DEPARTMENT OF CHEMISTRY

GOVT. DIGVIJAY PG AUTONOMOUS COLLEGE, RAJNANDGAON

Syllabus and Marking Scheme for

B.Sc. (Honours)

Major - Chemistry

Eighth Semester

Session 2025-26

Paper	Title of the Paper	Credit	Marks (ESE + IA)	Total Marks
DSC	Metal Complexes	3	80 + 20	100
DSC LAB	Metal Complexes Lab	1	40 + 10	50
DSE-I	Reaction Mechanism	3	80 + 20	100
DSE LAB	Reaction MechanismLab	1	40 + 10	50
DSE-II	Thermodynamics and Electrochemistry	4	80 + 20	100
DSE-III	Introduction to Spectroscopy	4	80 + 20	100
DSE-IV	Natural Products and Medicinal Chemistry	4	80 + 20	100

Y.A.Beg

3/2/25
(Dr AKS Sharma)

DEPARTMENT OF CHEMISTRY

GOVT. DIGVIJAY PG AUTONOMOUS COLLEGE, RAJNANDGAON (C.G.)

B.Sc. (Honours)

Major - Chemistry

Eighth Semester

2025-26

GOVT. DIGVIJAY AUTONOMOUS P.G. COLLEGE, RAJNANDGAON (C.G.)

B. Sc. (Honours) (session 2025-26)

Major - Chemistry

Session: **2025-26**	Program: B.Sc. (Honours)
Semester: VIII	Subject: Chemistry
Course Type: DSC 8	Course Code:
Course Title:	**Metal Complexes**
Credit: 03	Lecture: 60
M.M. 100 = (ESE 80 + IA 20)	Minimum Passing Marks: 40%

Title	Metal Complexes
Course Objectives	Students will have a basic knowledge of electronic spectra and magnetic properties of transition metal complexes, metal clusters, metal clusters metal clusters, lanthanoids and actinoids and electron diffraction, X-Ray diffraction and neutron diffraction.
Learning Outcomes	**Unit 1-** Students will develop an understanding about the electronic spectra and magnetic properties of transition metal complexes. **Unit 2 -** Students will have an insight look about metal clusters. **Unit 3-** Students will have an insight about lanthanoids and actinoids and electron diffraction. **Unit 4 -** Students will understand about magnetic properties of X-Ray diffraction and neutron diffraction.

Units	Lectures	Topics
I	15	**UNIT-I : Electronic Spectra of Transition Metal Complexes** Spectroscopic ground states, correlation, Orgel and Tanabe-Sugano diagrams for transition metal complexes (d^1-d^9 states), calculations of Dq, B and parameters, charge transfer spectra, spectroscopic method of assignment of absolute configuration in optically active metal chelates and their stereochemical information. **Magnetic Properties of Transition Metal Complexes** Magnetic properties of octahedral, tetrahedral, tetragonally distorted square planar, trigonal bipyramidal and square bipyramidal complexes based on CFT, spin equilibrium, spin free and spin paired equlibria, quenching of orbital angular momentum by ligand field, Magnetic properties of complexes with A, E and T terms, spin orbit coupling.
II	15	**UNIT-II : Metal clusters** Higher boranes, carboranes, metalloboranes and metallocarboranes. Metal carbonyl and halide clusters, compounds with metal-metal multiple

		bonds. Wade's rule, styx number, isolobal analogy, applications of boron compounds, synthesis and structures of S-N cyclic compounds
III	**15**	**UNIT-III : Lanthanoids and actinoids and Electron Diffraction** Introduction, occurrence, physical and chemical properties, electronic spectra and magnetic properties- oxidation states, term symbols, color transition, organometallic compounds and recent applications. **Electron Diffraction** Scattering intensity vs scattering angle, Wierl equation, measurement technique, elucidation of structure of simple gas phase molecules. Low energy electron diffraction and structure of surfaces.
IV	**15**	**UNIT-IV : X-Ray Diffraction** Bragg condition, Miller indices, Laue method, Bragg method, Debye – Scherrer method of X-Ray structural analysis of crystals, index reflections, identification of unit cells from systematic absences in diffraction pattern. Structure of simple lattices and X-ray intensities, structure factor and its relation to intensity and electron density, phase problem. Ramchandran Diagram. **Neutron Diffraction** Scattering of neutrons by solid and liquids, magnetic scattering, measurement techniques. Elucidation of structure of magnetically ordered unit cell.

List of Books	1. Advanced Inorganic Chemistry, F.A. Cotton and Wilkinson, John Wiley. 2. Inorganic Chemistry, J.E. Huheey, Harpes & Row. 3. Chemistry of the Elements, N.N. Greenwood and A. Earnshow, Pergamon. 4. Inorganic Electronic Spectrosocopy, A.B.P. Lever, Elsevier. 5. Magnetochemistry, R.L. Carlin, Springer Verlag. 6. Comprehensive Coordination Chemistry eds., G. Wilkinson, R.D. Gillars and J.A. Mc Cleverty, Pergamon. 7. Modern spectroscopy, J. M. Hollas, JohnWiley. 8. Applied electron spectroscopy for chemical analysis Ed. H. Windawi and F.L. Ho, Wiley Interscience.

Metal Complexes Lab	
Session: 2024-25	Program: **FYUG B. SC. (Honours with Research)**
Semester: VIII	Subject: **Chemistry**
Course type: DSC LAB	Course Code:
Course Title :	**Metal Complexes**
MM: 50 (40 + 10)	Minimum Passing Marks: **20**
Credit: 01	

List of Practicals

MAJOR EXPERIMENTS

Chromatography

Separation of cations and anions by Paper chromatography

Column chromatography

Flame Photometry / AAS / FIA

Determination of cations / anions and metal ions e.g. Na^+, K^+, Ca^{2+}, SO_4^{2-}, NO_2^-, Fe, Mo, Ni Cu, Zn, etc.

MINOR EXPERIMENTS

Spectrophotometry

Verification of Beer-Lambert law

Molar absorptivity calculation, plotting graph to obtain λ_{max} etc.Effect of pH in aqueous coloured system.

Determination of metal ions e.g. Fe, Cu, Zn, Pb, etc. using inorganic reagent like SCN, an organic chelating agent like dithizone, cupferron, 8-hydroxyquinoline, etc. in aqueous / organic phase in the presence of surface activeagents.

Nephelometry / Turbidimetry

Determination of chloride, sulphate, phosphate, turbidity, etc.

List of Books	
	1. Computer for Chemists, Pundhir & Bansal, Pragati Prakashan; 2. Computer and Common Sense, R. Hunt and J. Shelley, Prentice Hall. 2. Computational Chemistry, A.C. Norris. 3. Computer Programming in FORTRAN IV, V. Rajaraman, Prentice Hall 4. B.K Sharma, spectroscopy , Krishna publication

Session: 2025-26	Program: B.Sc. (Honours)
Semester: VIII	Subject: Chemistry
Course Type: DSE-E 8A	Course Code:
Course Title:	**Reaction Mechanism**
Credit: 3	Lecture: 60
M.M. 100 = (ESE 80 + IA 20)	Minimum Passing Marks: 40%

Title	Reaction Mechanism
Course Objectives	Students will have a basic knowledge of aliphatic electrophilic substitution, aromatic electrophilic substitution and aromaticity, free radical reactions, pericyclic reactions, rearrangements and reagents.
Learning Outcomes	**Unit 1-** Students will develop an understanding about aliphatic electrophilic substitution, aromatic electrophilic substitution and aromaticity. **Unit 2 -** Students will have an insight look about free radical reactions. **Unit 3-** Students will have an insight about pericyclic reactions. **Unit 4 -** Students will understand about rearrangements and reagents.

Units	Lectures	Topics
I	15	**Unit I : Substitution Reactions** **Aliphatic Electrophilic substitution** Bimolecular mechanisms S_E1, S_E2 and S_Ei mechanism, electrophilic substitution accompanied by double bond shifts. Effect of substrates, leaving group and the solvent polarity on the reactivity. **Aromatic Electrophilic substitution** The arenium ion mechanism and important Electrophilic substitution reactions, directing effect, orientation and reactivity, energy profile diagrams. The ortho/para ratio, ipso attack, diazonium coupling. **Aromaticity** Aromaticity in homocyclic and heterocyclic compounds Huckel's rule, anti- aromaticity, homo-aromaticity, non-aromaticity, quasi aromatic compounds PMO approach for Aromaticity and Annulenes.
II	15	**Unit II : Free Radical Reactions** Types of free radical reactions, free radical substitution mechanism at an Aromatic substrate, neighboring group assistance. Reactivity for aliphatic and aromatic substrates at a bridgehead. Reactivity in the attacking radicals. The effect of solvents on reactivity. Allylic halogenation (NBS), oxidation of aldehydes to carboxylic acids, auto-oxidation, coupling of alkynes and arylation of aromatic compound by

	13. Advanced Organic Chemistry, F.A. Carey and R.J. Sundbery, Plenum 14. Structure and Mechanism in Organic Chemistry, C.K. Ingold, Cornell University Press. 15. Organic Chemistry, R. T. Morrison and R.N. Boyd, Prentice Hall. 16. Modern Organic Reactions. H.O. House Benjamin Principles of Organic Synthesis, R.O.C. Normon and J.M. Coxon, Blackie, Academic & professional. 17. Pericyclic reactions, S.M. Mukherji, Macmillan India. 18. Reaction Mechanism in Organic Chemistry, S.M. Mukherji and S.P. Singh, Macmillan 19. Stereo Chemistry of Organic Compounds, D. Nasipuri, New Age International 20. Stereo Chemistry of Organic Compounds, P.S. Kalsi, New Age International.

Reaction Mechanism Lab	
Session: **2025-26**	Program: B.Sc. (Honours)
Semester:	Subject: **Chemistry**
Course type: DSE LAB (8A)	Course Code:
Course Title :	**Reaction Mechanism Lab**
MM: 50 (40 + 10)	Minimum Passing Marks: **20**
Credit : 01	

List of Practicals

MAJOR EXPERIMENTS

Organic Synthesis

(i) Acetylation: Acetylation of cholesterol and separation of cholesteryl acetate by column chromatography.
(ii) Synthesis of β-Naphthyl acetate / Hydroquinonediacetate.
(iii) Oxidation: Adipic acid by chromic acid oxidation ofcyclohexanol
(iv) Grignard reaction: Synthesis of triphenylmethanol from benzoicacid
(v) Aldol condensation: Dibenzalacetone from benzyldehyde
(vi) Sandmeyer reaction : p-chlorotoluene from p-toluidine / o- chlorobenzoic acid from anthranilic acid.
(vii) Acetoacetic ester Condensation: Synthesis of ethyl-n-butylacetoacetate by A.E.E. condensation.
(viii) Cannizzaroreaction : 4- chlorobenzaldehyde as substrate / Benzoic acid and benzyl alcohol.
(ix) Friedel Crafts Reaction: β-Benzoylpropionic acid from succinic anhydride and benzene.
(x) Aromatic electrophilic sustitutions: Synthesis of p-nitroaniline and bromoaniline. The products may be characterized by spectral techniques.

MINOR EXPERIMENTS

Qualitative Analysis

Separation, purification and identification of compounds of binary mixtures (solid-solid, liquid- solid) using TLC and column chromatography, chemical tests; IR spectra to be used for functional groupidentification.

Quantitative Analysis

(i) Determination of the percentage of number of hydrioxy group in an organic compound by acetylation method.
(ii) Estimation of amines/phenols using bromated bromide solution /or acetylation method.
(iii) Estimation of carbonyl group by hydrazone formation method
(iv) Estimation of Glycine by titration method.
(v) Determination of equivalent weight of carboxyl compound/ estimation of carboxyl group by titration method/ silver salt method

List of Books	1. Practical Organic Chemistry by A.I.Vogel. 2. Practical Organic Chemistry by Mann andSaunders. 3. Practical Organic Chemistry by Garg andSalija.

Session: **2025-26**	Program: B.Sc. (Honours)
Semester: VIII	Subject: Chemistry
Course Type: DSE-H & B	Course Code:
Course Title:	**Thermodynamics and Electrochemistry**
Credit: 4	Lecture: 60
M.M. 100 = (ESE 80 + IA 20)	Minimum Passing Marks: 40%

Title	Thermodynamics and Electrochemistry
Course Objectives	Students will have a basic knowledge of classical thermodynamics, statistical thermodynamics and non-equilibrium thermodynamics, electrochemistry and electrocatalysis, surface chemistry and macromolecules.
Learning Outcomes	**Unit 1-** Students will develop an understanding about the classical thermodynamics. **Unit 2 -** Students will have an insight look about statistical thermodynamics and non-equilibrium thermodynamics. **Unit 3-** Students will have an insight on electrochemistry and electrocatalysis. **Unit 4 -** Students will understand about surface chemistry and macromolecules.

Units	Lectures	Topics
I	15	**Unit-I : Classical Thermodynamics** Brief resume of concept of laws of thermodynamics, free energy, chemical potential and entropies. Partial molar properties, partial molar free energy, partial molar volume and partial molar heat content and their significances. Determination of these quantities. Concept of fugacity and determination of fugacity. Non-Ideal system. Excess function for non-ideal solutions, activity, activity coefficient. Debye-Huckel theory for activity coefficient of electrolyte solution, determination of activity and activity coefficients, ionic strength. Application of phase rule to three component systems.
II	15	**Unit-II : Statistical Thermodynamics** Concept of distribution, thermodynamic probability and most probable distribution. Maxwell Boltzmann distribution, Partition functions - translational, rotational, vibrational and electronic partition functions, calculation of thermodynamic properties in terms of partition functions. Applications of partitions functions, Fermi-Dirac statistics, Bose-Einstein statistics distribution law. **Non-equilibrium Thermodynamics** Irreversible thermodynamics, uncompensated heat, first and second law of thermodynamics, entropy production, Onsager equation, coupled reaction.
III	15	**Unit – III : Electrochemistry** Electrochemistry of solution, Debye-Huckel-Onsager treatment and its extension, ion-solvent interaction, Debye-Huckel-Jerum mode.

		Thermodynamics of electrified interface equation. Derivation of electro-capillarity. Lippmann equation (surface excess) methods of determination of structure of electrified interfaces. Guoy-Chapman, Stern, Graham-Devanathan- Mottwatts, Tobin, Bockris, Devanathan models. Over potentials, Exchange current density, derivation of Butler-Volmer equation, Tafel plot. Semiconductor interfaces theory of double layer at semiconductor, electrolyte solution interface, structure of double layer interfaces, effect of light at semiconductor solution interfaces. **Electrocatalysis** Influence of various parameters. Polarography theory-Ilkovic equation, half wave potential and its significance. Introduction to corrosion, homogeneous theory, forms of corrosion, corrosion monitoring and prevention methods.
IV	**15**	**UNIT–IV : Surface Chemistry** **Adsorption** Surface tension, capillary action, pressure difference across curved surface (Laplace equation), Gibbs adsorption isotherm, BET equation and estimation of surface area using BET equation. **Micelles** Surface active agents, classification of surface active agents, micellization, critical micellar concentration (CMC), factors affecting the CMC of surfactants, counter ion binding to micelles, thermodynamics of micellization, reverse micelles. **Macromolecules** **Polymer :** Definition, types of polymers, electrically conducting polymers, mechanism of polymerization, molecular mass, number and mass average molecular mass, molecular mass determination (osmometry, viscometry, diffusion and light scattering methods), sedimentation, chain configuration of macromolecules, calculation of average dimensions of various chain structures.

List of Books	1. Physical Chemistry, P.W. Atkins, ELBS 2. Thermodynamics, S. Glasstone 3. Statistical Thermodynamics, M.C. Gupta 4. Chemical Thermodynamics, Rastogi&Mishra 5. Kintetics and Mechanism of Chemical Transformation, J. Rajaraman 6. Micelles, Theoretical and Applied Aspects, V. Moroi, Plenum 7. Modem Electrochemisty Vol.-I and Vol.-II, J.O.M. Bockris and A.K.N. Reddy, Plenum 8. Introduction to Polymer Science, V.R. Gowarikar, N.V. Vishwanamanand J. Sridhar, Wiley Eastern.

Y.R. Beg

Session: **2025-26**	Program: B.Sc. (Honours)
Semester: VIII	Subject: Chemistry
Course Type: DSE-IV 8C	Course Code:
Course Title:	**Introduction to Spectroscopy**
Credit: 4	Lecture: 60
M.M. 100 = (ESE 80 + IA 20)	Minimum Passing Marks: 40%

Title	Introduction to Spectroscopy
Course Objectives	Students will have a basic knowledge of molecular and microwave spectroscopy, Infrared and Raman spectroscopy, nuclear magnetic resonance and nuclear quadruple resonance spectroscopy, photoelectron, photo. acoustic and electron spin resonance spectroscopy.
Learning Outcomes	**Unit 1-** Students will develop an understanding about the molecular and microwave spectroscopy. **Unit 2 -** Students will have an insight look about Infrared and Raman spectroscopy. **Unit 3-** Students will have an insight comparative study of nuclear magnetic resonance and nuclear quadruple resonance spectroscopy. **Unit 4 -** Students will understand about photoelectron, photo acoustic and electron spin resonance spectroscopy.

Units	Lectures	Topics
I	**15**	**Unit-I : Molecular Spectroscopy** Energy levels, molecular orbital, vibronic transitions, vibration progressions and geometry of the excited states , Franck - Condon principle, electronic spectra of polyatomic molecules. Emission spectra: radiative and non-radiative decay, internal conversion, spectra of transition metal complex, charge transfer spectra. **Microwave Spectroscopy** Classification of molecules, rigid rotor model, effect of isotopic substitution on the transition frequencies, intensities, non-rigid rotor. Stark effect, nuclear and electron spin interaction and effect of external field. Applications.
II	**15**	**Unit-II : Infrared spectroscopy** Review of linear harmonic oscillator, vibrational energy of diatomic molecules, zero point energy, force constant and bond strengths, anharmonicity. Morse potential energy diagram, vibration – rotation Spectroscopy, P, Q, R, branches. Breakdown of Oppenheimer approximation, vibration of polyatomic molecules. Selection rules, normal modes of vibration, group frequencies, overtones, hot bands, factors affecting the band positions and intensities, far IR region, metal ligand vibrations, normal co-ordinate analysis. **Raman Spectroscopy**

		Classical and quantum theories of Raman effect – Pure rotational, vibrational and vibrational–rotational Raman spectra, selection rules, mutual exclusion principle. Resonance Raman Spectroscopy, coherent anti stokes Raman Spectroscopy(CARS)
III	**15**	**Unit-III : Nuclear Magnetic Resonance Spectroscopy** Nuclear spin, nuclear resonance, saturation, shielding of magnetic nuclei, chemical shift and its measurements, factors influencing chemical shift, deshielding, spin- spin interactions, factors including coupling constant 'J'. Classification (ABX, AMX, ABC, A_2B_2, etc), spin decoupling. Basic ideas about instruments, FT NMR, advantages of FT NMR, use of NMR in medical diagnostics. **Nuclear Quadruple Resonance Spectroscopy** Quadruple nuclei, Quadruple moments, electric field gradient, coupling constant, splitting, applications.
IV	**15**	**Unit -IV : Photoelectron Spectroscopy** Basic principle: photo-electric effect, ionization process, Koopmans theorem, photoelectron spectra of simple molecules, ESCA, chemical information from ESCA. **Photo acoustic Spectroscopy** Basic principles of photo acoustic spectroscopy (PAS), PAS gases and condensed systems, chemical and surface applications. **Electron Spin Resonance Spectroscopy** Basic principles, zero field splitting and Kramer's degeneracy, factors affecting the 'g' value. Isotropic and anisotropic hyperfine coupling constants, spin Hamiltonian, spin densities and McConnell relationship, measurement techniques, applications.

List of Books	
	1. Modern Spectroscopy J.M. Hollas, Johan Wiley. 2. Applied Electron Spectroscopy for chemical analysis ed. H. Windawi and F.L. Ho, Wiley Interscience. 3. NMR, NQR EPR and Mossbauer Spectroscopy in Inorganic Chemistry, R.V. Parish. Ellish Harwood. 4. Physical Methods in Chemistry, R.S. Drago, Saunders Company 5. Infrared and Raman Spectra: Inorganic and Coordination Compounds, K. Nakamoto, Wiley. 6. Spectroscopic Methods in Organic Chemistry, D.H. Williams, I. Fleming, Tata McGraw-Hill. 7. Application of Spectroscopy of Organic Compounds, J .R. Dyer, Prentice Hall. 8. Organic Spectroscopy, Third Ed., William Kemp, Palgrave Publications. 9. Fundamentals of Molecular Spectroscopy, C.N. Banwell, Tata McGraw-Hill.

Session: 2025-26	Program: B.Sc. (Honours)
Semester: VIII	Subject: Chemistry
Course Type: DSE-ईई ३D	Course Code:
Course Title:	NATURAL PRODUCTS AND MEDICINAL CHEMISTRY
Credit: 4	Lecture: 60
M.M. 100 = (ESE 80 + IA 20)	Minimum Passing Marks: 40%

Title	NATURAL PRODUCTS AND MEDICINAL CHEMISTRY
Course Objectives	Students will have a basic knowledge of terpenoids and carotenoids, alkaloids, steroids, plant pigments, drug design development, quantitative structure activity relationship, antineoplastic agents, antibiotics, antimalarials and aminoquinoline derivatives.
Learning Outcomes	**Unit 1-** Students will develop an understanding about the terpenoids and carotenoids and alkaloids. **Unit 2 -** Students will have an insight look about steroids and plant pigments. **Unit 3-** Students will have an insight comparative study of drug design development, quantitative structure activity relationship and drug related concepts. **Unit 4 -** Students will understand about antineoplastic agents, antibiotics, antimalarials and aminoquinoline derivatives.

Units	Lectures	Topics
I	15	**Unit-I :** **A. Terpenoids and Carotenoids:** Classification, nomenclature, occurrence, isolation, general methods of structure determination of Citral, Geraniol, a-Terpeneol, Menthol, Farnesol, Zingiberene, Santonin, Phytol, Abietic acid and ß -Carotene. **B. Alkaloids:** Definition, nomenclature and physiological action, occurrence, isolation, general methods of structure elucidation, degradation, classification based on Nitrogen heterocyclic ring, role of alkaloids in plant. Synthesis and biosynthesis of the following: Ephedrine, (+)-Conine, Nicotine, Atropine, Quinine and Morphine.
II	15	**Unit-II :** **A. Steroids:** Isolation, structure determination and synthesis of Cholesterol, Bile acids, Androsterone, Testosterone, Esterone, Progestrone, Aldostrone and Biosythesis of cholesterol. **B. Plant Pigments:** Occurrence, nomenclature and general method of structure determination. Isolation and synthesis of Apigenin, Luteolin, Quercetin, Myrcetin, Quercetin-3-glucoside, Vitexin, Diadzine, Butein, Aureusin, Cyanidin, Hirsutidin.
III	15	**Unit-III :** **A. Drug Design :** Development of new drugs procedures followed in drug design, concepts of lead compound and lead modification, concepts of

		prodrugs and soft drugs, Structure-Activity Relationship (SAR), Factors affecting bioactivity, resonance, inductive effect. Theories of drug activity: occupancy theory, rate theory, induced fit theory. **Quantitative Structure Activity Relationship (QSAR) :** Hansch approach-free Wilson model, relationship between free Wilson and Hans analysis **B.** Concepts of drug receptors, lipophilicity, pharmacophore, pharmacological activity and typical range of parameters related to drug likeness. **C.** General introduction of pharmacokinetics and pharmacodynamics.
IV	**15**	**Unit -IV :** **A. Antineoplastic Agents:** Introduction, Alkylating agents, antimetabolites, carcinolytic antibiotics, mitotic inhibitors. **B. Antibiotics:** Constitution and synthesis of penicillins, chloramphenicol, tetracycline and streptomycin. **C. Antimalarials:** Synthesis and properties of the following Antimalarial drug: 8-amino quinoline derivatives- Pamaquine, Primaquine, Pentaquine, Isopentaquine. **D. Aminoquinoline derivatives-** Santoquine, Camaquine, Acridine derivatives-Mepacrine, Azacrin, Pyrimidine and Biguanidine derivatives-Paludrine, Pyremethamine.

List of Books	1. Natural Products: Chemistry and Biological Significance, J. Mann, R.S. Davidson, J.B. Hobbs. 2. D.V. Banthrope and J.B. Harbrone, Longman, Essex., Organic Chemistry, Vol.2, I.L. Finar, ELBS. 3. Chemistry, Biologcal and Pharmacological properties of Medicinal Plants from the Americans, Ed. Kurt Hostettmann, M. P. Gupta and A. Marston, Harwood Academic Publishers. 4. Introduction to Flavonoids, B.A. Bhom, Harwood Academic Publishers. 5. New Trendsin Natural Product Chemistry, Att-ur-Rahman and M.I. Choudhary, Harwood, Academic Publishers. 6. Insecticides of Natural Origin, Sukh Dev, Harwood Academic Publishers. 7. Introduction to medicinal Chemistry, A Gringuage, Wiley-VCH. 8. Burger's Medicinal Chemistry-1 (Chapter-9 and Ch-14), Drug Ed. M.E. Discovery, Wolff, John Wiley. 9. The Science of Flavanoids, Erich Groteworld, Springer.