HOLY CROSS COLLEGE (AUTONOMOUS)
Affiliated to Bharathidasan University
Nationally Accredited (3rd Cycle) with 'A' Grade by NAAC
College with Potential for Excellence.
Tiruchirappalli - 620002.

DEPARTMENT CHEMISTRY

Program Outcomes:

Upon completion of the B.Sc. Degree Programme, the graduate will

PO1.	**Understand the basic concepts, fundamental principles, and the scientific theories related to various scientific phenomena and their relevancies in the day-to-day life**
PO2	Acquire the skills in handling scientific instruments, planning and performing in laboratory experiments
PO3	Tackle issues and problems related to the field of chemistry through their analytical skills.
PO4	communicate scientific information and research results in written and oral formats effectively.
PO5	understand the interdisciplinary nature of chemistry and to integrate knowledge of mathematics, physics and other disciplines to a wide variety of chemical problems
PO6	gain Knowledge and skills required to get placements in schools, the chemical industries etc.

Programme Specific Outcomes:

Upon completion of the B.Sc. Degree Programme, the graduate would

PSO1	**have a firm foundation in the fundamentals and application of current andscientific theories in various branches of chemistry.**
PSO2	present the concepts of chemistry effectively and efficiently.
PSO3	predict the structure and mechanism of Chemical compounds.
PSO4	recognise and analyse qualitative and quantitative problems and plan strategies for their solution.
PSO5	explain the laboratory skills needed to design and interpret chemical research.
PSO6	carry out scientific experiments as well as record and analyze the results of such experiments.

Course Title	**Major Core 1 – General Chemistry-I**		
Code	**U15CH1MCT01**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Describe the shapes of atomic orbitals	2	R
CO-2	Compare and contrast the periodic properties of elements	1	Ap
CO-3	Describe the molecular velocities and molecular energies	1	U
CO-4	Analyse the acid and basic radicals through semi micro qualitative tests	6	An
CO-5	Compare the stabilities of the intermediates	3	K
CO-6	Apply the IUPAC system of nomenclature for naming organic compounds	3	Ap

Course Title	Allied – 1: Allied Chemistry Paper I [For Botany and Zoology]		
Code	**U15CH1AOT01**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Discuss the effects operating in the organic compounds.	PSO2	U
CO-2	Classify the organic compounds according to Huckel‘s rule of aromaticity.	PSO1	U
CO-3	Compare and contrast the periodic properties of the elements.	PSO2	A
CO-4	Distinguish the first order and second order kinetics with examples.	PSO2	An
CO-5	Explain the different types of chromatographic techniques.	PSO4	An

Course Title	ALLIED 2: ALLIED CHEMISTRY PRACTICAL PAPER II		
Code	**U15CH1AOP02**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Critical capacity to understand the procedures in order to define the common methods of analysis..	PSO 2	U
CO-2	Use correct titrimetric procedure when carrying out titrations	PSO 5	An
CO-3	Prepare the standard solution of different strength.	PSO 5	U
CO-4	Explain the acid base, redox and complexometric titrations with examples.	PSO 6	An
CO-5	Apply knowledge of concentrations of solutions to everyday examples and estimate the strength of the given unknown solution	PSO 6	App
Course Title	**Major Core 2 – General Chemistry-II**		
Code	**U15CH2MCT02**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Describe the effects operating in organic compounds	PSO1	R, U
CO-2	Discuss the mechanism of elimination reactions	PSO3	U
CO-3	Explain the first law of thermodynamics and relate the work, heat and energy	PSO2	Ap
CO-4	Analyse the thermochemical laws	PSO3	An
CO-5	Interpret the geometry of molecules using VSEPR	PSO4	An
CO-6	Sketch the MOT for N_2 and O_2	PSO3	U

Course Title	Allied – 3: Allied Chemistry Paper III [For Botany and Zoology]		
Code	**U15CH2AOT03**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Classify the coordination compounds according to the IUPAC nomenclature.	PSO1	U
CO-2	Discuss the preparation and properties of aminoacids and proteins.	PSO2	U
CO-3	Determine the efficiency of Carnot Cycle	PSO3	A
CO-4	Analyze the variation of specificand equivalent conductance with dilution.	PSO4	An
CO-5	Explain the laws of photochemistry	PSO2	U

Course Title	MAIN CORE PAPER – GENERAL CHEMISTRY – III		
Code	**U15CH3MCT04**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Calculate the work function and free energy.	PSO 1	Ap
CO-2	Derive Maxwell‘s relations.	PSO 2	U
CO-3	Describe Nernst heat theorem.	PSO 2	U
CO-4	Compare the periodic properties of alkali and alkaline earth metals.	PSO 3	R,U
CO-5	Discuss the anomalous behavior of fluorine and oxygen	PSO 3	U
CO-6	Predict aromaticity using Huckel‘s rule.	PSO 3	Ap
CO-7	Discuss the mechanism of aromatic electrophilic substitution reaction.	PSO 4	U
CO-8	Predict the oxidation and reduction product of aromatic poly nuclear hydrocarbons.	PSO 5	U, Ap

Course Title	MAINCORE – 5: VOLUMETRIC ANALYSIS – Theory Cum Lab -I		
Code	**U15CH3MCP05**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Critical capacity to understand the procedures in order to define the common methods of analysis..	PSO 2	U
CO-2	Use correct titrimetric procedure when carrying out titrations	PSO 5	An
CO-3	Prepare the standard solution of different strength.	PSO 5	U
CO-4	Explain the acid base, redox and complexometric titrations with examples.	PSO 6	An
CO-5	Apply knowledge of concentrations of solutions to everyday examples and estimate the strength of the given unknown solution	PSO 6	App

Course Title	ALLIED – 4: Allied Chemistry Paper I (For Physics Main)		
Code	**U15CH3AOT01**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Identify the type of organic reaction and field effect in the given examples	PSO 1	U
CO-2	Predict the periodic trends along the group and the period	PSO 2	U
CO-3	Examine the polarity of the molecules using Fajan‘s rule	PSO 3	An
CO-4	Distinguish the types of magnetism	PSO 3	U
CO-5	Discuss the different colligative properties of solutions	PSO 4	U

Course Title	SBE-3 & 4 : Experimental Chemistry for life science [Botany & Zoology]		
Code	**U15CH3SBT03/ U15CH5SBT04**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Identify the phytconstituents present in plant extracts.	PSO4	U
CO-2	Separate any given amino acids using paper chromatography.	PSO5	A
CO-3	Determine the melting and boiling points of the given organic compounds.	PSO5	A
CO-4	Predict the nature of the samples based on pH measurements.	PSO4	An
CO-5	Differentiate the different qualities of any given water sample	PSO6	An

Course Title	MAJOR CORE - 6 : GENERAL CHEMISTRY – IV		
Code	**U15CH4MCT06**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Compare the periodic properties of d-block elements.	PSO 1	U
CO-2	Explain the Nucleophilic substitution mechanisms.	PSO 2	U
CO-3	Discuss the synthetic applications of Organomatallic compounds.	PSO 2	U
CO-4	Derive the rate equation of the first, second, third and zero order reactions.	PSO 3	R,U
CO-5	Calculate the activation using Arrhenius equation.	PSO 2	Ap
CO-6	Discuss the theories of reaction rates.	PSO 2	U
CO-7	Problems in quantum yield.	PSO 3	Ap
CO-8	Discuss the mechanism of given naming reactions.	PSO 3	U, Ap

Course Title	MAJOR ELECTIVE – 2 : FOOD CHEMISTRY		
Code	**U17CH5MET03A**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	List the important nutrients of healthy diet	PSO1	U
CO-2	Analyses the nutrients presents of balanced diet	PSO2	An
CO-3	Summarize the various cooking methods and its effects.	PSO1	U
CO-4	Explain the different food preservation techniques	PSO4	U
CO-5	Evaluate the adulterants present in food	PSO5	Ap

Course Title	ALLIED – 5 : Allied Chemistry Paper II (For Physics Main)		
Code	**U15CH3AOT02**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Explain the structure of solids on the basis of packing and discuss crystal defects and their influence on materials properties	PSO 1	R, U
CO-2	explain theory and practice of common photochemical and photophysical methods	PSO 2	U
CO-3	Explain the different types of conductometric titrations	PSO 2	U
CO-4	Calculate the reduction potential for various metals	PSO 3	Ap
CO-5	Derive the rate equation for first order and second order equations	PSO 4	An

Course Title	ALLIED 6: ALLIED CHEMISTRY PRACTICAL PAPER III		
Code	**U15CH4AOP03**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Critical capacity to understand the procedures in order to define the common methods of analysis..	PSO 2	U
CO-2	Use correct titrimetric procedure when carrying out titrations	PSO 5	An
CO-3	Prepare the standard solution of different strength.	PSO 5	U
CO-4	Explain the acid base, redox and complexometric titrations with examples.	PSO 6	An
CO-5	Apply knowledge of concentrations of solutions to everyday examples and estimate the strength of the given unknown solution	PSO 6	App

Course Title	Main Core – 7: Inorganic Chemistry		
Code	**U15CH5MCT07**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Classify the various types of isomerism of coordination compounds.	PSO1	R
CO-2	Analyze the stability of complex based on EAN and 18 electron rule.	PSO4	An
CO-3	Compare the various theories of coordination complexes.	PSO2	U
CO-4	Categorize the different types of crystals and its defects,	PSO1	U
CO-5	Sketch and explain the packing arrangements of atoms and the structures of few ionic crystals	PSO6	U
CO-6	Classify the subatomic particles and explain the nuclear shell and liquid drop model.	PSO1	U
CO-7	Evaluate the nuclear stability based of n/p ratio, whole number rule, mass defect and packing fraction	PSO4	E
CO-8	Categorize the various nuclear reactions and summarize the applications of radio isotopes.	PSO6	U
CO-9	Sketch and explain the biological functions of few bio inorganic compounds.	PSO5	U
CO-10	Summarize the chemistry of inner transition elements.	PSO4	An

Course Title	Major Core 8 – ORGANIC CHEMISTRY-I		
Code	U15CH5MCT08		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Formulate and discriminate the preparation, properties and strength of aliphatic, Aromatic carboxylic, sulphonic acids and their derivatives.	PSO 1	R, U
CO-2	Explain the preparation, properties and basicity of nitrogen containing organic compounds.	PSO 2	U
CO-3	Describe the physiological functions and structures of proteins, amino acids and nucleic acids.	PSO 2	Ap
CO-4	List out the preparation, properties of oxygen and sulphur containing compounds.	PSO 3	R
CO-5	Elucidate the structure of glucose and fructose	PSO 4	Ap

Course Title	Main Core – 9: Physical Chemistry – I [Electro chemistry and Phase rule]		
Code	U15CH5MCT09		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Analyze the variation of specific and equivalent conductance with dilution	PSO2	An
CO-2	Discuss the applications of conductance measurement	PSO4	A
CO-3	Classify the types of electrodes	PSO1	U
CO-4	Explain the electrochemical theory of corrosion	PSO5	U
CO-5	Sketch and discuss the phase diagram of simple eutectic systems	PSO2	U

Course Title	Main Elective – 2 : Chemistry of Biomolecules		
Code	**U15CH5MET03**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Explain the digestion and absorption of carbohydrates, processes involved in their metabolism and regulation of blood sugar.	PSO2	An
CO-2	Recognize the different types of blood lipid, discuss the metabolism of fatty acids and analyze the factors influencing the absorption of cholesterol.	PSO4	An
CO-3	Describe the metabolic pathway of proteins and recognize the effect of starvation on metabolism.	PSO2	U
CO-4	Categorize the different classes of enzymes, list their properties and describe the action of enzymes and bacteria on digestion of various nutrients.	PSO2	U
CO-5	Analyze the metabolic effects of thyroxine.	PSO3	An
CO-6	Discuss the function and properties of blood, bile pigments and bile acids.	PSO3	An

Course Title	NON MAJOR ELECTIVE – 1: HOME CARE		
Code	**U15CH5NMT01/U15CH6NMT01**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Categorize the Composition of a balanced diet.	**PSO 1**	**R, U**
CO-2	Explain the different types of marriages	**PSO 1**	**U**
CO-3	Describe the methods of fire prevention and fire fighting in homes	**PSO 1**	**Ap**
CO-4	List out the rules involved in cleaning and polishing of various metal ware.	**PSO 4**	**Ap**
CO-5	Enumerate the Precautions in application of pesticides.	**PSO 4**	**Ap**

Course Title	NON MAJOR ELECTIVE – 2: COSMETOLOGY		
Code	**U15CH6NMT02**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Discuss the different types of skins and their functions	PSO1	U
CO-2	Identify the various hair problems	PSO2	U
CO-3	Outline the advantages and disadvantages of mask treatment.	PSO2	U
CO-4	Prepare the natural facial packs on their own.	PSO3	An
CO-5	Summarizes the hazards due to usage of cosmetics.	PSO4	Ap

Course Title	MAJOR CORE PAPER – 11: ORGANIC CHEMISTRY - II		
Code	**U15CH6MCT12**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Identify the chirality and configuration in various organic compounds.	PSO-1	U
CO-2	Predict the nomenclature of geometrical isomers.	PSO-3	An
CO-3	Analysis the conformers of alkanes, cycloalkanes and their stability.	PSO-3	An
CO-4	Discuss the mechanisms of various molecular rearrangements.	PSO-1	U
CO-5	List out the preparation and properties of Heterocyclic compounds.	PSO-1	U
CO-6	Elucidate the structure of terpenes and alkaloids.	PSO-2	U

Course Title	MAJOR CORE – 12 : PHYSICAL CHEMISTRY – II [SPECTROSCOPY]		
Code	**U15CH6MCT13**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Explain the principles of Rotational spectroscopy calculate moment of inertia from rotational spectra of diatomic molecules.	PSO 1	U
CO-2	Distinguish harmonic and anharmonic vibrations	PSO 2	U
CO-3	Discuss the Classical and Quantum theories of Raman effect	PSO 2	Ana
CO-4	Outline Salient features of fragmentation pattern of organic compounds	PSO 4	App
CO-5	Demonstrate NMR chemical shifts and splitting patterns with illustrations	PSO 5	App
CO-6	Determine the dissociation energy using Birge-Sponer method.	PSO 2	App

Course Title	Main Core – 9: Physical Chemistry – I [Electro chemistry and Phase rule]		
Code	**U15CH5MCT09**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Analyze the variation of specific and equivalent conductance with dilution	PSO2	An
CO-2	Discuss the applications of conductance measurement	PSO4	A
CO-3	Classify the types of electrodes	PSO1	U
CO-4	Explain the electrochemical theory of corrosion	PSO5	U
CO-5	Sketch and discuss the phase diagram of simple eutectic systems	PSO2	U

Course Title	Major Elective – 3 : Analytical Chemistry		
Code	**U15CH6MET04**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Categorize the various chemicals and recognizes the precautions to handle poisonous chemicals and to avoid the accidents.	PSO1	An
CO-2	Summarize the principles and applications of various chromatographic techniques.	PSO5	A
CO-3	Explain the different types of polarization and differentiate the magnetism.	PSO2	U
CO-6	Summarize the principle, instrumentation and application of thermogravimetric analysis.	PSO4	An
CO-7	Sketch the schematic instrumentation of various photometric methods.	PSO4	An

Course Title	MAJOR CORE – 10: PRACTICAL PAPER II/III		
Code	**U15CH5MCP10/ U15CH6MCP11**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Carry out self directed experiments	PSO5	Ap
CO-2	Develop the skill to prepare different organic compounds	PSO1	U
CO-3	Apply the techniques of gravimetric analysis to find out the quantity of an ion in a given solution.	PSO4	Ap
CO-4	Purify the crude sample.	PSO4	An
CO-5	Accurately record and analyse the results of the experiments	PSO5	Ap

Course Title	MAJOR CORE – 13: MAIN PRACTICAL III/II		
Code	**U15CH5MCP11/ U15CH6MCP10**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Carry out self directed experiments	PSO5	Ap
CO-2	Calibrate the conductometry and potentiometry	PSO1	U
CO-3	Apply the techniques of condutometry, potentiometry, pH, colorimetry to solve chemical problems	PSO4	Ap
CO-4	Determine the strength of the given unknown solution	PSO4	An
CO-5	Accurately record and analyse the results of the experiments	PSO5	Ap

Course Title	SBE-5: Industrial chemistry		
Code	**U15CH5SBT04**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Illustrate the preparation of p-acetamol, aspirin and ibubrufen	PSO1	U
CO-2	Understand the theories of colour and constitution and identifies the preparation and uses of various dyes	PSO2	An
CO-3	Describe the mechanism of ionic and free radical polymerization and discuss the stereochemistry of polymers	PSO2	U
CO-4	Summarizes the raw materials and manufacturing of glass cement industry	PSO4	An
CO-5	discuss the processes involved in fertilizer and paper industry	PSO4	An

Course Title	Skilled Based Elective – 4: Forensic Science		
Code	**U15CH5SBT04**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Describe the history and development of forensic science.	PSO1	U
CO-2	List the types of poison and their treatment methods.	PSO2	An
CO-3	Explain the forensic importance of hair and fibre.	PSO2	U
CO-4	Discuss the forgeries involved in document examination.	PSO4	An
CO-5	Mention the types and characteristics of drugs	PSO4	An

M.SC. CHEMISTRY

PO No.	Programme Outcomes *Upon completion of the M.Sc. Degree Programme, the graduate will be able to*
PO-1	Acquire knowledge and understanding of essential facts, concepts, principles and theories of Chemistry.
PO-2	Develop Skills to evaluate, analyze and interpret the chemical information and data
PO-3	Solve problems competently by identifying the essential parts of a problem and formulating a strategy for solving the problem
PO-4	Use standard laboratory equipments, modern instrumentation and classicaltechniques to carry out experiments and develop skills to interpret and explain the limits of accuracy ofexperimental data in terms of significance and underlying theory
PO-5	Think creatively (divergently and convergent) to propose novel ideas in explaining facts and figures or providing new solution to the problems
PO-6	Collaborate effectively as part of a team to solve problems, and interactproductively with a diverse group of team members

PSO No.	Programme Specific Outcomes: *Upon completion of the B.Sc. Degree Programme, the students would*
PSO-1	provide Knowledge about all fundamental and advanced aspects of Chemistry
PSO-2	predict the structure and mechanism of Chemical compounds
PSO-3	examine specific phenomena theoretically and experimentally
PSO-4	carry out scientific experiments as well as record and analyze the results of such experiments
PSO-5	acquire knowledge, abilities and insight in well-defined area of research within Chemistry
PSO-6	contribute to the generation of new scientific insights or to the innovation of new applications of chemical research

Course Title	MAJOR CORE 1- PHYSICAL CHEMISTRY-I		
Code	**P16CH1MCT01**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Solve the Schrödinger equation for one and three dimensional box	PSO 1	U
CO-2	Classify the molecules into point groups and apply group theory in studying vibrational spectra of different inorganic compounds	PSO 1	U
CO-3	Construct the hybridization scheme for non linear molecule using group theory	PSO 2	Ana
CO-4	Generate the structure using IR and Raman spectroscopy	PSO 3	App
CO-5	Compare and contrast IR and RAMAN sepetroscopy	PSO 3	App
CO-6	Explain the application of XPS in the study of complexes	PSO 4	App
CO-7	Discuss the theory and interpret the structure using C^{13} NMR spectra	PSO 5	App
CO-8	Explain the ESR spectra of simple systems	PSO 5	Ana
CO-9	Gain knowledge to explain Group theory	PSO 5	App

Course Title	MAJOR CORE 2: ORGANIC CHEMISTRY –I		
Code	P16CH1MCT02		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Discuss the stability of reactive intermediates	PSO 1	U
CO-2	Predict the mechanism for free radical substitution reaction	PSO 2	Ana
CO-3	Differentiate the aliphatic nucleophilic substitution and elimination reaction	PSO 3	App
CO-4	Identify the optical activity of organic molecules	PSO 4	App
CO-5	Discuss the asymmetric synthesis using chiral catalysts and chiral reagents	PSO 5	App
CO-6	Obtain knowledge about various chemical reactions and stereochemistry	PSO 5	App

Course Title	MAJOR CORE 3 - INORGANIC CHEMISTRY-I		
Code	**P16CH1MCT03**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Outline the concepts of VBT,MOT and VSEP theories	PSO 1	R, U
CO-2	Examine the different types of π bonding and its ;uses in p and d -block elements.	PSO 2	R
CO-3	Explain the various types of acid and bases	PSO 2	U
CO-4	Describe the chemistry of few aqueous and non aqueous solvents	PSO 3	R
CO-5	Summaries the concepts and applications of redox potential	PSO 4	An
CO-6	Sketch the structure and bonding of Dinuclear clusters , polyhedral boranes and carboranes.	PSO 4	U
CO-7	Compare the properties of Lanthanides and Actinides.	PSO 5	R, An
CO-8	Discuss the magnetic properties of inner transition elements.	PSO 5	U
CO-9	Gain knowledge to teach various Concepts of inorganic chemistry	PSO 5	Ap

Course Title	MAJOR CORE 4 - INORGANIC CHEMISTRY PRACTICALS –I		
Code	**P16CH1MCP04**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Estimate the amount of metal ions present in the given simple photo colorimetically	PSO3	Ap
CO-2	Identify the common and rare radicals present in the given inorganic salt mixture	PSO2	U
CO-3	Separate the radicals into groups	PSO1	U
CO-4	Prepare stock solution in ppm units	PSO1	U
CO-5	Draw the standard calibration graph	PSO4	An
CO-5	Acquire skill to analyze the given sample qualitatively and quantitatively.	PSO3	Ap

Course Title	CHEMISTRY MAJOR CORE 5 - INORGANIC CHEMISTRY PRACTICALS –II		
Code	**P16CH1MCP05**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Estimate the amount of ions present in the given solution.	PSO3	Ap
CO-2	Estimate the hardness of water	PSO3	Ap
CO-3	Separate the ions through proper techniques	PSO1	U
CO-4	Prepare the Inorganic complexes	PSO4	Ap
CO-5	Understand the method of preparation of complexes	PSO1	U
CO-6	Gain analytical skill to analyse the sample using quantitative methods.	PSO3	Ap

Course Title	MAJOR CORE : 6 - PHYSICAL CHEMISTRY – II		
Code	**P16CH1MCT06**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Identify, describe and explain the quantum mechanical behavior of simple systems, such as the harmonic oscillator and the rigid rotor	PSO 1	U
CO-2	Discuss LS and J.J coupling scheme and derive ground state term symbol for various atoms	PSO 2	U
CO-3	Explain HMO theory and apply it in the calculation of pi – electron energies for simple conjugated systems	PSO 3	App
CO-4	Construct the phase diagram for three component systems	PSO 4	Ana
CO-5	Compare and contrast simple collision theory and ARRT	PSO 1	U
CO-6	Describe the influence of solvent, ionic strength and pressure on the rate of the reaction in solution	PSO 1	U
CO-7	Gain knowledge to teach physical chemistry	PSO 3	App

Course Title	Major Core 7 – ORGANIC CHEMISTRY-II		
Code	**P16CH2MCT07**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Identify the aromaticity in organic compound and discuss the mechanism of substitution reactions in aromatic compounds.	3	Ap
CO-2	Explain the addition mechanism of reagents across carbon- carbon multiple bond.	2	Ap
CO-3	Illustrate the mechanism of the various rearrangement reactions	3	Ap
CO-4	Outline the applications of reducing and oxidizing reagents	1	An
CO-5	Design the target molecule based on Retro synthetic analysis	5	ap
CO-6	Compare ,contrast the structure of nucleic acids and Discuss the structure of proteins and carbohydrates	2	U
CO-7	Gain knowledge to teach important concepts in stereochemistry.	3	App

Course Title	MAIN CORE 8 - ORGANIC CHEMISTRY PRACTICALS –I		
Code	**P16CH2MCP08**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Diagnose the suitable separation technique	PSO4	An
CO-2	Analyze the given organic mixture	PSO5	An
CO-3	Identify the functional groups and elements present in the organic components	PSO3	U
CO-4	Synthesize the derivatives obtained from the pure organic component	PSO6	C
CO-5	Explain the principles of organic preparation	PSO2	U
CO-6	Acquire analytical skill to anlayse the given organic compound qualitatively.	PSO3	Ap

Course Title	MAIN CORE 9 - ORGANIC CHEMISTRY PRACTICALS –II		
Code	**P16CH2MCP09**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Characterize the products by physical means including melting point	PSO1	U
CO-2	Perform common laboratory techniques including preparation, crystallization and recrystallization	PSO2	An
CO-3	Critically evaluate data collected to determine the purity and yield of products	PSO2	An
CO-4	Predict the outcome of organic reactions using a basic understanding of the general reactivity	PSO3	An
CO-5	Describe the significance of organic quantitative analysis in organic estimation	PSO1	U
CO-6	Acquire skill to analyse organic compound quantitatively.	PSO3	Ap

Course Title	NON-MAJOR ELECTIVE – 1: FOOD SCIENCE		
Code	**P16CH2NMTO1**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Summarize the various cooking methods and its effects.	PSO 1	U
CO-2	List the important nutrients of healthy diet	PSO 3	U
CO-3	Outline the meal planning for various age groups	PSO 1	An
CO-4	Prepare a diet chart for hypertension and diabetes	PSO 2	Ap
CO-5	Categorize the various food additives and its functions	PSO 3	Ap
CO-6	Explain the different food preservation techniques	PSO 4	U
CO-7	Evaluate the adulterants present in food	PSO 5	An
CO-8	Discuss the modern concepts of biofortification and nutraceuticals	PSO 5	U
CO-9	Gain knowledge to give awareness about food and nutrition.	PSO 3	Ap

Course Title	Major Core 10–INORGANIC CHEMISTRY-II		
Code	**P16CH3MCT10**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Recall the crystal field and molecular orbital theories.	PSO1	R&U
CO-2	Compare and contrast the inner and outer sphere mechanism of complexes.	PSO2	U
CO-3	Analyze the catalytic applications of organometallic compounds.	PSO4	An
CO-4	Interpret the structure of complexes using spectroscopic techniques.	PSO5	Ap
CO-5	Discuss the photochemistry of organometallic compounds.	PSO6	U&Ap
CO-5	Gain knowledge to teach about various Concepts of inorganic chemistry	PSO5	Ap

Second Year – Semester- III

Course Title	Chemistry Main Core Paper 11 - Physical Chemistry – III		
Code	**P16CH3MCT11**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	construct the fuel cells	PSO6	C
CO-2	Classify and explain the electrokinetic phenomenon	PSO2	U
Co-3	Apply Tafel equation in corrosion process	PSO4	Ap
CO-3	Sketch and interpret the cyclic voltagrams of redox systems	PSO3	Ap
CO-4	Illustrate the various methods for counting macro states.	PSO5	An
CO-5	Compare and contrast the Bose-Einstein and Fermi-Dirac statistics.	PSO2	U
CO-6	Explain Onsagar‘s reciprocal relations.	PSO1	U
CO-7	gain skill to interpret cyclic voltagrams	PSO4	Ap

Course Title	MAJOR ELECTIVE 1 - ORGANIC CHEMISTRY		
Code	**P16CH3MET01**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Interpret the given UV and IR spectra and deduce the structure of the compound	PSO 2	An
CO-2	Discuss the factors affecting the chemical shift.	PSO 1	K
CO-3	Explain the 2D techniques in NMR.	PSO 1	U
CO-4	Outline the fragmentation patterns for organic compounds using mass spectrometry.	PSO 2	Ap
CO-5	Generate the structure of alkaloids.	PSO 2	Ap
CO-6	Distinguish Norrish type I and type II reactions.	PSO 3	U
CO-7	Discuss the FMO approach for dienes and trienes.	PSO 1	U
CO-8	Acquire skill to interpret all spectroscopic data.	PSO 2	Ap

Course Title	Major Core 13 - Physical Chemistry Practical– II		
Code	**P16CH3MCP13**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Understand the theoretical concepts of physical experiments	PSO1	U
CO-2	Execute the conductometric and potentiometric titration	PSO4	Ap
CO-3	Predict the end point through volumetric method	PSO3	E
CO-4	Draw and relate the end point through graphical method	PSO4	An
CO-5	Evaluate the solubility product of silver chloride	PSO5	E
CO-6	Gain knowledge to analyse the given sample.	PSO5	Ap

Course Title	Major Core 12 - Physical Chemistry Practical - I		
Code	**P16CH3MCP12**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Understand the theoretical concepts of non- electrical experiments	PSO1	U
CO-2	Construct the phase diagram for one component and three component systems	PSO5	C
CO-3	Predict the end point through volumetric method	PSO3	E
CO-4	Determine the Arrhenius parameters.	PSO5	An
CO-5	Draw and relate the end point through graphical method	PSO4	An
CO-6	Acquire the practical skills to analyse the given sample using non electrical practical techniques.	PSO5	Ap

Course Title	Non-Major Elective 2 – Chemistry in everyday life		
Code	**P16CH3NMT02**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Discuss the applications of antibiotics and analgesics	PSO1	R&U
CO-2	Describe the physical, chemical properties of metals and the applications of metals used in homes	PSO2	Ap
CO-3	Narrate the steps involved in prevention of corrosion in metals.	PSO4	An
CO-4	Distinguish natural and synthetic rubber.	PSO2	R&U
CO-5	Identify the chemical poisons present in flavouring agents and food additives	PSO6	U&Ap
CO-6	Gain knowledge to teach safety measures in daily life	PSO6	U&Ap

Course Title	Major Core Paper 14 - Inorganic Chemistry- III		
Code	**P16CH4MCT14**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Solve the experiments with precision and accuracy.	PSO5	An
CO-2	Analyze the given unknown sample using HPLC technique	PSO6	An
CO-3	Compare and contrast UV and IR spectroscopic techniques.	PSO2	U
CO-4	Interpret Mossbauer spectra of inorganic complexes	PSO3	Ap
CO-5	Diagnose the structure of given crystal using X-ray diffraction	PSO4	An
CO-6	Categorize the therapeutic applications of radio isotopes	PSO1	U
CO-7	Explain the invivo and invitro process of nitrogen fixation.	PSO1	U
CO-8	Relate the functions of oxy hemoglobin and deoxy hemoglobin	PSO1	U
CO-9	Develop knowledge about various Concepts in inorganic chemistry	PSO3	Ap

Course Title	MAJOR ELECTIVE 2 - PHYSICAL CHEMISTRY		
Code	P16CH3MET02		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Evaluate the significance of LASER	PSO4	An
CO-2	Compare and contrast photochemistry and radiation chemistry	PSO4	An
CO-3	Interpret the applications nuclear radiations	PSO2	U
CO-4	Describe the fast reaction techniques	PSO1	Ap
CO-5	Discuss the applications of Electrophoresis and electro osmosis	PSO2	An
CO-6	Determine the molecular weights of polymers using number average and weight average methods.	PSO4	An
CO-6	Develop knowledge to explain some important topics in physical chemistry	PSO4	Ap

Course Title	MAJOR ELECTIVE-3 - GREEN AND NANO CHEMISTRY		
Code	**P16CH4MET03**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Enumerate the Green Chemistry Principles.	PSO 1	U
CO-2	Distinguish microwave and ultrasound green synthesis.	PSO 1	U
CO-3	Elucidate the various mechanisms using ionic liquids and PTC.	PSO 2	An
CO-4	Discuss the properties and synthesis of nanoparticles.	PSO 5	U
CO-5	Summarizes the applications of carbon nanotubes and colloidal gold.	PSO 6	App
CO-6	Gain knowledge about Green chemistry and Nano technology	PSO 6	App

Course Title	SELF STUDY PAPER - APPLIED CHEMISTRY		
Code	**P17CH4SST15**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Understand the fundamental concepts in solid state and to predict the structure of ionic crystals	PSO 1	U
CO-2	Apply the principles of nuclear chemistry in various nuclear reactions and understand the applications of radioactive isotopes.	PSO 1	Ap
CO-3	Predict the different properties of inorganic polymers.	PSO 2	An
CO-4	Explain the components of soil, soil microorganism and soil reactions	PSO 3	U
CO-5	Identify the sources , causes and effects of air pollution, water pollution and solid waste management	PSO 5	Ap
CO-6	Develop the knowledge on soil and environmental chemistry	PSO 5	Ap

M. PHIL. CHEMISTRY

Course Title	MAJOR CORE 1- RESEARCH METHODOLOGY		
Code	**MPH17CH1C01**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Discuss the art of writing thesis.	PSO 1	U
CO-2	Compare t-test and F- test.	PSO 2	U
CO-3	Explain microwave and ultrasound assisted green synthesis.	PSO 3	U
CO-4	Give the mechanism of Wittig reactions.	PSO 4	An
CO-5	Discuss the Applications of LC-MS technique.	PSO 5	Ap

Course Title	MAJOR CORE 2- PHYSICAL METHODS IN CHEMISTRY		
Code	**MPH17CH1C02**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Interpret the FT-IR, NMR and Mossbauer spectra of the molecules	PSO 1	App
CO-2	Elucidate the structure of molecules involving NMR active nuclei.	PSO 2	App
CO-3	Analyze and interpret 2D NMR spectra of molecules and to differentiate between 1D and 2D spectra	PSO 3	An
CO-4	Interpret the structure of organic compounds using mass spectrometry	PSO 4	App
CO-5	Elucidate the structure of simple molecules using diffraction techniques	PSO 5	App

Course Title	MAJOR ELECTIVE - ENVIRONMENTAL CHEMISTRY		
Code	**MPH17CH1E03**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Discuss the types of environment.	PSO 1	U
CO-2	Differentiate primary vs secondary waste water treatments.	PSO 2	U
CO-3	Explain -Total Organic Carbon Analysis.	PSO 3	U
CO-4	Give the instrumentation of FT-IR spectroscopy.	PSO 4	Ana
CO-5	Discuss the Applications of Adsorption.	PSO 5	App

Course Title	MAJOR ELECTIVE - KINETICS AND MECHANISM		
Code	**MPH17CH1E04**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Discuss the fundamentals of chemical kinetics	PSO 1	U
CO-2	Explain the theories and concepts of chemical kinetics	PSO 2	U
CO-3	Correlates catalysis with chemical kinetics.	PSO 3	U
CO-4	Discuss the substituent effects based on LFER.	PSO 4	Ana
CO-5	Propose the reaction mechanism in solution and derive the rate law .	PSO 5	App

Course Title	MAJOR ELECTIVE - PHYTOCHEMISTRY		
Code	**MPH17CH1E05**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Discuss the classification of metabolites, functions, structures of cells, microbes and detect them technically	PSO 1	U
CO-2	Explain the different extraction methods	PSO 2	U
CO-3	Explain the different analytical techniques In structure determination	PSO 3	Ana
CO-4	Interpret the presence of phenolic compounds and terpenoids	PSO 4	App
CO-5	Interpret and elucidated the structure of basic phytoconstituents in plant extracts .	PSO 5	App

Course Title	MAJOR ELECTIVE - PHYTOCHEMISTRY		
Code	**MPH17CH1E05**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Discuss the classification of metabolites, functions, structures of cells, microbes and detect them technically	PSO 1	U
CO-2	Explain the different extraction methods	PSO 2	U
CO-3	Explain the different analytical techniques In structure determination	PSO 3	Ana
CO-4	Interpret the presence of phenolic compounds and terpenoids	PSO 4	App
CO-5	Interpret and elucidated the structure of basic phytoconstituents in plant extracts .	PSO 5	App