DEPARTMENT OF CHEMISTRY

COURSE CURRICULUM & MARKING SCHEME

M.Sc. CHEMISTRY
Semester - II

SESSION : 2024-25

ESTD: 1958

GOVT. V.Y.T. PG AUTONOMOUS COLLEGE, DURG, 491001 (C.G.)

(Former Name – Govt. Arts & Science College, Durg)

NAAC Accredited Grade A^+, College with CPE - Phase III (UGC), STAR COLLEGE (DBT)

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Department of Chemistry

Govt. V.Y.T. PG Autonomous

College, Durg (C.G.)

M.Sc. Chemistry

Second Semester

2024-25

Syllabus and Marking Scheme for Second Semester

Session 2024-25

Paper No.	Title of the Paper	Marks Allotted in Theory		Marks Allotted in Internal Assessment		Credits
		Max	Min	Max.	Min.	
I	**MCH-201 TRANSITION METAL COMPLEXES AND DIFFRACTION METHODS**	80	16	20	04	05
II	**MCH-202 CONCEPTS IN ORGANIC CHEMISTRY**	80	16	20	04	05
III	**MCH-203 THERMODYNAMICS, ELECTROCHEMISTRY AND SURFACE CHEMISTRY**	80	16	20	04	05
IV	**MCH-204 SPECTROSCOPY**	80	16	20	04	05
V	**MCHL-03 Lab Course I ORGANIC CHEMISTRY PRACTICAL**	100	36	-----	-----	04
IV	**MCHL-04 Lab Course II ANALYTICAL CHEMISTRY PRACTICAL**	100	36	-----	-----	04
	Total	**520**	-----	**80**	-----	**28**

04 Theory papers - 320

04 Internal Assessment - 80

02 Practical - 200

Total Marks - 600

20 marks = 01 credit in Theory Papers and 25 Marks = 01 Credit in Practical

Note: Industrial Visit/Training is mandatory for all students as part of curriculum

M.Sc. CHEMISTRY

SEMESTER - II

2024-25

PAPER- I

MCH-201: TRANSITION METAL COMPLEXES AND DIFFRACTION METHODS

Course Outcome (CO):

After completion of the course, students would be able:

CO1: To understand how to interpret electronic spectra of complexes.

CO2: To know magnetic properties of complexes of different geometry.

CO3: To understand principle of electron diffraction and x-ray diffraction and their uses in structure determination of compounds.

CO4: To understand neutron diffraction technique, metal cluster and metal polyacids.

M.Sc. CHEMISTRY
SEMESTER - II
2024-25
PAPER- I
MCH-201: TRANSITION METAL COMPLEXES AND DIFFRACTION METHODS

Max. Marks 80
Min. Marks 16

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.

Unit – II **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.

Unit –III **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. Description of the procedure for an X-ray structure analysis, absolute configuration of molecules, Ramchandran Diagram.

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.

Unit-IV **Neutron Diffraction**

Scattering of neutrons by solid and liquids, magnetic scattering, measurement techniques. Elucidation of structure of magnetically ordered unit cell.

Metal clusters

Higher boranes, carboranes, metalloboranes and metallocarboranes. Metal carbonyl and halide clusters, compounds with metal-metal multiple bonds.

Isopoly and Heteropoly Acids and Salts

Prepration, properties and structure of isopolyandheteropoly acids of molybdenum and tungsten.

REFERENCE 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. McCleverty, Pergamon.
7. Modern spectroscopy, J. M. Hollas, John Wiley.
8. Applied electron spectroscopy for chemical analysis Ed. H. Windawi and F.L. Ho, Wiley Inter science.

Question Paper Format and Distribution of Marks for PG Semester Examination

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1. The question paper will be of **80 marks**

2. Questions will be asked Unit-wise in each question paper.

3. From each Unit, the questions will be asked as follows:

Q.1 Very short answer type question **(Answer in one or two sentences)** **(02 Marks)**

Q.2 Very short answer type question **(Answer in one or two sentences)** **(02 Marks)**

Q.3 Short answer type question **(Answer in 200-250 words)** **(04 Marks)**

Q.4 Long answer type questions **(Answer in 400-450 words)** **(12 Marks)**

Type of Question	Unit-I	Unit-II	Unit-III	Unit-IV
Very Short (2 Questions) (Maximum two sentences)	2 x 2 = 4 Marks	2 x 2 = 4 Marks	2 x 2 = 4 Marks	2 x 2 = 4 Marks
Short (1 Question) 200-250 words	1 x 4 = 4 Marks	1 x 4 = 4 Marks	1 x 4 = 4 Marks	1 x 4 = 4 Marks
Long answer (1 Question) 400-450 words	1 x 12 = 12 Marks	1 x 12 = 12 Marks	1 x 12 = 12 Marks	1 x 12 = 12 Marks

Note:

1. Question no. 1 and Question 2 will be compulsory.
2. Question no. 3 and 4 will consist of 2 optional questions of which one has to be attempted.
3. As mentioned above, two compulsory very short answer type questions (2+2 marks), one short answer type question with internal choice (4 marks) and one long answer type question with internal choice (12 marks) will be asked from each unit.
   Thus there will be questions of 20 marks from each unit and of total 80 marks from all the four units of the syllabus/syllabi.

M.Sc. CHEMISTRY
SEMESTER - II
2024-25
PAPER- II
MCH-202: CONCEPTS IN ORGANIC CHEMISTRY

Course Outcome (CO):

After completion of the course, the students would be able:

CO1: Recognize and distinguish between aromatic and antiaromatic compounds by their structures.

CO2: Explain different free radicals and mechanisms of different rearrangements via free radicals.

CO3: Learn the terminology associated with conformational analysis and stereochemistry of various compounds

CO4: Know the basic concept of different types of pericyclic reactions and rules governing them.

M.Sc. CHEMISTRY
SEMESTER - II
2024-25
PAPER- II
MCH-202: CONCEPTS IN ORGANIC CHEMISTRY

Max. Marks 80
Min. Marks 16

Unit –I **Nature of Bonding in Organic Molecules**

Localized and delocalized chemical bond, conjugation and cross conjugation, bonding infullerenes, Bonds weaker than covalent- addition compounds, crown ether complexes and cryptands, inclusion compounds, cyclodextrins, catenanes and rotaxanes

Aromaticity

Aromaticity in benzenoid and non- benzenoid compounds, alternant and non- alternant hydrocarbons, Huckel's rule, energy level of pi - molecular orbitals, annulenes, antiaromaticity, homo-aromaticity, PMO approach.

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 diazonium salts, Sandmeyer reaction. Free radical rearrangement, Hunsdiecker reaction

Unit –III **Conformational analysis**

Conformational analysis of cycloalkanes, decalins, effect of conformation on reactivity, conformation of sugars, steric strain due to unavoidable crowding.

Stereochemistry

Elements of symmetry, chirality, enantiotopic and diastereotopic atoms, groups and faces, stereospecific and stereoselective synthesis. Asymmetric synthesis. Optical activity in the absence of chiral carbon (biphenyls, allenes and spiranes), chirality due to helical shape. Stereochemistry of the compounds containing nitrogen, sulphur and phosphorus.

Unit –IV **Pericyclic Reactions**

Molecular orbital symmetry, Frontier orbitals of ethylene, 1,3- butadiene, 1,3,5-hexatriene and allyl system. Classification of pericyclic reactions. Woodward-Hoffman correlation diagrams. FMO and PMO approach. Electrocyclic reactions- conrotarory and disrotatory motions, 4n, 4n+2 and allyl systems. Cycloadditions- antarafacialand suprafacial additions, 4n and 4n+2 systems, 2+2 addition of ketenes.Sigmatropic rearrangements, suprafacial and antarafacial shifts of H, sigmatropic shifts involving carbon moieties, 3, 3-and 5,5- sigmatropic rearrangements. Claisen, Cope and aza-Cope rearrangements.

REFERENCE BOOKS:

1. Advanced Organic Chemistry – Reaction Mechanism and Structure, Jerry March John Wiley.
2. Advanced Organic Chemistry, F.A. Carey and R.J. Sundbery, Plenum
3. Structure and Mechanism in Organic Chemistry, C.K. Ingold, Cornell University Press.

4. Pericyclic reactions, S.M. Mukherji, Macmillan India.
5. Reaction Mechanism in Org. Chem., S.M. Mukherji and S.P. Singh, Macmillan
6. Stereo Chemistry of Organic Compounds, D. Nasipuri, New Age International.
7. Stereo Chemistry of Organic Compounds, P.S. Kalsi, New Age International.
8.. Organic Chemistry, I.L.Finar, Vol. I & II, ELBS.

Question Paper Format and Distribution of Marks for PG Semester Examination

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Note:

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M.Sc. CHEMISTRY

SEMESTER - II

2024-25

PAPER- III

MCH-203: THERMODYNAMICS, ELECTROCHEMISTRY AND SURFACE CHEMISTRY

Course Outcome (CO):

After completion of the course, the students would be able:

CO1: To have knowledge and understanding of basic concepts in classical thermodynamics – partial molar properties, fugacity, activity and activity coefficient, construct and apply phase diagrams to 3-component systems.

CO2: To illustrate the concepts in statistical thermodynamics – distribution, thermodynamic probability, partition function and its application and to compare various statistics. fundamental concepts of irreversible thermodynamics and discuss the application of its laws.

CO3: To explain and derive equations related to the theory of strong electrolytes – Debye-Huckel law and its extensions, structure/models and thermodynamics of electrified interfaces, polarography and its applications.

CO4: To describe and interpret various adsorption isotherms and its applications, concept and various aspects of micelles and macromolecules.

M.Sc. CHEMISTRY
SEMESTER - II
2024-25
PAPER- III
MCH-203: THERMODYNAMICS, ELECTROCHEMISTRY AND SURFACE CHEMISTRY

Max. Marks 80
Min. Marks 16

Unit-I

Classical Thermodynamics

Maxwell relations, Partial molar properties- concept, its significance and methods of determination, Concept of chemical Potential, Gibbs Duhem Equation, variation of chemical potential with temperature and pressure. Concept of fugacity, its significance and methods of determination. Non-ideal systems: excess functions for non-ideal solutions. Concept of activity and activity coefficient.

Application of phase rule to three component systems: solid-liquid system and liquid-liquid system, salting out effect.

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

Fundamental concepts, entropy production and entropy flow, phenomenological laws, Onsager's reciprocity relations, and irreversible thermodynamics for coupled reactions.

Unit – III

Electrochemistry

Electrochemistry of solutions: Ion- solvent interactions, Debye-Huckel theory for activity coefficient of electrolyte solutions, ionic strength, Debye-Huckel limiting law, Debye- Huckel- Onsager treatment and its extension.

Thermodynamics of electrified interface equations: Derivation of electro-capillarity, Lippmann equations, determination of surface excess.

Structure of electrified interfaces: Guoy-Chapman and Stern models. Over potentials, exchange current density, derivation of Butler-Volmer equation. Tafel plot. Polarography theory - Ilkovic equation, half wave potential and its significance.

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, free radical mechanism of polymerization, molecular mass, number and mass average molecular mass, molecular mass determination (osmometry, viscometry and sedimentation).

REFERENCE BOOKS:

1. Thermodynamics, S.Glasstone
2. Statistical Thermodynamics, M.C.Gupta
3. Chemical Thermodynamics, Rastogi & Mishra
4. Micelles, Theoretical and Applied Aspects, V. Moroi, Plenum
5. Modem Electrochemistry Vol.-I and Vol.-II, J.O.M. Bockris and A.K.N.Reddy, Plenum
6. Introd. to Polymer Science, V.R. Gowarikar, N.V. Vishwanamanand J. Sridhar, Wiley Eastern.

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M.Sc. CHEMISTRY
SEMESTER - II
2024-25
PAPER- IV
MCH-204: SPECTROSCOPY

Course Outcome (CO):

After completion of the course, students would be able:

CO1: To gain insight into the basic principle of molecular spectra and discuss rigid rotor, energy levels, origin of rotational spectra and its applications.
CO2: To understand the theories/principles, predict the functional groups and differentiate between IR and Raman spectra
CO3: To acquire knowledge of principle, technique, interpretation and applications of NMR spectroscopy.
CO4: To interpret the principle and applications of photo electron, photo acoustic and ESR spectroscopy.

M.Sc. CHEMISTRY
SEMESTER - II
2024-25
PAPER- IV
MCH-204: SPECTROSCOPY

Max. Marks 80
Min. Marks 16

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.

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)

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, AB 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.

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.

REFERENCE BOOKS:

1. Modern Spectroscopy J.M. Hollas, Johan Wiley.
2. Applied Electron Spectroscopy for chemical analysis ed. H. Windawiand F.L. Ho, Wiley Interscience.
3. NMR, NQR, EPR and Mossbauer Spectroscopy in Inorg. Chem., 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.

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Name and Signatures	Representative (Prof. Sc. Faculty Other Dept.)
Chairperson /H.O.D	.....
Subject Expert Dr. A.K. Mishra 05/7/24	**Departmental members**
(University Nominee)	
Subject Expert	Dr. V.S. Geete
Representative	
(Industry)	
Representative ..... Dr. Bhawana Jain	Dr. A. Kashyap
(Alumni)	5/7/24 Dr. P. Kathane

M.Sc. Chemistry
[Second Semester]
MCHL-03: Laboratory Course I
Organic Chemistry
2024-25

Course Outcome (CO):

After completion of the course, students would be able:

CO1: To understand the basic principles involved in separation of organic binary mixture and identify the components by qualitative analysis.

CO2: To get trained in one step/two-step synthesis of commercially important organic compounds based on different chemical processes.

CO3: To learn about separation and purification of organic mixtures by chromatography

CO4: To identify and characterize prepared and separated compounds by IR spectral analysis.

M.Sc. Chemistry
[Second Semester]
MCHL-03: Laboratory Course I
Organic Chemistry
2024-25

Course Outcome (CO):

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CO3: To learn about separation and purification of organic mixtures by chromatography

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M.Sc. Chemistry
[Second Semester]
Laboratory Course I: Organic Chemistry
2024-25

M. M. 100

MAJOR EXPERIMENTS

Organic Synthesis

(i) Acetylation: Acetylation of cholesterol and separation of cholesteryl acetate by column chromatography.
(ii) Synthesis of β-Naphthyl acetate / Hydroquinone diacetate.
(iii) Oxidation: Adipic acid by chromic acid oxidation of cyclohexanol
(iv) Grignard reaction: Synthesis of triphenylmethanol from benzoic acid
(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) Cannizzaro reaction: 4- chlorobenzaldehyde as substrate / Benzoic acid and benzyl alcohol.
(ix) Friedel Crafts Reaction: β-Benzoyl propionic acid from succinic anhydride and benzene.
(x) Aromatic electrophilic substitutions: Synthesis of p-nitroaniline and bromoaniline.
(xi) Clemmenson reduction: Hydrocarbons from ketones.
(xii) Nitration: Picric acid from phenol

Microwave assisted Synthesis

(xiii) Synthesis of benzoic acid from benzamide.
(xiv) Synthesis of N-aryl Phthalimides.

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 chemical tests.

Identification of functional group of organic compounds by FTIR

Separation, purification and identification of compounds of binary mixtures TLC and column chromatography.

Organic Synthesis

(i) Reduction: Acetic acid from ethanol.
(ii) Esterification: Oil of Wintergreen from salicylic acid.
(iii) Sulphonation: Sulphanilic acid from aniline.

REFERENCE BOOKS:

1. Practical Organic Chemistry by A.I. Vogel.
2. Practical Organic Chemistry by Mann and Saunders.
3. Practical Organic Chemistry by Garg and Salija.

M.Sc. Chemistry
[Second Semester]
MCHL-04: Laboratory Course 2
Analytical Chemistry
2024-25

Course Outcome (CO):

After completion of the course, students would be able:

CO1: To understand the basic principles involved in quantitative analysis using various analytical techniques.

CO2: To get trained in handling sophisticated instruments.

CO3: To learn about application of various methods in the analysis of water, oil and soil samples.

CO4: To interpret data and calculate statistical parameters.

M.Sc. Chemistry [Second Semester]
Laboratory Course II
Analytical Chemistry
2024-25

Max. Marks 100

EXPERIMENTS

1. **Error Analysis & Statistical Data Analysis**
   Statistical treatment for error analysis, standard deviation, linear least squares.
   Calibration of volumetric apparatus, burettes, pipette, standard flask, weight box, etc.
2. **Volumetric Analysis**
   Determination of iodine and saponification values of oil sample.
   Determination of DO, COD, BOD of water sample.
   Determination of hardness of water samples.
3. **Chromatography**
   Separation of cations and anions by
   Paper chromatography
   Column chromatography
4. **Flame Photometry**
   Determination of sodium and potassium by flame photometer
5. **Spectrophotometry**
   Determination of metal ions eg. 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 active agents.
6. **Nephelometry / Turbidimetry**
   Determination of chloride, sulphate, phosphate, etc.
   Determination of turbidity in water samples.

MINOR EXPERIMENTS

1. **Conductometry**
   Estimation of aspirin from tablet.
   Determination of relative strengths of different acids.
   Determination of the strength of strong and weak acids in a given mixture conductometrically.
2. **pH metry**
   Determination of the strength of acid pHmetrically.
   Determination of the strength of strong and weak acids in a given mixture using a pH meter.
3. **Food Analysis**
   Determination of phosphate concentration in soft drinks.
   Detection of adulterants in food samples.
4. **Water analysis**
   Determination of pH and conductivity of water samples.
   Determination of TDS in water sample.
   Determination of fluoride in water sample.
5. **Soil Analysis**
   Determination of iron in soil samples.
   Determination of Nitrate – N in soil samples.
6. **Use of Computer program and Softwares**
   Application of computer and softwares in Chemistry.

REFERENCE BOOKS:

1. 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.

The syllabus for M.Sc. Chemistry is hereby.approved for the Session 2024-25

Name and Signatures	Departmental members **Name and Signatures**
Chairperson /H.O.D Dr. Anupama Asthana	1. Dr. V.S. Geete .....
Subject Expert Dr. Arun Mishra 05/7/24 (University Nominee)	2. Dr. Sunitha B. Mathew .....
Subject Expert Dr. S.C. Tiwari	3. ....
Subject Expert H. Mohabey Dr. Hemlata Mohabey	4. ....
Subject Expert (Dr. Anju Jha) 05/07/24	5. Dr. Prerna Kalhans 05/7/24
Representative ..... (Industry)	6. ....
Representative Dr. Bhawana Jain (Alumni)	7. ....
Representative Dr. S.D. Deshmukh (Professor Science Faculty Other Dept.)	8. Dr. A. Kashyap .....
	9. ....
	10. ....
	11. ....
	12. ....