

Course No.	CHL-263			
Course Title	Organic Chemistry and Synthesis			
Course Coordinator	Dr. J D Ekhe			
Slot in which offered. If not offered write N	Odd		Even	
	G			
Structure	Lecture	Tutorial	Practical	Credits
	3			6
Text Book	1) Jagdamba singh and LDS Yadav ; Advanced Organic Chemistry Vol I &II; Pragati Prakashan 2) Morrison and Boyd , Organic Chemistry ,6 th edition ;Prentice Hall,Inc 3) Groggins P. H.; Units Processes In Organic Synthesis, Tata McGraw Hills Book Co. 4) F. A. Cotton, G. Wilkinson.;Advanced organic chemistry ,Interscience publishers, 1967.			
Content	<p>Oxidation: Intoduction, definition, types of oxidation, oxidising agents and their properties viz. permanganate, dichromate, sodium chlorite, chlorine dioxide, peroxides like PbO₂, MnO₂, H₂O₂ oxidation reactions, liquid and vapour phase oxidation, kinetics and thermochemistry of such reactions.</p> <p>Amination by Amminolysis: General introduction including aminating agents, their properties and survey of aminating reaction, physical and chemical factors affecting these processes, catalysts used in various amination and amminolysis reactions and their brief kinetic and thermodynamic study.</p> <p>Amination by reduction: General Introduction, definition, chemical reactions in iron and acid (Bechamp) other metals and acid reduction, metal and alkali reduction, sulphide reduction.</p> <p>Alkylation: General Introduction, alkylating agents, Factors affecting alkylation:Catalyst, Concentration, Pressure, Temperature, Mechanism, Effect of alkylation.</p> <p>Nitration: Introduction, nitrating agents, aromatic nitration, thermal properties and process equipment nitrators.Halogenation: Introduction, kinetics and thermodynamics of such reactions Manufacturing processes for selected industrially important organic chemicals, design and construction of equipment for halogenation, apparatus for photochlorinator.</p> <p>Polymerization: Introduction to Polymerization, polymerization processes, polymerization techniques, copolymerization, manufacturing processes for various industrially important polymers.</p>			

Course No.	CHL-214			
Course Title	Organic Chemical Technology (Unit Process for Organic Synthesis)			
Course Coordinator	Dr. J D Ekhe			
Slot in which offered. If not offered write N	Odd		Even	
			G	
Structure	Lecture	Tutorial	Practical	Credits
	3			6
Text Book (Max. 2)	<ol style="list-style-type: none"> 1) Doraiswamy L.K.; Organic Synthesis Engineering, Academic Press, New York. 2) Groggins P. H.; Unit Processes in Organic Synthesis, 5th Edition, Tata McGraw Hill. 3) Shreve R.N. and Brink H.A., Chemical Process Industries, McGraw Hill Book Co. 4th Edition, 1967. 4) Venkateswarulu D.; Manual of Chemical Technology, Vol. I and II, Educational Development Centre, I.I.T. Madras, 1977 			
Content	<p>Oxidation – Liquid and vapour phase oxidation, kinetics and thermo chemistry, Apparatus for technical oxidation of euganol, toluene, acetaldehyde and vapour phase oxidation of methanol to formaldehyde .</p> <p>Amination by Amminolysis –Brief introduction and review on chemistry involved Design of reactors and auxiliaries, technical manufacture of amino compounds, control of amino recovery systems.</p> <p>Amination by reduction – Introduction, Brief review of Bechamp reducer and technical preparation and purification of aniline, α-nitronaphthalene manufacture of p-nitroaniline, brief discussion on other metal reduction, catalytic hydrogenation: hydrogen production reactions conditions in Cu, Ni, Sn catalysts and selected technical preparations e.g. continuous fluid bed vapour phase reduction of nitrobenzene, manufacture of xylidene from nitroxylene.</p> <p>Alkylation –Equipments for alkylation, effect of alkylation and technical alkylation method for Codeine, Hexylresorcinol, Glycol ethers, Ethyl cellulose, Sodium CMC ,TEL,Diethylamine,dimethylamine, ethyl benzene</p> <p>Esterification and Hydrolysis – Esterification of organic acids, Esterification of carboxylic acid derivatives, Esters by addition of unsaturated systems. Inter-esterification. Technical preparation of ethyl acetate, cellulose acetate, nitroglycerine, polyethyl ether, phthalates, Kinetics, thermodynamics and mechanism of hydrolysis. Technical preparations involving hydrolysis e.g. Hydrolysis of fats, preparation of furfural, glycols, phenols from chlorobenzene etc.</p> <p>Polymerisation - General Introduction, Resin manufacturing process. Condensation polymerization. Addition polymerization, Intermediates for resins : Phenol, Formaldehyde, HMT, Vinyl acetate, Phthalic anhydride, etc.</p>			

Course No.	CHL261			
Course Title	Physical Chemistry and General Metallurgy			
Course Coordinator	Dr C Das and Dr. (Mrs.) R.V. Motghare			
Structure	Lecture	Tutorial	Practical	Credits
	3			6
Text Book	<ol style="list-style-type: none"> 1. uri B.H. and Sharma L.R.; Principles of Physical Chemistry, S. Chand & Co., New Delhi./ Vishal Publishing Co. 2. .L.Kapoor; A textbook of physical chemistry, 3rd Edition, Macmillan India Ltd. 3. lasstone S.G.; Introduction of Electrochemistry, Affiliated East-West Pvt. Ltd. N New Delhi 4. eter Atkins, Julio de Paula, 8th Edition, Oxford University Press 5. arrow G.M.; Physical Chemistry, 6th ed., McGraw-Hill, New York 6. . W. Castellan, Physical Chemistry, 3rd Edition, Narosa Publishing House 7. lasstone S.G.; Thermodynamics for Chemist, Affiliated East-West Pvt. Ltd. N New Delhi 			
Content	<p>Gases: Real gases: Equation of state for ideal and real gases, compressibility factor, van der Waal's equation, critical constants, principle of corresponding states; Kinetic Theory of gases: Pressure of an ideal gas, Maxwell's distribution of velocities and energy, Types of molecular velocities, molecular collision in a gas, viscosity, the principle of equipartition of energy.</p> <p>Thermodynamics: The first law of thermodynamics: Heat and work, enthalpy, heat capacity, isothermal, adiabatic process, Joule Thomson effect; Thermochemistry: thermochemical laws, Kirchoff's equation, flame and explosion temperatures, reversible and irreversible process; The Second law of thermodynamics: Carnot cycle and carnot theorem, Clausius inequality, Entropy and it's change, Third law of thermodynamics; free energy, work function, Gibbs Helmholtz equation, chemical potentials, Gibb's Duhem equation, fugacity, activity, chemical equilibrium, van't Hoff reaction isotherm, van't Hoff equation, Heterogeneous equilibrium: Clausius–Clapeyron equation, phase rule, phase diagram of one and component system, partial miscibility, Nernst distribution law, solvent extraction, Solution of non electrolyte: Raoult's law, ideal and nonideal solutions, vapour pressure of solutions of two volatile components, fractional distillation, Azeotropic mixture, colligative properties</p>			

Electrochemistry: Conductance determination, transport number determination, standard electrode potentials, standard cells, concentration cells, application of EMF measurements: heat of reaction, dissociation constants of acids and bases, solubility product, activity coefficient, hydrogen ion concentration; storage batteries, electrometric titration, hydrolysis of salts, theory of acid-base indicators.

Photochemistry: Laws of photochemistry, photo chemical reactions, combination of hydrogen and chlorine, flash photolysis and radiolysis.

General principles and Processing of Metallurgy: Occurrence and Mineral wealth of India. Ore Dressing roasting, calcinations, smelting, fluxes and slag. Types of Furnaces, refining of metals, Metallurgical industries of Iron, Steel, Aluminium, Copper, Lead, Zinc, etc. Manufacturing processes for these metals.

Course No.	CHP-263			
Course Title	Organic Chemistry Lab.			
Course Coordinator	Dr. Anupama Kumar			
Slot in which offered. If not offered write N	Odd		Even	
	G			
Structure	Lecture	Tutorial	Practical	Credits
			3	2
Text Book	<p>Text/References:</p> <ol style="list-style-type: none"> 1. R. M. Robert, J. C. Gilbert, L. B. Rodewald & A. S. Wingrove "Modern Experimental organic chemistry", Saunder International Edition 1985. 2. N.K. Vishnoi, Advanced practical organic chemistry, 5th Edition, Vikas Publishing House, Pvt.Ltd, 1996. 3. L. M. Harwood & C. I. Moody, Experimental organic chemistry, Blackwell Scientific Publications, 2003. ELBS, Longmann, 5th Edition, Vogel's textbook of practical organic chemistry 4. Vogel's Text book of Practical Organic Chemistry, 5th Edition, Pearson Education, 2000. 			
Content	<ol style="list-style-type: none"> 1) Quantitative determination of the following functional groups: (1) Acid, (2) Phenol, (3) Nitro, (4) Amino, (5) Ester, (6) Hydroxy, (7) Aldehyde. 2) Organic Preparations and purification through activated charcoal treatment/ crystallization (Single/ two step) of the following; (1) Acetanilide, (2) p-Nitro-Acetanilide, (3) p- Bromo-Acetanilide, (4) Aspirin, (5) m-Dinitrobenzene, (6) Oxalic Acid. 3) Esterification reaction. 4) Sulfonation reactions. 			

Course No.	CHP-214			
Course Title	Organic Chemical Technology Lab.			
Course Coordinator	Dr. Anupama Kumar			
Slot in which offered. If not offered write N	Odd		Even	
			G	
Structure	Lecture	Tutorial	Practical	Credits
			3	2
Text Book	<p>Text/References:</p> <ol style="list-style-type: none"> 1. R. M. Robert, J. C. Gilbert, L. B. Rodewald & A. S. Wingrove "Modern Experimental organic chemistry", Saunder International Edition 1985. 2. N.K. Vishnoi, Advanced practical organic chemistry, 5th Edition, Vikas Publishing House, Pvt.Ltd, 1996. 3. L. M. Harwood & C. I. Moody, Experimental organic chemistry, Blackwell Scientific Publications, 2003. ELBS, Longmann, 5th Edition, Vogel's textbook of practical organic chemistry 4. Vogel's Text book of Practical Organic Chemistry, 5th Edition, Pearson Education, 2000. 			
Content	<ol style="list-style-type: none"> 1) Study of Oxidation Reaction. 2) Study of Reduction Reaction. 3) Study of Esterification Reaction. 4) Study of Hydrolysis Reaction. 5) Study of Neutralization. 6) Study of Alkylation Reaction. 7) Study of Resin Preparation (Phenol-Formaldehyde, Polystyrene, etc.). 8) Study of Halogenation Reaction. 9) Demonstration of Distillation, Steam Distillation, Vacuum Distillation, Soxhlet Extraction 10) Identification of unknown Compound : Identification of unknown single component organic compound including element detection and functional group test and other physical test. 11) Estimation : Messenger Method (Sulphur) ; Kjeldhals Method (Nitrogen) 12) High pressure reaction : (Amination of chlorobenzene etc.) 			

Course No.	CHP-261			
Course Title	Physical and Inorganic Chemistry Lab			
Course Coordinator	Dr. (Mrs.) R.V. Motghare and Dr. C Das			
Slot in which offered. If not offered write N	Odd		Even	
			G	
Structure	Lecture	Tutorial	Practical	Credits
			3	2
Text Book	Text/References: <ol style="list-style-type: none"> 1. Dr. J. B. Yadav; Advance Practical Physical Chemistry; Goel Pubs. House, 2007 2. Dara, S.S.; A text book on Experiments and Calculations in Engineering Chemistry (ninth edition); S. Chand, 2003. 			
Content	<ol style="list-style-type: none"> 1) To study the reaction kinetics of hydrolysis of ethylacetate by HCl. 2) To study the reaction kinetics of hydrolysis of ethylacetate by NaOH. 3) To study the adsorption of Oxalic acid / acetic acid on Charcoal and verify Freundlich and Langmuir adsorption isotherm. 4) Potentiometric titration of i) Strong acid and weak base and ii) Strong acid. 5) Potentiometric titration of KI and KMnO_4. 6) Conductometric titration of i) Strong acid and Weak base and ii) Weak acid and Weak base. 7) Determination of partition Coefficient of iodine between organic solvent and water. 8) Verification of Beer's law for KMnO_4 and $\text{K}_2\text{Cr}_2\text{O}_7$ using Colorimeter. 9) Determination of heat of ionization of acetic acid. 10) Determination of heat of Crystallization of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$. 11) Estimation of ferrous and ferric content in iron ore. 13) To find the constant of conductivity cell, determination of dissociations constant of weak acid. 14) Determination of dissociation constant of a weak acid by EMF method. 			