

## SYLLABUS OF INDUSTRIAL CHEMISTRY (MINOR) FOR UG

UG INDUSTRIAL CHEMISTRY (Minor)	Year-First	Semester- First (I)
<b>Paper-I (Theory) INDUSTRIAL CHEMISTRY (MINOR)-I</b>		
<b>CREDITS=4</b>		<b>COMPULSORY</b>
<b>MAX MARKS:100</b>		<b>MIN PASSING MARKS:33</b>
<b>TOTAL NUMBER OF LECTURES=50</b>		
UNIT	TOPICS	No of Lectures
I	<b>Fundamentals of chemical calculations:</b> Atomic weight, molecular weight, equivalent weight, mole concept, percentage yield, molarity, molality, normality, Mole Fraction.	10
II	<b>CHEMICAL BONDING</b> Concept of hybridization, Hybrid orbitals and molecular geometry, Vallance shell electron pair repulsion (VSEPR) Theory, Shapes of following molecules and ions: H <sub>2</sub> O, NH <sub>3</sub> , PCl <sub>5</sub> , SF <sub>6</sub> , SF <sub>4</sub> , ClF <sub>3</sub> , I <sub>3</sub> <sup>-</sup> and ICl <sub>4</sub> <sup>-</sup>	10
III	<b>GENERAL ORGANIC CHMISTRY</b> General Introduction to Organic Compounds, allotropes of carbon, hybridization, shapes of organic compounds, bond length, bond angle, bond energy, nomenclature, isomerism, inductive effect, hyperconjugation, concept of resonance, Huckel's rule for aromaticity.	10
IV	<b>STERIOCHEMISTRY</b> Concept of isomerism, Types of isomerism; Optical isomerism – elements of symmetry, molecular chirality, enantiomers, stereogenic center, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogenic centers Relative and absolute configuration, sequence rules, D & L and R & S systems of nomenclature. Geometric isomerism – determination of configuration of geometric isomers, E & Z system of nomenclature.	10
V	<b>HEAT, THERMODYNAMICS AND CHEMICAL EQUILIBRIUM</b> A brief introduction of heat capacity of pure gases and gaseous mixtures at constant pressures, enthalpy changes, entropy, thermodynamic laws, processes and functions, free energy, thermodynamic criteria and equilibrium constant, effect of temperature and pressure on equilibrium constants in gaseous system (formation of ammonia)	10
<b>Recommended Books:</b>		
1. Advanced Inorganic Chemistry, F. A. Cotton and G. Wilkinson, John Wiley		
2. Inorganic Chemistry, J. E. Huheey, Ellen A. Keiter, Richard L. Keiter, Addison Wesley Longman (Singapore) Pvt. Ltd.		
3. Lee, J.D. Concise Inorganic Chemistry, Pearson Education		
4. Organic Chemistry, R. T. Morrison, R.N. Boyd, Pearson.		
5. Physical Chemistry P.W. Atkins, ELBS.		
6. Principals of Physical Chemistry , Puri , Sharma & Pathania, Vishal Publication , Jalandhar		

UG INDUSTRIAL CHEMISTRY (Minor)	Year-Second	Semester- Third (III)
<b>Paper-II (Theory) INDUSTRIAL CHEMISTRY (MINOR)-II</b>		
<b>CREDITS=4</b>		<b>COMPULSORY</b>
<b>MAX MARKS:100</b>		<b>MIN PASSING MARKS:33</b>
<b>TOTAL NUMBER OF LECTURES=50</b>		
UNIT	TOPICS	No of Lectures
I	<b>PHYSICAL INTERACTIONS</b> Formal Charges, hydrogen bonding, Van der Waal's forces, Dipole Moment and Molecular structures (diatomic and polyatomic molecules), Percentage ionic character from dipole moment, Fajjan's rule, Aufbau's principle.	10
II	<b>SURFACE CHEMISTRY</b> Adsorption isotherm, sols, gels, emulsions, micelles, aerosol, effect of surfactants.	10
III	<b>CERAMICS</b> Introduction of ceramics, types, manufacturing processes and applications of ceramics.	08
IV	<b>CRYSTALLIZATION</b> Introduction, Equilibrium solubility, nucleation and super saturation, equipment and their application of tank crystallizer, evaporator crystallizer and circulating liquid evaporator crystallizer.	12
V	<b>DISTILLATION</b> Introduction, principle, equipments and their applications of simple, fractional, steam, vacuum.	10
<b>Recommended Books:</b>		
<ol style="list-style-type: none"> <li>1. W. D. Bowen, H. K. Kingery, D.R. Uhlmann, Introduction to Ceramics, Wiley Publishers, New Delhi (1976)</li> <li>2. J. A. Kent, J. A. (ed), Riegel's Handbook of Industrial Chemistry, CBS Publishers, NewDelhi.(1997)</li> <li>3. G. Cao, Nanostructures and Nanomaterials: Synthesis, Properties &amp; Applications by Guozhong Cao, Imperial college Press, London (2004).</li> <li>4. W. D. Callister Jr., D. G. Rethwisch Materials Science and Engineering: An Introduction , John Wiley &amp; Sons (2018) .</li> <li>5. E. R. Riegel, Industrial Chemistry, Van Nostrand Reinhold Company; 7th Revised edition (1974) .</li> <li>6. F. H. Northern, Elements of Ceramics, Addison Wesley Publishing Corp (1952).</li> </ol>		