carbonyl condensations, 1,5-difunctionalised compounds. Micheal addition and Robinson annelation.
nit-3	**Oxidation** Introduction, Different oxidative processes. Hydrocarbons-alkenes, aromatic rings, saturated C-H groups (activated and unactivated) Alcohols, diols, aldehyde's, ketones, ketals and carboxylic acids. Amines, hydrazines, and sulphides. Oxidations with ruthenium tetraoxide, iodobenzene diacetate and thallium. (III) Nitrate. **Reduction** Introduction, Different reductive processes. Alkanes, alkenes, alkynes, and aromatic rings. Carbonyl compounds-aldehydes, ketones, acids and their derivatives. Epoxides. Nitro nitroso, azo and oxime groups. Expoxide, Nitro, Nitroso, azo and oxime group Hydrogenolysis.

Unit-4	**Organometallic Reagents** Principle, preparations, properties and applications of the following in organic syn with mechanistic details. Group I and II metal organic compounds Li, Mg, Hg, Cd, Z Ce Compounds.
Unit-5	**Synthesis of some complex molecules:** Application of the above in the synthesis of following compounds: Canphor, longifoline, cartisone, reserpine, vitamin D, juvabion, aphidicol fredericamycin. A

SUGGESTED READINGS:

1. Designing Organic Synthesis, S. Warren. Wiley.
2. Organic Synthesis-Concept, Methods and Starting Materials, J. Fuhrhop.
3. Some Modern Methods of Organic Synthesis. W. carruthers, Cambridge Univ. Press.
4. Modern Synthetic Reactions H.O. House, W.A Benjamin.
5. Advanced Organic Chemistry : Reactions, Mechanisms and Structure, J. March. Wiley.
6. Principles, of Organic Chemistry Part B. F.a. Carey and R.J. Sundberg, Plenum Press.

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Class / कक्षा	: M.Sc.
Semester / सेमेस्टर	: IV
Subject / विषय	: Chemistry
Title of Subject Group	: Analytical Chemistry
विषय समूह का शीर्षक	:
Paper No. / प्रश्नपत्र क्रमांक	: OPT-3 (Code- MCH-516)
Compulsory / अनिवार्य या Optional / वैकल्पिक अनिवार्य	: Optional
Max. Marks अधिकतम अंक	: 35

	Particulars / विवरण
Unit-1	**Introduction** Role of analytical chemistry Classification of analytical methods classical a instrumental. Types of instrumental analysis. Selecting an analytical method. Neatness a cleanliness. laboratory operations and practices. Analytical balance. Techniques weighing, errors. Volumetric glassware cleaning and calibration of glassware. Sam Volumetric glassware cleaning and Calibration of glassware. Sample preparati dissolution and decompositions. Gravimetric techniques. Selecting and handling reagents. Laboratory notebooks. Safety in the analytical laboratory. **Errors and Evaluation** Definition of terms in mean and median. Precision-standa deviation, relative standard deviation. Accuracy-absolute error, relative error. Types error in experimental data determinate (systematic), indeterminate (or random) and gro Sources of error and the effects upon the analytical results. Methods for report analytical data. Statistical evaluation of data-indeterminate errors. The uses of statistics.
Unit-2	**Food analysis** Moisture, ash, crude protein, fat crude fiber, carbohydrates, calcium, potassium, sodiu and phosphate. Food adulteration-common adulterants in food, contamination of food stuffs. Microscopic examination of foods for adulterants. Pesticide analysis in foo prodcuts. Extraction and purification of sample. HPLC. Gas chromatography f organophosphates. Thin-layer chromatography for identification of chlorinated pesticide in food products.

Unit-3	**Analysis of Water Pollution** Origin of Waste water, types, water pollutants and their effects. Sources of pollution-domestic, industrial, agricultural soil and radioactive wastes as source pollution. Objectives of analysis-parameter for analysis-colour, turbidity, total s conductivity, acidity, alakalinity, hardness, chloride, sulphate, fluoride, silica, phosph adn different forms of nitrogen, Heavy metal pollution-public health significance cadmium, chromium, copper, lead, zinc, manganese, mercury and arsenic. Ge survey of instrumental technique for the analysis of heavy metals in aqueous syst Measurements of DO, BOD, and COD. Pesticides as water pollutants and analysis. W pollution laws and standards.
Unit-4	**Analysis of soil, Fuel, Body Fluids and Drugs** (a) Analysis of Soil, moisture pH total nitrogen, phosphorus, silica, lime, magn manganese, sulphur and alkali salts. Fuel analysis : liquid and gas. Ultimate and proximate analysis-heating values-grading coal. Liquid fuels-flash point, aniline point, octane number and carbon residue. Gaseo fuels-produced gas and water gas-calorific value.
Unit-5	(a) **Clinical Chemistry** : Composition of blood-collection and preservation of sampl Clinical analysis. Serum electrolytes, blood glucose, blood urea nitrogen, uric ac albumin, globulins, barbiturates, acid and alkaline phosphates. Immunoassay : principl of radio immunoassay (RIA) and applications. The blood gas analysis trace elements in t body (b) **Drug analysis** : Narcotics and dangerous drug. Classification of drugs. Screening S gas and thin-layer chromatography and spectrophotometeric measurements.

SUGGESTED READINGS:

1. Analytical Chemistry, G.D. Christian, J.Wiey.
2. Fundamentals o analytical Chemistry. D.A. Skoog. D.M. West and F.J. Hooler, W.B. Saunders.
3. Analytical Chemistry-Principles. J.H. Kennedy, W.B. Saunders.
4. Analytical Chemistry-Principles and Techniques. L.G. Hargis. Prentice Hall.
5. Principles of Instrumental analysis D.A. Skoog and J.L. Loary, W.B. Saunders.
6. Principles of Instrumental Analysis D.A. Skoog W.B. Saunders.
7. Quantitative Analysis, R.A. Day, Jr. and A.L. Underwood, Prentice Hall.
8. Environmental Solution, S.M. Khopkar, Wiley Eastern.
9. Basic Concepts of Analysis Chemistry, S.M. Khopkar, Wiley Eastern.
10. Handbook of Instrumental Techniques for Analytical Chemistry, F. Settle, Prenti Hall

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Class / कक्षा	: M.Sc.
Semester / सेमेस्टर	: IV
Subject / विषय	: Chemistry
Title of Subject Group विषय समूह का शीर्षक	: **Electrochemistry**
Paper No. / प्रश्नपत्र कमांक	: **OPT-4 (Code- MCH-517)**
Compulsory / अनिवार्य या Optional / वैकल्पिक अनिवार्य	: Optional
Max. Marks अधिकतम अंक	: 35

Particulars / विवरण

t-1	**1. Conversion and Storage of Electrochemical Energy Present status of energy consumption :** Pollution problem. History of fuel cells, Direct energy conversion by electrochemical means. Maximum intrinsic efficiency of an electrochemical converter. Physical interpretation of the Carnot efficiency factor in electrochemical energy converters. Power outputs. electrochemical Generators (Fuel Cells) : Hydrogen oxygen cells, Hydrogen Air cell, Hydrocarbon air cell, Alkane fuel cell, Phosphoric and fuel cell, direct NaOH fuel cells, applications of fuel cells. **Electrochemical Energy Storage :** Properties of Electrochemical energy storage : Measure of battery performance, Charging and discharging of a battery, Storage Density, Energy Density. Classical Batteries : (i) Lead Acid (ii) Nickel-Cadmium, (iii) Zinc manganese dioxide. Modern Batteries : (i) Zinc-Air (ii) Nickel-Metal Hydride, (iii) Lithium Battery, Future Electricity storers Storage in (i) Hydrogen, (ii) Alkali Metals, (iii) Non aqueous solutions.
	Corrosion and Stability of Metals : Civilization and Surface mechanism of the corrosion of the metals; Thermodynamics and the stability of metals, Potential -pH (or Pourbaix) Diaphragmsl; uses and abuses Corrosion current and corrosion potential -Evans diagrams. Measurement of corrosion rate : (i0 Weight Loss method, (ii) Electrochemical Method. **Inhibiting Corrosion :** Cathodic and Anodic Protection. (i) Inhibition by addition of substrates to the electrolyte environment, (ii) by charging the corroding method from external source, anodic Protection, Organic inhibitors, The fuller Story Green inhibitors. **Passivation :** Structure of Passivation films, Mechanism of Passivation, Spontaneous Passivation Nature's method for stabilizing surfaces.

Unit-3	**Bioelectrochemistry** bioelectrodics, Membrane Potentials, Simplistic theory, Modern theory, Elec conductance in biological organism: Electronic, Protonic electrochemical mechanis nervous systems, enzymes as electrodes. **Kinetic of Electrode Process :** Essentials of Electrode reaction. Current Density, Overpotential, Tafel Equation, E Volmer equation. Standard rate constant (K0) and Transfer coefficient (a). Exch Current. **Irreversible Electrode processes :** Criteria of irreversibility, informatino irreversible wave.
Unit-4	**Methods of determining kinetic parameters for quasi-rversible and irrever waves :** Koutecky's methods, Meits Israel Method, Gellings me **Electrocatalysis** Chemical catalysts and Electrochemical catalysts with special reference to purosti porphyrin oxides of rare earths. Electrocatalysis in simple redox reactions, in reac involving adsorbed species. Influence of various parameters.
Unit-5	**Potential Sweep Method :** Linear sweep Voltammetry, Cyclic Voltammetry, theory and applications. Diagno criteria of cycli voltammetry. Controlled current microelectrode techniques : compari with controlled potentials methods, chronopotentiometry, theory ad applicati **Bulk Electrolysis Methods :** Controlled potential coulometry, Controlled Coulometry, Electroorganic synthesis and important applications. Stripping analysis : anodic and Cathodic modes, Pre electrol and Stripping steps, applications of Stripping Analysis.

SUGGESTED READINGS:

1. Modern Electrochemistry Vol. I, IIa, Vol. IIB J'OM Bockris and A.K.N. Reddy, Plenum Publication, New York.
2. Polarographic Techniques by L. Meites, Interscience.
3. "Fuel Cells : Thjeir electrochemistry". McGraw Hill Book Company, New York.
4. Modern Polarographic Methods by A.M. Bond, Marcell Dekker.
5. Polarography and allied techniques by K. Zutshi, New age International publicatin. New Delhi.
6. "Electroaalytical Chemistry by Basil H. Vessor & Galen W. ; Wiley Interscience.
7. Electroanalytical Chemistry by Basil H. Vessor & alen w. ; Wiley Interscience.
8. Topics in pure and Applied Chemistry, Ed. S. K. Rangrajan, SAEST Publication, Karaikudi (India)

BARKATULLAH UNIVERSITY, BHOPAL

Session – 2010-11

Class / कक्षा	: M.Sc.
Semester / सेमेस्टर	: IV
Subject / विषय	: Chemistry
Title of Subject Group	: Industrial Chemistry-
विषय समूह का शीर्षक	: Pesticites & Glass Industrie
Paper No. / प्रश्नपत्र कमांक	: OPT-5A (Code- MCH-518
Compulsory / अनिवार्य या Optional / वैकल्पिक अनिवार्य	: Optional
Max. Marks अधिकतम अंक	: 35

Particulars / विवरण

Unit- I **Cleansing Agents**

Cleansing Agents : Toilet and washing soaps; preparation and uses, Syntheti detergents; alkyl aryl sulfonates, fatty alcohot surfaces, ethanolamines nonionic detergents.

Unit-II **Fertizilizers and Inorganic Materials :**

Fertilizers : Fertilizers Industries in India, Manufacture of Ammonium salts. Urea, Nitrates, Phosphates and Supephosphates, Nitrogen fixation.

Glass: Types, their composition and properties testing glass. Manufacture of Glass Fibres. Optical Glass, Coloured Glasses, Lead Glass and Neutron Absorbing Glass.

Ceramics: Important clays and feldspar. Glazing and vitrification, Glass ceramics.

Unit-III **Cement :** Types and their manufacture, setting process.

Ferrous Industry: Manufacture of steel and other important alloys.

Silicon : Pre silicon, Electronics Industry.

Unit- IV **Pesticles and Food additives**

Pesticles and Food additives : Classification, important categories of insecticides, fungicides, herbicides and rodenticies; Mode of action.

Unit-V **Chemistry and synthesis of common pesticides :** Such and Tabun, Sarin, Daygon, DDYP paraquat.

M.Sc. Semester IV
Chemistry
Practical

(Duration: 6-8 hrs in each branch)
Practical examination shall be conducted separately for each branch.

Inorganic Chemistry	**Max Marks - 33**
Preparation	12
Spectrophotometric Determinations / Flame Photometric Determinations	12
Record	04
Viva Voice	05
Total	**33**

Preparation

Preparation of selected inorganic compounds and their study by IR, electronic spectra, and magnetic susceptibility measurements. Handling of air and moisture sensitive compounds involving vacuum lines. Selection can be made from the following :

1. Sodium amide. Inorg. Synth., 1946, 2, 128.
2. Atomic absorption analysis of Mg and Ca.
3. Synthesis of trichlorodiphenylantimony (V) hydrate. Inorg. Synths., 1985, 23, 194
4. Sodium tetrathionate $Na_2S_4O_6$.
5. Metal complex of dimethyl sulfoxide : $CuCl_2.2DMSO$ J.Chem. Educ., 1982, 59, 57.
6. Synthesis of metal acethylacetonate : Inorg. Synths, 1957, 5, 130, 1963, 1, 183.
7. Cis and Trns $[Co(en)_2Cl_2]^+$.
8. Determination of Cr (III) complex. $[Cr(H_2O)_6]NO_3.3HO$,. Inorg. synths., 1972, 13, 184.
9. Preparation and use of Ferrocene. J. Chem. Edu. 1966, 43, 73; 1976, 53, 730.
10. Preparation of [Co(phenathroline-5,6 quinone)].

Spectrophotometric Determinations / Spectroscopic identification of recorded spectra like IR, NMR, ESR and Mass

a. Manganese/Chromium in steel sample.
b. Nickel by extractive spectrophotometric method.
c. Fluoride/nitrite/phosphate.
d. Copper-Ethylene diamine complex : Slope-ratio method.

Flame Photometric Determinations

a. Sodium and potassium when present together.
b. Lithium/calcium/barium/strontium.
c. Cadmium and magnesium in tap water.

Organic Chemistry **Max Marks - 33**

Multi-step Synthesis of Organic Compounds	12
Spectroscopy/Spectrophotometric Determinations	12
Record	04
Viva Voice	05
Total	**33**

Multi-step Synthesis of Organic Compounds

The exercise should illustrate the use of organic reagents and may invplve purification of products by chromatographic techniques. Photochemical reaction Benzophenone -> Benzpinacol _> Benzpinacolone Beckmann rearrangement : Benzanilide from benzene Benzene -> Benzophenone -> Benzphenone oxime -> Benzanilide Benzilic acid rearrangement : Benzilic acid from benzoin Benzoin -> Benzil -> Benzilic acid Synthesis heterocyclic compounds Skraup synthesis : Preparation of quinoline from aniline Fisher Indole synthesis : Preparation of 2-phenylindole from phenylhydrazine. Enzymatic synthes Enzymatic synthesis Enzymatic reduction : reduction of ethyl acetoacetate using Baker's yeast to yield enantiomeric excess of S (+) ehtyl-3-hydroxybutanoate and determine its optical purity. Biosynthesis of ethanol from sucrose. Synthesis using microwave Alkylatio of diethyl malonate with benzyl chloride. Synthesis using phase transfer catalyst. Alkylatio of diethyl malonate or ethyl acetoacetate with an alkylhalide.

Spectroscopy

Identification of organic compounds by the analysis of their spectral data (UV, IR, PMR, CMR & MS)

Spectrophotometric (UV/VIS) Estimations/isolation of the following (any one compound)

Spectroscopic estimation

1. Amino acids
2. Proteins
3. Carbohydrates
4. Ascorbic acid
5. Aspirin
6. Caffeine

Isolation

1. Cascin from milk
2. Lycopine from tomato
3. Piperine from black pepper
4. Caffeine from tea leaves
5. Lactose from milk