SEMESTER I/III			
PART III	**ALLIED CHEMISTRY FOR BIOLOGICAL SCIENCES I**		
Code : 18UCHA11/18UCHA31	**Hrs/Week : 4**	**Hrs/ Sem : 60**	**Credits : 3**

CO No.	**Course Outcomes** **Upon completion of this course, students will be able to**	**PSOs addressed**
CO 1	Account for the filling of electron in orbitals	PSO1, PSO 3
CO 2	Inscribe the electronic configuration of elements	PSO1, PSO 3
CO 3	Recognize conductors, insulators and semiconductors	PSO1, PSO 3
CO 4	Adapt a method to purify organic compounds	PSO1,PSO 3
CO 5	Estimate the amount of Carbon, Hydrogen and sulphur in a sample	PSO 2, PSO 7
CO 6	Evaluate molecular weight of a chemical compound	PSO 6
CO 7	Correlate the importance of colloids in day to day life	PSO 5
CO 8	Develop a basic understanding of emulsions	PSO 1
CO 9	Classify D-glucose, D-fructose, D-mannose and D-galactose	PSO 1
CO 10	Interconvert glucose into fructose and vice versa	PSO 1
CO 11	Identify protein by their colour reactions	PSO 1
CO 12	Record the steps involved in Hoffmann's exhaustive methylation	PSO 6
CO 13	Explicate isoprene rule and its significance	PSO 1

UNIT-I ATOMIC STRUCTURE AND CHEMICAL BONDING

Quantum numbers and their significance- Paul's exclusion principle – Aufbau principle – Hund's rule – Electronic configuration of elements (atomic number 1 to 36)

Lattice energy – Born-Harber cycle–Factors affecting the dissolution of ionic compounds – M.O. Theory of covalent bond – Bonding, antibonding and non bonding orbital – M.O. Configuration of H_2,N_2 ,O_2-Bond order – Band theory of metallic bond- Conductors, insulators, semi conductors- Hydrogen bonding – types and effects – Vander Wall's London forces.

UNIT-II INTRODUCTION TO ORGANIC CHEMISTRY

Definition and importance-Sources of organic compounds-purification of organic compounds-Crystallisation- Fractional crystallisation-Sublimation-Solvent extraction-Soxhlet extraction

Elemental analysis-qualitative analysis of Carbon, Hydrogen, nitrogen, Sulphur and halogen- estimation of Carbon, Hydrogen, Nitrogen-Calculation of empirical formula-Determination of molecular weight by Victor meyer's method, silver salt, Chloroplatinic salt method- Calculation of molecular formula

UNIT- III – COLLOIDS AND EMULSIONS

Definition- Classification of Colloids –comparison of lyophilic and lyophobic colloidsPreparation of sols-Dispersion method(Bredig's Arc method) –Aggregation method(oxidation , reduction, double decomposition)-Properties – Optical(Tyndall effect) – kinetic(Brownian movement) Electrical (electrical double layer) – Coagulation of colloids – Hardy Schulze law- Hoff meister series – protective colloids – gold number – Gels – classification, preparation , properties(imbibition,synerisis and thixotropy). Emulsion – types and their distinction. Emulsifiers – surfactants– applications of colloids-food, medicine, thixotropic paints, clarification of municipal water, formation of delta.

UNIT-IV BIOMOLECULES AND ENZYMES

Carbohydrates- classification- configurations of D-glucose, D-fructose, D-mannose and D-galactose (structures only) – interconversions of glucose and fructose- interconversions of arabinose and glucose-epimerisation- muta rotation- general study of starch and cellulose

Amino acids-classification-essential amino acids-isolation from proteins- peptide linkage- polypeptides. Proteins- classification- colour reactions- structure

Enzymes—Classification of enzymes-enzyme specificity-factors affecting enzyme reaction-Michaeli's-Menton theory- Inhibition of enzyme action-, competitive, non-competitive and uncompetitive- immobilization of enzymes- industrial and medical application of enzymes.

UNIT-V ALKALOIDS AND TERPENES

Alkaloids: Definition – General methods of structure determination – Hoffmann's exhaustive methylation with conine as example - structure and synthesis of piperline and nicotine.

Terpenes: Definition – Claissification –examples – isoprene rule- general methods of structure determination – structure and synthesis of citral and methol.

BOOKS FOR REFERENCE

1. Arun Bahl and B.S.Bahl,Advanced Organic Chemistry,S.Chand and Company Ltd., Reprint 2005.
2. B.R.Puri, L.R.Sharma,K.C.Kalia, Principles of Inorganic Chemistry, Milestone publishers and distributers, Delhi, 2010.
3. Arun Bahl,B.S.Bahl,G.D.Tuli, Essentials of Physical Chemistry, S.Chand &Company Ltd.,New Delhi,2008.
4. Jerry March, Advanced Organic Chemistry, Reactions Mechanisms and Structure, 4th Edition. 2013
5. K.S.Tewari,N.K.Vishnoi,S.N.Mehrotra, A Text Book of Organic Chemistry, 2nd Revised Edition, 1998.
6. B.R. Puri. L.R. Sharma, Madan S. Pathania, Principles of Physical Chemistry, Vishal Publishing Co., 2008.
7. M.K.Jain and S.C.Sharma , Modern Organic chemistry, Vishal Publishing Co., 2017-2018

SEMESTER II/IV			
ALLIED CHEMISTRY II	**ALLIED CHEMISTRY FOR BIOLOGICAL SCIENCES**		
Code : 18UCHA21/18UCHA41	**Hrs/Week : 4**	**Hrs/ Sem : 60**	**Credits : 3**

CO No.	**Course Outcomes** **Upon completion of this course, students will be able to**	**PSOs addressed**
CO 1	Differentiate ores and minerals	PSO 1
CO 2	Explain the methods of purification of ores	PSO 1
CO 3	Know the extracting methods, properties and uses of titanium, vanadium, thorium.	PSO 1
CO 4	Explain the preparation of Titanium tetrachloride, Vanadium pentoxide, Thorium nitrate.	PSO1
CO 5	Sketch the preparation of some industrially important organic compounds such as Freon , rayon , polyester , nylon , thiokol Dacron	PSO1, PSO-5
CO 6	Classify fuels and know its industrial uses	PSO1, PSO 4
CO 7	Sterilize water for domestic use	PSO1
CO 8	Basic knowledge of abrasives	PSO1,PSO 7
CO 9	Describe the role of micro and macro nutrients in plant growth	PSO1
CO 10	Identify the implication of biofertilizers on soil	PSO 1,PSO 5
CO 11	Classify fatty acids as saturated, unsaturated, unusual and essential fatty acids.	PSO 1
CO 12	Analyse Cholesterol and know its biochemical significance	PSO 1

UNIT-I METALLURGY

Ores and Minerals- types of ores – methods of ore dressing- roasting –calcination-reduction(aluminothermic)-smelting-purification by electrolysis and ion exchange method-oxidative refining- zone refining- Kroll process- types of furnaces.

Extraction , properties and uses of titanium-vanadium –thorium.

Preparation of Titanium tetrachloride, Vanadium pentoxide and Thorium nitrate

UNIT II– PREPARATION AND USES OF SOME IMPORTANT ORGANIC COMPOUNDS

Preparation and uses of Formalin , choloroform , Freon , rayon , polyester , nylon , thiokol Dacron , silicone, Bakelite , polythene , urethane , Teflon , PVC , BHC

UNIT-III INDUSTRIAL CHEMISTRY

Fuels-classification-gaseous fuels like water gas ,producer gas, liquefied petroleum gas, gobar gas, compressed natural gas.

Water-Hardness of water-temporary and permanent hardness, disadvantages of hard water-softening of hard water-zeolite process, demineralization process and reverse osmosis-sterilisation of water for domestic use by chlorine, ozone and UV light.

Abrasives-Types of electric furnaces-Manufacture and uses of carborundum, calcium carbide, alundum-Industrial uses of lamp black, carbon black, activated charcoal, wood charcoal, animal charcoal, coke, artificial diamond

UNIT IV AGRICULTURAL CHEMISTRY

Fertilizers – role of micro and macro nutrients in plant growth – characteristics and importance of manures – preparation and uses of urea, ammonium sulphate, CAN, DAP, super phosphate and mixed fertilizers – biofertilizers.

Pesticides – insecticides – fungicides – rodenticides – bactericides and herbicides – preparation and uses of lead arsenate, Bordeaux mixture, zineb, epsam and aluminium phosphide.

UNIT-V LIPIDS

Definition and classification of lipids- Types of fatty acids- saturated, unsaturated, unusual and essential fatty acids- triacyl glycerol number-acid number- RM value-acetyl value-Chemistry of phospholipids-lecithin-cephalin- Cholesterol-tests-structure- (structural elucidation not required)-Biochemical functions of cholesterol-physiological significance.

BOOKS FOR REFERENCE

1. Arun Bahl and B.S.Bahl,Advanced Organic Chemistry,S.Chand and Company Ltd., Reprint 2005.
2. B.R.Puri, L.R.Sharma,K.C.Kalia, Principles of Inorganic Chemistry, Milestone publishers and distributers, Delhi, 2010.
3. Arun Bahl,B.S.Bahl,G.D.Tuli, Essentials of Physical Chemistry, S.Chand &Company Ltd.,New Delhi,2008.
4. Jerry March, Advanced Organic Chemistry, Reactions Mechanisms and Structure, 4^{th} Edition. 2013
5. K.S.Tewari,N.K.Vishnoi,S.N.Mehrotra, A Text Book of Organic Chemistry, 2^{nd} Revised Edition, 1998.
6. B.R. Puri. L.R. Sharma, Madan S. Pathania, Principles of Physical Chemistry, Vishal Publishing Co., 2008.
7. M.K.Jain and S.C.Sharma , Modern Organic chemistry, Vishal Publishing Co., 2017-2018

SEMESTER- III			
Core V	**Physical Chemistry-I**		
Code : 18UCHC31	**Hrs/Week : 4**	**Hrs/ Sem : 60**	**Credits : 4**

Vision:

Explore and enhance new chemical frontiers in physical chemistry.

Mission:

Mould the students to acquire knowledge in the field of nuclear chemistry, Surface Chemistry , phase rule and gaseous states of matter

Course Outcome :

CO No.	Upon completion of this course, students should be able to	PSO addressed	CL
CO- 1	have an overall knowledge about liquid and gaseous states of matter	1,2 , 3	Re
CO- 2	explain the relationship between kinetic energy and temperature of a gas; between temperature and the velocity of a gas; and between molar mass and the velocity of a gas.	1,3	Un
CO- 3	understand the basis of nuclear forces , nuclear stability , radioactivity and nuclear reactions	1,2,4	Un
CO- 4	interpret phase rule	1,3,4	Ev
CO- 5	prioritise the phenomenon of catalysis in industry and biological systems and learn the basic concepts of adsorption and its applications in various walks of life	1 , 2,5,7,8	Ap
CO- 6	enumerate the general characteristics of catalytic reactions and thorough knowledge of the theory behind homogeneous and heterogeneous catalysis	1 ,2,7	Re
CO- 7	distinguish adsorption/desorption and the kinetics of catalytic reactions on a surface.	3,4,5,7,8	An
CO- 8	justify the significance of Freundlich, Langmuir isotherms and BET isotherm	1,2	Ev

SEMESTER- III			
Core V	Physical Chemistry-I		
Code : 18UCHC31	Hrs/Week : 4	Hrs/ Sem : 60	Credits : 4

Unit I Gaseous State

Kinetic theory of gases – justification of postulates-derivation of kinetic gas equation-deduction of gas laws from the kinetic gas equation-Charle's law, Boyle's law, Avogadro's law, ideal gas equation – Dalton's law of partial pressure – Graham's law of diffusion- kinetic theory and temperature – Maxwell's law of distribution of velocities (no derivation) –types of molecular velocities – graphical representation and its significance- collision diameter – collision number – collision frequency – mean free path – viscosity of gases-calculation mean free path and collision diameter from Chapman equation- deviations from ideal behavior-compressibility factor- effect of pressure and temperature on deviation-explanation of deviation-volume correction-pressure correction – Van der Waal's equation—limitations-liquefaction of gases-critical phenomenon—Andrew's isotherms of CO_2- Van der Waal's equation and critical constants-experimental determination- law of corresponding states.

Unit II Nuclear Chemistry – I

Nuclear size- Nuclear Forces – Packing Fraction – mass defect and binding energy – mass energy relation – stability of nucleus – n/p ratio – odd even rule – magic numbers – nuclear models (Shell model and liquid drop model) – Types of radioactive decay – Radioactive series – k electron capture and internal conversion- group displacement law – detection and measurement of radioactivity by G.M Counter – rate of decay – half life and average life – Geiger Nuttal rule – radioactive equilibrium – nuclear isomerism

Unit III Nuclear Chemistry – II

Artificial radioactivity – different types of artificial radioactivity – Nuclear reactions (elastic, inelastic, scattering and spallation) – Nuclear Fission and atom bomb – Nuclear Fusion and hydrogen bomb –Stellar energy – fertile and fissile isotopes – Neutron activation analysis – Application of radioactive isotopes in medicine, reaction mechanism and carbon dating – Nuclear reactor –and its components – fast breeder reactors – Nuclear power reactors in India – Particle accelerators (Cyclotron, Synchrotron)- Chemistry of Hot atom – Radiation Dosimetry – Hazards and precautions in Nuclear Technology

Unit IV Phase Rule

Statement – definitions of terms used – thermodynamic derivation of phase rule –phase diagrams- areas- curves- triple point- meta stable equilibrium- polymorphism-enantiotropy-monotropy- -experimental determination of transition point –colour change,density change,-solubility change, and cooling curve methods.

One component system-water system, Sulphur system -two component system – condensed system and reduced phase rule – simple eutectic system – Ag-Pb system –Pattinson's process for the desilverisation of argentoferrous Lead –Zn-Cd system -principles of freezing mixture –

KI-H_2O -system forming compounds with congruent and incongruent melting points – (Zn – Mg system, $FeCl_3$ – H_2O system)

Unit V Surface Chemistry

Adsorption – types- physisorption and chemisorption – adsorption of gases by solids- adsorption isotherm – derivation and significance of Freundlich and Langmuir isotherms – BET isotherm (no derivation) – applications of adsorption – adsorption indicator- heterogenous catalysis-froath floatation process-

Catalysis - General characteristics of catalytic reactions – acid-base catalysis and enzyme catalysis– Fischer Lock and key theory – characteristics of enzyme catalysis. Mechanism and kinetics of enzyme catalysed reaction (Michaelis-Menton equation). Activation energy and catalysis – theories of homogeneous and heterogeneous catalysis – mechanism of the hydrogenation of ethene on nickel surface. Acid base catalysis – mechanism – promoters – promotion action – examples of catalytic poisoning – negative catalysis – mechanisms of negative catalysis, autocatalysis and photocatalysis.

Text Books

1. B.R.Puri. L.R. Sharma, Madan S. Pathania, Principles of Physical Chemistry, Vishal Publishing Co., 2008.
2. Arun Bahl, B.S. Bahl, G.D. Tuli, Essentials of Physical Chemistry, S. Chand & Company Ltd., New Delhi, 2008.

Books for Reference

1.Sadhan Kr.Dutta, Principles of Physical Pharmacy and Biophysical Chemistry, Books and Allied (P) Ltd. Kolkata, 2007

2. P.L.Soni, O.P.Dharmaha,Text Book of Physical Chemistry(A Modern Approach), Sultan Chand and Sons Publishers, Revised Edition, 2010.

3.Iran.Levine,Physical Chemistry,Mc Graw Hill, Kogakusha Ltd. 1978.

SEMESTER- IV			
Core VI	**Organic Chemistry-II**		
Code :18UCHC41	**Hrs/Week:4**	**Hrs/ Sem: 60**	**Credits:4**

Vision:

Acquire adequate knowledge to design a reaction in organic chemistry

Mission:

- Know the chirality of molecules and understand the stereoisomerism
- Study the conformational analysis
- Appreciate the application of organometallic compounds in synthesis

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO - 1	interpret the elements of symmetry, chirality	1	Un
CO - 2	explain the rules of stereochemical configuration to perspective drawings, Newman projections and Fischer projections Apply the Cahn Ingold Prelog rule for ascertaining the geometric configuration (cis or trans and/or E or Z) of disubstituted cycloalkanes	2	Un, Ap
CO - 3	define Sachse Mohr theory – Newman projection ,Sawhorse & Fischer formulae Know about the conformational analysis	1	Re
CO - 4	classify carbohydrates and compare and contrast the reactions and structure of glucose and fructose Illustrate the structure and reactions of carbohydrates	5,6	Un
CO - 5	discuss epimerization and mutarotation	1	Un
CO - 6	demonstrate various Theories of colour and constitution, know the applications of dyes .	1	Ap, Re
CO - 7	synthesize and Characterize acetoaceticester, malonic ester and cyanoacetic ester	5,7	Cr
CO - 8	recall the preparation of NBS and wilkinsons catalyst Prepare reagents in organic synthesis like Lithium Aluminium hydride, Periodic acid, Sodamide, Selenium dioxide, lead tetra acetate, Osmium tetraoxide, Raney nickel, Sodium borohydride	3, 8 4	Re Cr

SEMESTER- IV			
Core VI	**Organic Chemistry-II**		
Code :18UCHC41	**Hrs/Week:4**	**Hrs/ Sem: 60**	**Credits:4**

Unit - I Stereochemistry

Stereoisomerism – Optical activity of compound with one and two chiral centres. Elements of symmetry – Plane of symmetry, axis of symmetry and centre of symmetry. Enantiomers and diastereo isomers (d, 1 and meso forms) with examples – asymmetric and dissymmetric molecules. Cahn Ingold Prelog conversion DL and RS configuration.-notations for compounds containing more than one asymmetric C-atoms racemisation and methods of resolution of racemic mixture – Walden inversion – Stereochemistry of diphenyl compounds, allenes and spiranes with examples. Geometrical isomerism – Definition – cis – trans and syn – anti concept E-Z notation. Determination of configuration – Method of cyclisation – Conversion of a compound into known configuration.

Unit – II Conformational Analysis

Definition – Bayer's strain theory – Sachse Mohr theory – Newman projection ,Sawhorse & Fischer formulae - difference between conformation and configurations. Conformation analysis of ethane, 1,2 – dichloro ethane and cyclohexane (boat form, Chair form)—dihedral angle (torsional angle) – factors affecting stability of conformation – Dipole - Dipole interaction, bond opposite strain- factors affecting conformational stability.

Unit- III Carbohydrates

Introduction and classification – laboratory and industrial preparation of glucose and fructose – reactions of glucose and fructose – structure of glucose and fructose – open chain and ring structure – epimerisation – mutarotation – interconversion of glucose and fructose and vice versa – ascending and descending the series – (Kiliyani & Wohl's synthesis). Manufacture of sucrose – Structure of maltose, lactose and sucrose (elucidation not included) – Starch and cellulose – reactions –uses – differences between starch and cellulose.

Unit-IV Active Methylene Compounds & Dyes

Active methylene compounds –preparation, synthetic applications of acetoaceticester, malonic ester and cyanoacetic ester

Dyes-Witt's theory of colour and constitution – chromophore – Auxochrome –classification of dyes according to chemical structure – preparation and uses of Nitrodyes – Martius yellow. Azo dyes – Aniline yellow, Methyl orange, Congo red, Bismark brown,
Diphenylmethane dyes- Auramine O. Xanthene dyes – Fluorescein, Eosin and Rhodamine B. Phthalein dyes – Phenolphthalein. Indigo and Thioindigoid dyes – Indigo and Thioindigo. Anthraquinoid dyes – Alizarin.
Classification of dyes according to method of application-Direct dyes, Mordant dyes, Vat dyes, Ingrain dyes and Disperse dyes.

Unit-V Synthetic Reagents

Preparation and synthetic applications of the following reagents in organic synthesis – Aluminium isopropoxide, N-Bromo succinimide (NBS), Lithium Aluminium hydride, Periodic acid, Sodamide -Selenium dioxide- lead tetra acetate-Osmium tetraoxide- Raney nickel-Sodium borohydride- Wilkinson's catalyst.

Text Books

1. K.S.Tewari,N.K.Vishnoi,S.N.Mehrotra, A Text Book of Organic Chemistry, 2nd Revised Edition, 1998.
2. Arun Bahl and B.S.Bahl, Advanced Organic Chemistry,S.Chand and Company Ltd., Reprint 2005.

Books for Reference

1. Ernest l. Eliel, Stereochemistry of Organic compounds,Tata McGRAW –Hill Publication company Ltd., New Delhi, 1975
2. D. Nasipuri, Stereochemistry of Organic Compounds - Principles and Applications, New Age International Publishers, 1994
3. P. S. Kalsi, Stereochemistry -Conformation and Mechanism, New Age International Publishers, 1994
4. M.K.Jain and S.C.Sharma , Modern Organic chemistry, Vishal Publishing Company, 2008.
5. Jerry March, Advanced Organic Chemistry, Reactions Mechanisms and Structure, 4th Edition. 2013
6. N.Tewari, Advance Organic Reaction mechanism Books and allied (P) Ltd. Kolkata 700010 India Second revised edition 2005

SEMESTER III			
Core Skill Based	**Agricultural Chemistry and Water Management**		
Code :18UCHS31	**Hrs./Week:4**	**Hrs/ Sem : 60**	**Credits:4**

Vision

Facilitate the students to know the basic knowledge about agriculture and soil

Mission

- Realize the importance of agriculture
- Understand the chemistry behind fertilizers and pesticides
- Idea to create vermincompost
- Analyze the quality of drinking water

Course Outcome

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO - 1	understand the importance of soil its constituents, fertility and to promote agriculture.	1, 7	Un
CO - 2	know the preparation and importance of fertilizers in agriculture	1, 7	Re
CO - 3	realize the importance of pesticides and insecticides	1, 7	Ap
CO - 4	understand the water quality standards and water quality parameters.	2, 3, 7	Un
CO - 5	aware of the harmful effects of pollutants Produce vermi compost and gobar gas	2, 3, 8	An,Cr
CO - 6	understand the processes used for purification of municipal water	4	Un
CO - 7	treat waste water by using different methods	4, 7, 8	Cr
CO - 8	estimate the amount of carbonate, chloride, nitrate, phosphate, zinc and calcium present in soil.	4, 7	Ap

SEMESTER III			
Core Skill Based Agricultural Chemistry and Water Management			
Code :18UCHS31	Hrs/Week:4	Hrs/ Sem 60	Credits:4

Unit I Soil Nature and Plant Nutrients

Saline, alkali and acid soils. Buffering capacity of soil - Soil reclamation. Liming of soil – measurement of soil pH - Soil fertility – essential plant nutrients and their functions – deficiency symptoms – macro and micro nutrients & their functions. Natural and synthetic manures-qualities of a good fertilizer- classification of fertilizers – nitrogeneous fertilizers - Preparation and importance of urea, calcium cyanamide - phosphatic fertilizers - preparation and importance of super phosphate, triple super phosphate- potash fertilizers - preparation and importance of potassium chloride and potassium nitrate -complex fertilizers - preparation and importance of DAP, mixed fertilizers (NPK) and human effluent from gobar gas plant as a manure. Vermiculture -vermi compost.

Unit II Pesticides

Pesticides, Insecticides, Repellants, Fungicides- Definition-classification – on the basis of their mode of action, target organisms they control, method of application- environmental hazards - preparation and uses of DDT, BHC, lead arsenate, bordeaux mixture, dithiocarbamates.

Unit III Water Quality Parameters

Water quality standard for drinking water (WHO)- Water quality parameters-pH, EC, alkalinity, Total acidity, hardness, DO, BOD, COD, salinity, nitrate (Methaemoglobinemia), phosphate and fluoride content – Eutrophication- Toxic metals - Heavy metal pollution –Hg, As, and Cd. Case studies (Minamata, arsenic poison in West Bengal, Itai-itai)

Unit IV Water Treatment

Waste water treatment-methods and equipments used-preliminary treatment (screening, skimming) - primary treatment (sedimentation, coagulation) - secondary treatment (trickling filters, oxidation pond, anaerobic digestion)-tertiary treatment (adsorption, ion-exchange, reverse osmosis, electrodialysis, disinfection)-treatment of water of municipal purposes-domestic sewage treatment-industrial waste water treatment.

Unit V LABORATORY WORK (Using Water analyzer and HPLC)

(Internal Evaluation Only)

1. Analysis of carbonate, chloride, nitrate, phosphate, zinc and calcium in soil.
2. Determination of Total Organic Carbon (TOC) in soil.
3. Determination of pH and conductivity of water from different sources.
4. Determination of DO, COD and hardness of water.
5. Samples will be collected from agro ecosystem. Presence of pesticides are recorded / Analysis using HPLC

Industrial Visit

A visit may be made to an industry or a premier institution.

*A report of the industrial visit may be submitted as an assignment.

Text Books

1. Text Book of pharmaceutical chemistry Jayashree Ghosh S.Chand and company, New Delhi 2003

2. K.Bagavathi Sundari, Applied Chemistry , MJP Publishers.2008

Books for Reference

1.B.K.Sharma, Industrial Chemistry, Goel Publishing House, Fifth Edition., 1993-94

2.P.S. Sindhu, Environmental Chemistry, New Age International Publishers.2010