

M.Sc. INDUSTRIAL CHEMISTRY AND MANAGEMENT CURRICULUM

Total number of Credits: 90

Category	Code	Course	Hour/Week			Credits
			Lecture	Tutorial	Practical	
SEMESTER-I						
CORE	18CMSI11	Dye Chemistry	4	0	0	4
CORE	18CMSI12	Chemistry of fuels	4	0	0	4
CORE	18CMSI13	Principles of management	4	0	0	4
DSE		Discipline Specific Elective - I	3	0	0	3
DSE		Discipline Specific Elective - II	3	0	0	3
GE		Generic Elective-I	1	0	2	2
CORE	18PMSI11	Organic Chemistry – Practical I	0	0	6	3
			19	0	8	23
SEMESTER – II						
CORE	18CMSI21	General Chemistry	4	0	0	4
CORE	18CMSI22	Chemistry of Fibres	4	0	0	4
CORE	18CMSI23	Quantitative methods in Business	4	0	0	4
DSE		Discipline Specific Elective - III	3	0	0	3
CORE	18PMSI21	Inorganic Chemistry – Practical II	0	0	6	3
CORE	18PMSI22	Industrial Chemistry – Practical III	0	0	6	3
CORE	18IMSI21	Internship	0	0	30	2
			15	0	42	23
SEMESTER – III						
CORE	18CMSI31	Paint Chemistry	4	0	0	4
CORE	18CMSI32	Analytical Techniques	4	0	0	4
CORE	18CMSI33	Operations Management	4	0	0	4
DSE		Discipline Specific Elective - IV	3	0	0	3
DSE		Discipline Specific Elective - V	3	0	0	3
GE		Generic Elective – II	2	0	0	2
CORE	18PMSI31	Physical Chemistry – Practical IV	0	0	6	3
			20	0	6	23
SEMESTER – IV						
CORE	18CMSI41	Synthetic Organic Chemistry	5	0	0	5
DSE		Discipline Specific Elective - VI	4	0	0	4
CORE	18RMSI41	Project work	0	0	24	12
			9	0	24	21
		Total	63	0	80	90

List of Discipline Specific Elective Courses

S.No.	Subject Code	Subject Name
1		Separation Techniques
2		Analytical Techniques
3		Organic name reactions and synthesis of reagents
4		Management information system
5		Statistics in numerical methods
6		Stereo chemistry and reaction mechanism
7		Nuclear and photochemistry
8		Bioinorganic chemistry
9		Human Resource Management
10		Chemical & Instrumental Methods of Drug Analysis
11		Pharmaceutical Chemistry
12		Natural products
13		Marketing management
14		Electro analytical and Separation Techniques
15		Enzyme technology and related entrepreneurial skills
16		Macromolecular Chemistry
17		Pharmaceutical Formulation Technology – II
18		Electrochemistry and group theory
19		Novel materials and green industrial catalysis
20		Electrochemistry and spectroscopy

List of Generic Elective Courses

S.No.	Subject Code	Subject Name
1		Soft Skill I
2		Soft Skill II
3		Green Chemistry
4		Cheminformatics
6		Food Chemistry and Adulteration

Course Objective: To study the history of dye, synthesis of dyes and classification of dyes and colouring of dyes.

Unit 1 History and classification of Dye

12

History of dye stuff-role of color-indigo-purple of the ancient natural mordant dye-era of synthetic dyes-diazotization - reactive dyes -colour and constitution-chromophores-auxochromes-bathochromic groups-hypochromic group- V B approach of colours - steric effect and color. Classification of dyes according to constitution to applications - classification of textile chemicals - surface active agents, non-surface active agents – Dye stuff intermediates. Basic chemicals – induction of different substitute – sulfanilic acids – naphthalene mono and disulphanilic acid – nature of compounds – reduced and halogenated compounds – alkali function, Diazotisation.

Unit II Synthesis of Dyes

12

Synthesis of the following dyes – Methyl orange II – Naphthol blue, Bismark brown, para red, Malachite green – Magenta , phenol red, eosin, saframine, acridine yellow, quinoline blue, alizarin, copper pathalocyanin. General properties of dye stuff - Linearity – co-planarity – Fastness properties . Direct cotton dyes (substantive dyes) – properties – structure of direct dyes – mechanism of dyeing – fibre bond – effect of electrolyte – effect of temperature – classification of direct cotton dyes, dissolution of direct dyes – after treatment of dyeing – development of dye fixing agents- treatment with copper salts treatment with chromium compounds - topping with basic dye - absorption of basic dyes with cellulose .

Unit III Characterization of Dyes

12

Acid dyes – classification - chemical constitution of some dyes - molecularly - split acid dyes - aggregated acid dyes - leveling dyes - milling dyes - characteristics and trade names - mechanism of dyeing effect of electrolyte and temperature - bath assistants. Basic dyes - characteristics - dissolution - chemical class - nature of affinity on cellulose and protein fibres, Mordants etheno mordants Mordant dyes - formation of chromium complexes - trade names - methods of application - chrome processes – chromosol processes - metal complexes dyes – constitution of ingrain dyes - dyeing mechanism - stripping.

Unit IV Dyes type -I

12

Azoic colours - Azoic coupling – combination shades with azoics – protective colloids – electrolytes stabilisation of diazonium salts – complex salts of diazonium compounds – established diazo compounds – anti diazoamine compounds stabilizers – diazomine compounds - mono sulphonic acids. Vat dyes – indigo fermentation of vat – zinc lime vat - hydrosulphite vat – commercial vat dyes – properties – trade names – particle size – reduction potential – effect of pH on colour under different conditions.

Sulphur dyes – general methods of manufacture – chemical nature – classification.

Unit V Dyes type-II

12

Disperse dyes – ion amines – disperse acetate dyes – chemical structure – dispersion process – function of the dispersing agents – dyeing processes – fibres swelling in dyeing – uses of carries – heat energy in dyeing properties of carries and trade names. Reactive dyes - reactive systems – constitutional aspects – acrylamide dyes – reactive mordant – evidence of chemical bond - the site of reaction – solubility of fiber linkage – main and side reaction . Miscellaneous dyes – oxidation colours – fluorescent brightening agents – application on cellulose fibres – polyamide fibres – polyester fibres – acrylic fibres – toxicity of fluorescent brighteners. Non textile use of dye stuff – leather dyeing – paper dyeing – food colour – solvent dyes – hair dyes – miscellaneous – face powder – lipstick.

Total: 60 hrs

Course Outcomes:

- To know about history of dyes
- To familize about types of dyes
- To learn about synthesis of various dyes
- To study about the mechanism and treatment of dyeing
- To understand the types, Characteristics of acid and basic dyes

Text Books:

1. V.A. Shenai – Principles of Dyeing & Technology of Dyeing - Sevak publication.
2. 2. C.L. Bard – Theory & Practice of Wool dyeing - SDC – Yorkshire.

Reference Books:

1. K.V.Datye – Processing of synthetic fibres – John Wiley
2. E.R. Trotmann – Dyeing & Chemicals Technology of Textile fibres. Charles Griffins.
3. S.R. Cockett - Dyeing & printing - Pitman publishers

Course Objective: To study of fuels, classification of fuels, refining of gasoline and analysis of gases by gas chromatography

Unit I Classification of fuels

12

Classification of fuels – Solid, liquid and gaseous fuels - sampling procedure- Type of fuels - Characteristic of a good fuels, Types of fossil fuels. Solid fuels, origin - classification of coal by rank - Analysis of coal-Ultimate and Proximate analysis-Volatility - ash content-Moisture content (Dean and Stark Method) - significance of these parameters for industrial applications-Metallurgical/Boiler/Thermal power plants. Calorific value of solid fuels by bomb calorimeter.

Unit II Liquid fuels

12

Liquid fuels-petroleum-origin of petroleum-classification-refining of crude oil-cracking-thermal & catalytic cracking-process. Details and advantages - fractional distillation - extraction & azeotropic distillation-products-gasoline-kerosene, diesel and waxes-various grades of gasoline-aviation fuel-jet fuels and their uses.

Unit III Characteristics of Fuels

12

Refining of gasoline-octane number-improvement of antiknock properties-diesel oil- cetane number-significance-kerosene as a fuel-liquid fuels-characterisation-determination of viscosity by redwood viscometer, Saybolt viscometer - flash point, fire point, aniline point, pour point, cloud point, carbon residue - determination of these characteristics and their significance in assessing the quality of liquid fuels - calorific value-determination

Unit IV Gaseous fuels

12

Gaseous fuels-producer gas, water gas, coal gas, LPG, bottled gas, bio gas, Gobar gas, composition, production and uses- determination of calorific value- gas analysis -chemical analysis of constituents - Hempel and Orsat methods - portable kits - brief description.

Unit V Analysis of Fuels

12

Analysis of gases, petrol, kerosene by gas chromatography - IR study- a brief description (introductory level).

Total: 60 hrs

Course Outcomes:

- To study the different classification of fuel
- To learn the various analysis methods namely Ultimate and Proximate
- To understand the various types of refining process
- To learn the different grades of gasoline
- To familiarize the various properties of liquid fuel

Reference Books:

1. An introduction to the study of fuel by J.C. Macrae, Elsevier publishing company, 1966.
2. Fuels and fuel burners by Kalman Steiner, First edition, 1946.
3. Fuel-solid-liquid and gaseous by J.S.S.Brame, J.G.King sixth edition, revised by Dr. J.G. King.
4. Fuels and their combustion by Haslam of Russell, 1925.
5. Chemistry of petroleum hydrocarbons by Brooks- BT et-al, Vol.1, 1954.
6. Modern petroleum technology, third edition, published by the institute of petroleum, 1962.

Text Books:

1. Methods of analysis for petro chemicals by Littmann (ER) edition.
2. IP standards for petroleum and its products part-1- Methods for analysis and testing, 34th edition, 1975.
3. Petroleum refinery distillation, II edition by R.N. Watkins
4. Fuel and Fuel technology by Francis (W)
5. Technical gas and fuel analysis by Alfred H. white, II edition, McGraw-Hill Book company, INC, 1920.
6. Encyclopedia of Industrial chemical analysis, Vol. II, edited by Foster Dee Snell and Elifford L. Hilton, Interscience publishers, 1966.

Course Objective

To study management cycle, policy making, authority relationship and span of control.

Unit I**12**

Management defined – Basic principles and process of Management. The evolution of Management. The evolution of Management Science.

Unit II**12**

Planning as the first step in the process of Management cycle – Basic techniques of Planning – Basic factors involved in planning – Key planning points – Psychological hazards to rational planning – Strategic consideration in planning.

Policy Making:

Policy making as a guide to action in the organization – General policies and specific policies in an organization – Basic areas of policy making.

Unit III**12**

Need for organization – organizational hierarchy in large concerns – Top Management organization – Staff units and Committee – Factors to be considered in the establishment of an organization.

Basic division of Functional activities – Methods of grouping activities – Typical patterns used – Use of organizational charts and manuals.

Unit IV**12****Authority**

Authority, relationship – Line function and staff – Basics of delegation of responsibility and authority. Centralization and decentralization of authority and the pros and cons of each.

Unit V**12**

Span of control – pros and cons of narrow and wide spans of control – Optimum span.

Concepts of control – Application of the process of control at different levels of management – performance standard

Total: 60 hrs**Course Outcomes:**

- To enhance the knowledge of management studies.
- To learn about planning process.
- To learn about organising process.
- To learn about directing process.
- To know the controlling process.

Reference Books:

1. Allen, L.A., Management and organization, McGraw Hill publishing co., Ltd.
2. Chandrabose . D. Principles of Management and administration PHI2002
3. Hellriegel /Jackson/ Solum, Management- A Competency based approach, Thomson, South Western.
4. Hannagan, Management concepts and practices, Macmillan India Ltd.
5. Koontz o'Dohnel, Principles of Management, McGraw Hill publishing co., Ltd.
6. Prasad, I.M, Principles and practices of management Sultanchand & Sons.
7. Peter Drucker, The practice of Management - Hillied publications.

Course Objective: To learn the techniques of different functional groups. To apply the skill in two stage preparation, purification and recrystallisation.

I. QUALITATIVE ANALYSIS OF SIMPLE ORGANIC COMPOUNDS

1. Identification of carboxylic acids,
2. Esters,
3. Phenols,
4. Amines,
5. Nitro compounds,
6. Ketones,
7. Aldehydes,
8. Carbohydrates,
9. Urea,
10. Thiourea.

II. ESTIMATION OF ORGANIC COMPOUNDS

1. Estimation of Phenol
2. Estimation of aniline
3. Estimation of glucose
4. Estimation of methyl ketone
5. Estimation of Aldehydes / ketone
6. Estimation of vinegar
7. Estimation of vitamin –C

Total: 90 hrs

Course Outcomes:

- To understand different functional groups
- To identify organic compounds based on appearance and odour
- To introduce various reagents and their respective reactions in identify functional groups
- To distinguish one functional group from other
- To acquire professional skills in identifying functional groups

Text Book:

1. Gnanaprakasam, Ramamurthy, "Organic Chemistry Lab Manual" S. Viswanathan Pvt. Ltd. 3rd edition **2011**

Reference Book:

1. Vogel's – "Textbook of qualitative organic Analysis", Longmann, 12th edition, **2011**

Course Objectives: To learn about different laws of photochemistry, the kinetics of decomposition familiarize with the structure of the atom and its atomic properties and nuclear fusion and fission mechanism.

Unit I Chemical Kinetics**12**

Expression for rate of reaction – rate constant, order and molecularity of a reaction- differential and integrated forms of rate expressions for first, second and zero order reactions- examples- time for half change for first and second order reactions- Experimental methods of determining order of reactions- pseudo unimolecular reactions- examples- Experimental determination of rate constants of inversion of cane sugar and alkaline hydrolysis of esters

Unit II PhotoChemistry**12**

Beer- Lambert's law, Stark- Einstein's law- Primary and secondary processes- Quantum yield- Experimental determination of quantum yield- Kinetics of decomposition of HI, combination of H₂ and Cl₂ – Photochemical equilibrium- Jablonsky diagrams- Fluorescence- phosphorescence- thermo luminescence – chemiluminescence- photosensitization.

Unit III Atomic Structure**12**

Structure of the atom- Dalton's theory- Rutherford's model- Bohr's model-mass number- Somerfeld's extension of Bohr's theory-Heisenberg's uncertainty principle- Dual character of electron- Debroglie wave equation- Quantum numbers. The periodic table- the long form of the periodic table- electronic configurations of element- division of element into s,p,d,f blocks. Atomic properties.

Unit IV Metals and metallurgy**12**

Metals and metallurgy: Various steps involved in metallurgy Nuclear Chemistry: The nature of the nucleus, nuclear forces, packing fraction, mass defect, nuclear fission- fusion reactions. Experimental evidences. Calculation of Q values. Artificial radio activity.

Unit V Pharmaceutical Chemistry**12**

Common drugs and medicines used in the home: Antibiotics -sulpha drugs - antiseptics - disinfectants - analgesics -hypnotics -sedatives - tranquillizers remedies for common cold, influenza and other viral diseases - laxatives - burn preparations - indigenous drugs - drugs in combination - prevention and control of adverse reactions from drugs.

Total: 60 hrs

Course Outcomes:

- To determine the factors that affect the rate of chemical reactions using collision theory
- To understand the concept of reaction mechanism and the rate law for the reactio
- To learn about different laws of photochemistry.
- To understand the kinetics of decomposition
- To familiarize with the structure of the atom and its atomic properties

Reference Books:

1. J. Rajaram and J.C. Kuriacose, Kinetics and mechanism of chemical transformations, Macmillan India Ltd. 1993.
2. K.J. Laidler, Chemical Kinetics, Harper and Row, New York, 1987.
3. K.L. Kapoor, a Text Book of Physical Chemistry, Macmillan India Ltd., 2001
4. K.K. Rohatgi Mukherjee, 1978, Fundamentals of photo Chemistry, Wiley Eastern Ltd.
5. N.J. Turro, 1978, Modern Molecular Photochemistry, Benjamin, Cummings, Menlo Park, California.

Text Books:

1. J.E. Huheey, Inorganic Chemistry – Principles, Structure and Reactivity:
Harper Collins, New York, IV Edition (1993)
2. F.A. Cotton and G. Wilkinson, Advanced Inorganic Chemistry- A Comprehensive
Text, John Wiley and Sons V Edition (1998)
3. K. F. Purcell and J.C. Kot, Inorganic Chemistry-WB Saunders Co., USA 1977
4. Agarwal, Chemistry of Organic Natural Products, Goel Publishing House.
5. L. Stryer, Biochemistry, W.H.Freeman and Co., New York.

Course Objectives: To learn the methodology and mechanism of printing and painting in textiles, classify different kinds of fibers in terms of their strength, understand the stages of printing and dyeing in textile industries and understand the durability and quality of fibers

Unit 1 Introduction

12

General aspects, cellulose & cotton fibres – classification of fibres – properties, count, denier tex, staple length, spinning properties, strength, elasticity and creep. Cellulose – structural aspects – main structure – nature of the side way links – characteristics of cellulose fibre. Cotton fibre – ginning machines – general properties – ferromagnetic cotton – accelerated oxidation of cotton, cellulose. Identification tests for cellulose and cotton fibres.

Unit II Types of Fibres

12

Wool, silk & Bast fibres. Wool, formation of wool, macromolecules – formation of Keratin in animals – general properties. Silk – life cycle of silk worm – formation of silk fibre – waste silk – silk proteins – types of silk, general methods, properties. Bast fibres – Linen – retting and general properties – Hemp, retting and properties – Jute – harvesting, retting and properties. Identification tests for wool, silk and bast fibres. Rayons - Viscose rayons – chemistry of viscose process – manufacture, purification, conditioning stepping, shredding, ageing, mining, ripening and spinning processes – properties – fibre manufacture – yarn properties. Cuprammonium rayon – Chemistry of cuprammonium process – manufacture of cuprammonium rayon, properties – hydro and oxycellulose, identification tests for rayon fibres.

Unit III Synthetic fibres-I

12

Synthetic fibres – polyamide fibres and polyester fibres, polymerization, condensation – addition polymerization – molecular weight – linear symmetry – orientation, intermolecular, cohesive forces, molecular rigidity. Polyamide fibre-chemical nature-manufacture, properties and spinning of nylon 6, nylon 66 – other polyamide–antistatic nylon – copolyamide - nylon degradation.

Unit IV Synthetic fibres-II

12

Polyester –chemical nature, preparation of polyester fibre, spinning properties – basic dyeable polyesters – antistatic polyester –spinning without spinnerette – polyester degradation – surface modification – polyester decolourization, identification tests for polyamide and polyester fibres.

Unit V Textile Chemistry

12

Textile printing general consideration and printing machinery – distinction between dyeing and printing – stages of printing –actual printing methods – post treatment. Printing paste and ageing and steaming. Dyestuffs used in printing paste – fastness properties – wetting agent – dispersing agents – other additives – thickness – rheological behavior of gums. Starch and types of gums used in printing paste. Ageing – steaming methods – mechanism of steaming – steamers.

Total: 60hrs

Course Outcomes:

- To understand the durability and quality of fibers
- To differentiate cellulose and cotton fibers
- To classify different kinds of fibers in terms of their strength
- To know the manufacturing of fibers from natural resources
- To familiarize with the synthesis and properties of synthetic fibers

Text Books:

- 1.V.A. Sheani – Textile fibres – Sevak publications.
- 2.B.K. Kesavan and Mishra – Fibre Science – SSMIIT.

Reference Books:

- 1.K.P. Hess – Textile fibres and Textile printing – Mahajan publications.
2. R.S. Prayag – Technology of Textile printing – Prayag & Co., Dharwad.
- 3.H.A. Shah – Technology and Management of Printing BITRA.

Course Objectives: To know about the Probability their applications in Business, basic idea about the different sampling techniques, the single and two factor analysis of variance , the various Analysis Methods and the Application of Statistics.

Unit 1 Introduction to Statistics

Probability: Rules of probability, Binomial, Poisson and Normal distribution – their applications in Business and industrial problems – Baye’s theorem and its business applications.

Unit II Sampling Techniques

Elementary idea of different sampling techniques – Hypothesis testing – chi- Square test- Correlation and regression analysis. Single and two factor analysis of variance.

Unit III Analysis Methods

Elementary concepts of factor analysis. Multiple regression analysis, discriminant analysis, Cluster analysis and Co-joint analysis in marketing problems.

Unit IV Application of Statistics

Application of Differentiation and Integration, Maxima, Minima, average cost, total cost, marginal revenue, average revenue, total revenue. Consumer surplus and producer surplus.

Unit V Business Survey

Research in business – Conducting investigation – Report writing – Academic and Business Research Reports- Research format.

Total: 60 hrs

Course Outcomes:

- To know about the Probability their applications in Business
- To get a basic idea about the different sampling techniques
- To learn about the Single and two factor analysis of variance
- To know about the various Analysis Methods
- To know about the Application of Statistics

Text Books:

1. Green and Tuli, Marketing Research, Prentice Hall, 1998.
2. Akar and Day, Marketing Research, Wiley and Sons, 1998.

Reference Books:

1. Richard. I Levin and David S. Rubin, Statistics for Management. Pearson Education, Asia, 2002.
2. David M. Levin, Simothi C. Krehbiel and Mark L Berenson. Business statistics- A first course. Pearson Education, Asia, 2002.
3. Gupta S.P and Gupta M.P., Business statistics, New Delhi, Sultanchand, 1997.

Course Objective:

- To learn the quantitative determination of compound by volumetric titration method.
- To learn the qualitative analysis of a given salt mixture.

1. Qualitative analysis of simple inorganic compounds

Identification of simple anions:

Chloride, Sulphate, phosphate, carbonate, bromide, iodide, nitrate, sulphide, nitrite, Fluoride.

Identification of cations :

Ca, Mg, Ba, Co, Ni, Zn, Mn, Fe, Cr, V, U, Cu, Cd, Hg, As, Sb, Bi.

2. Estimation of the following:

- (i) Total hardness in water of EDTA
- (ii) Estimation of Ca, Mg, and chloride in water.
- (iii) Estimation of purity of washing soda.
- (iv) Estimation of available chloride in bleaching powder.
- (v) Estimation of calcium in egg shell.

3. Colorimetric analysis:

1. Estimation of iron
2. Estimation of nickel
3. Estimation of manganese
4. Estimation of copper.

TOTAL: 90h

Course Outcomes:

- To identify the simple anions
- To identify the simple cations
- To analysis the simple Inorganic compounds
- To estimate the total hardness of water in EDTA
- To estimate the ions in water

TEXT BOOKS:

- 1) Jeyavathana Samuel, Chemistry Practical Book, G.G.Printers, Chennai, 2012.
- 2) Vickie.M.Williamson, M.Larry Peck, Lab manual for General Chemistry, Cengage Learning India Private Limited, New Delhi, 2009.

REFERENCE BOOKS:

- 1) V.V. Ramanujam, Inorganic Semimicro Qualitative Analysis, The National Publishing Company, Chennai, third edition,1974.
- 2) Vogel's "Textbook of Quantitative chemical Analysis", Pearson Education Ltd. Sixth Edition, 2008

Course Objectives: To determine the BOD and COD of municipal sewage and industrial wastewater, calcium oxide, moisture and silica content in cement pour point and cloud point for lubricants and flash point and fire point for fuels.

1. Determination of lead in red lead
2. Determination of BaSO₄ content.
3. Determination of ZnS content in lithophone.
4. Determination of moisture and silica content in cement.
5. Determination of mixed oxide content in cement.
6. Determination of calcium oxide content in cement.
7. Estimation of active calcium oxide in lime.
8. Determination of flash point and fire point for fuels.
9. Determination of pour point and cloud point for lubricants.
10. Determination of moisture in coal/coke by distillation method (Dean and stark method)
11. Determination of carbon by Conradson method.
12. Determination of viscosity of an engine oil by Redwood viscometer.
13. Determination of calorific value of solid and liquid fuels by Bomb calorimeter.
14. Analysis of CO, CO₂ and NO_x in exhaust gases.
15. Determination of BOD and COD of municipal sewage and industrial wastewater.
16. Determination of organics, suspended and total solids in wastewater.
17. Determination of phosphate in a fertilizer.

TOTAL:90h

Course Outcomes:

- To determine lead in red lead
- To determine barium sulphate content
- To analysis CO, CO₂ and NO_x the simple Inorganic compounds
- To determination of flash point and fire point for fuels
- To determination of moisture in coal/coke by distillation method

TEXT BOOKS:

1. Gary D. Christian, "Analytical Chemistry", John Wiley & Sons, INC, New York, Fifth Edition, 1994.
2. V.K. Ahluwalia, Sunita Dhingra, "Comprehensive Practical Organic Chemistry – Qualitative Analysis", University Press Private Limited, India, First Indian Edition, 2010.

REFERENCE BOOKS:

1. John H. Kennedy, "Analytical Chemistry: Practice", Saunders College Publishing, New York, Second Edition, 1990.
2. Russell.S.Drago, Physical Methods in Inorganic Chemistry, West Press Private Limited, New Delhi, 1965.

Course Objective: To gain practical experience by working in a professional organic chemistry -related environment. To demonstrate an ability to work independently and utilize principles of organic chemistry to solve real-world problems.

Course Requirements

- Students wishing to receive credit for internship are required to find, apply for, and be selected for a chemistry or materials related internship position with an organization of their choice. They will then need to seek permission by the Department Chair to register for the appropriate internship course.
- The student must complete at least 90 hr of work during the semester for each hour of academic credit awarded, and these work hours must be completed during the term (odd or even semester vacation) in which the student is registered for the internship course.
- After the student has completed the internship, the student must submit the final evaluation report of the internship experience and 20 minute presentation to department at conclusion of semester. The Department Chair and class instructor will allot the marks for the internship evaluation report.

Course outcome

- To know the various types of industries.
- To learn the procedure of identifying, approaching, applying and getting approval of internship from a leading industry.
- To witness the entire work area of the industry.
- To understand the nature of job involved in the various sector of the industry.
- To adapt with the working people.

Course Objectives: To study the principle and components of paint, the reaction mechanism and lacquers, emulsion, polymerization technique in paint.

Unit I INTRODUCTION TO PAINT AND PIGMENTS 12

Principles – ingredient – application dry film properties, mechanism of drying of paints. Pigmentation – pigment properties – types of pigments – selection of – dispersion – colour matching. Solvents – solvent properties – solvent viscosity – theory - boiling point and evaporation rates – flash point – chemical nature – toxicity and smell.

Unit II PAINT ADDITIVES 12

Paint additives affecting viscosity – pigment volume – silica and silicates – residual thickness- choice of additive affecting viscosity – additives affecting surface and interfacial tension – surfactants – additives affecting gloss – additives affecting chemical reactions.

Unit III LACQUERS AND EMULSIONS 12

Lacquers and emulsion paints- non-aqueous dispersions- cellulose polymers – acrylic polymers – lacquer film formers – hot spray-emulsion paints – oil and alkyd paints – oxidative drying – drying mechanism – conjugated and non-conjugated oils – driers – bodied oils.

Oil paints and varnishes – petroleum resins, indene resins, phenolic resins, alkyd resins – ingredients – alkyd finishes – stoving finish – wood primers.

Unit IV PAINT FINISHING 12

Poly urethanes – one pack paints – urethane oils and alkyd finishes – moisture curing pre-polymers, isocyanate stoving finishes – pack paint- activated polymer – polyhydroxylic resins – solventless finishes – yellowing – toxicity.

Unit V POLYMERISATION TECHNIQUES IN PAINT 12

Thermosetting alkyds – polyester and acrylic paints based on nitrogen resin – urea formaldehyde resins – melamine formaldehyde resins – acrylic nitrogen resins.

Paints based on nitrogen resins – UF & MF finishes – stoving finishes – cold curing finishes – finishes based on acrylic nitrogen resin. Epoxy coatings, epoxy resins – polyols, alkyd containing cross link powder coatings- cationic self polymerization, UV curing finishes – cured by polyamines – solventless finishes – water based epoxy coatings.

Total: 60 hrs

Course Outcomes:

- To understand what is paint
- To know the various ingredients present in paint
- To learn the different mechanism of drying of paints
- To know various additives used in paint and their properties
- To learn what is laquers and emulsion paint

Text Books:

1. V.A. Shenai – Textile finishing – Sevak publications.
2. JT Marsh – Textile finishing Textile Institute, Manchester.

Reference Books:

1. V.A. Shenai – Technology of Bleaching Sevak publications.
2. E.R. Trotman – Textile scouring and bleaching – Charles Griffins Co.,
3. A.J. Hall – Textile finishing – BI publications..

Course Objectives: To learn the various instrumental methods, potentiometry, conductometric, biamperometry, nephelometry, fluorimetry, polarimetry, refractometry photometry and atomic absorption spectroscopy and analytical techniques.

Unit I**12**

Potentiometry, Conductometry, Biamperometry –Theory, Instrumentation and Applications.

Unit II**12**

Nephelometry, Fluorimetry, Polarimetry, Refractometry - Theory, Instrumentation and Applications.

Unit III**12**

Flame Photometry, and Atomic Absorption Spectroscopy - Theory, Instrumentation and Applications.

Unit IV**12**

Radio analytical Techniques, Isotope dilution analysis, Radioimmunoassay, Radiochromatography and Radio electrophoresis, Activation analysis.

Unit V**12**

Thermal methods - Thermogravimetric and differential thermal analysis, thermometric titrations, differential scanning calorimetry – basic instrumentation and applications.

Total: 60hrs**Course Outcomes:**

- To learn the various instrumental methods, potentiometry, conductometric, biamperometry
- To learn what is nephelometry, fluorimetry, polarimetry, refractometry
- To understand what is flame photometry and atomic absorption spectroscopy
- To learn what is radio analytical techniques
- To learn the concept, what is thermal methods and their types

Text Books:

1. Analytical chemistry – G.Dick.
2. Quantitative chemical analysis – Saunders and Toppan.

Reference Books:

1. Fundamentals of analytical chemistry- Skoog and West.
2. Instrumental methods of analysis – Willard, Merritt, Dean and Settle.

Course Objective: The course is to understand the strategic role of operations management in creating and enhancing a firm's competitive advantages and to understand the concepts of layout, planning, maintenance, quality and inventory control, material and store management

Unit I Introduction to operations management

12

Concept of Operations – Functions & Responsibilities of a Production Manager – Relationship with other departments – Production Systems – Plant Location – Factors influencing location – Site selection – Plant Layout – Objective – Principles and criteria of Plant Layout – Types of Layout – Assembly Line Balancing.

Unit II Capacity planning

12

Capacity Planning – Measurement of Capacity – Capacity change – Make or Buy decision – Production Planning – Meaning – Elements – Importance – Procedure – Process Planning – Routing & scheduling – Production Control – Objectives – Functions involved.

Unit III Maintenance management & quality control

12

Maintenance Management – Advantages – Policies – Types of Maintenance – Failure Analysis – Total Productive Maintenance – Quality Control – Definition – principles – Statistical Quality Control – Benefits – Control Charts.

Unit IV Time & work study

12

Work Study – Objectives – Major components importance – Procedure – Method Study – Scope – Procedure – Micro Motion Study – Work Measurement – Definition – Techniques – Time Study – Ergonomics.

Unit V Vendor development & stores location

12

Vendor Development – Stages in source selection and evaluation – Vendor Rating – Rating criteria. – Store Keeping – Functions – Responsibilities of Store Keeper – Stores Location.

Total: 60 hrs

Course Outcomes:

- To understand about the fundamental production and operations concepts.
- To analyze the product layout using Line Balancing
- To gain knowledge on calculation of capacity
- To understand the various planning concepts.
- To analyze the failure for maintenance.

Text Books:

1. Stevenson J. William, Operations Management, 9th Edition, TMH, 2007
2. Hanna, D.Mark & Rocky Newman, Integrated Operations Management-Adding value for Customers, PHI, 2001.
3. Aswathappa K. and SridharaBhat, Production and Operations Management, Himalaya Pub. House, 2003.

Reference Books:

1. Lee J. Krajewski and Larry P. Ritzman, 2007, Operations Management strategy and analysis, 9th Edition, Pearson Education / Prentice Hall of India, 2007.
2. Everett Adam, Jr. and Ronald J. Elbert, Production and Operations Management Concepts, Models and Behaviour, 5th Edition, PHI. 2003.
3. Edward M. Knod and Richard J. Schonberger, 2001, Operations Management meeting customers demands, McGraw hill international, 7th Edition, 2001.
4. Kanishka Bedi, 2005, Production and Operations Management, Oxford University Press, 2005.
5. Chary, S.N, Production and Operations Management, Tata McGrawhill, 2nd Edition, 2003.
6. Heizer Jay & Render Barry, Operations Management, Pearson Education, 8th Edition, 2007.

Course Objectives:

To determine the molecular weight of the given compound by viscosity and Rast Cryoscopic method. To verify Debye – Huckel – Onsagar equation and Lambert – Beer’s law. To understand the techniques of polarimetry, conductivity and potentiometry method.

1. Study of inversion of cane sugar in the presence of acid using polarimeter.
2. Determination of molecular weight of a polymer by viscosity method.
3. To study refractive index- concentration relationship for solutions.
4. Determination of dissociation constant of weak electrolyte by conductivity method.
5. (i) Determination of cells constant
(ii) Verification of Debye – Huckel – Onsagar equation for strong electrolytes.
(iii) Determination of pKa of a weak acid using Henderson equation.
6. Potentiometric titration of Cl^- vs Ag^+
7. Construction of phase diagram of two component systems forming simple eutectic.
8. Molecular weight determination by Rast Cryoscopic method.
9. Verification of Lambert – Beer’s law.
10. Determination of rate constant for the acid catalysed hydrolysis of esters.
11. Determination of second order rate constant for peroxydisulphate –iodide reactions in the presence and absence of added neutral salt.
12. Determination of molecular weight by depression of transition temperature method.
13. Determination of equilibrium constant for $\text{I}_2 + \text{I}^-$
14. Determination of concentration of KI

Total: 60 h**Course Outcomes:**

- To enhance the knowledge of experimental techniques in physical chemistry
- To know the study of inversion of cane sugar in the presence of acid
- To learn the determination of molecular weight of polymer
- To study the refractive index and concentration relationship for solution
- To determine the molecular weight of sample by different method

TEXT BOOKS:

1. P. S. Raghavan, B. Viswanathan, Practical Physical Chemistry, Viva books Private Limited, New Delhi, 2005.
2. B.D. Khosla and V.S. Garg, Senior Practical Physical Chemistry, R. Chand and Co., New Delhi, 1998.

REFERENCE BOOKS:

1. A. Findary, T.A. Kitchner Practical physical chemistry, Longmans, Green and Co., 1997.

J.M. Wilson, K.J. Newcombe, A.R. Denko. R.M.W. richett, Experiments in Physical Chemistry, Pergamon Press, 2007.

Course Objective: To learn electro cyclic reactions, sigma topic rearrangement, Introduction to photochemistry, cyclisation reaction and ring opening of 1, 3 Butadiene, 1, 3, 5 hexatriene systems, synthon, C-C, C = C bond formation by various method reagents in organic synthesis.

UNIT – I Electro cyclic reactions 15

Electro cyclic reactions – definition, classification, M.O treatment, FMO- PMO - correlation diagram treatment with example. Application of electro cyclic reactions in organic synthesis. Cyclo addition reactions – classification – definition.

UNIT – II Sigma topic rearrangement 15

Sigma topic rearrangement – Hydrogen migration [1,3],[1,5]&[1,7] definition, classification, FMO-PMO treatment and correlation diagram. Hydrogen migration in cyclic system like cyclopentadiene, Indene cyclohepta trienes. Sigma topic rearrangement involving methyl group and chiral groups. Sigmatopic rearrangements in cope & Claisen reactions – FMO&PMO treatment. Degenerates molecules, Fluxional molecules, application of sigma topic rearrangement in organic synthesis.

UNIT – III Photo chemistry 15

Photo chemistry – Introduction to photochemistry. quantum yield cyclisation reaction and ring opening of 1, 3 Butadiene, 1, 3, 5 hexatriene systems. Primary & Secondary, photochemical reactions, photochemistry of carbonyl, Diene and Dienones.

UNIT-IV Retrosynthetic Analysis 15

Synthon, C-C, C = C bond formation by various method. (Aldol, Michael, Peterson, Shapiro, Wittig, Benzoin, Robinson annulations, Deick Mann condensation. Synthesis of enamines and their applications.

UNIT – V Reagents in Organic Synthesis 15

Reagents in organic synthesis: metal hydrides, Lithium dimethyl cuprates, LDA, 1, 3 dithione, trimethyl silyl iodide, 9BBN, DCC. Synthesis of cubane, 5- hexenoic acid, Bicyclo [4, 1, 0] heptanes -2-one.

Total: 75 hrs

Course Outcomes:

- To know about the basic criteria of Electro cyclic reactions
- To get a basic idea about the Sigma topic rearrangement
- To learn about the photochemistry. quantum yield cyclisation reaction
- To know about the various Retrosynthetic Analysis
- To know about the various Reagents in Organic Synthesis

Text Books:

1. R.O.C. Norman, Organic Synthesis, Chapman and Hall, New York, 2nd edition, 1980.
2. S.M. Mukherji, S.P. Singh, Organic Reaction Mechanism, MacMillan India Ltd., Chennai, 3rd edition 1984.
3. Francis A. Carey, Richard J. Sunderg, Advanced Organic Chemistry Part A and B, Plenum Press, 3rd Edition, 1990.

Reference Books:

1. Jerry March, Advanced Organic Chemistry, Wiley Eastern Limited, 4th edition, New Delhi, 1999.
 2. John Mc. Murray, Organic Chemistry, Cengage Learning, 8th edition, 2011.
- T.L. Gilchrist and C.W. Rees, Carbenes, Nitrenes and Arynes, Thomas Nelson and Sons Ltd., London, 1969.

Course Objective

To learn about the concept of project work. To know about designing new experiments and carry out the experiments. To know about the various characterization techniques used to characterize the synthesized compounds. To know about the necessities of literature survey and to learn about writing dissertation of project work.

NOTE

1. The project work may be carried in either industrial chemistry or in management science.
2. The candidates will undergo inplant training for atleast two weeks in industries/ National laboratories /R & D centers at the end of second semester (during summer). During the fourth semester industrial projects may be undertaken in industries/ National laboratories/R & D centers either in industrial chemistry or in management science.

TOTAL: 24 hrs**Course Outcomes:**

- To identify the topic with the consideration feasibility.
- To learn the procedure of literature survey of the concered topic.
- To derive a plan for executing the work in the stipulated time with maximum efficiency and success.
- The intensive exposure to industry as a first time experience.
- Understanding different sectors of an industry and the functionaries of each sector.

Syllabus
Discipline Specific Elective
Courses

TEXT BOOKS:

1. J. Huheey, Inorganic Chemistry, Harper and Collins, NY IV Edition, 1983.
2. H.J. Arnikar, Nuclear Chemistry, Wiley Eastern Co. II Edition, 1987.
3. F.A. Cotton and G. Wilkinson, Advanced Inorganic Chemistry- A Comprehensive Text, John Wiley and Sons, V Edition, 1998.

REFERENCE BOOKS:

1. M.C. Day and J. Selbin, Theoretical Inorganic Chemistry, Vann no strand Co., New York, 1974.
2. D.F. Shrivvers, P.W. Atkins and C.H. Langfor, Inorganic Chemistry, Freeman, New York, 1990.

Course Objective: To learn about several methods of analytical techniques. Basic concept about UV - visible spectroscopy, infrared spectroscopy, raman spectra, nuclear magnetic resonance and electron spin resonance and mass spectrometry and their applications.

UNIT I Techniques of UV- Visible spectroscopy and Infrared Spectroscopy 09

Colourimetric analysis and UV- Visible spectroscopy: Beer Lambert's law, Principles of single and double beam instruments – applications for analysis of inorganic and organic samples. Infrared spectrophotometric analysis – principle and instrumentation and molecular structure determination.

UNIT II Raman Spectra and Nuclear Magnetic Resonance 09

Raman Spectra – principle, basic instrumentation – structural analysis. Nuclear Magnetic Resonance – Principle, instrumentation, structure determination, NMR of ^1H , ^{13}C , ^{31}P , ^{19}F .

UNIT III Electron Spin Resonance and Mass 09

Electron Spin Resonance – Principle, instrumentation, applications to coordination compounds. Mass Spectrometry – Principle, basic instrumentation, fragmentation patterns – organic molecular structural determination.

UNIT IV Thermogravimetric Analysis 09

Thermo gravimetric and differential thermal analysis, DSC thermometric titrations, differential scanning calorimetry – basic instrumentation and applications.

UNIT V Atomic Absorption and Photoelectron Spectroscopy 09

Atomic absorption spectroscopy: Theory, Atomizers, Flame and Electro thermal. Radiation sources, Instrumentation, spectral and chemical interferences, application. Photoelectron spectroscopy (UV and X-Ray) –photo electron spectra Koopman's theorem, fine structure in PES, chemical shift and correlation with electronic charges.

TOTAL: 45 hrs

Course Outcomes:

- To learn the various Techniques of UV- Visible spectroscopy and Infrared Spectroscopy
- To learn what is Raman Spectra and Nuclear Magnetic Resonance
- To understand about Electron Spin Resonance and Mass spectroscopy
- To learn what is fragmentation patterns
- To learn the concept, what is Thermogravimetric Analysis and basic instrumentation and applications

TEXT BOOKS:

1. D.A.Skoog and D.M.West, Fundamentals of Analytical Chemistry, IV Edition, Old Reinhold & Winston, Publication, 1982.
2. B.K. Sharma, Instrumental methods of Chemical analysis, Goel Publishing House, 24th Edition, 2005.
3. Gurdeep R. Chatwal, Sham K. Anand, Instrumental Methods of Chemical Analysis, Himalaya Publication, 1979.

REFERENCE BOOKS:

1. Willard Merrit, Dean and Settle, Instrumental methods of analysis, 6th Edition, CBS Publ, 1986.
2. A. I. Vogel, Textbook of Qualitative Inorganic Analysis, 3rd Edition, ELBS, 1976. Old Reinhold & Winston, Publication, 1982.

**ORGANIC NAME REACTIONS AND
SYNTHESIS OF REAGENTS**

3 0 0 3

Course Objective: To study condensation reaction oxidation and reduction reaction, To know the synthesis and application of important reagent.

Unit I Organic Reactions - I **09**

Condensation reactions of the following; Aldol, Claisen ester condensations. Cannizzaro reaction, Dieckmann cyclisation, Reformatsky reaction, Dakin reaction, Etard reaction, HVZ reaction, Umpolung synthesis and Stephen reaction.

Unit II Organic Reactions – Oxidations **09**

Barton reaction, Jones oxidation, Oppenauer oxidation and Michel addition.

Unit III Organic Reactions – Reductions **09**

Birch reduction, Clemmenson reduction, Meerwin P.V reduction, rosenmund reduction.

Unit IV Organic Reagents- I **09**

Synthesis and applications of the following reagents: 9-BBN, n-butyl lithium, ceric ammonium nitrate(CAN), DCC, Grignard reagent, LDA, Gilman reagent, NBS and PCC.

Unit V Organic Reagents- II **09**

Use of the following reagents in organic synthesis and functional group transformations- complex metal hydrides, dicyclohexyl carbodimide, 1,3-dithiane, woodward and provost hydroxylation, selenium dioxide, crown ethers and Peterson's synthesis, Wilkinson's catalyst, Baker yeast.

Total: 45 hrs

Course Outcomes:

- To learn Aldol, Cannizzaro, Claisen ester condensation reactions
- To understand Dieckmann, Dakin, HVZ, Stephen reactions
- To study about Organic reaction and its oxidation process
- To familize Organic reactions and its reduction process
- To gain knowledge related to synthesis of various organic reagents

Text Books:

1. R.O.C. Norman, Principles of Organic Synthesis, Chapman and Hall, London, 1980.
2. Francis A. Carey, Richard J. Sundberg, Advanced Organic Chemistry-Part B, 3rd Edition 1990.
3. S.M. Mukherji, S.P. Singh, Organic Reaction Mechanism, Macmillan India Ltd. 1990.

Reference Books:

1. F.A. Cary, Organic Chemistry, Second edition, McGraw Hill, Inc., 1992.
2. P.S. Kalsi, Stereochemistry, Wiley Eastern Limited, New Delhi, 1990

MANAGEMENT INFORMATION SYSTEM

3 0 0 3

Course Objective: The course is to understand evolution of information system marketing, importance, designing Computer based methods, information about account and financial and control, hardware, software acquisition, ergonomic factors to be considered.

Unit I **09**

Introduction – Establishing the frame work – Business models – Evolution of information system – System Development Life cycle.

Unit II **09**

Requirement Analysis – Structured methodologies – Designing Computer based methods.

Unit III **09**

Functional management information system: Production information system – marketing information system.

Unit IV **09**

Accounting information system – Financial information system - Personnel information system- Interrelationship of functional management information systems.

Unit V **09**

Hardware, software acquisition, Ergonomic factors to be considered, cost – benefit analysis- Quality Assurance – System security – Training strategies.

General Characteristics of computer – CPU, I/O devices – Operating Systems – Programming language – application software.

Total: 45 hrs

Course Outcomes:

- To enhance the knowledge of management studies.
- To learn about Evolution of information system .
- To learn about Requirement Analysis.
- To learn about Hardware, software acquisition.
- To know the Operating Systems.

Text Books:

- Steven Alter, Information Systems – A Management Perspective Addison Wesley 1999.
2. James A O'Brein Management Information System, Tata McGraw Hill New Delhi, 1999.
 3. Kenneth C. Laudon and Jane Price Laudon management Information Systems – Managing the digital firm, Pearson Education, Asia 2002 PHI

Reference Books:

1. Gordon B. Davis Management Information System: Conceptual Foundations, Structure and Development, McGraw Hill 1974.
2. Turban Mc Lean and Wetherbe, Information technology for Management making connections for strategic advantage, John Wiley 1999.
3. Ralph M. Stair and George W. Reynolds, Principles of Information systems - A Managerial Approach, Thomson Learning 2001.
4. Kendall and Kendall Systems Analysis and Design, Prentice Hall of India, 5th edition, New Delhi.
5. S. Sadagopan Management Information systems- Prentice Hall of India, New Delhi, 2002.
6. Murdich & Ron, Information system for Modern management , PHI 2002.
7. Goyal DP, Management Information Systems, MacMillian, 2000

Course Objective: To learn about general consideration of molecular asymmetry and dissymmetry, configuration metals of determinations mechanisms of reactions and rearrangement.

UNIT – I Stereochemistry 09

Stereochemistry: a) General consideration of molecular asymmetry and dissymmetry. Configuration – absolute and relative methods of determination, Chemical transformation, asymmetric synthesis.

UNIT – II Coupling Reactions 09

Chiral auxiliaries, chiral reagents and catalysts, Enantiomeric excess, Quasiracemates Atropisomerism of biphenyls. Coupling reactions – Hock coupling – Suzuki coupling – Tin coupling – Transaction metal catalyses coupling reaction.

UNIT – III Retrosynthetic Analysis-I 09

Basic principles and terminology of retro synthesis, synthesis of aromatic compounds, one group an disconnections, one group C-C and two group C-C Disconnection.

UNIT – IV Retrosynthetic Analysis-II 09

Retro-synthetic approach of Amine and alkene synthesis, Robinson annulations, Micheal addition and important functional group interconversions.

UNIT – V Synthetic Methodology 09

Protection, of functional groups (hydroxyl, amino, carboxyl, and carbonyl groups, Terminal alkyne). Illustration of protection and deprotection in synthesis

TOTAL: 45 hrs

Course Outcome:

- To learn the molecular asymmetry and dissymmetry of stereochemistry.
- To know about the absolute and relative methods of determination.
- To understand what is chiral auxiliaries, chiral reagents and catalysts.
- To familiarize the various coupling reactions.
- To know the basic principles and terminology of retro synthesis.

TEXT BOOKS:

1. P. S. Kalsi, Stereochemistry Conformation and Mechanism, New Age International Publication, 2005.
2. Eliel, Stereochemistry of Carbon Compounds, Tata Mc Grawhill Education, 1975.
3. E.S. Gould, Mechanism & structure in organic Chemistry, Holt, Rinehart & Winston, New Delhi, 1963.

REFERENCE BOOKS:

1. Morrison and Boyd, Organic Chemistry, Pearson Education Inc, 6th Edition, 1992.
2. I.L. Finar, Organic Chemistry, Longmans Green & Co., 3rd Edition, 1964.

TEXT BOOKS:

1. G.S. Manku, Inorganic Chemistry, TMG Co., 1984.
2. F.A. Cotton and G. Wilkinson, Advanced Inorganic Chemistry- A Comprehensive Text, John Wiley and Sons, V Edition, 1998.

REFERENCE BOOKS:

1. D.F. Shriver, P.W. Atkins and C.H. Langford, Inorganic Chemistry, CH Langford, 1990
2. N.N. Greenwood and Earnshaw, Chemistry of the Elements, Pergamon Press New York, 1984.

Course Objective: To learn about basic concepts of structure and functionality, membranes, structure, function transport properties, aspects of electrochemical phenomena of biological system, enzyme, co enzyme, nitrogen fixation and photosynthesis.

UNIT I Thermodynamics and biology**09**

Thermodynamics and biology – Basic concepts of structure and functionality – membranes – structure, function transport properties, aspects of electrochemical phenomena – active transport, ionophores, biological energy storage and Phosphate hydrolysis.

UNIT II Essential and trace metal ions**09**

Essential and trace metal ions. Coenzymes – Vitamin B coenzymes, carboxy peptidase and Superoxide dismutase. Heme – enzyme – Peroxidase and catalases.

UNIT III Structure Oxygenation and Stereochemistry**09**

Oxygen carriers – Hemeproteins – Hemoglobin, myoglobin – Structure Oxygenation and Stereochemistry – Bohr effect. Non-heme oxygen carriers – Hemerythrin and hemocyanin-Iron storage and transport proteins.

UNIT IV Nitrogen fixation**09**

Nitrogen fixation – Introduction, types of nitrogen fixing micro organisms. Nitrogenase enzyme – Metal clusters in nitrogenase – redox property – Dinitrogen complexes – transition metal complexes of dinitrogen – nitrogen fixation via nitride formation and reduction of dinitrogen to ammonia. Biological redox systems: Cytochromes – Classification, cytochrome a, b and c Cytochrome P-450. Iron – sulphur proteins – rubredoxin and ferredoxin. Photosynthesis and chlorophyll's.

UNIT V Bio analytical Chemistry**09**

Bio analytical Chemistry-Toxicity & medicine-Toxicity of Hg, Cd, Zn, Pb, As, Sb. Anti cancer agents. Metal ion poisoning: Failure of metal ion control systems, role of metal ion. Diagnosis and treatment – use of radio isotopes. Pollution studies: Effluents and treatment. Inorganic plant nutrition and indicator plants for mineral exploration.

TOTAL: 45 hrs**Course Outcome:**

- To learn about Thermodynamics and biology.
- To know various Essential and trace metal ions in biology.
- To understand about Structure Oxygenation and Stereochemistry.
- To know about Hemoglobin, myoglobin oxygen carriers.
- To learn about Nitrogen fixation and types of nitrogen fixing micro organisms

TEXT BOOKS:

1. M.Satake and Y.Mido, "Bioinorganic Chemistry", Discovery Publishing House, New Delhi 1996.
2. G. N. Mughherjee and Arabinda Das, Elements of Bioinorganic Chemistry, McGraw Hill, 1993.

REFERENCE BOOKS:

1. G.Eichron, Inorganic Bio-chemistry, Vol. I and II, Elsevier, 1973.
2. J.E. Huheey, Inorganic Chemistry - Principles, Structure and Reactivity; 4th Edition, Harper Collins, New York, 1993.

Course Objectives: To enhance the knowledge of Human Resource management studies, evaluation methods about HR management and the labors law.

Unit I Introduction of human resource management 09

Definition, Importance of Human Resources, Objectives of Human Resource Management, Qualities of a good personnel manager – Evolution and growth of Personnel Management in India. Human Resource Policies: Need, type and scope – Human Resource policies and work culture. Human Resource planning: Long and short term planning, Job analysis, skills inventory, job description and job specification.

Unit II Function of HR Management 09

Recruitment and selection: purposes, types and methods of recruitment and selection, relative merits and demerit of the different methods; personnel search, selection instruments, reduction of recruitment costs. Functions of human resources management from procurement to separation: placement, induction, transfers, promotions, disciplinary actions, termination of services: Resignation, dismissal, retrenchment and voluntary retirement schemes, exit, interview, prevention of employee turnover.

Unit III Evaluation Methods 09

Performance evaluation: Ranking, rating scales, critical incident method, removing subjectivity from evaluation, MBO as a method of appraisal, Job evaluation, criteria for promotions and job enrichment.

Unit IV Labors Law 09

Wage and salary administration: meanings, calculations of wage, salary, perquisites, compensation package, cost of living index and calculation of dearness allowance, rewards and incentive: financial and non-financial incentives, productivity-linked bonus, compensation Criteria.

Unit V Managerial Practice 09

Personnel Office Management: Functions of the office, correspondence, O 7 M in personnel departments, Maintenance of Personnel records. Time Management: Importance of Time factor, Time waster, Prioritizing Work Scheduling, Functions of the Time Office, Flexible Work arrangements.

Total: 45 hrs

Course Outcome:

- To enhance the knowledge of Human Resource management studies.
- To learn about evaluation methods.
- To learn about HR management.
- To know the labors law.
- To learn about managerial practice.

Text Books:

- Luis R. Gomez - Mejia David B.Bakin and Robert L. Cardy. Managing Human.
2. Beardwell and Cen Holder, Human resource Management Macmillan India Ltd.,

Reference Books:

1. Straus and Sayles, Managing Human Resources - Prentice Hall Inc, (1977).
2. Graham H.T., & R.Bennet, Human Resources Management - Pitman, London, (1985).
3. Edwin Flippo, Principles of Personnel Management - McGraw Hill.

Text Book

1. Y.R.Sharma, Elementary Organic Absorption Spectroscopy, S.Chand & Co., 2nd edition New Delhi. 1996.

Reference Books

1. A.H.Beckett and J.B.stenlake, Practical Pharmaceutical Chemistry, Part-I and II, the Athlone Press, London, 4th Edition, CBS Publisher, Delhi, 1998.
2. H.H.Willard, L.L.Meritt, J.A.Dean and F.A.Settle, Instrumental Methods of Analysis, Wadsworth, New York, 7th edition, 1986.
3. John R.Dyer, Applications of absorption spectroscopy of Organic Compounds, PrenticeHall, London, 1987.
4. Robert M.Silverstein, ClaydonBassler and Terence C.Morril, Spectrophotometric Identification of Organic Compounds, 6th Edition, John Wiley & Sons, New York, 2002.

Course Objective: To know about the classification and synthesis drugs, antibiotics, enzymes phase transfer catalysis. Vitamins – Introduction, water, fat soluble vitamins. Details of vitamin A, C, B₁, B₂, B₆

Unit I	Classification of Drugs	09
Classification of drugs-CNS drugs types function and metabolism general and local anesthetics. Sedatives and hypnotics: types function and metabolism. Narcotics and analgesics function and metabolism.		
Unit II	Antibiotics	09
Classification of Antibiotics – structure and synthesis; Chloromphenicol, pencillins and streptomycin and applications.		
Unit III	Enzyme Concept	09
Enzymes, co-enzymes, theory. Michaelis-Menten's equation and verification by graphical methods- Eadie plot and Lineweaver-Burk plot. Enzyme catalysis, Enzyme specificity, Enzyme mechanism. Enzyme Inhibition- Competitive inhibition, Un-competitive inhibition and Non-competitive inhibition.		
Unit IV	Phase transfer catalysis	09
Phase transfer catalysis, ionic liquids. Miscellaneous catalysis. Use of crown ethers.		
Unit V	Vitamins	09
Introduction, water soluble and fat soluble vitamins. Details of vitamin A, C, B ₁ , B ₂ , B ₆ ,		

TOTAL: 45h

Course Outcome:

- To know about the various types of drugs
- To understand the structure and synthesis of antibiotics.
- To learn about pencillins and streptomycin and its applications.
- To understand the Enzyme Concept
- To learn the Phase transfer catalysis using crown ethers.
- To understand about the structure and applications of vitamin A, C, B₁, B₂, B₆.

TEXT BOOKS:

1. William O. Foye, Thomas L. Lemke, David A. Williams, Principles of Medicinal Chemistry, Lippincott Williams & Wilkins, 4th Edition, 1995.
2. Wilson & Gisvold's Textbook of Organic Pharmaceutical and Medicinal Chemistry, John.M. Beale and John. H. Block, Lippincott Williams & Wilkins, 10th Edition, 1998.

REFERENCE BOOKS:

1. M. E. Wolf, Burger's Medicinal Chemistry and Drug Discovery: Therapeutic Agents, WileyBlackwell; 5th Edition edition, 1997.
2. Ashutosh Kar, Medicinal Chemistry, New Age International Publication, 4th Edition, 2005.

TEXT BOOKS:

1. R.O.C. Norman, Chapman and Hall, Principles of Organic Synthesis, London, 1980.
2. E.S. Gould, Structure and mechanism in Organic Chemistry, Henry Holt and Co. New York, 1957.
3. Francis A. Carey and Richard J. Sundberg, Advanced Organic Chemistry-Part B, 3rd Edition, 1990.
4. S.M. Mukherji and S.P. Singh, Organic Reaction Mechanism, Macmillan India Ltd., 1990.

REFERENCE BOOK:

1. Michael. B. Smith, Organic Synthesis, Elsevier Inc, Third Edition, 2010.

Course Objective: The course is to understand marketing, importance, market segmentation, market research and control, industrial markets, product positioning, sampling techniques, online marketing and promotion mix.

Unit I Introduction 09

Understanding the term Marketing - Importance of Marketing-Scope of Marketing-Core Concepts-Company Orientation toward marketplace-Marketing and Customer Value-Marketing Environment-Micro and Macro Environment.

Unit II Consumer markets 09

Model of Consumer Behavior, Seven Os Structure, Factors Affecting Consumer Behavior, Stages in the Adoption Process, Industrial Markets - Characteristics, Industrial Buyer Behavior, Service Marketing-Characteristics-Marketing Strategy.

Unit III Market segmentation 09

Levels and Bases for Segmentation, Segmenting Consumer Markets, Business Markets, Market Targeting -Evaluating Market Segments -Product Positioning, Positioning Strategies.

Unit IV Marketing programme 09

Decisions Involved in Product, Branding, Packaging, Product Line and Product Mix Decisions, New Product Development, Product Life Cycle. Pricing Products, Strategies, Distribution -Channels, Channel Management Decisions, Returns Management and Reverse Logistics. Promotion Mix - Advertising, Sales Promotion, Public Relations, Personal Selling.

Unit V Marketing research and control 09

Marketing Research – Objectives & Scope – Research designs – research procedure – data types & sources, sampling techniques, analysis & reporting. Demand Measurement and Sales Forecasting Methods, Estimating Current and Future Demand. Annual Plan Control, Efficiency Control, Profitability Control and Strategic Control, Marketing Audit, Online Marketing.

Total: 45 hrs

Course Outcome:

- To understand about the marketing and its importance
- To analyze the Micro and Macro Environment.
- To gain knowledge on Consumer Behavior
- To understand the various characteristics of industrial markets
- To analyze the various Levels and Bases for Segmentation

Text Books:

1. Kotler Philip, Keller, Koshy and Jha, Marketing Management , 13th Edition, Pearson Education / Prentice Hall of India, 2008

Reference Books:

1. Lamb, Hair and Mc Daniel, Marketing, 8th Edition, Thomson Learning, 2005.
2. RajanSaxena, Marketing management, TMH, 2006.
3. Keith Blois, Marketing, Oxford University Press, 2005.
4. Ramaswamy V.S. Namakumari S, 2006, Marketing Management - The Indian Context, Macmillan India Ltd., 2006.

ELECTRO ANALYTICAL AND SEPARATION TECHNIQUES 3 0 0 3

Course Objective: To learn about the theory and instruments like Polarography, Adsorption and partition chromatography, High Performance Liquid chromatography, Gas-liquid Chromatography and Thin layer Chromatography application

UNIT I Analytical Techniques 09

Polarography – theory, apparatus, DME, Diffusion, Kinetic and catalytic currents, Current - voltage curves for reversible and irreversible system, qualitative and quantitative applications to inorganic systems

UNIT II Amperometric titrations 09

Amperometric titrations – theory, apparatus, types of titration curves, successive titrations and indicator electrodes – Applications. Cyclic voltammetry - theory, application to inorganic systems- Coulometry.

UNIT III Introduction to Chromatography 09

Adsorption and partition chromatography, definition of terms, techniques and chemical concept of column, paper, TLC and HPTLC

UNIT IV Separation Technique-I 09

Chromatography: Gas-liquid Chromatography, Principles, Retention Volumes, Instrumentation, Carrier Gas, Columns, Stationary Phase, Detectors, Thermal Conductivity, Flame Ionization, Electron Capture, Application of G.L.C.

UNIT V Separation Technique-II 09

High Performance Liquid chromatography: Scope, Column efficiency, Instrumentation, Pumping Systems, Columns, Column packing, Detectors, Applications. Ionexchange and gel – permeation chromatography.

TOTAL: 45 hrs

Course Outcome:

- To understand about the Analytical Techniques in qualitative and quantitative applications to inorganic systems
- To gain knowledge on Amperometric titrations
- To understand the various Chromatography technique.
- To understand the Gas-liquid Chromatography.
- To understand the High Performance Liquid chromatography

TEXT BOOKS:

1. J. Huheey, "Inorganic Chemistry", Harper and Collins, IV Edition, New York, 1983.
2. H.J. Arnikar, "Nuclear Chemistry", Wiley Eastern Co. II Edition, 1987.
3. F.A. Cotton and G. Wilkinson, "Advanced Inorganic Chemistry- A Comprehensive Text"
John Wiley and Sons, V Edition, 1998.

REFERENCE BOOKS:

1. K. F. Purcell and J.C. Kot, Inorganic Chemistry, WB Saunders Co., USA, 1977.
2. M.C. Day and J. Selbin, Theoretical Inorganic Chemistry, Van Nostrand Co., New York 1974.
3. Lloyd R. Snyder, Joseph J. Kirkland & Joseph L. Glajch, Practical HPLC Method development, 2nd
Edition, Wiley Interscience, 2001.

TEXT BOOKS:

1. K.F. Purcell, and J.C. Kotz, Inorganic Chemistry the University of Michigan, 2010.
2. G. N. Mugerjee and Arabinda Das, Elements of Bioinorganic Chemistry, U. N. Dhur & Sons Pvt. Ltd., 1993.
3. M. Satake and Y. Mido, Bioinorganic Chemistry, Discovery Publishing House, New Delhi, 1996.

REFERENCE BOOKS:

1. G. Eichron, "Inorganic Bio-chemistry", Vol. I and II, Elsevier, 1973.
2. J. Huheey, "Inorganic Chemistry", Harper and Collins, IV Edition, New York, 1983.

Course Objective

To study the types of polymerization, polymerization techniques, crystallinity in polymers, applications of polymer, polymer degradation and additives for polymers.

UNIT I Basic Concepts of Polymers 09

Monomer, Repeating unit, degree of polymerization. Classification of polymers, Stereochemistry of polymer, nomenclature of stereo regular polymers. Types of polymerization - Chain polymerization, free radical polymerization; ionic polymerization; Coordination polymerization and Ziegler Natta catalyst.

UNIT- II Types of Polymerisation 09

Step polymerization, ring opening polymerization. Co polymerization, random, block and graft co polymers- preparation. Plastics – Types of plastics - Rubber – Natural and synthetic rubber - Vulcanisation of rubber.

Polymerisation techniques; bulk, solution, suspension and emulsion polymerization.

UNIT- III Molecular Weight and Glass Transition Temperature 09

Measurement of molecular weight and size; number average and weight average molecular weights. Glass transition temperature, concepts of glass transition temperature and associated properties.

UNIT- IV Glassy Solids and Polymer Crystallization 09

Glassy solids and glass transition, factors influencing glass transition temperature (T_g).

Crystallinity in polymers; Polymer crystallization, structural and other factors affecting crystallisability, effect of crystallinity on the properties of polymers.

UNIT –V Types of Polymers and Polymer Degradation 09

Synthetic resins and plastics; Manufacture and applications of polyethylene, PVC, Teflon, poly styrene, polymethylmethacrylate, poly urethane, phenol – formaldehyde resins, urea- formaldehyde resins and epoxy polymers.

Polymer degradation: Types of degradation- thermal, mechanical, photo, hydrolytic and oxidative degradations. Additives for polymers: Fillers, plasticizers, thermal stabilizers, photo stabilizers, anti oxidants and colourants.

TOTAL: 45hrs

Course Outcome:

- To know about basic ideas of polymers like monomer, repeat unit and degree of polymerization.
- To learn about the stereochemistry and nomenclature of polymers.
- To understand the various types of polymerization.
- To know the preparation and polymerization techniques.
- To understand the number average and weight average molecular weights.

TEXT BOOKS:

1. Fred. W. Billmeyer, Text Book of Polymer Science, John Wiley & Sons, 3rd Edition, 2007.
2. R. V. Gowariker, Polymer Science, New Age International Publication, 2006.

REFERENCE BOOKS:

1. R. J. Young and P. A. Powell, Introduction to Polymers, CRC Press, 3rd Edition, 1991.
2. A. Ravve, Principles of Polymer Chemistry, Springer New York, 3rd Edition, 2012.

TEXT BOOK:

- 1 S. K. Jain and V. Soni, Bentley's Textbook of Pharmaceutics, An Adaptation- Elsevier, 2012.

REFERENCE BOOK:

1. C. B. Gupta and S. S. Khanka, Entrepreneurship and Small Business Management, Sultan Chand & Sons, New Delhi, 2012.

Course Objective: To learn about Mean ionic activity and mean ionic activity coefficient, Electrode, Symmetry elements and Character table- Construction of Character table for C_{2V} and C_{3V} point group.

UNIT I Electro Chemistry-I 12

Mean ionic activity and mean ionic activity coefficient – concepts ionic strength. Nernst equation- redox system- electrochemical cell- Electrolytic conductance- Kohlraush's law and its applications, ionic equilibria. Debye- Huckel theory of strong electrolytes – Determination of activity coefficient by electrical method –Debye-Huckel limiting law qualitative and quantitative verification – Limitation of Debye –Huckel theory at appreciable concentration – Huckel equation – Debye- Huckel –Bronsted equation.

UNIT II Electro Chemistry-II 12

Electrode –electrolyte interface – adsorption at electrified interface- electrical double layer – Electrocapillary phenomenon – Lippmann Equation – Structure of double layers – Helmholtz – Perrin-Guoy-Chapman and Stern model of electrical double layers.Mechanism of electrode reaction – Polarisation and overpotential – the Butler Volmer equation for one step and multi step electron transfer reaction – Significance of exchange current density and symmetric factor-transfer coefficient and its significance – Mechanism of the hydrogen and oxygen evolution reactions.

UNIT III Group Theory- I 12

Symmetry elements and symmetry operations – Mathematical rules for the formation of a group- Definition and classification of Point groups – Identification and determination – Matrix representations- Reducible and irreducible representations- Similarity transformation - Orthogonality theorem and its consequences.

UNIT IV Group theory-II 12

Character table- Construction of Character table for C_{2V} and C_{3V} point group. Determination of symmetry of hybrid orbitals-Symmetry of hybrid orbitals in non linear molecules ($H_2O, CH_4, XeF_4, BF_3, SF_6$ and NH_3).

UNIT V Group theory-III**12**

Molecular vibrations -Direct product representation-Determination – IR and Raman activity of vibrational modes in non linear molecules (H_2O , CH_4 , XeF_4 , BF_3 , SF_6 and NH_3). Mutual exclusion principle. Symmetry selection rules of infrared and Raman Spectra. Selection rules for electronic transitions. Symmetry of molecular orbitals and electronic states of HCHO . Selection rules for electronic transitions of HCHO .

TOTAL: 60h**Course Outcome:**

- To learn the electrochemical cell and electrolytic conductance.
- To determine the activity coefficient by electrical method.
- To understand the mechanism of electrode reaction.
- To know about the mechanism of hydrogen and oxygen evolution reactions.
- To define and classify the point groups.

TEXT BOOKS:

1. Ramakrishnan and M.S Gopinathan, Group Theory in Chemistry, Vishal Publishing Co., 1988.
2. K.V.Raman, Group theory and its applications to Chemistry, Tata McGrawHill, 1990.

REFERENCE BOOKS:

1. J.O.M.Bokris & A.K.N.Reddy, Electrochemistry, Plenum, New York, Vol 1 & 2, 1977.
2. P. Delahay, Electrode kinetics & Structure of double layer, Interscience, New York, 1965
3. Robbins, Ions in solution, An introduction in electrochemistry, Clarendon press, Oxford, 1993.

NOVEL MATERIALS AND GREEN INDUSTRIAL CATALYSIS 4 0 0 4

Course Objective: To learn about some important functional materials and novel materials, properties of metallic clusters, characterization techniques, catalysts in chemical transformation of functional and novel materials.

Unit 1 Introduction to Functional and Nanomaterials 12

An overview-, materials, molecular materials, functional materials, nanomaterial's classification /properties and industrial applications.

Unit II Properties of Metallic clusters 12

Supported metallic clusters, Catalysts preparation method, physical and chemical properties. Catalysis mechanism uses and synthetic applications

Unit III Characterization 12

Tools for Structural Characterization of novel materials by UV-Visible spectroscopy, Infrared spectroscopy, Nuclear magnetic resonance spectroscopy and mass spectrum

Unit IV Metal Oxides 12

Various types of Metal oxides and basic concept of metal oxides, Supported metal oxides, Industrial catalysis (Synthesis Gas and Hydrogen).

Unit V Catalysts in chemical transformation 12

Ammonia Synthesis, Methanol and Fischer – Tropsch Synthesis, Hydrocarbon Transformations, Environmental Catalysis.

TOTAL: 60h

Outcomes:

- To overview the functional and nanomaterial
- To know about the classification and industrial applications of nanomaterial
- To familiarize the preparation and properties of metallic clusters
- To understand the tools used for structural characterization of novel materials
- To know the metal and supported metal oxides

TEXT BOOK:

1. Harry R. Allcock, Introduction to Materials Chemistry, Wiley Interscience Publisher.

REFERENCE BOOK:

1. Bradley D. Fahlman, Materials Chemistry 2nd ed. Springer Publisher, 2011.

Course Objective: To know about mean ionic activity and mean ionic activity coefficient, Electrode – electrolyte interface, Interaction of matter with radiation and Equation of motion of spin in magnetic fields –Chemical shift – spin-spin coupling –NMR of simple AX and AMX type molecules.

UNIT I Electro Chemistry-I 12

Mean ionic activity and mean ionic activity coefficient – concepts ionic strength. Nernst equation- redox system- electrochemical cell- Electrolytic conductance- Kohlraush’s law and its applications, ionic equilibria. Debye- Huckel theory of strong electrolytes – Determination of activity coefficient by electrical method –Debye-Huckel limiting law qualitative and quantitative verification – Limitation of Debye –Huckel theory at appreciable concentration – Huckel equation – Debye- Huckel –Bronsted equation.

UNIT II Electro Chemistry-II 12

Electrode –electrolyte interface – adsorption at electrified interface- electrical double layer – Electrocapillary phenomenon – Lippmann Equation – Structure of double layers – Helmholtz – Perrin- Guoy-Chapman and Stern model of electrical double layers.

UNIT III Electro Chemistry-II 12

Mechanism of electrode reaction – Polarisation and overpotential – the Butler Volmer equation for one step and multi step electron transfer reaction – Significance of exchange current density and symmetric factor-transfer coefficient and its significance – Mechanism of the hydrogen and oxygen evolution reactions.

UNIT IV Spectroscopy-I 12

Interaction of matter with radiation – Einstein’s theory of transition probability – rotation spectroscopy of a rigid rotor – non- rigid rotor – di atomic and poly atomic molecules. Vibrational spectroscopy – harmonic Oscillator – anharmonicity – Vibrational spectra of poly atomic molecules- Vibrational frequencies - group frequencies – Vibrational coupling overtones – Fermi resonance. Raman Spectra.

UNIT V Spectroscopy-II 12

Equation of motion of spin in magnetic fields –Chemical shift – spin-spin coupling –NMR of simple AX and AMX type molecules –calculation of coupling constants- ^{13}C , ^{19}F , ^{31}P NMR spectra – applications – a brief discussion of Fourier transform resonance Spectroscopy.

TOTAL: 60h

Course Outcome:

- To overview the functional and nanomaterial
- To know about the classification and industrial applications of nanomaterial
- To familiarize the preparation and properties of metallic clusters
- To understand the tools used for structural characterization of novel materials
- To know the metal and supported metal oxides

TEXT BOOKS:

1. S. Glasstone, "Introduction to Electrochemistry", Affiliated East West Press, New Delhi, 1960.
2. D. R. Crow, "Principles and Applications to Electrochemistry", Chapman and Hall, 1991.

REFERENCE BOOKS:

1. P. H. Rieger, Electrochemistry, Chapman and Hall, New York, 1994.
2. G. Aruldas, Molecular Structure and Spectroscopy, Prentice Hall, 2002.
3. G. M. Barrow, Introduction to Molecular Spectroscopy, McGraw Hill, New York, 1962.

Syllabus

Generic Elective Courses

TEXT BOOKS:

1. Barun K. Mitra, "Personality Development and Soft Skills". Oxford University Press. New Delhi. 2011.
2. S.P. Sharma, "Personality Development", Pustaq Mahal. New Delhi. 2010.

REFERENCE BOOKS:

1. Meenakshi Raman and Sangeetha Sharma, "Technical Communication", Oxford University Press. New Delhi, 2009.
2. A.S. Hornby: "Oxford Advanced Learner's Dictionary of Current English", Oxford University Press, 2007

SOFT SKILL II

1 0 2 2

Course Objective: To provide basic information about presentation skill and train the students for letter writing, creation of resume and develop the interview skills. To provide information about the Process, types and patterns of communication.

Unit I Presentation Skills 09

General presentation methods and developing presentation skill

Unit II Soft skills (Time Management, Stress Management and Body Language) 09

Time management: Importance, Plan and Execution, Default reason and rectification methods. Stress Management: Stress Impacts over Efficiency and how to manage. Body Language: Its importance and need

Unit III Resume / Report / Letter Writing 09

Resume: Basic components of a resume, Preparation of a resume, Types of resume Report: How to prepare reports, reports components and structure Letter writing: types of letters, framing letters, basic structure, how to draft a letter

Unit IV Frequently asked Questions 09

Unit V Interview Skills 09

Aims of Interview expectations and how to fulfill, developing skills

TOTAL: 45 h

Course Outcome:

- Self introduction and role play facilitate cultivation firmness of mind and empathy
- Group discussion infuses team spirit and sense of competition
- Listening regenerates transformation empathetically
- Cloze exercises provide support to build vocabulary
- Implementation of assertive thoughts can be acquired through writing skills

TEXT BOOKS:

1. Barun K. Mitra, "Personality Development and Soft Skills". Oxford University Press. New Delhi. 2011.
2. S.P. Sharma, "Personalilty Development", Pustaq Mahal. New Delhi. 2010.

REFERENCE BOOKS:

1. Meenakshi Raman and Sangeetha Sharma, "Technical Communication", Oxford University Press. New Delhi, 2009.
2. A.S. Hornby: "Oxford Advanced Learner's Dictionary of Current English" Oxford University Press, 2007

Course Objective:

To train the students to use eco-friendly approaches in synthesizing agro-based chemicals viz. insecticides, fungicides, herbicides, bactericides acaricides, weedicides to emphasize green chemistry approach in crop protection which help to reduce global warming.

UNIT-I Introduction**06**

Current status of chemistry and the Environment-Evolution of the Environmental movement: Public awareness - Dilution is the solution to pollution-Pollution prevention

UNIT- II Green Chemistry**06**

Definition – Principles of Green Chemistry - Why is this new area of Chemistry getting to much attention - Why should chemist pursue the Goals of Green Chemistry - The roots of innovation – Limitations

UNIT- III Green Chemistry using Bio Catalytic Reactions**06**

Introduction - Fermentation and Bio transformations - Production of Bulk and fine chemicals by microbial fermentation- Antibiotics – Vitamins - Bio catalyses synthesis of industrial chemicals by bacterial constructs - Future Trends.

UNIT-IV Green House Effect and Global Warming**06**

Introduction - How the green house effect is produced - Major sources of green house gases - Emissions of CO₂ - Impact of green house effect on global climate - Control and remedial measures of green house effect - Global warming a serious threat - Important points

UNIT-V Future Trends in Green Chemistry**06**

Green analytical methods, Redox reagents, Green catalysts; Green nano-synthesis, Green polymer chemistry, Exploring nature, Biomimetic, Proliferation of solvent-less reactions; Non-covalent derivatization, Biomass conversion, emission control.

TOTAL: 30h**Course Outcomes:**

- To understand the connection between common atoms and complex molecules
- To explain and analysing simple chemical reactions
- To distinguishing between recyclable and non-recyclable materials
- To assessing the potential impact of chemical reactions to environment and human health

- To understand the connection at the chemical level between all matter and will develop your inquiry based activities to explore best practices related to organic farming and resource management.

TEXT BOOKS:

1. M. Lancaster, "Green Chemistry: an Introductory Text", RSC, 2002
2. Sheldon, Arends, Hanefeld, "Green Chemistry and Catalysis", Wiley, New York, 2007.

REFERENCE BOOKS:

1. Anastas & Warner, Green Chemistry : Theory & Practice ,Oxford Univ. Press,New York, 1998.
2. S. E. Park, J. S. Chang, S. H. Jhung, "The Role of Catalyst for Green Chemistry", Chemworld, Vol. 44 (8), 38, 2004.

TOTAL: 30 h

Course Outcomes:

- To understand basis of group theory and its applications
- To study Logics, sets and functions
- To get a clear idea on the principles and theories of algorithms, induction Basics and process of photosynthesis
- To understand the Basics of stereochemistry and structure of proteins
- To study History of science and chemical information

TEXT BOOKS:

1. P. Shanmughavel, "Principles of Bioinformatics", Pointer publishers, 2005.
2. Arfken, "Mathematical Methods for Physicists" Academic Press, 1985

REFERENCE BOOKS:

1. P. Shanmughavel, "Trends in Bioinformatics", Pointer publishers, 2006.
2. Francis A. Carey and Richard J. Sundberg, "Advanced Organic Chemistry-Part A & B" Third Edition, 1990.

Course Objective:

To understand the basic information of food chemistry and adulteration, appreciate the importance of food additives and pesticide control and provide an information about food preservatives

UNIT-I Introduction**06**

Food: source, functions of food – food groups – food guide – basic five food groups, usage of the food guide – food in relation to health – objectives of cooking.

Water: Purification processes – Ion exchangers, reverse osmosis, activated charcoal treatment - Use of chlorination, ozone, and UV light disinfection. Specification of drinking water.

UNIT-II Constituents of Foods**06**

Carbohydrates: Classification, Principles involved in the analysis of carbohydrates –estimation of carbohydrates.

Proteins: amino acids – peptides - Analysis of proteins – Separation of amino acids by paper chromatography.

Minerals and vitamins: Sources, functions, deficiency of the following minerals (calcium, iron, iodine, fluorine, sodium and potassium (elementary treatment). Vitamins - classification, sources, Vitamins – A, D, E and K, C, B Complex, - B6 & B12.

UNIT-III Food Additives**06**

Artificial sweeteners – saccharin, cyclamate, aspartame – food flavours – esters, aldehydes and heterocyclic compounds. Antioxidants. Food colours – changes in cooking..Restricted use. Spurious colours. Emulsifying agents, preservatives – leavening agents. Baking powder –Yeast. Taste enhancers – MSG-vinegar

UNIT-IV Pesticides Control**06**

Spoilage of foods by insects and pests, loss in food quantity and quality Various pesticides used in agriculture and post-harvest storage, uses of pesticides for food grain application.

UNIT-V Food Adulteration**06**

Common adulterants in different foods – milk and milk products, vegetable oils, and fats, spices and condiments, cereals, pulses, sweetening agents and beverages. Contamination with toxic chemicals – pesticides and insecticides. .

TOTAL: 30h**Course Outcomes:**

- To know about the basic criteria of food and water standards for consumption
- To get a basic idea about the chemical constituents of food
- To learn about the various food additives, their chemical composition and their permissible level of usage in foods.
- To know about the various organisms which spoil the crops pre and post harvest and their control using pesticides
- To know about the various food adulterants for different types of food and methods to detect those adulteration.

TEXT BOOKS:

1. Owen.R. Fennema, Food Chemistry, Marcel Decker Inc., New York. 1996.
2. M. Swaminathan, Text Book on Food chemistry, Printing and Publishing CO., Ltd., 1993.

REFERENCE BOOKS:

1. B. Siva Sankar, Food Processing and Preservation, Prentice – Hall of India Pvt. Ltd., New Delhi, 2002.
2. S. Ramakrishnan, K. G. Prasannam, R. Rajan, Principles - Text book of medical biochemistry, Orient Longman Ltd., Third Edition, 2001.