Class	Sr No	Sub Name/Course name	Outcomes
Msc-I	1	B.O.1.1-Cryptogamic Botany	1.It provide basic knowlage of features Bryophytwes share with other land plant. 2.It provides knowlage to distinguish mosses ,leafy liverwards and thallus liverwords. 3.Pteridophytes may represent the closest living relative to seed plant 4.There was a rich fossile record showing that pteridophytes have ancestor dating nearly 400 millian years 5.Student had studied the life cycle vascular and non vascular plant.
Msc-I	2	B.O.1.2(Plant Physiology and Biochemistry)	1.It was study of vital processes of plant life. 2.It was an experimental labrotory based field science thatb require knowlage of physics and chemistry. 3.plant physiology study awide range process and function that plants used to live including respiration ,metabolism,transpiration plant harmon . 4.Plant physiology help to study plant life along with their process and function .
Msc-I	3	B.O.1.3(Genetics and plant breeding)	1.It helps to study cytogenetics ,genetics plant harmons gene ,gene expression and regulation.genome and genomic organization. 2.This syllabus helped to crack to examination like ICAR-NET,ICAR-SRF,ICAR-JRF and other competitive exam. 3.This helped to inrich their powerfull knowlage of plant science essential for the development of student in the area of agricutured. 4.This also very usefull for techers and researchers related to plant science sub to stimulate success to student carry.
Msc-I	4	B.O.1.4(Botanical technique)	1.The aim of this course is to ensure that you can achive an upto date level of understanding and competens that will serves as na lasting and practical; basis for carreer e.g.-Recherch wgeather industry pure or applied biology and teching. 2.To provide teaching in scientific and transferable skill through modulkar lecture corses research project written work and seminar . 3.at end of course was you had increase your capacity to think criticaly your ability to design 4.Each module was a suggestion as recent related review article etc.

		CHP-110 & 210 Physical chemistry (M.Sc-I)	1. Recapitulate concepts of B. Sc level. 2. Getting knowledge about basics of physical concepts. 3. To get knowledge of different forms of energies and its laws. 4. To become aware of kinetics of various reactions. 5.To become aware of how chemistry is related to our surrounding. 6. Using imformation in researh.
		CHA-392 (Advance analytical techniques) **(M.Sc-II)**	1. Student should become aware of analytical techniques. 2. By using these techniques they can do various sample analysis. 3. Analysis provides knowledge about constituent and amount of matter provided to analyst. 4. By busing this knowledge matter becomes useful in various fields.
		CHA-490 (Analytical spectroscopy) (M.Sc-II)	1. Getting knowledge about internal structure of molecules. 2. By using this knowledge analysis

			can be performed. 3. By busing this knowledge matter becomes useful in various fields. 4. To improve utilisation of various matters.
M.Sc. Analytical Chemistry	1	Physical Chemistry Semester - I CHP-110: Fundamentals of Physical Chemistry-I (4 Credits) SECTION-II (2 Credits, 24 L, 6 T) Chemical kinetics and reaction dynamics	1. Attempted to make students to Know about The rates of reaction, reaction rate, rate laws & rate constants, the determination of the rate law, first order, second order reactions, half lives, fractional order reactions. 2. Attempted to make students to Know about rate laws, simple reactions, the temperature dependence of reaction rates, reactions approaching equilibrium, consecutive reactions, the steady state approximations, pre equilibria, unimolecular reactions. 3. Attempted to make students to Know about The kinetics of complex reactions: chain reaction- explosion, photochemical reactions quantum efficiency, fast reactions-flash photolysis, flow techniques, relaxation methods. 4. Attempted to make students to Know about Molecular reaction dynamics- collision theory- the basic calculations, the steric requirements, Diffusion control reactions- classes of reactions, diffusion and reactions, the details of diffusion, Activated complex theory- the reaction coordinate and the transition state, the formation and decay of the activated complex, how to use the Eyring equation, thermodynamics aspects, reactions between ions. 5. Attempted to make students to Know about Enzyme catalysts: Michaelis-Menten mechanism, limiting rate, Lineweaver Burk and Eadie plots enzyme inhibition, competitive and non-competitive inhibition. 6. Attempted to make students to Know about

			Molecular Thermodynamics: Molecular energy levels, Boltzmann distribution law, partition functions and ensembles, translational, rotational and vibrational partition functions of diatomic molecules, Obtaining energy, heat capacity, entropy free energy, equilibrium constants from partition functions, equipartition of energy, Maxwell-Boltzmann, Fermi-Dirac and Bose-Einstein statistics.
	2	Physical Chemistry Semester – II CHP-210: Fundamentals of Physical Chemistry-II (4 Credits) SECTION-II (2 Credits, 24 L, 6 T) Nuclear and Radiation Chemistry	1) Attempted to make students to Know about Radio Chemistry : recapitulation – type of radioactive decay, Decay Kinetics, Detection & measurement of radiation (G.M. & Scintillation counter) 2) Attempted to make students to Know about Elements of radiation chemistry – Radiation chemistry, interaction of radiation with miller, passage of nucleolus through matter, interaction of radiation with matter, Units. for measuring radiation absorption, Radiation dosimetry, Radiolysis of water, free radiation in water Radiolysis, Radiolysis of some aqueous solution. 3) Attempted to make students to Know about Nuclear Reactor: - The fission energy, The Natural uranium reactor, the four factor formula- The reproduction factor K, the classification of reactor. Reactor power, Critical size of thermal reactor, excess reactivity & control, the Breeder reactor, The Indians nuclear energy programme, Reprocessing of spent fuel, Recovery of Uranium & Plutonium, Nuclear waste management, Natural nuclear reactor. 4) Attempted to make students to Know about Isotopes for nuclear reactors. Isotope separation, separation of selected isotopes, Plutonium. 5) Attempted to make students to Know about Applications of radioactivity: Typical reaction involved in preparation of radio isotopes: 3H, 14 C, 22Na 32P 35S, and I127 General principles of using radioisotopes. Physical constants – Diffusion coefficients, surface area, solubility. Analytical applications neutron activation analysis, dilution analysis,

			radiometric titration. Industrial applications– radiation guaging, friction and wear out, gamma radiography.
	3	CHA-390 I & II Electro analytical and Radio analytical methods of analysis	Attempted to make students to Know about Coulometry: Current voltage relationship during an electrolysis, Operating cell an at fixed applied potential, Electrolysis at constant working electrode potential, Coulometric methods of analysis, Faradays laws of electrolysis, Instrumentations-Constant current and constant voltage instruments, potentiostatic coulometry-Instrumentation and applications, coulometric titrations (Amperostatic coulometry)-Apparatus and applications, advantages and limitations, problems. Attempted to make students to Know about Voltammetry and polarographic methods of analysis. Attempted to make students to Know about A) Polarography (linear scanpolarography): Polarographic principles, Instrumentation (different types of microelectrode such as dropping mercury electrode, the static drop mercury electrode, rotating disc and ring disc electrode, cell for polarography, reference and counter electrode and circuit diagram), polarogram and polarographic currents, charging or capacitive current, role of supporting electrolyte, factors affecting on polarographic wave, Ilkovic Equation, advantages and disadvantages of DME, polarographic maxima and maxima suppresors, interference due to dissolved oxygen, Applications (qualitative analysis, quantitative analysis by calibration curve and standard addition methods), specific examples of analysis – analysis of Cu, Cd, Zn, Pb, etc. from tap water and alloys., problems. Attempted to make students to Know about B) Hydrodynamic voltametry and applications of hydrodynamic voltametry (volatametric detectors in chromatography and flow injection analysis, Voltametric oxygen sensors, amperometric titration). Attempted to make students to Know about

			C) Pulse Polarography: different types of excitation signals in pulse polarography, Differential pulse polarography, square wave polarography, Stripping method. Voltametry with ultra microelectrode, Applications of these technique Cu and Zn from tap water by differential pulse polarography and by square wave polarography, Vitamin-C by differential pulse polarography, Determination of Pb in tap water by stripping method) Attempted to make students to Know about D) Cyclic Voltametry: Principle of cyclic Voltammetry, cyclic voltamogram of K3[Fe(CN)6], and parathion, criteria of reversibility of electrochemical reactions, quasi reversible and irreversible processes. Attempted to make students to Know about 4 Amperometry: Principle, Instrumentation, typical applications, amperometric titrations, chronoamperometry and chrono-potentiometry. Section-II: Radioanalytica and thermal methods of analysis 5 Radioanalytical Methods of Analysis Attempted to make students to Know about a) Activation analysis: Neutron activation analysis, principle, technique, steps involved in neutron activation analysis. Radiochemical and instrumental methods of analysis, important applications of NAA. Attempted to make students to Know about b) Isotope dilution analysis: Principle, types of isotope dilution analysis, typical applications of isotope dilution analysis. Attempted to make students to Know about c) Radiometric titration: Principle, techniques based on complex formation and precipitation, radiometric titration curves for estimation of ions from their mixture. 6 Thermal methods of analysis Principle, different methods of thermal analysis, A) Attempted to make students to Know about Thermo gravimetric methods of analysis:

			Instrumentation, thermogram and information from thermogram, factors affecting thermogram, applications TGA for quantitative analysis (TG analysis of CaC2O4 H2O, CuSO45H2O, dolomite ore, etc.) and problems based TGA B) Differential Thermal Attempted to make students to Know about Analysis (DTA): Instrumentation, general principles, differential thermogram, DT and TG curve together, Applications (DT analysis of mixture of polymers, DT analysis of CaC2O4 H2O, DT analysis of sulfur, DT analysis of CuSO4 5H2O). TG and DT curve for Mn(PH2O2)2 H2O, Attempted to make students to Know about C) Differential Scanning Calorimetry (DSC): Principle, Instrumentation, and Applications (DCS curve of polyethylene terphthalate, DSC curve for isothermal crystallization of polyethylene, DSC of phenacetein), thermometric titrations, Evolved gas analysis.
	4	CHA-481: Analytical Toxicology and Forensic Science	Sec-I: Analytical Toxicology Attempted to make students to Know about 1 Diagnosis of acute poisoning, Tratment of acute poisoning, The role of the clinical toxicology laboratory Attempted to make students to Know about 2 Diagnosis of acute poisoning, Treatment of acute poisoning, The role of the clinical toxicology laboratory Attempted to make students to Know about 3 Toxicology: Isolation, identification and determination of following 1) Narcotics- heroin and cocaine. 2) Stimulants- caffeine, amphetamines. 3) Depressants- Barbiturates, Benzodiazepines Attempted to make students to Know about 4 Narcotics and Psychotropic substances Act Def – addict, cannabis (hemp), Coca derivative, coca leaf, Manufacture medicinal cannabis, narcotic drug, opium , opium derivative, opium poppy, poppy straw, psychotropic substance, Illicit traffic,

			Prohibition control regulation offence and penalties Section-II: Food Analysis Attempted to make students to Know about 5 Carbohydrates: Definition, classification, and functions, Analysis of carbohydrates from food sample by different method i) volumetric determination by Fehling's solution, ii) Colorimetric analysis of carbohydrates by Folin Wu method, Nelson Somyogi method, iii) total carbohydrates by Anthrone method, iv) Estimation of starch by anthrone method, v) Determination of amylase, vi) Estimation of pectic substances (gravimetric and colorimetric method), vii)Estimation of crude fibbers Attempted to make students to Know about 6 Proteins Definitions and functions, Analysis of proteins by Kjedahl's method, analysis of protein by Lowry method, Estimation of amino acids by colorimetric method, Estimation of food grain for methionine content, Protein digestibility in vitro, Protein efficiency and net protein ratio, Determination of net protein utilization, digestibility and biological value, Polyacrylamide gel electrophoresis of proteins. Attempted to make students to Know about 7 Analysis of Lipids: Estimation of oil in oilseeds, Estimation of free fatty acids, Saponification value of oils, iodine value, Determination of acid value of oil, determination of peroxide value of oil, Identification and quantification of fatty acids. Attempted to make students to Know about 8 Determination of food preservatives (06 L, Ref-10) Definition, SO2 legistration and determination by Tanners method, Nitrate and nitrites legistration and determination, boric acid legistration and determination, Benzoic acid legistration and determination, 4-hydroxybenzoate legistration and determination, ascorbic acid legistration and determination. Sweeteners: Saccharine identification and determination, Colours:

			Identification by general methods, Natural colours. Attempted to make students to Know about 9 Milk Analysis of milk and milk products: Composition of milk, analysis of milk with respect to pH, acidity, fates, casein content, lactose content, mineral content, adulteration of milk.
	M.Sc. (Part I) Sem-I & II	Basic organic chemistry	Students understand to –1) i) Identify chiral center in the given organic compounds. ii) Define Erythro, threo, meso, diasteroisomers with suitable examples. iii) Able to find R/S configuration in compounds containing two chiral centers. iv) Explain Bayer's strain theory, Heat of combustion and relates stability of cycloalkanes. 2) Understand: i) Concept of different reagents used in the one type of conversion ii) Merits & demerits of different reagents iii) Reagent based mechanisms iv) Use of different hydrogen donors for hydrogenation 3) Students understand – 1. Definition and type of nucleophiles and leaving groups 2. Different types of nucleophilic substitution reactions 3. Definition of inversion and racemization 4. The kinetics, mechanism & stereochemistry of these reactions 5. Whether a given reaction follows SN1 or SN2 mechanism? 6. The comparison between SN1 & SN2 reactions An SNi mechanism in presence and absence of pyridine 8. To predict product/s or supply the reagent/s for these reactions 4) Students learned – 1. Definition and types of elimination reactions 2. Different types of bases and leaving groups 26 3. Statement of Hoffmann and Saytzeff rule 4. The evidences, mechanism & stereochemical aspects of these reactions 5. Whether a given reaction follows E1, E2 or E1cB mechanism? 6. Comparison between E1 & E2 reactions 7. The effect of structure, attacking and leaving group on reactivity of such reactions 8. To predict product/s or supply the reagent/s for these reactions
	M.Sc. (Part -I)	Main Group Element & Bioinorganic chemistry	A student learned i) To write electronic configuration of any element. ii) To give reasons for anomolous behavior of

			first element of IIIA to VII A groups with other Elements in the same group. iii) To know the exact position p-block elements in the long form of the periodic table. iv) To know the allotropes of carbon. v) Basic compounds of boron, aluminum, silicon vi) Concept of oxyanions, different than mineral acids, oxyacids of phosphorous & sulphur vii) Overlapping of atomic orbitals of halogens, interhalogen compounds A student learned i) Know different biomolecules. ii) Appreciate the role of biochemistry in the day to day life. iii) Understand the importance of biochemistry. iv) Define carbohydrates. v) Classify carbohydrates giving suitable examples. vi) Write and complete various reactions of glucose. vii) Explain optical activity in carbohydrates. viii) Write Fischer projection and perspective formula with glyceraldehydes as reference compound. ix) Explain the principle in Killani Fischer synthesis. x) Explain stereoisomerism in monosaccharide. xi) Draw structure of some common aldoses and ketoses. xii) Distinguish between diastereomers and epimers. xiii) Write cyclic structure of glucose in Fischer, Haworth and chair form. xiv) Know the phenomenon of mutaroatation. xv) Draw the structure and bonding in maltose, lactose, cellobiose and sucrose. xvi) Know about polysaccharide, structures of starch and cellulose.
	M.Sc. (Part I) Sem-I & II	Basic organic chemistry	Students understand to –1) i) Identify chiral center in the given organic compounds. ii) Define Erythro, threo, meso, diasteroisomers with suitable examples. iii) Able to find R/S configuration in compounds containing two chiral centers. iv) Explain Bayer's strain theory, Heat of combustion and relates stability of cycloalkanes. 2) Understand: i) Concept of different reagents

			used in the one type of conversion ii) Merits & demerits of different reagents iii) Reagent based mechanisms iv) Use of different hydrogen donors for hydrogenation 3) Students understand – 1. Definition and type of nucleophiles and leaving groups 2. Different types of nucleophilic substitution reactions 3. Definition of inversion and racemization 4. The kinetics, mechanism & stereochemistry of these reactions 5. Whether a given reaction follows SN1 or SN2 mechanism? 6. The comparison between SN1 & SN2 reactions An SNi mechanism in presence and absence of pyridine 8. To predict product/s or supply the reagent/s for these reactions 4) Students learned – 1. Definition and types of elimination reactions 2. Different types of bases and leaving groups 26 3. Statement of Hoffmann and Saytzeff rule 4. The evidences, mechanism & stereochemical aspects of these reactions 5. Whether a given reaction follows E1, E2 or E1cB mechanism? 6. Comparison between E1 & E2 reactions 7. The effect of structure, attacking and leaving group on reactivity of such reactions 8. To predict product/s or supply the reagent/s for these reactions
	Msc I	Cha-190 .Safety in chem. Lab.&GLP. (Sec.I	1).Test and control articles should have the right quality and instruments should be calibrated and well maintained 2).People should be trained or otherwise qualified for the job. The ability to provide timely, accurate, and reliable data is essential to the role of analytical and bioanalytical chemists and is especially true in the discovery, development, and manufacture of pharmaceuticals and life science products 3)This includes drugs for human and animal use but also aroma and color additives in

			food, biological products and medical devices. 4)The ability to provide timely, accurate, and reliable data is essential to the role of analytical and bioanalytical chemists and is especially true in the discovery, development, and manufacture of pharmaceuticals and life science products.
	MSC II	CHA-380.geological alloy analysis	1 Alloy analysis using Xenemetrix spectrometers has become standard practice .Our spectrometers identify most alloys and complete chemical analysis in a few seconds. 2 You can use our high-level spectrometers for quick and easy differentiation and identification for all classes of alloy including: Iron, steel – low alloy and carbon steel, stainless steel, copper, brass, bronze, aluminum bronze, leaded brass and bronze, aluminum, nickel alloys, zinc alloys, cobalt alloys, titanium alloys , solders- tin, lead, and silver
	M.Sc (part II)	Labrotary automation & sensor based technique(CHA -380)	1 Students should know about 2Introduction, classification, iii. Nomenclature, iv. Structure-activity relationship,3) Chemical structures, ix. Methods of production
	Msc-I	CHA-190 Chemical Lab safety &Good lab.practices	• 1) Know that risk is the probability of suffering injury or harm from exposure to a hazard • 2) Be aware that all laboratory research has risks and that careful planning and preparation are required to mitigate them • 3) Explain the components of the Globally Harmonized System for Classifying Hazardous Materials, including pictograms, signal words, hazard statements, hazard categories (ranking), and precautionary statements.

	Msc(Part-II)	Pharmaceutical Analysis(CHA-391)	i. Methods of production and pharmacological activity. ii. Meaning of the terms of the various drugs. iii. Synthesis and uses of few drug molecules. iv. Action of drugs, vi. Assay of drugs and factors affecting drug action,