

## **M.Sc. Chemistry**

**Programme Code: 330**

### **Programme Summary**

Duration: 2 years

#### **Eligibility**

B Sc with CBZ/ PCM with 45% marks in aggregate. Course contents: Organic chemistry, analytic chemistry, inorganic chemistry, physical chemistry, spectroscopy and chromatography, etc.

#### **Program outcome (PO):**

- To have sound knowledge about the fundamentals and applications of chemical and scientific theories.
- Every branch of Science and Technology is related to Chemistry.
- An ability to apply knowledge of important laboratory techniques, methods, and instrumentation.
- An ability to design and execute new chemical experiments, good laboratory practice and proper handling of chemical to successfully complete a research project.
- Easily assess the properties of all elements discovered.
- Apply appropriate techniques for the qualitative and quantitative analysis of chemicals in laboratories and in industries.
- Will become familiar with the different branches of chemistry like analytical, organic, inorganic , physical, environmental, polymer and biochemistry.
- Helps in understanding the causes of environmental pollution and can open up new methods for environmental pollution control.
- Develops analytical skills and problem solving skills requiring application of chemical principles.
- Acquires the ability to synthesize, separate and characterize compounds using laboratory and instrumentation techniques.
- An ability to broaden their foundations through activities such as teaching, internships, and fellowships.
- An understanding of professional responsibility and ethics in Chemistry.

**Course outcome:**

	Course code	Course name	Credits	Course outcome
<b>1<sup>st</sup> Semester</b>				
1	C001	Inorganic Chemistry I	3	In this paper students are expected to understand the structure of inorganic molecules their reaction mechanism and various theories to understand the transition metal complexes.
2	C002	Organic Chemistry I	3	This paper provide the knowledge to student of all basic areas of chemistry regarding Nature of Bonding in Organic Molecules, Stereochemistry, Reaction Mechanism: Structure and Reactivity, Aliphatic Nucleophilic Substitution, Aliphatic Electrophilic Substitution.
3	C003	Physical Chemistry I	3	In this branch of chemistry students know how chemical energy changes to electrical energy and vice versa. How all physical phenomena take place and detailed study of thermodynamics.
4	C004	Group Theory & Spectroscopy	3	Group theory gives a theoretical knowledge regarding the properties of molecules in various aspects. And the knowledge of spectroscopy prepare to students for data interpretation of various molecules on the basis of obtained data from various technique such as unifying principle, Atomic Electronic Spectroscopy, microwave spectroscopy and infrared spectroscopy.
5	C005	Laboratory Course IA	3	The main purpose of Qualitative analysis of inorganic radicals and organic mixture to prepare the students as a chemist in industry or a lab and provide the knowledge regarding to follow proper procedures and regulations for safe handling and use of chemicals and can follow the proper procedures and regulations for safe handling when using chemicals.
6	C006	Laboratory Course IB	3	In this lab course students are expected to understand the technique of chromatography, organic synthesis and practical's related to conductometry and electrochemistry.

2 <sup>nd</sup> Semester				
7	C007	Inorganic Chemistry II	3	In this paper students are expected to understand the colors and magnetic behavior of transition metal complexes, structure of silicates and inorganic compound related to borane and carbonyls
8	C008	Organic Chemistry II	3	To understand the Mechanism and characteristics of different aromatic electrophilic, aromatic nucleophilic substitution and free radicals reactions. Addition and elimination reactions providing the knowledge regarding organic synthesis and generating new molecules. Pericyclic reactions gives the ultimate knowledge regarding green chemistry and provide key for formation of ecofriendly organic molecules.
9	C009	Physical Chemistry II	3	In this branch of chemistry students know how chemical energy changes to electrical energy and vice versa. How all physical phenomena take place and detailed study of thermodynamics.
10	C010	Spectroscopy & Separation Methods	3	Part-A-Spectroscopy is provide a fundamental tool for organic molecular structure and give desirable knowledge for interpretation of data regarding the techniques such as Raman Spectroscopy, Nuclear Magnetic Resonance Spectroscopy and molecular Electronic Spectroscopy.  Part-B- Separation techniques are play an important role in separation of Natural occuring and synthetic organic molecules or components such as HPLC, GLC and ion exchange chromatography.
11	C011	Laboratory Course IIA	3	I-Qualitative and Quantitative analysis of metal ions involving volumetric and gravimetric method, various organic synthesis and physical experiments at PG level provide the knowledge regarding to follow proper procedures and regulations for safe handling and use of chemicals and can follow the proper procedures and regulations for safe handling when using chemicals.
12	C012	Laboratory Course IIB	3	In this lab course students are expected to understand the technique of quantitative analysis of organic compounds, inorganic preparations and pH-metry and potentiometry related experiments.
3 <sup>rd</sup> Semester				
13	C018	Organic Synthesis & Photochemistry	3	This paper will be able to student design the new organic molecules

				and give analytical tool regarding synthetic chemistry under various topics-Disconnection approach of organic molecules, protecting groups of various functional groups, one group and two group disconnections and photo chemistry developed a new approach regarding green chemistry and design new molecules under topics-determination of reaction mechanism and photochemical reactions.
14	E002	Bioorganic, Bioorganic & Bio Physical Chemistry I	3	This branch of chemistry is very much related to living being that how any metal ion or group is important to human body and functions of different metalloproteinase in our body.
15	E006	Organometallic reagents and Organic Synthesis	3	In this paper students basically understand the application of transition metal in organic synthesis and concepts related to oxidation, reduction and rearrangement reactions.
16	E005	Spectroscopy & Solid State	3	Spectroscopy is basic tool for understanding analytical techniques. In this semester areas to be covered are UV, IR and ORD CD which will give student complete understanding of establishing chemical structure of organic molecule.
17	C016	Laboratory course- Organic IIIA	3	This lab provide knowledge to the students of Qualitative Analysis Separation, purification and identification of the components of a mixture of three organic compounds (three solids or two liquids and one solid, two solids and one liquid), using TLC for checking the purity of the separated compounds. Preparation of derivatives and spectral analysis.
18	C017	Laboratory course- Organic IIIB	3	The main purpose of this experimental paper is to Students will be able to and understand how to calculate limiting reagent, theoretical yield, and percent yield. how to engage in safe laboratory practices by handling laboratory glassware, equipment, and chemical reagents. how to dispose of chemicals in a safe and responsible manner. how to work effectively as a member of a team. how to perform common laboratory techniques including reflux, distillation, recrystallization, vacuum filtration and thin-layer chromatography.

4 <sup>th</sup> Semester				
19	C027	Natural Product Chemistry	4	<p>I- Natural products compounds primarily of plant origin with vivid chemical structure. To establish their structure by using chemical degradations will be main focus of this subject. Chemical degradation studies will make students to revive basic organic chemistry already being studied by them thus will enable them to understand completely basic concepts of chemistry. Compounds belonging to alkaloids, steroids, flavanoids, porphyrins and carotenoids of varied structure and pharmacological activity will be taught to the students.</p> <p>II- Students are expected to learn basic Chemistry of natural occurring compounds.</p>
20	E009	Spectroscopy	3	<p>Spectroscopy is basic tool for understanding analytical techniques. In this semester areas to be covered are nuclear magnetic resonance both proton and carbon and mass which will give student complete understanding of establishing chemical structure. Students are expected to understand basic concept about spectroscopy.</p>
21	E010	Bioinorganic, Bioorganic and Biophysical Chemistry II	3	<p>This branch of chemistry is very much related to living being that how any metal ion or group is important to human body and functions of different metalloproteinase in our body.</p>
	E013	Heterocyclic Chemistry	3	<p>Hetero cyclic chemistry is the branch of organic chemistry which contain hetero atom. In this paper students are expected to understand their nomenclature, method of preparation and their chemical reactions. Besides hetero cyclic compounds have manifold application in pharmacy, medicine, agriculture and allied fields.</p>
23	C025	Laboratory Course Organic IVA	3	<p>I- Natural products chemistry has produced enormous results and made great contributions to human health and industry, only a fraction of natural resources have been rigorously studied. This course provide the basic knowledge of extraction methods of following products:</p> <ol style="list-style-type: none"> <li>caffeine from tea leaves</li> <li>casein from milk</li> <li>lactose from milk</li> <li>nicotine dipicrate from tobacco</li> </ol>

				<p>e) limonene from citrus fruits</p> <p>II- Chromatography is an important biophysical technique that enables the separation, identification, and purification of the components of a mixture for qualitative and quantitative analysis. Chromatography techniques provide the basic knowledge to the students regarding qualitative analysis of natural products.</p>
24	C026	Laboratory Course IV B	3	<p>1. Subject spectroscopy is basic tool for understanding analytical techniques. In this semester areas to be covered are nuclear magnetic resonance both proton and carbon and mass which will give student complete understanding of establishing chemical structure of known and unknown compounds which are synthesized /isolated compound.</p> <p>2. To give the practical knowledge of spectroscopic methods &amp; spectrophotometric (UV/VIS) ds having wide applications. estimations to the students.</p> <p>3 Students are expected to understand basic concept of both the techniques so as they are able to analyses the compounds</p>