

Chhindwara University, Chhindwara (M.P.)

III

SYLLABUS OF M.A./M.Com./M.Sc./M.H.Sc. PREVIOUS/FINAL OR SEMESTER -----

Name of Paper	Title of paper	Max. Marks			Minimum Marks			Total Marks
		Theory	CCE	Practical	Theory	CCE	Practical	
MCH								50
I 501	Application of Spectroscopy I	40	10		15	04		50
II 502	Photo Chemistry	40	10		15	04		50
III 503	Environmental Chemistry	40	10		15	04		50
IV	Group A 1. Chemistry of Materials 504	40	10		15	04		50
	2. Heterocyclic Chemistry 505	40	10		15	04		50
	3. Physical Organic Chemistry 506	40	10		15	04		50

IV optional subjects

Board of Studies :

- I. Chairman
- II. Subject Expert -
1. Polymer Chemistry 507
2. Heavy Chemical and Petroleum 508
3. Organometallic Chemistry 509
- 5.
- 6.
- 7.

Practical - Max Min		
In-Organic	34	13
Organic	33	13
Physical	33	13

Chhindwara University, Chhindwara (M.P.)

(Session 2020-21 Onwards)

Class/ कक्षा : M.Sc. Chemistry

Semester/ सेमेस्टर : III

Title of Subject / विषय का शीर्षक : APPLICATION OF SPECTROSCOPY-I

Paper/प्रश्न पत्र : I Code : MCH-501

Max. Marks/अधिकतम अंक : 40+10 CCE

Min. Marks/न्यूनतम अंक : 15+04 CCE

Unit I Electronic Spectroscopy :

Electronic Spectral Studies for d₁ - d₉ systems in octahedral, tetrahedral and square planer complexes.

Unit II Vibrational Spectroscopy

Symmetry and shapes of AB₂,AB₃,AB₄,AB₅ and AB₆, mode of bonding of ambidentate ligands, nitrosyl, ethylenediamine and diketonato complexes, application of resonance Raman spectroscopy and its applications.

Unit III Nuclear Magnetic Resonance Spectroscopy – I

General introduction and definition, chemical shift, spin-spin interaction, shielding and deshielding mechanism, mechanism of measurement of chemical shift values and correlation for protons bonded to carbon (aliphatic, olefinic, aldehydic and aromatic) and other nuclei (alcohols, phenols, enols, carboxylic acids, amines, amides & marcaption),

Unit IV Nuclear Magnetic Resonance Spectroscopy – II

Chemical exchange, effect of deuteration, Complex spin spin interaction between two, three four and five nuclei (I order spectra) Stereochemistry, hindered rotation, Karplus curve-variation of coupling constant with disordered angle. NMR shift reagents, solvent effects. Nuclear overhauser effect (NOE).

Unit V Mossbauer Spectroscopy

Basic principles, spectral parameters and spectrum display. Application of the technique to the studies of (1) bonding and structures of Fe+2 and Fe+3 compounds including those of intermediate spin, (2) Sn²⁺ and Sn⁴⁺ compounds nature of M-L bond, co-ordination number, structure and (3) detection of oxidation state and in equivalent MB atoms.



Chhindwara University, Chhindwara (M.P.)

(Session 2020-21 Onwards)

Class/ कक्षा : M.Sc. Chemistry

Semester/ सेमेस्टर : III

Title of Subject / विषय का शीर्षक : PHOTOCHEMISTRY

Paper/प्रश्न पत्र : II Code : MCH-502

Max. Marks/अधिकतम अंक : 40+10 CCE

Min. Marks/न्यूनतम अंक : 15+04 CCE

Unit I

Photochemical Reaction

Interaction of electromagnetic radiation with matter, types of excitations, fate of excited molecule, quantum yield, transfer of excitation energy, actinometry.

Unit II

Determination of Reaction Mechanism

Classification, rate constants and life times of reactive energy state, determination of rate constants of reactions. Effect of light intensity on the rate of photochemical reactions. Types of photochemical reactions-photo dissociations, gas-phase photolysis.

Unit III

Photochemistry of Alkenes

Intramolecular reactions of the olefinic bond-geometrical isomerism, cyclisation reactions, rearrangement of 1,4-and 1,5-dienes.

Photochemistry of Aromatic Compounds

Isomerisation, additions and substitutions.

Unit IV

Photochemistry of Carbonyl Compounds

Intramolecular reactions of carbonyl compounds-saturated, cyclic and acyclic, β , γ unsaturated and α , β unsaturated compounds, cyclohexadienones. Intermolecular cycloaddition reactions-dimerisations and oxetane formation.

Unit V

Miscellaneous Photochemical Reactions

Photo-Fries reactions of annilides, Photo-Fries rearrangement. Barton reaction. Singlet molecular oxygen and its reactions. Photochemical formation of smog. Photodegradation of polymers. Photochemistry of vision.



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(Session 2020-21 Onwards)

Class/ कक्षा : M.Sc. Chemistry

Semester/ सेमेस्टर : III

Title of Subject / विषय का शीर्षक : ENVIRONMETAL CHEMISTRY

Paper/प्रश्न पत्र : III Code : MCH-503

Max. Marks/अधिकतम अंक : 40+10 CCE

Min. Marks/न्यूनतम अंक : 15+04 CCE

Particulars/विवरण

Unit I

Atmosphere

Atmospheric layers, Vertical temperature profile, heat/radiation budget of the earth atmosphere systems. Properties of troposphere, thermodynamic derivation of lapse rate. Temperature Inversion. Calculation of Global mean temperature of the atmosphere. Biogeochemical cycles of carbon, nitrogen, sulphur, phosphorus, oxygen. Residence times.

Atmospheric Chemistry

Sources of trace atmospheric constituents : nitrogen oxides, Sulphur dioxide and other sulphur compounds, carbon oxides, chlorofluorocarbons and other halogen compounds, methane and other hydrocarbons.

Tropospheric Photochemistry

Mechanism Photochemical decomposition of NO₂ and formation of ozone. Formation of oxygen atoms, hydroxyl, hydroperoxy and organic radicals and hydrogen peroxide. Reactions of hydroxyl radicals with methane and other organic compounds. Reaction of OH radicals with SO₂ and NO₂. Formation of Nitrate radical and its reactions. Photochemical smog meteorological conditions and chemistry of its formation.

Unit II

Air Pollution

Air pollutants and their classifications. Aerosols-sources, size distribution and effect on visibility, climate and health.

Acid Rain

Definition, Acid rain precursors and their aqueous and gas phase atmospheric oxidation reactions. Damaging effects on aquatic life, plants, buildings-and health. Monitoring of SO₂ and NO₂. Acid rain control strategies

Mechanism of Ozone formation, Mechanism of catalytic ozone depletion, Discovery of Antarctic Ozone hole and Role of chemistry and meteorology. Control Strategies.

Green House Effect

Terrestrial and solar radiation Spectra, Major green house gases and their sources and Global warming potentials. Climate change and consequences.

Urban Air Pollution

Exhaust emissions, damaging effects of carbon monoxide. Monitoring of CO. Control strategies.

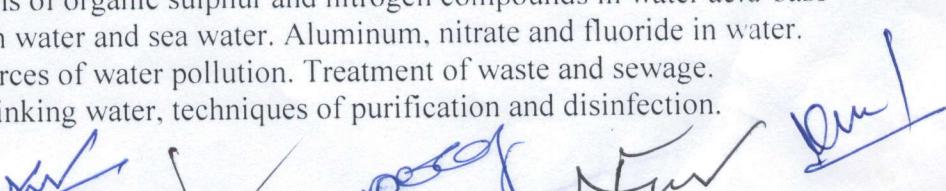
Unit III

Aquatic Chemistry and Water Pollution

Redox chemistry in natural waters. Dissolved oxygen, biological, oxygen demand, chemical oxygen demand, determination of DO, BOD and COD. Aerobic and anaerobic reactions of organic sulphur and nitrogen compounds in water acid-base chemistry of fresh water and sea water. Aluminum, nitrate and fluoride in water.

Petrification. Sources of water pollution. Treatment of waste and sewage.

Purification of drinking water, techniques of purification and disinfection.



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Unit IV

Environmental Toxicology

Toxic heavy metals: Mercury, lead, arsenic and cadmium. Causes of toxicity. Bioaccumulation, sources of heavy metals. Chemical speciation of Hg, Pb, As, and Cd. Biochemical and damaging effects.

Toxic Organic Compound : Pesticides, classification, properties and uses of organochlorine and ionospheres pesticides detection and damaging effects.

Polychlorinated biphenyls : Properties, use and environmental continuation and effects.

Polynuclear Aromatic Hydrocarbons : Source, structures and as pollutants.

Unit V

Soil and Environmental Disasters ' Soil composition, micro and macro nutrient, soil pollution by fertilizers, plastic and metals. Methods of re-mediation of soil. Bhopal gas tragedy, Chernobyl, three mile island, Minimata Disease, Seveso (Italy). London smog.

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Chhindwara University, Chhindwara (M.P.)

(Session 2020-21 Onwards)

Class/ कक्षा : M.Sc. Chemistry

Semester/ सेमेस्टर : III

Title of Subject / विषय का शीर्षक : CHEMISTRY OF MATERIALS

Paper/प्रश्न पत्र : IV Optional – (I) Code : MCH-504

Max. Marks/अधिकतम अंक : 40+10 CCE

Min. Marks/न्यूनतम अंक : 15+04 CCE

Particulars/विवरण

Unit I

A. Multiphase materials

Ferrous alloys; Fe-C phase transformations in ferrous alloys; stainless steels, non ferrous alloys, properties of ferrous and non-ferrous alloys and their applications.

B. Glasses, Ceramics, Composites and Nanomaterials

Glassy state, glass formers and glass modifiers, applications. Ceramic structures, mechanical properties, clay products. Refractories, characterizations, properties and applications.

Microscopic composites; dispersion-strengthened and particle-reinforced, fibre-reinforced composites, macroscopic composites. Nanocrystalline phase, preparation procedures, special properties, applications.

Unit II

A. Thin Films and Langmuir-Blodgett Films

Preparation techniques; evaporation/sputtering, chemical processes, MOCVD, sol-gel etc. Langmuir-Blodgett (LB) film, growth techniques, photolithography, properties and applications of thin and LB films.

B. Liquid Crystals

Mesomorphic behaviour, thermotropic liquid crystals, positional order, bond orientational order, nematic and smectic mesophases; smectic-nematic transition and clearing temperature -homeotropic, planar and schlieren textures, twisted nematics, chiral nematics, layer arrangement in smectic A and smectic C phases, optical properties of liquid crystals. Dielectric susceptibility and dielectric constants. Lyotropic phases and their description of ordering in liquid crystals.

Unit III

A. Polymeric Materials

Molecular shape, structure and configuration, crystallinity, stress-strain behaviour, thermal behavior, polymer types and their application, conductors and ferro-electric polymers.

B. Ionic Conductors

Types of ionic conductors, mechanism of ionic conduction, interstitial jumps (Frenkel); vacancy mechanism, diffusion superionic conductors; phase transitions and mechanism of conduction in superionic conductors, examples and applications of ionic conductors.

Unit IV

High Tc Materials

Defect perovskites, high T_c superconductivity in cuprates, preparation and characterization of 1-2-3 and 2-1-4 materials, normal state properties; anisotropy; temperature dependence of electrical resistance; optical phonon modes, superconducting state; heat capacity; coherence length, elastic constants, position lifetimes, microwave, absorption-pairing and multigap structure in high T_c materials, applications of high T_c materials.

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Unit V

A. Materials of Solid State Devices

Rectifiers, transistors, capacitors-IV-V compounds, low-dimentional quantum structures; optical properties.

B. Organic Solids, Fullerenes, Moleuclar Devices

Conducting organics, organic superconductors, magnetism in organic materials. Fullerenes-doped, fullerenes as superconductors.

Moleuclar rectifiers and transistors, artificial phytosynthetic devices, optical storage **memory and switches-sensors.**

Nonlinear optical materials; nonlinear optical effects, second and third order-molecular hyperpolarisability an second order electric susceptibility — materials for second and third harmonic generation.

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Chhindwara University, Chhindwara (M.P.)

(Session 2020-21 Onwards)

Class/ कक्षा : M.Sc. Chemistry

Semester/ सेमेस्टर : III

Title of Subject / विषय का शीर्षक : HETEROCYCLIC CHEMISTRY

Paper/प्रश्न पत्र : IV Optional – (II) Code : MCH-505

Max. Marks/अधिकतम अंक : 40+10 CCE

Min. Marks/न्यूनतम अंक : 15+04 CCE

Particulars/विवरण

Unit I

Nomenclature of Heterocycles

Replacement and systematic nomenclature (Hantzsch MCH-Widman system) for monocyclic fused and bridged heterocycles.

Aromatic Heterocycles

General chemical behaviour of aromatic heterocycles, classification (structural type), criteria of aromaticity (bond lengths, ring current and chemical shifts in ^1H NMR-spectra. Empirical resonance energy, delocalization energy and Dewar resonance energy, diamagnetic susceptibility exaltations). Heteroaromatic reactivity and tautomerism in aromatic heterocycles.

Unit II

Non-aromatic Heterocycles

Strain-bond angle and torsional strains and their consequences in small ring heterocycles. Conformation of six-membered heterocycles with reference to molecular geometry, barrier to ring inversion, pyramidal inversion and 1,3-diaxial interaction. A stereo-electronic effect's anomeric and related effects, Attractive interactions-hydrogen bonding and intermolecular nucleophilic electrophilic interactions. Heterocyclic synthesis-principles of heterocyclic synthesis involving cyclization reactions and cycloaddition reactions.

Unit III

Small Ring Heterocycles

Three-membered and four-membered heterocycles-synthesis and reactions of aziridines, oxiranes, thiranes, azetidines, oxetanes and thietanes.

Benzo-Fused Five-Membered Heterocycles

Synthesis and reactions including medicinal applications of benzopyrroles, Bezofurans and benzothiophenes.

Unit IV

Meso-ionic Heterocycles

General classification, chemistry of some important meso-ionic heterocycles of type-A and B and their applications.

Six-Membered Heterocycles with one Heteroatom

Synthesis and reactions of pyrylium salts and pyrones and their comparison with pyridinium & thiopyrylium salts and phridones. Synthesis and reactions of quinolizinium and benzopyrylium salts, coumarins and chromones.

Six Membered Heterocycles with Two or More Heteroatoms: Synthesis and reactions of diazones, triazines, tetrazines and thiazines. Seven-and Large-Membered Heterocycles: Synthesis and reactions of azepines, oxepines, thiepines, diazepines, thiazepines, azocines, diazocines, dioxocines and dithiocines.

Unit V

Heterocyclic Systems Containing P, As, Sb and B

Heterocyclic rings containing phosphorus: Introduction, nomenclature, synthesis and characteristics of 5- and 6-membered ring systemsphosphorinaes, phosphorines, phospholanes and phospholes. Heterocyclic rings containing As and Sb : Introduction, synthesis and characteristics of 5- and 6-membered ring system. Heterocyclic rings containing B : Introduction, synthesis reactivity and spectral characteristics of 3- 5- and 6-membered ring system.

Chhindwara University, Chhindwara (M.P.)

(Session 2020-21 Onwards)

Class/ कक्षा : M.Sc. Chemistry

Semester/ सेमेस्टर : III

Title of Subject / विषय का शीर्षक : PHYSICAL ORGANIC CHEMISTRY

Paper/प्रश्न पत्र : IV Optional – (III) Code : MCH-506

Max. Marks/अधिकतम अंक : 40+10 CCE

Min. Marks/न्यूनतम अंक : 15+04 CCE

Particulars/विवरण

Unit I	<p>Concepts in Molecular Orbital (MO) and Valence Bond (VB) Theory Introduction to Huckel molecular orbital (MO) method as a mean to explain modern theoretical methods. Advanced techniques in PMO and FMO theory, Molecular mechanics, semi empirical methods and ab initio and density functional methods. Scope and limitations of several computational programmes.</p>
Unit II	<p>Quantitative MO theory : Huckel molecular orbital (HMO - method as applied to ethene, allyl and butadiene. Qualitative MO theory ionisation potential. Electron affinities. MO energy levels. Orbital symmetry. Orbital interaction diagrams. MO of simple organic systems such as ethene, allyl, butadiene, methane and methyl group. Conjugation and hyper-conjugation. Aromaticity. Valence bond (B) configuration mixing diagrams. Relationship VB configuration mixing and resonance theory. Reaction profiles. Potential energy diagrams. Carve. Crossing model-nature of activation barrier in chemical reactions.</p>
Unit III	<p>Principles of Reactivity Mechanistic significance of entropy, enthalpy and Gibb's free energy. Arrhenius equation. Transition state theory. Uses of activation parameters, Hammonds postulate, Bell-Evaris Polanyi Principle. Potential energy surface model. Marcus theory of electron transfer. Reactivity and selectivity principles. Kinetic Isotope Effect Theory of isotope effects. Primary and secondary kinetic isotope effects. Heavy atom isotope effects. Tunneling effect. Solvent effects. Structural Effects on Reactivity Linear free energy relationships (LFER). The Hammett equation, substituent constants, theories of substituent effects. Interpretation of δ-values. Reaction constants. Deviations from Hammett equation. Dualparameter correlations, inductive substituent constant. The Taft model, s_I and s_R scales.</p>
Unit IV	<p>Acids, Bases, Electrophiles, Nucleophiles and Catalysis functions and their applications. hard and soft acids and bases. Nucleophilicity scales. Nucleofugacity. The α-effect. Ambivalent nucleophiles. Acid-base catalysis-specific and general catalysis. Bronsted catalysis, Nucleophilic and electroPhilic catalysis. Catalysis by noncovalent binding-micellar catalysis. Steric and Conformation Properties Various type of steric strain and their influence on reactivity. Steric acceleration. Molecular measurements of steric effects upon rates. Rates. Steric LFER. Conformational barrier to bond rotation-spectroscopic detection of individual conformers. Acyclic and monocyclic systems. Rotation around partial double bonds. Winstein-Holness and Curtin-Hammett principle.</p>

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Unit V

Nucleophilic and Electrophilic Reactivity

Structural and electronic effects on SN1 and SN2 reactivity. Solvent effect. Kinetic isotope effects. Intramolecular assistance. Electron transfer nature of SN2 reaction. Nucleophilicity and SN2 reactivity based on curved crossing mode. Relationship between polar and, electron transfer reactions, SRN1 mechanism.

Electrophilic reactivity, general mechanism. Kinetic of SE2 Ar reaction. Structural effects on rates and selectivity. Curve-crossing approach to electrophilic reactivity.

Supramolecular Chemistry

Properties of covalent bonds-bond length, inter-bond angles, force constant, bold and molecular dipole moments. Molecular and bond polarizability, bond dissociation enthalpy, entropy, intermolecular forces, hydrophobic effects. Electrostatic, induction, dispersion and resonance energy, magnetic interactions, magnitude of interaction energy, forces d between macroscopic bodies, medium effects. Hydrogen bond.



Chhindwara University, Chhindwara (M.P.)

(Session 2020-21 Onwards)

Class/ कक्षा : M.Sc. Chemistry

Semester/ सेमेस्टर : III

Title of Subject / विषय का शीर्षक : POLYMERS CHEMISTRY

Paper/प्रश्न पत्र : V Optional – (I) Code : MCH-507

Max. Marks/अधिकतम अंक : 40+10 CCE

Min. Marks/न्यूनतम अंक : 15+04 CCE

Particulars/विवरण

Unit I

Basics

Importance of polymers. Basic concepts: Monomers, repeat units, degree of polymerization Linear, branched and network polymers. Classification of polymers. Polymerization: condensation, addition/radical chain-ionic and copolymerization. Polymerization condition and polymer reactions. Polymerization in homogeneous and heterogeneous systems.

Unit II

Polymer Characterization

Poly dispersion -average molecular weight concept. Number, weight and viscosity average molecular weights. Polydispersity an molecular weight distribution. The practical significance of molecular weight: Measurement of molecular-weights. End-group, viscosity, light scattering, osmotic and ultracentrifugation methods.

Unit III

Analysis and testing of polymers

Chemical analysis of polymers, spectroscopic methods, X-ray diffraction study. Microscopy. Thermal analysis and physical testing-tensile strength. Fatigue, impact, tear, resistance, Hardness and abrasion resistance.

Unit IV

Inorganic Polymers

A general survey and scope of Inorganic Polymers special characteristics, classification, homo and hetero atomic polymers.

Structure, Properties and Applications of

a. Polymers based on boron-borazines, boranes and carbpranes.

b. Polymers based on Silicon, silicone's poly metalloxanes and poly metallo siloxanes, silazanes.

Unit V

Structure, Properties and Application of Polymers

a- Polymers based on Phosphorous-Phosphazenes, Polyohosphates

b- Polymers based on Sulphur-Tetra sulphur teranitride and related compounds.

c- Co-ordination and metal chelate polymers.

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Chhindwara University, Chhindwara (M.P.)

(Session 2020-21 Onwards)

Class/ कक्षा : M.Sc. Chemistry

Semester/ सेमेस्टर : III

Title of Subject / विषय का शीर्षक : HEAVY CHEMICALS & PETROLEUM

Paper/प्रश्न पत्र : V Optional – (II) Code : MCH-508

Max. Marks/अधिकतम अंक : 40+10 CCE

Min. Marks/न्यूनतम अंक : 15+04 CCE

Particulars/विवरण

Unit I Water, Gases and Heavy Chemicals

Water: Water Pollutants, their classes with examples, Biochemical Oxygen demand, thermal pollution, pollution by fertilizers, detergents, pesticides and industrial wastes.

Water Purification :

Classical and modern Methods — Ion exchange, electrodialysis, Reverse osmosis. Softening of Hard water. Chlorination and fluoridation.

Unit II Gases : Chemistry Large-scale productin, storage, hazards and uses of the following industrial gases: Hydrogen, oxygen, nitrogen, carbon dioxide, chlorine, fluorine, sulphur dioxide, phosgene, acetylene, argon, neon and helium.

Heavy Chemicals : Manufacture, Physical properties, Analysis, Hazards and applications of the following chemicals :

HCl, H₂SO₄, HNO₃, H₃PO₄, polyphosphoric acid,
NaHCO₃, Na₂CO₃, NaOH, NaCl, Na₂S₂O₃, Bleaching Powder, Bromine.

Unit III Coal & Petroleum

Coal: Origin and economic importance of coal. Coal composition, Coal carbonization, Coal gasification, Coal Gas, Water Gas, Producer gas, coal tar industry and manufacture of coal tar based chemicals and their importance. Role as carcinogens, Non-fuel uses of coal, and Cl Chemistry based on MeOHCOCO₂. CH₄ and CH₂O.

Unit IV Petroleum: Origin and composition, Refining, Reforming Fractionation; Cracking; knocking and Octane number, Kerosene and Naptha; Liquified. Petroleum gas (I.P.G.) Synthetic Gas, Synthetic Petrol, Petrochemicals, manufacture of ethylene propylene. Butedmne, xylenes, etc. Economic importance with particular reference to India.

Unit V Fats & Oils

Fats & Oil Natural Fats, Edible and Industrial Oils of vegetable origin, Common fatty acids and glycerides. Hydrogenation of Unsaturated oils, manufacture of Vasaspati and margarine.

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Chhindwara University, Chhindwara (M.P.)

(Session 2020-21 Onwards)

Class/ कक्षा : M.Sc. Chemistry

Semester/ सेमेस्टर : III

Title of Subject / विषय का शीर्षक : ORGANO TRANSITION METAL CHEMISTRY
Paper/प्रश्न पत्र : V Optional – (III) Code : MCH-509

Max. Marks/अधिकतम अंक : 40+10 CCE

Min. Marks/न्यूनतम अंक : 15+04 CCE

UNIT I

Alkyls and Aryls of Transition Metals :- Types, routes of synthesis, stability and decomposition pathways, organo copper in organic synthesis

UNIT II

Compounds of Transition Metal-Carbon Multiple Bonds :- Alkylidenes, alkylidynes, low valent carbenes and carbynes-synthesis, nature of bond structural characteristics, nucleophilic and electrophilic reactions on the ligands, role in organic synthesis.

UNIT III

Transition Metal Π -Complexes :- Transition metal Π -complexes with unsaturated organic molecules, alkenes, alkynes, alkynes, allyl, diene, dienyl, arene and trienyl complexes, preparations, properties, nature of bonding and structural features. Important reactions relating to nucleophilic and electrophilic attack on ligands and to organic synthesis.

UNIT IV

Transition Metal Compounds with Bonds to Hydrogen ;

Homogeneous catalysis :- Stoichiometric reactions for catalysis homogeneous catalytic hydrogenation, Zeigler-Natta polymerization of olefins, catalytic reactions involving carbon monoxide such as hydrocarbonylation of olefins (oxo reaction), oxopalladation reactions, activation of C-H bond.

UNIT V

Fluxional Organometallic Compounds :- Fluxionality and dynamic equilibria in compounds such as n^2 -olefin, n^3 -allyl and dienyl complexes.

Books Suggested

- Principles and Applications of Organotransition Metal Chemistry, J.P. Collman, L.S. Hegsdsus, J.R. Norton and R.G. Finke, University Science Books.
- The Organometallic Chemistry of the Transition Metals, R.H. Crabtree, John Wiley
- Metalloc-organic Chemistry, A.J. Pearson, Wiley
- Organometallic Chemistry, R.C. Mehrotra and A.Singh, New Age International

INORGANIC - Chemistry

Practical-Chemistry MS.c Semester- III

Qualitative determinations of a three components mixture	-	8
Chromatographic Separations	-	8
Spectrophotometric analysis	-	8
Record	-	5
Viva-Voce	-	5

Marks - 34

- 1- Qualitative determinations of a three components mixture - One Volumetrically and two gravimetrically
 - a. Cu^{+2} , Ni^{+2} , Zn^{+2}
 - b. Cu^{+2} , Ni^{+2} , Fe^{+++}
 - 2- Chromatographic Separations : Thin Layer Chromatographic separation
 - a. Cadmium and Zinc
 - b. Zinc and Magnesium
 - c. Nickel and Manganese
 - d. Cobalt and Nickel
 - 3- Mole ratio method and continuous variation method for Fe-salicylic acid Fe-SCN complexes spectrophotometric method for determination of concentration of an inorganic compound. KMnO_4 , $\text{K}_2\text{Cr}_2\text{O}_7$

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T. J. *W. S. G.* *W. S. G.* *W. S. G.*

छिन्दवाड़ा विश्वविद्यालय, छिन्दवाड़ा

Session -2019-2020

Class/कक्षा	:	M.Sc.
Semester/सेमेस्टर	:	III
Subject/विषय	:	Chemistry
Paper	:	III
विषय समूह का शीर्षक	:	Physical Chemistry (Practical)

Physical Chemistry

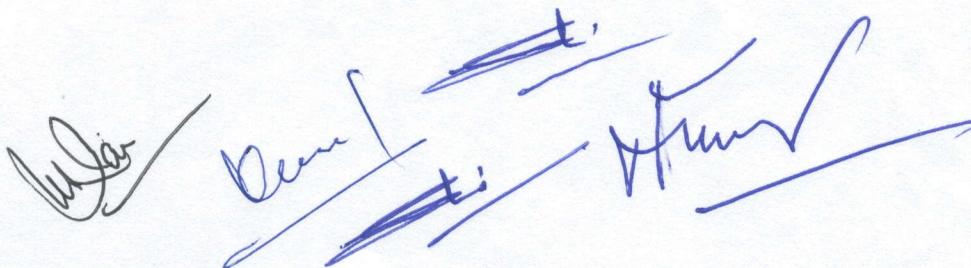
Spectroscopy	12
Chemical Kinetics	12
Record	04
Viva Voice	05
Total	33

Spectroscopy

- I. Determination of pKa of indication (e.g. methyl red) in (a) aqueous and (b) micellar media
- II. Determination of stoichiometry and stability constant of Ferrcisothiocyanation complex ion in Solution.
- III. Determination of rate of alkaline bleaching of Malchite green and effect of ionic strength on the rate of reaction.
- IV. Determination of stability constant of Fe(III)- salicylic acid complex.
- V. Lambert Beers Law.

Chemical Kinetics

- I. Determination of rate constant formation constant of an intermediate complex in the reaction of Ce (IV) and Hypophosphorous acid at ambient temperature.
- II. Determination of energy and enthalpy of activation in the reaction of KMnO4 and benzyl alcohol in acid medium.
- III. Determination of energy of activation of and entropy of activation from a single kinetic run.
- IV. Kinetics of an enzyme micellar catalyzed reaction.
- V. Determination of order of $S_2O_8^{2-}$ - I reaction
- VI. Determination of energy of activation of $S_2O_8^{2-}$ - I reaction
- VII. Studies on the effect of variation of ionic strength on the rate of $S_2O_8^{2-}$ - I reaction
- VIII. Ester hydrolysis catalyzed by a base
- IX. Kinetics of acid-catalyzed reaction between acetone-iodine.

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Practical

MS.c. Semester – III
Duration – 6-8 hours in each branch

Organic Chemistry

Max Marks – 33

Multi-step Synthesis of Organic Compounds

Marks - 8

- The exercise should illustrate the use of organic reagents and may involve purification of the products by chromatographic techniques.
- Preparation in steps: Benzophenone Benzopinacol Benzopincolone Beckmann rearrangement : Benzophenone from benzene.
- Benzene- Benzophenone- Benzophenone Oxime Benzanilide.
- Benzoic acid rearrangement: Benzoic acid from benzoin.
- Benzoin- Benzoic- Benzoic
- Synthesis of heterocyclic compounds Skraup synthesis.
- Preparation of quinoline from aniline.
- Fisher Indole synthesis: Preparation of 2- Phenylindole from phenylhydroxime.
- Preparation of phenolphthalein
- Preparation of fluorescein
- Preparation of eosin from fluorescein

Isolation

Marks- 4

- Isolation of nicotine from tobacco leaves preparation of coloured candle and analysis.

Preparation of some commercial organic products **Marks- 4**

Preparation of some commercial organic products such as insecticide and pesticide.

Interpretation of spectra

Marks- 4

- I R spectra of phenols & Alcohols, Naphthol's, Aldehydes, ketones and Acids.
- U.V. spectra of butadiene,acyclic diene,ketone,phenol,unsaturated carboxylic acid

Communication Skills:

Marks- 4

Presentation Skills : (1) How to make power point presentation

(2) Body language during presentation

Viva - 4

Record - 5

(Signature) *(Signature)* *t.*