



Master of Science, Chemistry
M. Sc. Chemistry, Semester – I

Course Code	PS01ECHE52	Title of the Course	Applied and Industrial Chemistry
Total Credits of the Course	4	Hours per Week	4

Course Objectives:	<ol style="list-style-type: none">1. This course offers the synergism of basic concepts of Chemistry with Industrial applications.2. The main objective of this course is to produce graduates with enhanced skills, knowledge and research aptitude to carry out higher studies or research and development in the various industrial areas.3. In depth knowledge of basic and applied area of Industrial Chemistry. Capability to demonstrate knowledge and understanding of major chemistry concepts, theoretical principles and experimental findings and ability to use modern instrumentation techniques with chemical analysis and separation.4. This course prepares the students for immediate entry to the workplace with sound theoretical, experimental knowledge in the area of fuels and energy, environment, health, and related multidisciplinary fields.5. Overall, the course offers basic foundation in chemistry, which enables the students to understand the concepts in chemical processing, engineering and industrial development.
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Course Content		
Unit	Description	Weightage* (%)
1.	Unit Operation: Introduction: Crystallization, Crystal Forms, Classification, Types of Crystallization Distillation, Drying, Types of Evaporation, Types of Filtration Principal of Chemical Industrial Process: Alkylolation, Amination by Aminolysis, Calcination, Carbonilation, Double Decomposition, Esterification, Halogenation, Hydrogenation, Hydrolysis, Sulphonation	25%
2.	Inorganic Nitrogen Chemicals : Ammonia, Nitric Acid, Ammonium Nitrate, Urea Industrial Gases : Nitrogen, Oxygen, Hydrogen, Carbon Dioxides	25%





3.	Manufacturing process : (Glass, Cement and Lime) Introduction, Classification and types, basic raw materials, principal of manufacturing process including chemical reactions.	25%
4.	Drug and Pharmaceuticals : Introduction, General mode of action, concept of lead compounds, lead compounds, and lead modification, analytical profiles of the selected drug, Development of drug. Petrochemicals: Introduction, Manufacture of petrochemicals	25%

Teaching-Learning Methodology	<p>A student-centered approach, which actively engages the students in the learning process, is critical of skills which result in healthy behavior are to be fostered and developed.</p> <p>The course with Applied Industrial Chemistry aims to make the students proficient in industrial chemistry through the transfer of knowledge in the classroom as well as in the laboratory. Industrial Chemistry program is designed to encourage the learning strategies that could be incorporated in a comprehensive approach that includes self-directed learning, cooperative learning, and peer education. In the classroom, this will be done through blackboard and chalk lectures, charts, power point presentations, and the use of audiovisual resources that are available on the internet such as virtual lab. The process of effective learning to a great extent will be based on teacher's experiences, identifying the slow learners and individual attention of the teacher towards them. A variety of approaches to teaching learning process, including lectures, seminars, tutorials, peer teaching and learning, practicum and research establishments will be adopted. Problem-solving skills and higher-order skills of reasoning and analysis will be encouraged through teaching Strategies. A feedback method with more anonymity will be preferred. An interactive mode of teaching will be used. The students will be encouraged to participate in the discussions and deliver seminars on the course related topics. A problem solving approach will be adopted wherever suitable.</p>
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Evaluation Pattern		
Sr.No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%





Course Outcomes: Having completed this course, the learner will be able to	
1.	Explain the basic concept unit process and unit operation.
2.	Know about principles of chemical industrial processes
3.	Become efficient in using standard operating procedures and will be well versed with the regulations for safe handling and use of chemicals.
4	Develop proficiency in application of current aspects of industrial chemistry. Students will be able to use chemical techniques relevant to academia and industry, generic skills and global competencies including knowledge and skills that enable the students to undertake further studies in the field of industrial chemistry or a related field, and work in chemical and non chemical sector.
5	Undertake hands on lab work and practical activities and develop problem solving abilities required for successful career in pharmaceuticals, chemical industries, teaching research, environmental monitoring, product quality, food products, oils and lubricants industries, fuels, petrochemicals and energy sector, etc.
6	Understood about nitrogen containing inorganic chemicals, and different industrial gases.
7	Know about principles of manufacturing processes in glass, cement and lime including chemical reactions
8	Know about the manufacturing process and quality control parameters in drugs, pharmaceuticals and petrochemicals

Suggested References:	
Sr. No.	References
1	Industrial Chemistry, By: B. K. Sharma, Goel Publishing House
2	Shreve's Chemical Process Industries, By: G. T. Austin (McGraw-Hill Book Company, New Delhi)
3	Comprehensive Industrial Chemistry, By: Dr. Prakash G. More, Pragati Edition
4	Unit operation, volume 1 & 2 By: K. A. Gavhane, Nirali Prakashan
5	Unit process in organic systems, By: Groggins, Tate, Mc Graw Hill Co. 5 th edition.
6	Synthetic Drugs, By: Gurdeep R. Chatwal (Himalaya Publication)





On-line resources to be used if available as reference material

On-line Resources

www.nptel.ac.in

www.swayam.gov.in

www.epgp.inflibnet.ac.in (e-PG pathshala)

www.ndl.iitkgp.ac.in (National Digital Library)

