AQAR – QUALITATIVE METRIC

2023 – 2024

Criterion 1 - Curricular Aspects

1. 1 -Curricula developed and implemented have relevance to the local, national, regional and global developmental needs which is reflected in Programme outcomes (POs), Programme specific outcomes (PSOs) and Course Outcomes (COs), of the Programmes offered by the Institution.

NAME OF THE PROGRAMME: PG CHEMISTRY **PROGRAMME CODE: PSCH**

Programme Outcomes:

PO1	Firm hold and sound footing in theoretical and practical aspects of Chemistry
PO2	An overall comprehensive and an in-depth knowledge and equip learners to possess global competency
PO3	Diversified branches with deep rooting cultivate research aptitude that leads to innovative findings
PO4	Informative but application oriented inputs
PO5	Enhanced chances to take up careers in industries and other pivotal sector.

PO6	Rigorous training to tackle challenges in the academic and societal need based fields
PO7	Opportunity to be exposed to the current emerging trends in the field of Chemistry through activities such as workshops, seminars and projects.

Programme Specific Outcomes:

PSO 1	Equipped with an in-depth knowledge of varied fields namely Organic Chemistry, Inorganic Chemistry , Physical and nanochemistry.
PSO 2	Training in problem solving procedures enables to interpret the experimental data into structures and mechanisms.
PSO 3	Provides a tremendous exposure and cultivates analytical and synthesising measures necessary to take up project work in reputed institutions.
PSO 4	Programme renders diversified thinking thereby promotes creative skills.
PSO 5	Directed to solve the problems that cause a negative impact on surroundings to pursue salient steps to safeguard environment.
PSO 6	Application-oriented input sharpens the skill to undertake CSIR-NET exam.
PSO 7	Knowledge with practical dimensions becomes a driving power to undertake research in different

	areas At a global level.
PSO 8	Multi-layered input enables to avail opportunities at chemical, pharmaceutical industries.
PSO 9	Becomes a contributing force and development agent in society.

Course Outcomes:

Course Code	**Course Title**	**Nature of the Course (Local/National /Regional/Global)**	**Course Description**	**Course Outcomes**
23PG1C1	ORGANIC	Global	This paper focuses on all the important aspects of	CO1: To recall the basic principles of organic chemistry. CO2: To understand the formation and detection of reaction intermediates of organic reactions. CO3: To predict the reaction mechanism of organic reactions and stereochemistry of organic compounds.

	REACTION MECHANISM-I		organic chemistry like aromaticity, reaction intermediates and stereochemistry.	CO4: To apply the principles of kinetic and non-kinetic methods to determine the mechanism of reactions. CO5: To design and synthesize new organic compound by correlating the stereochemistry of organic compounds.
23PG1C2	STRUCTURE AND BONDING IN INORGANIC COMPOUNDS	Global	It deals with theories, characterization with spectral studies and determination of structures of main group compounds.	CO1: To compare the stabilities various compounds CO2: To describe the theories of compounds Of ionic crystals CO3: To investigate the structures of complexes using by XRD techniques CO4: To possess a thorough understanding of electronic spectra of complexes by SEM and TEM CO5: To gain knowledge of Defect in crystals

23PG1C3	ORGANIC CHEMISTRY PRACTICALS	Global	This course gives a hands on experience of qualitatively analyzing organic compounds and to synthesis simple organic compounds.	CO1: To be skilled in the separation of binary organic mixtures CO2: To gain knowledge on the skills of doing micro level analysis CO3: To know the methods of qualitative analysis of organic compounds CO4: To learn about the preparation of suitable derivative of the organic functional groups CO5: To prepare organic compounds.
23PG1CE1	PHARMACEUTICAL CHEMISTRY	Global	This paper focuses on all the important aspects of Physical concepts of Spectroscop	CO1: To identify the suitable drugs for various diseases. CO2: To apply the principles of various drug action and drug design. CO3: To acquire the knowledge on product development based on SAR. CO4: To apply the knowledge on applications of computers in chemistry.

			y, Kinetic theory of gases and Photochemistry and Radiation Chemistry	CO5: To synthesize new drugs after understanding the concepts SAR.
23PG1CE2	NANOMATERIALS AND NANOTECHNOLOGY	Global	This paper provides an extensive study of the Nano materials, their methods of preparation, mechanical properties and their applications.	CO1: To explain methods of fabricating nanostructures CO2: To relate the unique properties of metallic nanoparticles with other nanomaterials. CO3: To discuss the electrical and magnetic properties of nano materials. CO4: To distinguish various types of nanosensors and carbon nanotubes. CO5: To explain Nanocomposites and core/shell nanoparticles.
23PG1CE			It deals with concepts of	CO1: To understand the behaviour of electrolytes in solution and compare the structures of electrical double layer of

3	ELECTROCHEMISTRY	Global	electrochemistry in various aspects like interionic effect, electrode kinetics, redox reactions batteries and fuel cells.	different models. CO2: To predict the kinetics of electrode reactions applying Butler-Volmer and Tafel equations CO3: To study different thermodynamic mechanism of corrosion, CO4: To discuss the theories of electrolytes, electrical double layer, electrodic and activity coefficient of electrolytes CO5: To have knowledge on storage devices and electrochemical reaction mechanism.
23PG1CE4	MOLECULAR SPECTROSCOPY	Global	This paper provides an extensive study of the rotatioal, vibrational spectroscopy, Raman spectroscop	CO1: To understand the importance of rotational and Raman spectroscopy CO2: To apply the vibrational spectroscopic techniques to diatomic and polyatomic molecules CO3: To evaluate different electronic spectra of simple molecules using electronic spectroscopy

			y, ESR spectroscopy, NMR spectroscopy and correlation techniques such as COSY, HETCOR, NOESY.	CO4: To outline the NMR, 13C NMR, 2D NMR – COSY, NOESY, Introduction to 31P, 19F NMR and ESR spectroscopic techniques. CO5: To develop the knowledge on principle, instrumentation and structural elucidation of simple molecules using Mass Spectrometry, EPR and Mossbauer Spectroscopy techniques
23PG1CAE	CHEMISTRY IN CONSUMER PRODUCTS (EDC)	Regional	It deals with concepts of cosmetics, preparation of the house hold products and its importance	CO1: To understanding the preparation of cosmetics CO2: To know the preparation of some personal care products like soap and shampoos CO3: To explore the preparation methods of house hold products CO4: To acquire hands-on training on the preparation of the house hold products. CO5: To get hands-on training on the preparation of some common products.

23PG2C4	ORGANIC REACTION MECHANISM-II	Global	This paper focuses on all the important aspects of organic chemistry like aromaticity, reaction intermediates and stereochemistry.	CO1: To understand the concept of aromaticity in benzenoid, non-benzenoid, heterocyclic and annulene compounds. CO2: To understand the mechanism involved in various types of organic reactions with evidences. CO3: To understand the applications of synthetically important reagents. CO4: To correlate the reactivity between aliphatic and aromatic compounds. CO5: To design synthetic routes for synthetically used organic reactions
23PG2C5			This paper provides an extensive study of the topics such as Chemical	CO1: To determine partial molar quantities and assess partition functions. CO2: To categorize and compare various partition functions - translational, rotational, vibrational and electronic partition functions and distinguish various Statistics CO3: To deduce Onsagar's theory and its

	PHYSICAL CHEMISTRY-I	Global	kinetics and Thermodynamics.	validity. CO4: To deduce the rate of chemical reactions to understand mechanism involved in reactions. CO5: To examine the kinetics of complex and fast reactions.
23PG2C6	INORGANIC CHEMISTRY PRACTICALS	Global	This course gives a hands on experience of qualitatively analyzing inorganic compounds and to do complexometric titrations.	CO1: To describe the principle and procedure of quantitative analysis CO2: To identify the suitable complexing agents for the given metal ions CO3: To draw the structure of various ligands and complexes CO4: To distinguish volumetric analysis and gravimetic analysis CO5: To apply the expressions of various terms in calculations
			This paper focuses on	CO1: To predict a drugs properties based on its structure. CO2: To describe the factors that affect its absorption, distribution, metabolism, and

23PG2CE5	MEDICINAL CHEMISTRY	Global	all the important aspects of Physical concepts of Spectroscopy, Kinetic theory of gases and Photochemistry and Radiation Chemistry	excretion, and hence the considerations to be made in drug design. CO3: To explain the relationship between drug's chemical structure and its therapeutic properties. CO4: To get knowledge of different theories of drug actions at molecular level. CO5: To identify different targets for the development of new drugs for the treatment of infectious and GIT.
23PG2CE6	GREEN CHEMISTRY	Global	This paper provides an extensive study of thegoals of green chemistry, principles of green chemistry,green reagents	CO1: To recall the basic chemical techniques used in conventional industrial preparations and in green innovations CO2: To understand the various techniques used in chemical industries and in laboratory CO3: To compare the advantages of organic reactions assisted by renewable energy sources and non-renewable energy sources CO4: To apply the principles of PTC, ionic

			and green synthesis.	liquid, microwave and ultrasonic assisted organic synthesis. CO5: To design and synthesize new organic compounds by green methods
23PG2CE7	BIO INORGANIC CHEMISTRY	Global	It deals with concepts of bioinorganic chemistry in various aspects like biological importance of metal ions, significance of haemoglobin , myoglobin, chlorophyll , metallo enzymes, nitrogen and toxicity of metals etc.	CO1: The students will be able to analyses trace elements. CO2: Students will be able to explain the biological redox systems. CO3: Students will gain skill in analyzing the toxicity in metals. CO4: Students will have experience in diagnosis. CO5: Learn about the nitrogen fixation and photosynthetic mechanism.

23PG2CE8	MATERIAL SCIENCE	Global	This course deals with study of synthesis, properties, structure and applications of nanoparticles.	CO1: To distinguish between bulk material and nanomaterials CO2: To choose the suitable synythetic methods to prepare particular nanomaterials CO3: To interpret the structure of nanomaterials using various characterisation techniques CO4: To catagorize and identify the different types Carbon nano structures CO5: To summarise the uses of nanomaterials in various fields
23PG2CSE1	CHEMISTRY IN EVERYDAY LIFE (EDC)	Regional	This paper focuses on all the important aspects of theory about soil, water, food	CO1: To analyse the buffering capacity of soil, p H, cation exchange capacity, nutrient availability of soil, fertility status of soil. CO2: To analyze the p H of water, hardness of water and acquire knowledge of advanced water purification techniques (and water treatment) CO3: To identify different types of food

			chemistry, cosmetics and oil.	colour, additives and food adulterants CO4: To learn the ingredients required for the preparation of the various types of shampoos, skin powder and nail polish CO5: To analyze and Detect the presence of adulderants in oils and to compare the physical and chemical refining of oils.
19PG3C11	ORGANIC CHEMISTY-III	Global	This paper provides an elaborate study of organic spectroscopy and their applications in structural elucidation of organic compounds. This paper also deals with reactions that are	CO1: To acquire a complete knowledge of the basic principles of 1H-NMR, 13C-NMR and Mass spectroscopy CO2: To be acquainted with complete knowledge of photochemistry of ketone &cyclo addition reactions and to develop an understanding of the significance of the number, and splitting of signals in NMR CO3: To be competent to assign structures to simple molecules on the basis of nuclear magnetic resonance spectra CO4: To distinguish the similarities and differences of Pericyclic reactions and Cyclo addition and sigmatropic reactions CO5: To apply the Spectral concepts to

			taking place under photochemical conditions and pericyclic reactions and terpenoids.	solve the problems, to elucidate the structures of simple organic compounds using the data from all the spectral techniques
19PG3C12	PHYSICAL CHEMISTRY-III	Global	This course covers the detailed study of group theory and its application and also covers the principles of surface chemistry, and a brief study of macromolecules.	CO1: To learn about symmetry elements and symmetry operations, the point groups and character table CO2: To Describe the selection rule for infrared-active and Raman active transitions, electronic transitions CO3: To analyse the hybridization of given compounds and to apply HMO theory to Ethylene and some conjugated systems CO4: To Classify of surface active agents, Polymers, and to derive Gibbs adsorption and BET isotherms CO5: To explain the kinetics of vinyl, cationic and anionic polymerizations and

				to determine the mass of polymers.
19PG3C13	GREEN CHEMISTRY	Global	This course deals with principles of green chemistry, environmental performance, alternative energy sources and greener technologies.	CO1: To know about the alternative feedstock and to study about the process and advantages of alternative materials CO2: To get familiarise about the green chemistry technology CO3: To understand the need of alternative energy sources CO4: To learn different types of renewable energy sources CO5: To acquire knowledge about the greener techniques in industries
19PG3CE1	MATERIAL CHEMISTRY	Global	This course deals with study of synthesis, properties, structure and applications of nano	CO1: To gain knowledge about the basic principles of nanochemistry and classification of nanomaterials. CO2: To describe several synthesis of inorganic nanoparticles, one-dimensional nanostructures (nanotubes, nanorods, nanowires), thin films, nanoporous materials, and nanostructured bulk materials,

			particles.	CO3: To criticize the importance of various instrumentation techniques such as NMR, IR, UV, X-ray diffraction, ESR etc., for elucidating the structures of nanomaterials. CO4: To depict the structure of carnonnanoatructures, organic nanopolymers and supra molecular structures CO5: To recognize the important role of nanomaterials in various fields.
19PG3CE 2	BIO-ORGANIC CHEMISTRY	Global	This paper deals with the molecular drug designing, classification of proteins, enzymes	CO1: Understand concepts of molecular recognition and drug design CO2: Remember the synthesis and structure of Proteins and amino acids. CO3: Know the extraction and purification of enzymes and their application in catalysis. CO4: Categorize and analyze enzyme mechanisms. CO5: Analyze the structure and biological functions of Coenzymes.

19PG3C14	Physical Chemistry Practicals-I	Global	This course gives lab experience on physical experiments	CO1: Developed expertise relevant to the professional practice of chemistry CO2: Developed an understanding of the breadth and concepts of physical chemistry CO3: An appreciation of the role of physical chemistry in the chemical sciences and engineering CO4: Developed an understanding of the role of the chemist and chemical engineer in tasks employing physical chemistry CO5: An understanding of methods employed for problem solving in physical chemistry
19PG3SICI	Internship	Global	This paper is designed to increase the problem solving, critical thinking and analytical	CO1: To carry out scientific experiments CO2: To accurately record and analyze the results of such experiments.

			reasoning skill of students.	
19PG4C15	Inorganic Chemistry-Iii	Global	This course covers the structure and Bonding of organ metallic compounds and basic concepts of bioinorganic compounds	CO1: Illustrate the structure and mode of bonding in organometallic complexes CO2: Apply the different electron counting procedures to predict the shape and stability of organometallic complexes CO3: Illustrate the mechanism of dioxygen binding in various oxygen carrier proteins CO4: Classify and identify the different types of metalloenzymes and metallo proteins based on their biological functions. CO5: Interpret the structure of borazines, boranes and carboranes.
19PG4C16	Organic Chemistry-Iv	Global	This course paper deals with types of synthetic compounds, basic	CO1: To differentiate the carbon –carbon bond forming reactions and to interpret the products and to explore reactivity patterns of various coupling reactions CO2: To elucidate the structural units

			concepts of photochemistry, nucleic acids and steroids	of quinine, morphine, ⟨-pinene and ⟨-codinene CO3: To correlate the skeletal units of nucleotides and nucleosides- RNA and DNA CO4: To categorize the reducing and oxidizing agents and its applications. CO5: To Sketch the effective and logical synthetic route for the synthesis of new molecules
19PG4C17	PHYSICAL CHEMISTRY-IV	Global	This paper deals with many spectroscopic techniques like Microwave, IR, Raman and Photoelectron, ESR, NQR and Mossbauer.	CO1: Describe the structure and mode of bonding in organometallic complexes containing carbonyls, nitrosyls, carbenes, carbynes, alkenes, alkynes and also metallocene complexes CO2: Apply different electron counting procedures to predict the shape and stability of organometallic complexes CO3: Illustrate the mechanism of dioxygen binding in various oxygen carrier proteins CO4: Classify different types of

				metalloenzymes and metallo proteins based on their biological functions. CO5: Distinguish whether the given compound belongs to chain or ring or cage or cluster
19PG4CE3	ANALYTICAL CHEMISTRY	Global	This course deals with chromatographic techniques, spectroscopic methods, applications of C-programms in chemistry	CO1: To acquire the complete knowledge of C language CO2: To develop logics which will help them to create programs, applications of chemistry problems in C. CO3: To explicate the theoretical principles of selected instrumental methods within electro analytical and spectrometric/spectrophotometric methods, and main components in such analytical instruments. CO4: To explain the confidence level and confidence limit, the sources of random errors and effects of random errors on analytical results. CO5: To illuminate the theoretical principles of various separation techniques in chromatography, and

				typical applications of chromatographic techniques
19PG4CE4	CHEMICAL ENGINEERING	Global	This paper deals with analytical methods. It also deals with programming in C language and its applications to solve problems in chemistry	CO1: To write C- Program using various features of C- language CO2: To categorize the various conditioning methods in water treatment CO3: To apply the principles involved in spectrophotometric analysis. CO4: To compare the mechanism between dry corrosion and wet corrosion CO5: To synthesize some industrially important polymers
19PG4C18	PHYSICAL CHEMISTRY PRACTICALS-II	Global	This lab course is course gives lab experience on physical experiments	CO1: Experience in some scientific methods employed in basic and applied physical chemistry CO2: Developed skills in procedures and instrumental methods applied in analytical and practical tasks of physical chemistry CO3: Developed skills in the scientific

				method of planning, developing, conducting, reviewing and reporting experiments CO4: Developed some understanding of the professional and safety responsibilities residing in working with chemical systems.
19PG4CPR	PROJECT	Global	This paper is designed to increase the skill of students in problem solving, critical thinking and analytical reasoning as applied to scientific problems	CO1: To carry out scientific experiments CO2: To accurately record and analyze the results of such experiments.