

PAPER CODE: 1SC2030303

TITLE OF PAPER: ORGANIC CHEMISTRY-III

Course Objective: To impart knowledge and training in chemistry at advanced level, make aware with recent analytical technique, use of reagents and reactions in laboratory, synthesis and study of materials, the exploration of their properties and development of ways to use the mineral life.

Teaching scheme (hours) per week		Credit		Theory Marks		Practical Marks		Total
Theory	Practical	Theory	Practical	University Assessment	Cont. Assessment	University Assessment	Cont. Assessment	
4	-	4	-	60	40	-	-	100

UNIT	DISCRIPTION IN DETAIL	WEIGHTAGE
I	Instrumental analysis Liquid Chromatography: HPLC Instrumentation, Adsorption Chromatography, Partition Chromatography, Other Types of Liquid Chromatography. Gas Chromatography: Basic Description, Classification of GC Methods, Stationary Phase, Carrier Gas, Detectors, Temperature Programming. Thermal techniques: TGA, DTA, DSC. Application of ^1H NMR and ^{13}C NMR spectra.	25%
II	Unit operation and Unit process Evaporation: Types of evaporators, jacketed, horizontal and vertical tube evaporators, forced circulation evaporations, entrainment separators (upturned, deflector type, tangential type), effect of scale formation, multiple effect evaporators Distillation: Boiling and distillation, vapor-liquid equilibria, Rault's law & Henry's law, relative volatility, azeotropic mixtures, flash distillation, steam distillation, vacuum distillation, fractional distillation, plate columns (Bubble cap, Sieve plate & Valve plate) Extractions: Liquid equilibria, Extraction with reflux, Extraction with agitation, equipment, it's use and performance, Filtration: Classification of filters, Sand filters, filter press, plates & frame press, filter aids, principles of leaf filters. Flow of Heat: Introduction, Conduction Convection (rate of heat transfer and heat transfer	25%

	coefficients), HeatExchangeEquipment's: Introduction, Double Pipe, Shell& tube, Fixed tube, U tube heat exchangers. Drying: General Principles (Significance, moisture content), Rate of drying Drying equipment's, Tray dryers, Rotary dryers, Single Drum dryer & Spray dryers. Unit operation such as Halgenation, Nitration, Alkylation, Sulphonation, Oxidation	
III	Industrial instrumentation and design of vessels. EquipmentDesign: Material of constructions: Mechanical properties, Corrosion resistance. Plastics. Ceramics: Metals and alloys, Stainless steel, Special material for food and pharmaceutical equipment. Protective coatings, Surface treatment to metals for corrosion resistance. Design of Vessels: Classification of chemical reactors, pressure vessels for internal or external pressure, Maintenance, Storage vessels for liquids and gases. Design of chemical reactors, Reactors with chemical addition, agitation, heating, removal of vapours, gas addition Instrumentation: Measurement of temperature, Thermo couples and pyrometers, High temperature thermometers, Optical pyrometers. Measurement of pressure and vacuum, Manometric and Bourdon gauges, Vacuum gauges, Ionization and pirani gauges. Flow measurement, Pitot tube, Rotameters. Liquid level indicators. Hook Type, Sight glass, Float type, Capacitance level indicator, Radiation level indicator.	25%
IV	Environmental analysis (A) Environmental pollutants: Introduction, Aquatic pollution – Inorganic, Organic, Pesticide, Agricultural, Industrial and Sewage, Detergents, Oil spills and Oil pollutants. (B) Water analysis: Water quality parameters – dissolved oxygen, biochemical oxygen demand. Analytical methods for measuring DO, BOD and COD. Purification and treatment of water. (C) Air analysis: Chemical and photochemical reactions in atmosphere, smog formation, oxides of N, C, S, O and their effect. Analytical methods for measuring air pollutants. (D) Effluent treatment: Industrial pollution of sugar, distillery, drug, pulp & paper and polymer industries and their analysis. Effluent treatment plants of above industries.	25%

Learning Outcomes

Students can understand the atomic and molecular basis of organic chemistry. They can know the impact of organic chemistry on the fields of medicine, pharmacy and its impact on the global economy. They can understand the fundamental principles of molecular structure and shape as they relate to organic molecules and their properties. They can identify organic molecules by functional group: alkane, alkene, alkyne, haloalkane, alcohol, thiol, ether, sulfide, amine, aldehyde, ketone, carboxylic acid and carboxylic acid derivatives.

LIST OF BOOKS:

- 1) P. H. Groggins: ***Unit processes in organic synthesis*** (MGH)
- 2) A. A. Frost and R. G. Pearson: ***Kinetics and Mechanism***
- 3) P. W. Atkins and Julio de Paule: ***Physical Chemistry***, VIIthEdn. (Oxford Union press, 2002)
- 4) S. Glasstone: ***Textbook of Physical Chemistry***, IIIndEdn. (McMillan India LTD. 1996)
- 5) W. J. Moore: ***Physical Chemistry***, XthEdn(Orient Longmans, 1993)
- 6) ***Thermodynamics, A core course***, by R. C. Srivastava, S. K. Saha, A. K. Jain Prentice Hall of India Pvt. Ltd, 2004
- 7) ***Industrial Instrumentation and Control*** by S. K. Singh Tata McGraw-Hill Publishing Company Limited, New Delhi.
- 8) F. A. Henglein: ***Chemical Technology*** (Pergamon)
- 9) M. G. Rao and M. Sittings: ***Outlines of Chemical Technology*** (EWP)
- 10) Clausen, Mattson: ***Principles of Industrial Chemistry***
- 11) H A. Lowenheim and M. K. Moran: ***Industrial Chemicals***.
- 12) Kirk and Othmer: ***Encyclopedia of Chemical technology***.
- 13) F. A. Henglein: ***Chemical safety Management and Engineering*** (Pergamon).
- 14) B. K. Sharma ***Environment Chemistry***,
- 15) M. K. Hill; ***Understanding Environmental Pollution A Primer***, Cambridge University Press, 2004.
- 16) I. L. Pepper, C. P. Gerba, M. L. Brusseau, ***Environmental & Pollution Science***, Elsevier, 2006.
- 17) G. M. Masters, ***Introduction to Environmental Engineering and Science***, Pearson, 2004.