SRI DURGA MALLESWARA SIDDHARTHA MAHILA KALASALA : VIJAYAWADA-10
(An Autonomous college in the jurisdiction of Krishna University, Machilipatnam)

CHEMISTRY	**CHET11A**	**2020-21**	**B.Sc., MPC, MCCS, BZC, FMC,AZC**

SEMESTER – I **Course I** No.of credits:4

INORGANIC &PHYSICAL CHEMISTRY (NEW SYLLABUS)

60 hrs. (4h/w)

(Online-36hrs & offline-24hrs)

INORGANIC CHEMISTRY ***24 h***

UNIT –I

Chemistry of p-block elements **8h**

1.1 Group 13: Preparation & structure of Diborane, Borazine **(2h)**
1.2 Group 14: Preparation, classification and uses of silicones **(2h)**
1.3 Group 15: Preparation & structures of Phosphonitrilic halides {$(PNCl_2)_n$ where n=3, 4 **(1h)**
1.4 Group 16: Oxides and Oxo acids of Sulphur (structures only) **(2h)**
1.5 Group 17: Pseudo halogens, Structures of Inter halogen compounds **(1h)** .

UNIT-II

1. Chemistry of d-block elements: (online teaching) ***6h***

2.1 Characteristics of d-block elements with special reference to electronic configuration, **(2h)**
2.2 variable valence, magnetic properties, catalytic properties **(2h)**
2.3 Ability to form complexes. Stability of various oxidation states. **(2h)**

2. Chemistry of f-block elements: (online teaching) ***6h***

2.4. Chemistry of lanthanides - electronic structure, oxidation states, lanthanide contraction, consequences of lanthanide contraction, **(2h)**
2.5 Magnetic properties. Chemistry of actinides - electronic configuration, oxidation states, **(2h)**
2.6 actinide contraction, comparison of lanthanides and actinides. **(2h)**

3. Theories of bonding in metals: (online teaching) ***4h***

2.7 Valence bond theory and free electron theory, explanation of thermal and electrical conductivity of metals based on these theories, **(2h)**
2.8 Band theory- formation of bands, **(1h)**
2.9 Explanation of conductors, semiconductors and insulators. **(1h)**

PHYSICAL CHEMISTRY ***36h***

UNIT-III : Solid state (online teaching) **10h**

3.1 Symmetry in crystals. Law of constancy of interfacial angles. **(2h)**
3.2 The law of rationality of indices. The law of symmetry. Miller indices, **(2h)**
3.3 Definition of lattice point, space lattice, unit cell. Bravais lattices and crystal systems. **(2h)**
3.4 X-ray diffraction and crystal structure. Bragg's law. Powder method. Defects in crystals. **(2h)**
3.5 Stoichiometric and non-stoichiometric defects. **(2h)**

UNIT-IV

1. Gaseous state **6h**

4.1 Vander Waal's equation of state. Andrew's isotherms of carbon dioxide, continuity of state. **(2h)**
4.2 Critical phenomena. Relationship between critical constants and Vander Waal's constants. **(2h)**
4.3 Law of corresponding states. Joule-Thomson effect. Inversion temperature. **(2h)**

2. Liquid state (online teaching) ***4h***

4.4 Liquid crystals, Mesomorphicstate. Differences between liquid crystal and solid/liquid. **(1h)**

4.5 Classification of liquid crystals into Smectic and Nematic. **(2h)**

4.6 Application of liquid crystals as LCD devices. **(1h)**

UNIT-V

Solutions, Ionic equilibrium& dilute solutions

1. Solutions (online teaching) 6h

5.1 Azeotropes- HCl-H2O system and ethanol-water system. Partially miscible liquids-phenol-water system. **(2h)**

5.2 Critical solution temperature (CST), Effect of impurity on consulate temperature. Immiscible liquids and steam distillation. Nernst distribution law. **(2h)**

5.3 Calculation of the partition coefficient. Applications of distribution law. **(2h)**

2. Ionic equilibrium 3h

5.4 Ionic product, common ion effect, solubility and solubility product. **(2h)**

5.5 Calculations based on solubility product. **(1h)**

3. Dilute solutions 7h

5.6 Colligative properties- RLVP, Osmotic pressure, Elevation in boiling point and depression in freezing point. **(3h)**

5.7 Experimental methods for the determination of molar mass of a non-volatile Solute using osmotic pressure. **(2h)**

5.8 Elevation in boiling point and depression in freezing point. Abnormal colligative properties. Van't Hoff factor. **(2h)**

1. .

List of text books

1. A Text book of Physical Chemistry by K. L. Kapoor
2. A Text book of Inorganic Chemistry by A.K.DE
3. A Text book of Physical Chemistry by Arun Bahl , B.S.Bahl & G.D.Tuli
4. A Text book of physical chemistry by S Glasstone
5. A Textbook of qualitative inorganic analysis by A.I. Vogel
6. Telugu Academy Book
7. Unified Chemistry by O.P.Agarwal-Vol-I

List of Reference Books

1. Principles of physical chemistry by Prutton and Marron
2. Solid State Chemistry and its applications by Anthony R. West
3. Inorganic Chemistry by J.E.Huheey
4. Basic Inorganic Chemistry by Cotton and Wilkinson
5. Atkins,P.W.&Paula,J.deAtkin'sPhysicalChemistryEd.,OxfordUniversityPress 10thEd(2014).
6. Castellan, G.W. PhysicalChemistry4thEd.Narosa(2004).
7. Mortimer,R. G.PhysicalChemistry3rdEd. Elsevier:NOIDA,UP(2009).
8. Barrow,G.M.PhysicalChemistry

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CHEMISTRY	**CHEP11A**	**2020-21**	**B.Sc., MPC, MCCS, BZC, FMC,AZC**

PRACTICAL-I **30**hrs (2 h / w)
No.of credits:1

LABORATORY COURSE -I

ANALYSIS OF SALT & MIXTURE

(At the end of Semester-I)
Qualitative inorganic analysis (Minimum of Six mixtures should be analysed)

50 M

Analysis of SALT MIXTURE ***50 M***

Analysis of mixture salt containing two anions and two cations (From two different groups) from the following:
Anions: Carbonate, Sulphate, Chloride, Bromide, Acetate, Nitrate, Borate, Phosphate**. Cations:** Lead, Copper, Iron, Aluminium, Zinc, Nickel, Manganese, Calcium, Strontium, Barium, Potassium and Ammonium**.**

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CHEMISTRY	**CHET21 A**		**2020-21**	**B.Sc., MPC, MCCS, BZC, FMC,AZC**

SEMESTER – II **Course II**

No.of credits:4

ORGANIC & GENERAL CHEMISTRY (NEW SYLLABUS) **60 hrs. (4h/w)**

(Online-36hrs & 24hrs)

ORGANIC CHEMISTRY **36h**

UNIT-I

Recapitulation of Basics of Organic Chemistry

Carbon-Carbon sigma bonds (Alkanes and Cycloalkanes) **12h**

1.1 General methods of preparation of alkanes- Wurtz and Wurtz - Fittig reaction, Corey House synthesis, physical and chemical properties of alkanes, Isomerism and its effect on properties. **(4h)**

1.2 Free radical substitutions; Halogenation, concept of relative reactivity v/s selectivity. **(2h)**

1.3 Conformational analysis of alkanes (Conformations, relative stability and energy diagrams of Ethane, Propane and butane). **(Online teaching)** **(3h)**

1.4 General molecular formulae of cycloalkanes and relative stability, Baeyer strain theory, Cyclohexane conformations with energy diagram,
Conformations of mono substituted cyclohexane. **(Online teaching)** **(3h)**

UNIT-II

Carbon-Carbon pi Bonds (Alkenes and Alkynes) **12h**

2.1 General methods of preparation, physical and chemical properties. **(2h)**

2.2 Mechanism of E1,E2,E1CB reactions, Saytzeff and Hoffmann eliminations, Electrophilic Additions, mechanism(Markownikoff / Antimarkownikoff addition) with suitable examples, *syn* and *anti*-addition; addition of H2,X2, HX. oxymercuration-9, demercuration , hydroboration-oxidation, ozonolysis, Hydroxylation ,
Diels alder reaction , 1,2 and 1,4 addition reaction in Conjugated Dienes. **(6h)**

2.3 Reactions of alkynes; acidity, electrophilic and nucleophilic additions, hydration to form carbonyl compounds, Alkylation of terminal alkynes. **(4h)**

UNIT-III

Benzene and its reactivity **12h**

3.1 Concept of aromaticity, Huckel's rule - application to Benzenoid (Benzene, Naphthalene) and Non - Benzenoid compounds (cyclopropenylcation, cyclopentadienyl anion and tropyliumcation) **(Online teaching)** **(3h)**

3.2 Reactions - General mechanism of electrophilic aromatic substitution, mechanism of nitration, Friedel- Craft's alkylation and acylation. **(4h)**

3.3 Orientation of aromatic substitution - ortho, para and meta directing groups. Ring activating and deactivating groups with examples (Electronic interpretation of various groups like NO2 and Phenolic). **(Online teaching)** **(3h)**

Orientation of (i) Amino, methoxy and methyl groups (ii) Carboxy, nitro, nitrile, carbonyl and sulphonic acid groups (iii) Halogens (Explanation by taking minimum of one example from each type) **(2h)**

GENERAL CHEMISTRY **24 h**

UNIT-IV - Surface chemistry and chemical bonding (Online teaching)

1. Surface chemistry **6h**

4.1 Colloids- Coagulation of colloids- Hardy-Schulze rule. Stability of colloids, Protection of Colloids, Gold number. **(3h)**

4.2 Adsorption-Physical and chemical adsorption, Langmuir adsorption isotherm, applications of adsorption. **(3h)**

2. Chemical Bonding **6h**

4.3 Valence bond theory, hybridization, VB theory as applied to ClF_3, $Ni(CO)_4$ **(2h)**

4.4 Molecular orbital theory -LCAO method, construction of M.O. diagrams for homo-nuclear and hetero-nuclear diatomic molecules (N2, O2, CO and NO). **(4h)**

3. HSAB **2h**

4.5 Pearson's concept, HSAB principle & its importance, bonding in Hard-Hard and Soft-Soft combinations. **(2h)**

UNIT-V

Stereochemistry of carbon compounds (Online teaching) **10h**

5.1 Molecular representations- Wedge, Fischer, Newman and Saw-Horse formulae. **(1h)**

5.2 Optical isomerism: Optical activity- wave nature of light, plane polarised light, optical rotation and specific rotation. **(2h)**

5.3 Chiral molecules- definition and criteria(Symmetry elements)- Definition of enantiomers and diastereomers – Explanation of optical isomerism with examples- Glyceraldehyde, Lactic acid, Alanine, Tartaric acid, 2,3-dibromopentane. **(4h)**

5.4 D, L, R,S and E,Z- configuration with examples.

Definition of Racemic mixture – Resolution of racemic mixtures (any 3 techniques) **(3h)**

Co-curricular activities and Assessment Methods

Continuous Evaluation: Monitoring the progress of student's learning

Class Tests, Worksheets and Quizzes

Presentations, Projects and Assignments and Group Discussions: Enhances critical thinking skillsand personality

Semester-end Examination: critical indicator of student's learning and teaching methods adopted by teachers throughout the semester.

List of Text Books

1. A Text book of Organic Chemistry by Lloyd.N.Ferguson
2. A Text book of Organic Chemistry by Rakesh K.Parashar & V.K.Ahluwalia
3. Telugu Academy Book
4. Unified Chemistry by O.P.Agarwal-Vol-I

List of Reference Books

Theory:

Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (PearsonEducation).
Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
Finar, I. L. Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
Eliel, E. L. &Wilen, S. H. Stereochemistry of Organic Compounds; Wiley: London, 1994.
Kalsi, P. S. Stereochemistry Conformation and Mechanism; New Age International, 2005.

Practical:

11 Ahluwalia, V.K. &Aggarwal, R. Comprehensive Practical Organic Chemistry: Preparation and Quantitative Analysis, University Press (2000).
Ahluwalia, V.K. &Dhingra, S. Comprehensive Practical Organic Chemistry: Qualitative Analysis, University Press (2000).
Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. Practical Organic Chemistry, 5th Ed., Pearson (2012)

Additional Resources:

Solomons, T. W. G.; Fryhle, C. B. &Snyder, S. A. Organic Chemistry, 12th Edition, Wiley.
Bruice, P. Y. Organic Chemistry, Eighth Edition, Pearson.
Clayden, J.; Greeves, N.&Warren, S. Organic Chemistry, Oxford.
Nasipuri, D. Stereochemistry of Organic Compounds: Principles and Applications, Third Edition, NewAge International.
Gunstone, F. D. Guidebook to Stereochemistry, Prentice Hall Press, 1975.

LABORATORY COURSE-II 30hrs (2 h / w)

Practical-II Volumetric Analysis

(At the end of Semester-II) No.of credits:1

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Volumetric analysis 50 M

1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture.
2. Determination of Fe (II) using KMnO4 with oxalic acid as primary standard.
3. Determination of Cu (II) using Na2S2O3 with K2Cr2O7 as primary standard
4. Estimation of water of crystallization in Mohr's salt by titrating with KMnO4

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CHEMISTRY	**CHET31A**	**2021-22**	**B.Sc.(BZC.MPC,FMC,MCCS & AZC)**

SEMESTER-III **Paper-III** **No.of Credits:3**

(ORGANIC CHEMISTRY & SPECTROSCOPY) 60hrs (4 h / w)

ORGANIC CHEMISTRY ***34h***

UNIT – I

1. Chemistry of Halogenated Hydrocarbons: 6h

Alkyl halides: Methods of preparation and properties, nucleophilic substitution reactions– SN1,SN2 and SNi mechanisms with stereo chemical aspects and effect of solvent etc.; nucleophilic substitution Vs elimination, Williamson's synthesis. Arylhalides: Preparation(including preparation from diazonium salts) and properties, nucleophilic aromatic substitution; SN_{Ar}, Benzyne mechanism. Relative reactivity of alkyl, allyl, benzyl, vinyl and aryl halides towards nucleophilic substitution reactions.

2. Alcohols &Phenols ***6h***

Alcohols: preparation, properties and relative reactivity of 1°, 2°, 3° alcohols- ***Lucas Reagent test***, Bouvaelt Blanc Reduction; Oxidation of diols by periodic acid and lead tetra acetate, Pinacol- Pinacolone rearrangement;

Phenols: Preparation and properties; Acidity and factors effecting it, Ring substitution reactions, Reimer–Tiemann and Kolbe's–Schmidt Reactions, Fries and Claisen rearrangements with mechanism;

UNIT-II

Carbonyl Compounds **10h**

Structure, reactivity, preparation and properties- ***Fehling's reagent, Tollen's Reagent, 2,4-DNP,Phenylhydragene, Formation of Oximes*** ; Nucleophilic additions- ***$NaHSO_3$, Formation of Alcohols, HCN, R-MgX, HemiAcetols***, Nucleophilic addition-elimination reactions with ammonia derivatives

Mechanisms of Aldol and Benzoin condensation, Claisen-Schmidt, Perkin, Cannizzaro and Wittig reaction, Beckmann haloform reaction and Baeyer Villiger oxidation,α- substitution reactions, oxidations and reductions(Clemmensen, wolf –kishner, with LiAlH4 &NaBH4).

Addition reactions of α,β-unsaturated carbonyl compounds: Michael addition. Active methylene compounds: Keto enol tautomerism. Preparation and synthetic applications of diethyl malonate and ethyl acetoacetate.

UNIT-III

Carboxylic Acids and their Derivatives **12h**

General methods of preparation, physical properties and reactions of monocarboxylic acids, effect of Substituents on acidic strength. Typical reactions of dicarboxylic acids, hydroxyl acids and unsaturated acids. Preparation and reactions of acid chlorides, anhydrides, esters and amides; Comparative study of nucleophilic substitution at acyl group-Mechanism of acidic and alkaline hydrolysis of esters, Claisen condensation, Reformatsky reactions and Curtius rearrangement Reactions involving H, OH and COOH groups- salt formation, anhydride formation, acid chloride formation, amide formation and esterification (mechanism). Degradation of carboxylic acids by Huns-Diecker reaction, decarboxylation by Schmidt reaction, Arndt- Eistert synthesis, halogenation by Hell- Volhard- Zelinsky reaction.

SPECTROSCOPY ***26 h***

UNIT-IV

Molecular Spectroscopy: **18h**

Interaction of electromagnetic radiation with molecules and various types of spectra;

Rotation spectroscopy: Selection rules, intensities of spectral lines, determination of bond lengths of diatomic and linear triatomic molecules, isotopic substitution.

Vibrational spectroscopy: Classical equation of vibration, computation of force constant, Harmonic and an harmonic oscillator, Mohr's potential curve, vibrational degrees of freedom for polyatomic molecules, modes of vibration. Selection rules for vibrational transitions, Fundamental frequencies, overtones and hot bands.

Electronic spectroscopy: Energy levels of molecular orbitals (σ, π, n). Selection rules for electronic spectra. Types of electronic transitions in molecules, effect of conjugation. Concept of chromophore. bathochromic and hypsochromic shifts. Beer-Lambert's law and its limitations.

Nuclear Magnetic Resonance (NMR) spectroscopy: Principles of nuclear magnetic resonance, equivalent and non-equivalent protons, position of signals. Chemical shift, NMR splitting of signals - spin-spin coupling, coupling constants. Applications of NMR with suitable examples - ethyl bromide, ethanol, acetaldehyde, 1,1,2-tribromo ethane, ethyl acetate, toluene and acetophenone.

UNIT-V *8h*

Application of Spectroscopy to Simple Organic Molecules

Application of visible, ultraviolet and Infrared spectroscopy in organic molecules.

Application of electronic spectroscopy and Woodward rules for calculating λ_{max} of conjugated dienes and α,β – unsaturated compounds.

Infrared radiation and types of molecular vibrations, functional group and fingerprint region. IR spectra of alkanes, alkenes and simple alcohols (inter and intramolecular hydrogen bonding), aldehydes, ketones, carboxylic acids and their derivatives (effect of substitution on >C=O stretching absorptions).

Co-curricular activities and Assessment Methods Continuous Evaluation: Monitoring the progress of student's learning Class Tests, Worksheets and Quizzes Presentations, Projects and Assignments and Group Discussions: Enhances critical thinking skills and personality

Semester-end Examination: critical indicator of student's learning and teaching methods adopted by teachers throughout the semester.

List of Text Books

1. A Text Book of Organic Chemistry by Bahl and Arunbahl
2. A Text Book of Organic chemistry by I L FinarVol I
3. A Text Book of Spectroscopy by M.S.Yadav
4. A Text Book of Spectroscopy by Gurudeep R,Chatwal
5. Telugu Academy Book
6. Unified Chemistry by O.P.Agarwal-Vol-II

List of Reference Books

1. Organic chemistry by Bruice
2. Organic chemistry by Clayden
3. Spectroscopy by William Kemp
4. Spectroscopy by Pavia
5. Organic Spectroscopy by J. R. Dyer
6. Elementary organic spectroscopy by Y.R. Sharma
7. Spectroscopy by P.S.Kalsi

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CHEMISTRY	**CHEP31A**	**2021-22**	**B.Sc(PMC,BZC,FMC, MCCS & AZC)**

SEMESTER-IV

Paper-IV

No of Credits:3

LABORATORY COURSE -III ***30hrs (2 h / w)***

(Practical Course-III Organic preparations and IR Spectral Analysis)

(At the end of Semester- III)

Organic preparations: ***40M***

i. Acetylation of one of the following compounds:

amines (aniline, o-, m-, p toluidines and o-, m-, p-anisidine) and phenols (β-naphthol, vanillin, salicylic acid) by any one method:

a. Using conventional method.

b. Using green approach

ii. Benzolyation of one of the following amines

(aniline, o-, m-, p- toluidines and o-, m-, p- anisidine)

iii. Nitration of any one of the following:

a. Acetanilide/nitrobenzene by conventional method

b. Salicylic acid by green approach (using ceric ammonium nitrate).

IR Spectral Analysis ***10M***

IR Spectral Analysis of the following functional groups with examples

a) Hydroxyl groups

b) Carbonyl groups

c) Amino groups

d) Aromatic groups

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CHEMISTRY	**CHET41A**	**2021-22**	**B.Sc(PMC,BZC,FMC, MCCS & AZC)**

SEMESTER-IV

Paper-IV

No of Credits:3

(INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY) 60hrs (4 h / w)

UNIT - I

Organo metallic Compounds **8h**

Definition and classification of organometallic Compounds on the basis of bond type, Concept of hapticity of organic ligands. Metal carbonyls: 18electron rule, electron count of mononuclear, poly nuclear and substituted metal carbonyls of 3d series. General methods of preparation of mono and binuclear carbonyls of 3d series. P-acceptor behaviour of carbon monoxide. Synergic effects (VB approach) - (MO diagram of CO can be referred to for synergic effect to IR frequencies).

UNIT – II

Carbohydrates **8h**

Occurrence, classification and their biological importance, Mono saccharides: Constitution and absolute configuration of glucose and fructose, epimers and anomers, mutarotation, determination of ring size of glucose and fructose, Haworth projections and conformational structures; Inter conversions of aldoses and ketoses; Killiani Fischer synthesis and Ruff degradation; Disaccharides– Elementary treatment of maltose, lactose and sucrose. Polysaccharides– Elementary treatment of starch.

UNIT- III

Amino acids and proteins **6h**

Introduction: Definition of Amino acids, classification of Amino acids into alpha, beta, and gamma amino acids. Natural and essential amino acids - definition and examples, classification of alpha amino acids into acidic, basic and neutral amino acids with examples. Methods of synthesis: General methods of synthesis of alpha amino acids (specific examples - Glycine,

Alanine, valine and leucine) by following methods: a) from halogenated carboxylic acid b) Gabriel Phthalimide synthesis c) strecker's synthesis.

Physical properties: Zwitter ion structure - salt like character - solubility, melting points, amphoteric character, definition of isoelectric point.

Chemical properties: General reactions due to amino and carboxyl groups - lactams from gamma and delta amino acids by heating- peptide bond (amide linkage). Structure and nomenclature of peptides and proteins.

Heterocyclic Compounds ***7h***

Introduction and definition: Simple five membered ring compounds with one hetero atom Ex. Furan. Thiophene and pyrrole - Aromatic character – Preparation from 1, 4, - dicarbonyl compounds, Paul-Knorr synthesis.

Properties: Acidic character of pyrrole - electrophillic substitution at 2 or 5 position, Halogenation, Nitration and Sulphonation under mild conditions - Diels Alder reaction in furan.

Pyridine – Structure - Basicity - Aromaticity- Comparison with pyrrole- one method of preparation and properties - Reactivity towards Nucleophilic substitution reaction.

UNIT- IV

Nitrogen Containing Functional Groups

Preparation, properties and important reactions of nitro compounds, amines and diazonium salts.

1. Nitro hydrocarbons ***3h***

Nomenclature and classification-nitro hydrocarbons, structure -Tautomerism of nitroalkanes leading to aci and keto form, Preparation of Nitroalkanes, reactivity -halogenation, reaction with HONO (Nitrous acid), Nef reaction and Mannich reaction leading to Micheal addition and reduction.

2.Amines: ***11h***

Introduction, classification, chirality in amines (pyramidal inversion), Importance and general methods of preparation.

Properties: Physical properties, Basicity of amines: Effect of substituent, solvent and steric effects. Distinction between Primary,

Secondary and tertiary amines using Hinsberg's method and nitrous acid. Discussion of the following reactions with emphasis on the mechanistic pathway: Gabriel Phthalimide synthesis, Hoffmann- Bromamide reaction, Carbylamine reaction,Mannich reaction,

Hoffmann's exhaustive methylation, Hofmann-elimination reaction and Cope elimination.

Diazonium Salts:

Preparation and Synthetic applications of diazonium salts including preparation of arenes, haloarenes, phenols, cyano and nitro compounds. Coupling reactions of diazonium salts (preparationofazo dyes).

UNIT- V

Photochemistry **5h**

Difference between thermal and photochemical processes, Laws of photochemistry- Grothus-Draper's law and Stark-Einstein's law of photochemical equivalence, Quantum yield- Photochemical reaction mechanism- hydrogen- chlorine and hydrogen- bromine reaction. Qualitative description of fluorescence, phosphorescence, Jablonski diagram, Photosensitized reactions- energy transfer processes (simple example).

Thermodynamics ***12 h***

The first law of thermodynamics-statement, definition of internal energy and enthalpy, Heat capacities and their relationship, Joule-Thomson effect- coefficient, Calculation of work for the expansion of perfect gas under isothermal and adiabatic conditions for reversible processes, State function. Temperature dependence of enthalpy of formation- Kirchoff s equation, Second law of thermodynamics Different Statements of the law, Carnot cycle and its efficiency, Carnot theorem, Concept of entropy, entropy as a state function, entropy changes in reversible and irreversible processes. Entropy changes in spontaneous and equilibrium processes. Third law of thermodynamics, Nernst heat theorem, Spontaneous and non- spontaneous processes, Helmholtz and Gibbs energies-Criteria for spontaneity.

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1. Text Book of physical chemistry by S Glasstone
2. A Text Book of Organic Chemistry by Bahl and Arunbahl
3. A Text Book of Organic chemistry by I L FinarVol I
4. A Text Book of Organic chemistry by I L FinarVol II
5. A Text Book of Inorganic chemistry by Gurudeep Raju
6. Telugu Academy Book

List of Reference Books

1. Concise coordination chemistry by Gopalan and Ramalingam
2. Coordination Chemistry by Basalo and Johnson
3. Organic Chemistry by G.Mareloudan, Purdue Univ

4. Concise Inorganic Chemistry by J.D.Lee

5. Advanced Inorganic Chemistry Vol-I by Satyaprakash, Tuli, Basu and Madan

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CHEMISTRY	**CHEP41A**	**2021-22**	**B.Sc(PMC,BZC,FMC, MCCS & AZC)**

SEMESTER-IV

Paper-IV

No of Credits:2

ABORATORY COURSE –IV 30hrs (2 h / w)

Practical Course-IV Organic Qualitative analysis 50 M

(At the end of Semester- IV)

Organic Qualitative analysis ***50 M***

Analysis of an organic compound through systematic qualitative procedure for functional group identification including the determination of melting point and boiling point with suitable derivatives.Alcohols, Phenols, Aldehydes, Ketones, Carboxylic acids, Aromatic primary amines, amides and simple sugars

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CHEMISTRY	**CHET01**	**2021-22**	**B.Sc(PMC,BZC,FMC, MCCS & AZC)**

SEMESTER-IV

Paper-V

No of Credits:3

Course V (INORGANIC &PHYSICAL CHEMISTRY) 60 hrs (4 h / w)

INORGANIC CHEMISTRY **26 h**

UNIT –I

Coordination Chemistry **12 h**

IUPAC nomenclature of coordination compounds, Structural and stereoisomerism in complexes with coordination numbers 4 and 6. Valence Bond Theory (VBT): Inner and outer orbital complexes. Limitations of VBT, Crystal field effect, octahedral symmetry. Crystal field stabilization energy (CFSE), Crystal field effects for weak and strong fields. Tetrahedral symmetry, Factors affecting the magnitude of crystal field splitting energy, Spectro chemical series, Comparison of CFSE for Octahedral and Tetrahedral complexes, Tetragonal distortion of octahedral geometry, Jahn-Teller distortion, square planar coordination.

UNIT –II

1. Inorganic Reaction Mechanism: **4h**

Introduction to inorganic reaction mechanisms. Concept of reaction pathways, transition state, intermediate and activated complex. Labile and inert complexes, ligand substitution reactions- SN^1 and SN^2, Substitution reactions in square planar complexes, Trans-effect, theories of trans effect and its applications

2. Stability of metal complexes: ***2h***

Thermodynamic stability and kinetic stability, factors affecting the stability of metal complexes, chelate effect, determination of composition of complex by Job's method and mole ratio method.

Bioinorganic Chemistry: ***8h***

Metal ions present in biological systems, classification of elements according to their action in biological system. Geochemical effect on the distribution of metals, Sodium/K- pump, carbonic anhydrase and carboxy peptidase. Excess and deficiency of some trace metals. Toxicity of metal ions (Hg, Pb, Cd and As), reasons for toxicity, Use of chelating agents in medicine, Cisplatinas an anti-cancer drug. Iron and its application in bio-systems, Haemoglobin, Myoglobin. Storage and transfer of iron.

PHYSICAL CHEMISTRY ***34 h***

UNIT-III

1 .Phase rule **6h**

Concept of phase, components, degrees of freedom. Thermodynamic derivation of Gibbs phase rule. Phase diagram of one component system - water system, Study of Phase diagrams of Simple eutectic systems i) Pb-Ag system, de silverisation of lead ii) NaCl-Water system, Congruent and incongruent melting point- Definition and examples for systems having congruent and incongruent melting point , freezing mixtures.

UNIT-IV

Electrochemistry **14h**

Specific conductance, equivalent conductance and molar conductance- Definition and effect of dilution. Cell constant. Strong and weak electrolytes, Kohlrausch's law and its applications, Definition of transport number, determination of transport number by Hittorf's method. Debye-Huckel- Onsagar's equation for strong electrolytes (elementary treatment only), Application of conductivity measurements- conductometric titrations.

Electrochemical Cells- Single electrode potential, Types of electrodes with examples: Metal-metal ion, Gas electrode, Inert electrode, Redox electrode, Metal-metal insoluble salt- salt anion. Determination of EMF of a cell, Nernst equation, Applications of EMF measurements

- Potentiometric titrations.

Fuel cells- Basic concepts, examples and applications

UNIT-V

Chemical Kinetics: **14 h**

The concept of reaction rates. Effect of temperature, pressure, catalyst and other factors on reaction rates. Order and molecularity of a reaction, Derivation of integrated rate equations for zero, first and second order reactions (both for equal and unequal concentrations of reactants). Half–life of a reaction. General methods for determination of order of a reaction. Concept of activation energy and its calculation from Arrhenius equation. Theories of Reaction Rates:

Collision theory and Activated Complex theory of bimolecular reactions. Comparison of the two theories (qualitative treatment only).Enzyme catalysis- Specificity,

factors affecting enzyme catalysis, Inhibitors and Lock & key model. Michaels- Menten equation- derivation, significance of Michaelis- Menten constant.

Co-curricular activities and Assessment Methods

Continuous Evaluation: Monitoring the progress of student's learning Class Tests, Worksheets and Quizzes Presentations, Projects and Assignments and Group Discussions: Enhances critical thinking skills and personality

Semester-end Examination: critical indicator of student's learning and teaching methods adopted by teachers throughout the semester.

List of Text Books

1. A Text Book of physical chemistry by S Glasstone
2. A Text Book of qualitative inorganic analysis by A.I. Vogel
3. A Text Book of Inorganic Chemistry by A.K.DE
4. Telugu Academy Book
5. Unified Chemistry by O.P.Agarwal vol-II

List of Reference Books

1. Concise Inorganic Chemistry by J.D.Lee
2. Advanced Inorganic Chemistry Vol-I by Satyaprakash, Tuli, Basu and Madan
3. Advanced physical chemistry by Gurudeep Raj
4. Principles of physical chemistry by Prutton and Marron
5. Advanced physical chemistry by Bahl and Tuli
6. Inorganic Chemistry by J.E.Huheey
7. Basic Inorganic Chemistry by Cotton and Wilkinson
8. Atkins,P.W.&Paula, J.deAtkin's PhysicalChemistryEd.,Oxford UniversityPress 10thEd(2014).
9. Castellan,G.W.PhysicalChemistry4thEd.Narosa(2004).
10. Mortimer,R. G.PhysicalChemistry3rdEd. Elsevier:NOIDA,UP(2009).

CHEMISTRY	**CHEP01**	**2021-22**	**B.Sc(PMC,BZC,FMC, MCCS & AZC)**

SEMESTER-IV

Paper-IV

No of Credits:2

Course-V LABORATORY COURSE **30**hrs (2 h / w)

Practical-Course –V Conductometric and Potentiometric Titrimetry ***50 M***

No.of credits:2

Conductometric and Potentiometric Titrimetry ***50 M***

1. **Conductometric titration-** Determination of concentration of HCl solution using standard NaOH solution.
2. **Conductometric titration-** Determination of concentration of CH_3COOH Solution using standard NaOH solution.
3. **Conductometric titration-** Determination of concentration of CH_3COOH and HCl in a mixture using standard NaOH solution.
4. **Potentiometric titration-** Determination of Fe (II) using standard $K_2Cr_2O_7$ solution.
5. Determination of rate constant for acid catalyzed ester hydrolysis.

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CHEMISTRY	CHET51	2017-18	B.Sc(PMC,BZC,FMC, MCCS)
		2018-19	

SEMESTER-V Paper-V No of Credits:3

((INORGANIC, ORGANIC & PHYSICAL CHEMISTRY- I)-- Skill Development
45 hrs (3 h / w)

INORGANIC CHEMISTRY
UNIT – I

Coordination Chemistry: **8h**

IUPAC nomenclature - bonding theories - Review of Werner's theory and Sidgwick's concept of coordination - Valence bond theory - geometries of coordination numbers 4-tetrahedral and square planar and 6-octahedral and its limitations, crystal filed theory - splitting of d-orbitals in octahedral, tetrahedral and square-planar complexes - low spin and high spin complexes - factors affecting crystal-field splitting energy, merits and demerits of crystal-field theory. Isomerism in coordination compounds - structural isomerism and stereo isomerism, stereochemistry of complexes with 4 and 6 coordination numbers.

UNIT-II

1.Spectral and magnetic properties of metal complexes: **4h**

Types of magnetic behavior, spin-only formula, calculation of magnetic moments, experimental determination ofmagnetic susceptibility-Gouymethod.

2.Stability of metal complexes: **3h**

Thermodynamic stability and kinetic stability, factors affecting the stability of metal complexes, chelate effect, determination of composition of complex by Job's method and mole ratio method.

ORGANIC CHEMISTRY
UNIT- III

Nitro hydrocarbons: **3h**

Nomenclature and classification-nitro hydrocarbons, structure -Tautomerism of nitroalkanes leading to aci and keto form, Preparation of Nitroalkanes, reactivity -halogenation, reaction with HONO (Nitrous acid),Nef reactionand Mannich reaction leading to Micheal addition and reduction.

UNIT – IV

Nitrogen compounds: **12h**

Amines (Aliphatic and Aromatic): Nomenclature, Classification into 1°, 2°, 3° Amines and Quarternary ammonium compounds. Preparative methods –

1. Ammonolysis of alkyl halides 2. Gabriel synthesis 3. Hoffman's bromamide reaction (mechanism). Reduction of Amides and Schmidt reaction. Physical properties and basic character - Comparative basic strength of Ammonia, methyl amine, dimethyl amine, trimethyl amine and aniline - comparative basic strength of aniline, N-methylaniline and N,N-dimethyl aniline (in aqueous and non-aqueous medium),

steric effects and substituent effects. Chemical properties: a) Alkylation b) Acylation c) Carbylamine reaction d) Hinsberg separation e) Reaction with Nitrous acid of 1°, 2°, 3° (Aliphatic and aromatic amines). Electrophillic substitution of Aromatic amines – Bromination and Nitration. Oxidation of aryl and Tertiary amines, Diazotization.

PHYSICAL CHEMISTRY

UNIT- V

Thermodynamics **15h**

The first law of thermodynamics-statement, definition of internal energy and enthalpy. Heat capacities and their relationship. Joule-Thomson effect- coefficient. Calculation of w, for the expansion of perfect gas under isothermal and adiabatic conditions for reversible processes. State function. Temperature dependence of enthalpy of formation-Kirchoff s equation. Second law of thermodynamics. Different Statements of the law. Carnot cycle and its efficiency. Carnot theorem. Concept of entropy, entropy as a state function, entropy changes in reversible and irreversible processes. Entropy changes in spontaneous and equilibrium processes.

List of Reference Books

1. Concise coordination chemistry by Gopalan and Ramalingam
2. Coordination Chemistry by Basalo and Johnson
3. Organic Chemistry by G.Mare loudan, Purdue Univ
4. Advanced Physical Chemistry by
5. Text book of physical chemistry by S Glasstone6.Concise Inorganic Chemistry by J.D.Lee
7. Advanced Inorganic Chemistry Vol-I by Satyaprakash, Tuli, Basu and Madan
8. A Text Book of Organic Chemistry by Bahl and Arun bahl

9.A Text Book of Organic chemistry by I L Finar Vol I10.Advanced physical chemistry by Gurudeep Raj

TEXT BOOK:

1. Unified Chemistry by Dr. O.P. Agarwal

SRI DURGA MALLESWARA SIDDHARTHA MAHILA KALASALA, VIJAYAWADA 10
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CHEMISTRY	**CHET52**	**2017-18**	**B.Sc(PMC,BZC,FMC, MCCS)**
		2018-19	

SEMESTER-V **Paper-VI** **No of Credits:3**

Paper - VI (INORGANIC, ORGANIC & PHYSICAL CHEMISTRY- II)

INORGANIC CHEMISTRY 45 hrs (3 h / w)

UNIT-I

1.Reactivity of metal complexes: 4h

Labile and inert complexes, ligand substitution reactions - SN^1 and SN^2,substitution reactions of square planarcomplexes - Trans effect and applications of trans effect.

2.Bioinorganic chemistry: 4h

Essential elements, biological significance of Na, K, Mg, Ca, Fe, Co, Ni, Cu, Zn and Cl^-. Metalloporphyrins –Structure and functions of hemoglobin, Myoglobin and Chlorophyll.

PHYSICAL CHEMISTRY

UNIT-II

1.Chemical kinetics 8h

Rate of reaction - Definition of order and molecularity. Derivation of rate constants for first, second, third and zero order reactions and examples. Derivation for time half change. Methods to determine the order of reactions. Effect of temperature on rate of reaction, Arrhenius equation, concept of activation energy.

2.Photochemistry 5h

Difference between thermal and photochemical processes. Laws of photochemistry- Grothus-Draper's law and Stark-Einstein's law of photochemical equivalence. Quantum yield-Photochemical reaction mechanism- hydrogen- chlorine, hydrogen- bromine reaction. Qualitative description of fluorescence, phosphorescence, Photosensitized reactions- energy transfer processes (simple example)

ORGANIC CHEMISTRY

UNIT- III

Heterocyclic Compounds 7h

Introduction and definition: Simple five membered ring compounds with one hetero atom Ex. Furan. Thiopheneand pyrrole - Aromatic character – Preparation from 1,4,- dicarbonyl compounds, Paul-Knorr synthesis.

Properties : Acidic character of pyrrole - electrophillic substitution at 2 or 5 position, Halogenation, Nitration andSulphonation under mild conditions - Diels Alder reaction in furan.

Pyridine – Structure - Basicity - Aromaticity - Comparison with pyrrole - one method of preparation andproperties - Reactivity towards Nucleophilic substitution reaction.

UNIT-IV

Carbohydrates **8h**

Monosaccharides: (+) Glucose (aldo hexose) - Evidence for cyclic structure of glucose (some negative aldehydes tests and mutarotation) - Proof for the ring size (methylation, hydrolysis and oxidation reactions) - Pyranose structure (Haworth formula and chair conformational formula).

(-) Fructose (ketohexose) - Evidence of 2 - ketohexose structure (formation of pentaacetate, formation of cyanohydrin its hydrolysis and reduction by HI). Cyclic structure for fructose (Furanose structure and Haworth formula) - osazone formation from glucose and fructose – Definition of anomers with examples.

Interconversion of Monosaccharides: Aldopentose to Aldohexose (Arabinose to

D- Glucose, D-Mannose) (Kiliani - Fischer method). Epimers, Epimerisation - Lobry de bruyn van Ekenstein rearrangement. Aldohexose to Aldopentose (D-Glucose to D- Arabinose) by Ruff degradation. Aldohexose to Ketohexose

[(+) Glucose to (-) Fructose] and Ketohexose to Aldohexose (Fructose to Glucose)

UNIT- V

Amino acids and proteins **7h**

Introduction: Definition of Amino acids, classification of Amino acids into alpha, beta, and gammaamino acids. Natural and essential amino acids - definition and examples, classification of alpha amino acids into acidic, basic and neutral amino acids with examples. Methods of synthesis: General methodsof synthesis of alpha amino acids (specific examples - Glycine, Alanine, valine and leucine) by following methods: a) from halogenated carboxylic acid b) Malonic ester synthesis c) strecker's synthesis.

Physical properties: Zwitter ion structure - salt like character - solubility, melting points, amphoteric character, definition of isoelectric point.

Chemical properties: General reactions due to amino and carboxyl groups - lactams from gamma and delta amino acids by heating peptide bond (amide linkage). Structure and nomenclature of peptides and proteins.

List of Reference Books

1. Concise coordination chemistry by Gopalan and Ramalingam
2. Coordination Chemistry by Basalo and Johnson
3. Organic Chemistry by G.Mare loudan, Purdue Univ
4. Advanced Physical Chemistry by Atkins
5. Text book of physical chemistry by S Glasstone
7. Instrumentation and Techniques by Chatwal and Anand
8. Essentials of nano chemistry by pradeep
9. A Textbook of Physical Chemistry by Puri and Sharma
10. Advanced physical chemistry by Gurudeep Raj

TEXT BOOK:

1. Unified Chemistry by Dr. O.P. Agarwal

SRI DURGA MALLESWARA SIDDHARTHA MAHILA KALASALA, VIJAYAWADA 10
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CHEMISTRY	**CHEP51**	**2017-18**	**B.Sc(PMC,BZC,FMC)**
		2018-19	

SEMESTER-V **Paper-V**

No of Credits:2PHYSICAL &GENERAL CHEMISTRY-1

LABORATORY COURSE – V
Practical Paper – V Organic Chemistry
(at the end of semester V) 30 hrs (2 h / W)

Organic Qualitative Analysis: **50M**

Analysis of an organic compound through systematic qualitative procedure for functional group identificationincluding the determination of melting point and boiling point with suitable derivatives.

Alcohols, Phenols, Aldehydes, Ketones, Carboxylic acids, Aromatic Primary Amines, Amides and Simplesugars.

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CHEMISTRY	CHEP52	2017-18 2018-19	B.Sc(PMC,BZC,FMC)

SEMESTER-V Paper-VI No of Credits:2

LABORATORY COURSE – VI

Practical Paper – VI PHysical CHEMISTRY

(at tHE end of semester V) 30 H

1. Determination of rate constant for acid catalyzed ester Hydrolysis**.**
2. Determination of molecular status and partition coefficient of benzoicacid in Benzene and water.
3. Determination of Surface tension of liquid
4. Determination of Viscosity of liquid.
5. Adsorption of acetic acid on animal cHarcoal, verification of FreundliscH isotHErm.

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CHEMISTRY	CHETEL61	2017-18 2018-19	B.Sc.(MPC,BZC,FMC)

SEMESTER-V Paper-VII (A) No. of credits: 3

SEMESTER-VI - Electives

ELECTIVE Paper – VII-(A): ANALYTICAL METHODS IN CHEMISTRY **45hrs (3h / w)**

UNIT-I

Quantitative analysis: **10h**

a) Importance in various fields of science, steps involved in chemical analysis**.** Principles of volumetric analysis :. Theories of acid-base, redox, complexometric, iodometric and precipitation titrations - choice of indicators for these titrations.

b) Principles of gravimetric analysis: precipitation, coagulation, peptization, coprecipitation, post precipitation, digestion, filtration and washing of precipitate, drying and ignition.

UNIT-II

Treatment of analytical data: **7h**

Types of errors, significant figures and its importance, accuracy - methods of expressing accuracy, error analysis and minimization of errors, precision - methods of expressing precision, standard deviation and confidence limit.

UNIT-III

SEPARATION TECHNIQUES IN CHEMICAL ANALYSIS: **8h**

SOLVENT EXTRACTION : Introduction,principle,techniques,factors affecting solvent extraction, Batch extraction, continuous extraction and counter current extraction. Synergism., Application - Determination of Iron (III)

ION EXCHANGE :Introduction,action of ion exchange resins,separation of inorganic mixtuers,applications, Solvent extraction: Principle and process,

UNIT – IV **10h**

Chromatography: Classification of chromatography methods, principles of differential migration adsorption phenomenon, Nature of adsorbents, solvent systems, R_f values, factors effecting R_f values.

Paper Chromatography: Principles, R_f values, experimental procedures, choice of paper and solvent systems, developments of chromatogram - ascending, descending and radial. Two-dimensional chromatography,applications.

UNIT –V **10h**

Thin layer Chromatography (TLC): Advantages. Principles, factors effecting R_f values. Experimental procedures. Adsorbents and solvents. Preparation of plates. Development of the chromatogram. Detection of the spots. Applications.

Column Chromatography: Principles, experimental procedures, Stationary and mobile Phases, Separation technique. Applications

HPLC : Basic principles and applications.

List of Reference Books

1. Analytical Chemistry by Skoog and Miller
2. A textbook of qualitative inorganic analysis by A.I. Vogel
3. Nanochemistry by Geoffrey Ozin and Andre Arsenault
4. Stereochemistry by D. Nasipuri
5. Organic Chemistry by Clayden

TEXT BOOK:

1. Unified Chemistry by Dr. O.P. Agarwal

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CHEMISTRY	CHEPEL61	2017-18 2018-19	B.Sc(MPC,BZC,FMC)

SEMESTER-V Paper-VII(A) No . of credits: 2

LABORATORY COURSE – VI

Practical Paper – VII-(A) : ANALYTICAL METHODS IN CHEMISTRY (at the end of semester VI) **30hrs (2 h / W)**

50M

1. Identification of aminoacids by paper chromatography.
2. Determination of Zn using EDTA
3. Determination of Mg using EDTA

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CHEMISTRY	CHETCL65	2017-18 2018-19	B.Sc(MPC,BZC)

SEMESTER-V No . of credits: 3

PAPER –POLYMER CHEMISTRY **45 hrs (3 h / w)**

UNIT---I **12h**

Introduction of polymers:

Basic definitions, degree of polymerization ,classification of polymers- Natural and Synthetic polymers, Organic and Inorganic polymers, Thermoplastic and Thermosetting polymers, Plastics, Elastomers , Fibers and Resins, Linear ,Branched and Cross Linked polymers, Addition polymers and Condensation Polymers, mechanism of polymerization. Free radical, ionic and Zeigler – Natta polymerization.

UNIT-II **8 h**

Techniques of Polymerization : Bulk polymerization , solution polymerization , suspension and Emulsionpolymerization.

UNIT-III **8 h**

Molecular weights of polymers: Number average and weight average molecular weights Determination ofmolecular weight of polymers by Viscometry , Osmometry and light scattering methods.

UNIT-IV **9h**

Polymer additives:

Introduction to plastic additives – fillers, Plasticizers and Softeners , Lubricants and Flow Promoters, Anti aging additives , Flame Retardants , Colourants , Blowing agents , Cross linking agents ,Photo stabilizers , Nucleating agents.

UNIT-V **8h**

Polymers and their applications:

Preparation and industrial applications of Polyethylene, Polyvinyl chloride, Teflon, Polyacrylonitrile, Terelene , Nylon6.6 silicones.

REFERENCE BOOKS:

1. Seymour, R.B. & Carraher, C.E. *Polymer Chemistry: An Introduction,* Marcel Dekker, Inc. New York,1981.
2. Odian, G. *Principles of Polymerization*, 4th Ed. Wiley, 2004.
3. Billmeyer, F.W. *Textbook of Polymer Science*, 2nd Ed. Wiley Interscience, 1971.
4. Ghosh, P. *Polymer Science & Technology*, Tata McGraw-Hill Education, 1991.34
5. Lenz, R.W. *Organic Chemistry of Synthetic High Polymers.* Interscience Publishers, NewYork, 1967.

TEXT BOOK:

1. **Unified Chemistry by Dr. O.P. Agarwal**

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CHEMISTRY	CHE PCL65	**2017-18** **2018-19**	**B. SC(MPC,BZC,FMC)**

(Examination at the end of the VI semester)

LABORATORY COURSE – VIII
Practical Paper – VIII-A-1: (at the end of semester VI) 30 hrs (2 h / W)

1. Preparation of Aspirin.
2. Preparation of Paracetamol.
3. Preparation of Acetanilide.
4. Preparation of Barbutiric Acid.
5. Preparation of Phenyl Azo β-naphthol

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CHEMISTRY	CHETCL66	2017-18 2018-19	B.Sc(MPC,BZC)

SEMESTER-V No . of credits: 3

PAPER –FUEL CHEMISTRY AND BATTERIES

UNIT –I **12h**

45 hrs (3 h / w)

Review of energy sources (renewable and non-renewable) – classification of fuels and their calorific value. Coal: Uses of Coal (fuel and non fuel) in various industries , its composition , carbonization of coal - coal gas , producer gas and water gas – composition and uses – fractionation of coal tar – uses of coal tar based chemicals , requisites of a good metallurgical coke , coal gasification (Hydro gasification and catalytic gasification).

UNIT-II 6h

Petroleum and petrol chemical industry:
Composition of crude petroleum , refining and different types of petroleum products and their applications.

UNIT-III
10h

Fractional distillation (principle and process) , cracking (Thermal and catalytic cracking). Reforming petroleum and non petroleum fuels (LPG , CNG , LNG , biogas) ,fuels derived from biomass, fuel from waste , synthetic fuels (gaseous and liquids) , clear fuels , petro chemicals : vinyl acetate, propylene oxide.

UNIT-IV **10h**

Lubricants:
Classification of lubricants , lubricating oils(conducting and non conducting), solid and semisolid lubricants ,synthetic lubricants. Properties of lubricants (viscosity index , cloud point , pore point).

UNIT-V 7 h
Batteries:
Primary and secondary batteries, battery components and their role, Characteristics of Battery. Working offollowing batteries: Pb acid, Li-Battery. Fuel cell and Solar cell.

(Material will be given along with the syllabus)Reference books:

1. E.Stochi : Industrial chemistry , Vol-1,Ellis Horwood Ltd.UK
2. P.C.Jain , M.Jain: Engineering chemistry, Dhanpat Rai &sons , Delhi.
3. B.K.Sharma: Industrial Chemistry , Goel Publishing house , Meerut.

TEXT BOOK: Unified Chemistry by Dr. O.P. Agarwal

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CHEMISTRY	CHE PCL66	**2017-18** **2018-19**	**B. SC(MPC,BZC)**

LABORATORY COURSE – VIII

Practical Paper – VIII-A-2 (at the end of semester VI) 30 hrs (2 h / W)
Green Reactions

1. Green procedure for organic qualitative analysis: Detection of N, S andhalogens
2. Acetylation of 10 amine by green method: Preparation of acetanilide
3. Rearrangement reaction in green conditions: Benzil-Benzilic acid rearrangement
4. Electrophilic aromatic substitution reaction: Nitration of phenol
5. Radical coupling reaction: Preparation of 1,1-bis -2-naphthol
6. Green oxidation reaction: Synthesis of adipic acid
7. Green procedure for Diels Alder reaction between furan and maleic anhydride

Qualitative analysis

1. Estimation of carbonate and Bicarbonate in washing soda.
2. Dichrometry- Estimation of Fe^{+2} and Fe^{+3} ions

Electro Chemistry

1. Determination of redox potential of Fe^{+2} or Fe^{+3} by potentiometric titration using ferrous ammonium sulphate.

Determination of pH of solution by using pH meter.

List of Reference Books

1. Green Chemistry Theory and Practice. P.T.Anatas and J.C. Warner
2. Green Chemistry V.K. Ahluwalia Narosa, New Delhi.
3. Real world cases in Green Chemistry M.C. Cann and M.E. Connelly
4. Green Chemistry: Introductory Text M.Lancaster: Royal Society of Chemistry (London)
5. Green Chemistry: Introductory Text, M.Lancaster
6. Principles and practice of heterogeneous catalysis, Thomas J.M.,Thomas M.J., John Wiley

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CHEMISTRY	CHETCL67	2017-18 2018-19	B.Sc(MPC,BZC,FMC)

SEMESTER-V **No . of credits: 3**

PAPER –PHARMACEUTICAL AND MEDICINAL CHEMISTRY

UNIT-I **8h**

Pharmaceutical chemistry Terminology: Pharmacy, Pharmacology, Pharmacophore, Pharmacodynamics,Pharmacokinetics (ADME, Receptors - brief treartment) Metabolites and Anti metabolites.

UNIT-II

Drugs: **9 h**

Nomenclature: Chemical name, Generic name and trade names with examples Classification: Classificationbased on structures and therapeutic activity with one example each, Administration of drugs

UNIT-III

Synthesis and therapeutic activity of the compounds: **10h**

a. Chemotheraputic Drugs 1.Antibiotics - β-Lactam Antibiotics,

2. Anti -malarial Drugs(chloroquine)

b. Psycho therapeutic Drugs:

1. Anti pyretics (Paracetamol)2.Levodopa

UNIT-IV

Pharmacodynamic Drugs: **8h**

1. Antiasthma Drugs (Solbutamol)
2. Diuretics (Frusemide)

UNIT-V

HIV-AIDS: **10 h**

Immunity - CD-4cells, CD-8cells, Retro virus, Replication in human body, Investigation available, preventionof AIDS, Drugs available - examples with structures: PIS: Indivanir (crixivan), Nelfinavir(Viracept).

List of Reference Books:

1.Medicinal Chemistry by Dr. B.V.Ramana 2.Synthetic Drugs by O.D.Tyagi & M.Yadav3.Medicinal Chemistry by Ashutoshkar 4.Medicinal Chemistry by P.Parimoo

5.Pharmacology& Pharmacotherapeutics R.S Satoshkar & S.D.Bhandenkar6.Medicinal Chemistry by Kadametal P-I & P.II

7. European Pharmacopoeia

TEXT BOOK:

1. Unified Chemistry by Dr. O.P. Agarwal

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CHEMISTRY	CHE PWCL67	**2017-18** **2018-19**	**B. SC(MPC,BZC)**

(Examination at the end of the VI semester) No of Credits:2 30H

VII-A-3 Practical:- Project Work

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CHEMISTRY	**CHETCLS68**	**2017-18**	**B.Sc. (PMC,BZC,FMC&MCCS)**
		2018-19	

Semester: VI Credits: 3

ENVIRONMENTAL CHEMISTRY

UNIT-I **9H**

Introduction

Concept of Environmental chemistry-Scope and importance of environment in now adays – Nomenclature of environmental chemistry – Segments of environment - Natural resources – Renewable Resources – Solar andbiomass energy and Nonrenewable resources – Thermal power and atomic energy – Reactions of atmospheric oxygen and Hydological cycle.

UNIT-II **9H**

Air Pollution

definition – sources of air pollution – classification of air pollution – acid rain – photochemical smog – green house effect – formation and depletion of ozone – bhopal gas disaster – controlling methods of air pollution.

UNIT-III **9H**

Water pollution

Unique physical and chemical properties of water – water quality and criteria for finding of water quality – Dissolved oxygen – BOD, COD, Suspended solids, total dissolved solids, alkalinity – Hardness of water – methods to convert temporary Hard water into soft water – methods to convert permanent Hard water into soft water – eutrophication and its effects – principal wastage treatment – Industrial waste water treatment.

UNIT-IV **9H**

CHEmical Toxicology

Toxic chemicals in the environment – effects of toxic chemicals – cyanide and its toxic effects – pesticides and its biochemical effects – toxicity of lead, mercury, arsenic and cadmium.

UNIT-V **9H**

Ecosystem and biodiversityEcosystem

Concepts – structure – Functions and types of ecosystem – Abiotic and biotic components – Energy flow and Energy dynamics of ecosystem – Food chains – Food web – Tropic levels – biogeochemical cycles (carbon, nitrogen and phosporus)

Biodiversity

Definition – level and types of biodiversity – concept - significance – magnitude and distribution of biodiversity

– trends - biogeographical classification of india – biodiversity at national, global and regional level.

Text books and Reference books:

1. **Fundamentals of ecology by M.C.dash**
2. **A Text book of Environmental CHEMISTRY by W. Moore and F.A. Moore**
3. **Environmental CHEMISTRY by Samir k. Banerji**

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CHEMISTRY	**CHEPCLS68**	**2017-18** **2018-19**	**B.Sc. (PMC,BZC, FMC &MCCS)**

SEMESTER – VI **PRACTICALS** **PAPER –II** **Credits: 1**

LABORATORY COURSE – VI

Practical Paper – Elective VII B (at the end of semester VI) 30 H

1. Determination of carbonate and bicarbonate in water samples (acidity and alkalinity)
2. Determination of Hardness of water using EDTA

A) Permanent Hardness b) TemporaryHardness

3. Determination of Acidity
4. Determination of Alkalinity
5. Determination of chlorides in water samples

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CHEMISTRY	**CHETCLS69**	**2017-18** **2018-19**	**B.Sc. (PMC,BZC,FMC&MCCS)**

Semester: VI Credits: 3

GREEN CHEMISTRY

UNIT-I **10H**

Green CHEMISTRY: Introduction- Definition of green chemistry, need of green CHEMISTRY, basic principles of green chemistry. Green synthesis- Evalution of the type of the reaction i) Rearrangements (100% atom economic), ii) Addition reaction (100% atom economic). Organic reactions by Sonication method: apparatus required examples of sonochemical reactions (heck, Hundsdiecker and Wittig reactions).

UNIT-II **10H**

selection of solvent:i) aqueous phase reactions ii) reactions in ionic liquids, heckreaction, suzuki reactions, epoxidation. iii) solid supported synthesis **super critical co2**: preparation, properties and applications, (decaffeination, dry cleaning)

UNIT-III **10H**

microwave and ultrasound assisted green synthesis: apparatus required, examples of maos (synthesis of fused anthro quinones, leukart reductive amination of ketones) - advantages and disadvantages of maos. aldol condensation- cannizzaro reaction- diels-alder reactions-strecker's synthesis**.**

UNIT-IV **5H**

Green catalysis: heterogeneous catalysis, use of zeolites, silica, alumina, supported catalysis- biocatalysis: Enzymes, microbes phase transfer catalysis (micellar/surfactant)

UNIT V **10H**

Examples of green synthesis / reactions and some real world cases: 1. Green synthesis of the following compounds: adipic acid , catechol , disodium imino di acetate (alternative Strecker's synthesis) 2. Microwave assisted reaction in water – Hoffmann elimination – methyl benzoate to benzoic acid – oxidation of toluene and alcohols – microwave assisted reactions in organic solvents. Diels-Alder reactions and decarboxylation reaction. 3. Ultrasound assisted reactions – sonochemical Simmons –smith reaction(ultrasonic alternative to iodine)

Text books and Reference books:

1. Green chemistry theory and Practice. P.T.Anatas and J.C. Warner
2. Green chemistry V.K. ahluwalia Narosa, New delhi.
3. Real world cases in Green chemistry M.C. Cann and M.E. Connelly
4. Green chemistry: Introductory Text M.Lancaster: Royal Society of chemistry (London)
5. Green chemistry: Introductory Text, M.Lancaster
6. Principles and practice of Heterogeneous catalysis, thomas J.M.,thomas M.J., johnwiley
7. Green chemistry: Environmental friendly alternatives R S sanghli and M.msrivastava, Narosa Publications

SRI DURGA MALLESWARA SIDDHARTHA MAHILA KALASALA, VIJAYAWADA 10

(An Autonomous college in the jurisdiction of Krishna University, Machilipatnam, A.P.)

CHEMISTRY	**CHEPCLS69**	**2017-18**	**B.Sc. (PMC,BZC, FMC&MCCS)**
		2018-19	

SEMESTER – VI **PRACTICALS** **PAPER –II** **Credits: 1**

Laboratory course – VII

Practical paper – elective vii c (at the end of semester vi) 30 h

1.Determination of specific reaction rate of hydrolysis for methyl acetate catalysed by hydrogen ion at room temperature**.**

2.Determination of molecular status and partition coefficient of benzoicacidin benzene and water.

3.Surface tension and viscosity of liquids.

4.Adsorption of acetic acid on animal charcoal, verification of freundlisch isotherm.

Elemental analysis: **10H**

CHEMISTRY	CHETCLS610	2017-18 2018-19	B.Sc. (PMC,BZC,FMC&MCCS)

Semester: VI Credits: 3

INSTRUMENTAL METHODS OF ANALYSIS

UNIT – I

Introduction to spectroscopic methods of analysis: **4 H**

Recap of the spectroscopic methods covered in detail in the core chemistry syllabus: Treatment of analytical data, including error analysis. Classification of analytical methods and the types of instrumental methods. Consideration of electromagnetic radiation.

UNIT – II

Molecular spectroscopy: **8H**

Infrared spectroscopy:

Interactions with molecules: absorption and scattering. Means of excitation (light sources), separation of spectrum (wavelength dispersion, time resolution), detection of the signal (Heat, differential detection), interpretation of spectrum (qualitative, mixtures, resolution), advantages of Fourier Transform (FTIR). Samples and results expected. Applications: Issues of quality assurance and quality control, Special problems for portable instrumentation and rapid detection.

UNIT – III **10H**

UV-Visible/ Near IR – emission, absorption, fluorescence and photoaccoustic. Excitation sources (lasers, time resolution), wavelength dispersion (gratings, prisms, interference filters,laser, placement of sample relative to dispersion, resolution), Detection of signal (photocells, photomultipliers, diode arrays, sensitivity and S/N), Single and Double Beam instruments, Interpretation (quantification, mixtures, absorption vs. Fluorescence and the use of time, photoaccoustic, fluorescent tags).

UNIT – IV **16H**

Separation tecHniques Chromatography: Gas chromatography, liquid chromatography, supercritical fluids, Importance of column technology (packing, capillaries), Separation based on increasing number of factors (volatility, solubility, interactions with stationary phase, size, electrical field), Detection: simple vs. Specific (gas and liquid), Detection as a means of further analysis (use of tags and coupling to IR and MS), electrophoresis (plates and capillary) and use with DNA analysis. 46 Immunoassays and DNA techniques

Mass spectroscopy: Making the gaseous molecule into an ion (electron impact, chemical ionization), Making liquids and solids into ions (electrospray, electrical discharge, laser desorption, fast atom bombardment), Separation of ions on basis of mass to charge ratio, Magnetic, Time of flight, Electric quadrupole. Resolution, time and multiple separations, Detection and interpretation (How this is linked to excitation).

Elemental analysis: **10H**

UNIT – V

Mass spectrometry (electrical discharges).

Atomic spectroscopy: Atomic absorption, Atomic emission, and Atomic fluorescence.

Excitation and getting sample into gas phase (flames, electrical discharges, plasmas), wavelength separation and resolution (dependence on technique), Detection of radiation (simultaneous/scanning, signal noise), Interpretation (errors due to molecular and ionic species, matrix effects, other interferences).

NMR spectroscopy: **P**rinciple, Instrumentation, Factors affecting chemical shift, Spin coupling,Applications.

Electroanalytical methods: Potentiometry & Voltammetry

Radiochemical methods

X-ray analysis and electron spectroscopy (surface analysis)Text books and Reference books:

1. Skoog, D.A. Holler F.J. & Nieman, T.A. Principles of Instrumental Analysis, Cengage Learning IndiaEd.

2. Willard, H.H., Merritt, L.L., Dean, J. & Settoe, F.A. Instrumental methods ofanalysis, 7th Ed. Wadsworth publishing Company Ltd., Belmont, California,USA, 1988.

3.P.W. Atkins: physical chemistry.

4.G.W. Castellan: physical chemistry.

5.C.N. Banwell: Fundamentals of Molecular Spectroscopy.

6.Brian smith: Infrared Spectral Interpretations: A Systematic approach.

7. W.J. Moore: physical chemistry

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CHEMISTRY	**CHEPCL66**	**2017-18**	**B.Sc. (PMC,BZC)**
		2018-19	

SEMESTER – VI **PRACTICALS** **PAPER –II**

30 H **Credits: 1**

Ii. Laboratory course – viii practical paper – viii-a-2 (at theend of semester vi)

1.green procedure for organic qualitative analysis: detection of n, s andhalogens2.acetylation of 10 amine by green method: preparation of acetanilide

3. Rearrangement reaction in green conditions: benzil-benzilic acid rearrangement
4. Electrophilic aromatic substitution reaction: nitration of phenol
5. Radical coupling reaction: preparation of 1,1-bis -2-naphthol
6. Green oxidation reaction: synthesis of adipic acid
7. Green procedure for diels alder reaction between furan and maleic anhydride

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CHEMISTRY	**CHETCLS612**	**2017-18** **2018-19**	**B.Sc. (PMC,BZC,FMC&MCCS)**

Semester: VI Credits: 3 45Hra

ANALYSIS OF DRUGS, FOODS , DAIRY PRODUCTS & BIO-CHEMICAL ANALYSIS

UNIT- I

Analysis of the following drugs and pharmaceuticals preparations: (Knowledge ofmolecular formula, structure and analysis)

Analysis of anlgesics and antipyretics like aspirin and paracetamolAnalysis of antimalerials like choloroquine .

Analysis of drugs in the treatment of infections and infestations :Amoxycillin., chloramphenicol,metronidazole, penicillin, tetracycline, cephalexin(cefalexin).

Anti tuberculous drug- isoniazid.

UNIT – II

Analysis of the following drugs and pharmaceuticals preparations:

(Knowledge of molecular formula, structure and analysis)

Analysis of antihistamine drugs and sedatives like: allegra, zyrtec(citirizine), alprazolam,Trazodone, lorazepem, ambien(zolpidem), diazepam,

UNIT – III

Analysis of anti epileptic and anti convulsant drugs like phenobarbital and phenacemide.

Analysis of drugs used in case of cardiovascular drugs:atenolol, norvasc(amlodipine), Analysis of lipitor(atorvastatin) a drug for the preventin of productin of cholesterol. Analysis of diuretics like: furosemide (Lasix), triamterene

Analysis of prevacid(lansoprazole) a drug used for the prevention of production of acids In stomach.

UNIT – IV

Analysis of Milk and milk products: Acidity, total solids, fat, total nitrogen, Protenines,lactose, phosphate activity, casein, choride. Analysis of food materials- Preservatives: Sodium carbonate, sodium benzoate sorbic acid Coloring matters, - Briliant blue FCF, fast green FCF, tertrazine, erytrhosine , sunset yellow FCF.

Flavoring agents - Vanilla , diacetyl, isoamyl acetate, limonene, ethylpropionate , allyl Hexanoate and Adulterants in rice and wheat, wheat floo0r, sago,coconut oil, coffee powder, tea powder, milk..

UNIT – V

Clinical analysis of blood:Composition of blood,clinical analysis,trace elements in the body.Estimation of blood chlolesterol,glucose,enzymes,RBC & WBC ,Blood gas analyser

Text books and Reference books:

1.F.J.welcher-Standard methods of analysis,

2.A.I.Vogel-A text book of quantitative Inorganic analysis-ELBS,

3.F.D.Snell & F.M.Biffen-Commercial methods of analysis-D.B.Taraporavala & sons,

4.J.J.Elving and I.M.kolthoff- chemical analysis - A series of monographs on analytical chemistry and its applications -- Inter Science- Vol I to VII.,

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CHEMISTRY	**CHEPWCL67**	**2017-18**	**B.Sc. (PMC,BZC, FMC&MCCS)**
		2018-19	

SEMESTER – VI **PRACTICALS** **PAPER –II**

30 H **Credits: 1**

VII-A-3 Practical:- Project WorK

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CHEMISTRY	**CHETCLS612**	**2017-18** **2018-19**	**B.Sc. (PMC,BZC,FMC&MCCS)**

Semester: VI Credits: 3

INORGANIC MATERIALS OF INDUSTRIAL IMPORTANCE

UNIT - I

Recapitulation of *s*- and *p*-Block Elements **8H**

Periodicity in *s*- and *p*-block elements witH respect to electronic configuration, atomic and ionicsize, ionization ent Halpy, electronegativity (Pauling, Mulliken, and Alfred - RocHow scales).

Allotropy in C, S, and P. Oxidation states witH reference to elements in unusual and rare oxidation states like carbides and nitrides), inert pair effect, diagonal relationsHip and anomalous beHaviour of first member of eacH group.

UNIT – II **15H**

Silicate Industries

Glass: Glassy state and its properties, classification (silicate and non-silicate glasses). Manufacture and processing of glass. Composition and properties of tHe following types of glasses: Soda lime glass, lead glass, armoured glass, safety glass, borosilicate glass, fluorosilicate, coloured glass, pHotosensitive glass.

Ceramics: Important clays and feldspar, ceramic, tHeir types and manufacture. HigH tecHnology ceramics and tHeir applications, superconducting and semiconducting oxides, fullerenes carbon nanotubes and carbon fibre.

Cements*:* Classification of cement, ingredients and tHeir role, Manufacture of cement and tHe settingprocess, quick setting cements.

UNIT – III **8H**

Fertilizers:

Different types of fertilizers. Manufacture of tHe following fertilizers: Urea, ammonium nitrate, calcium ammonium nitrate, ammonium pHospHates; polypHospHate, superpHospHate, compound and mixed fertilizers, potassium cHloride, potassium sulpHate.

UNIT – IV **8H**

Surface Coatings:

Objectives of coatings surfaces, preliminary treatment of surface, classification of surface coatings. Paints and pigments-formulation, composition and related properties. Oil paint, VeHicle,modified oils, Pigments, toners and lakes pigments, Fillers, THinners, Enamels, emulsifying agents.

Special paints (Heat retardant, Fire retardant, Eco-friendly paint, Plastic paint), Dyes, Wax polisHing, Water and Oil paints, additives, Metallic coatings (electrolytic andelectroless), metal spraying and anodizing.

UNIT – V **6H**

Alloys:

Classification of alloys, ferrous and non-ferrous alloys, Specific properties of elements in alloys. Manufacture of Steel (removal of silicon decarbonization, demanganization, desulpHurization depHospHorisation) and surface treatment (argon treatment, Heat treatment, nitriding, carburizing). Composition and properties of different types of steels.

CHemical explosives:

Origin of explosive properties in organic compounds, preparation and explosive properties oflead azide, PETN, cyclonite (RDX). Introduction to rocket propellants

Reference Books:

1. StoccHi: *Industrial CHemistry*, Vol-I, Ellis Horwood Ltd. UK.
2. M. Felder, R. W. Rousseau: *Elementary Principles of CHemical Processes*, Wiley PublisHers, New DelHi.
3. D. Kingery, H. K. Bowen, D. R. UHlmann: *Introduction to Ceramics,* Wiley PublisHers, New DelHi.
4. A. Kent: Riegel's *Handbook of Industrial CHemistry*, CBS PublisHers, New DelHi.

5. C. Jain & M. Jain: *Engineering CHemistry,* DHanpat Rai & Sons, DelHi.

6. Gopalan, D. Venkappayya, S. Nagarajan: *Engineering CHemistry,* Vikas Publications, New DelHi.
7. K. SHarma: *Engineering CHemistry*, Goel PublisHing House, Meerut

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CHEMISTRY	**CHEPCL66**	**2017-18** **2018-19**	**B.Sc. (PMC,BZC, FMC &MCCS)**

SEMESTER – VI **PRACTICALS** **PAPER–VIII** **Credits: 1**

II. LABORATORY COURSE – VIII

Practical Paper – VIII-B-2: (at tHe end of semester VI) **30 H**

1. Green procedure for organic qualitative analysis: Detection of N, S andHalogens2.Acetylation of 10 amine by green metHod: Preparation of acetanilide
3. Rearrangement reaction in green conditions: Benzil-Benzilic acid rearrangement
4. Electrophilic aromatic substitution reaction: Nitration of phenol
5. Radical coupling reaction: Preparation of 1,1-bis -2-napHtHol
6. Green oxidation reaction: Synthesis of adipic acid
7. Green procedure for Diels Alder reaction between furan and maleic anhydride

Qualitative analysis

3. Estimation of carbonate and Bicarbonate in wasHing soda.
4. DicHrometry- Estimation of Fe^{+2} and Fe^{+3} ions

Electro CHemistry

1. Determination of redox potential of Fe^{+2} or Fe^{+3} by potentiometric titration using ferrous ammoniumsulpHate.

Determination of pH of solution by using pH meter.

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CHEMISTRY	**CHETCLS613**	**2017-18** **2018-19**	**B.Sc. (PMC,BZC,FMC&MCCS)**

Semester: VI Credits: 3

ANALYSIS OF APPLIED INDUSTRIAL PRODUCTS

UNIT-I

Analysis of soaps: moisture and volatile matter,cobined alkali,total fatty matter, free alkali, totalfatty acid, sodium silicate and chlorides.

Analysis of paints :vehicle and pigments ,Barium sulphate ,total lead, lead chromate,iron pigments, zinc chromate

UNIT- II

Analysis of oils:saponification value,iodine value,acid value,ester value, bromine value, acetyl value.

Analysis of industrial solvents like benzene,acetone,methanol and acetic acid., Determination ofmethoxyl and N-methyl groups.,

UNIT-III

Analysis of fertilizers: urea,NPK fertilizer,super phosphate, Analysis of DDT,BHC,endrin,endosulfone,malathion,parathion.,

Analysis of starch,sugars,cellulose and paper,

UNIT -IV

Gas analysis: carbon dioxide, carbon monoxide, oxygen, Hydrogen, saturated Hydro carbon, unsaturated Hydrocarbons, nitrogen, octane number, cetane number

Analysis of Fuel gases like: water gas,producer gas,kerosene (oil) gas. Ultimate analysis :carbon, Hydrogen,nitrogen,oxygen,phosphorus and sulfur.,

UNIT - V

Analysis of Complex materials:

Analysis of cement- loss on ignition, insoluble residu, total silica, sesqui oxides, lime,Magnesia, ferric oxide, sulphuric anhydrid.

Analysis of glasses - Determinaiton of silica, sulphuur, barium, arsinic, antimony, totalR2O3, calcium, magnesium, total alkalies,aluminium,chloride,floride

SUGGESTED BOOKS:

1.F.J.welcher-Standard methods of analysis,

2.A.I.Vogel-A text book of quantitative Inorganic analysis-ELBS, 3.H.H.Willard and H.Deal- Advanced quantitative analysis- Van nostrandco,

4.F.D.Snell & F.M.Biffen-Commercial methods of analysisd.B.Taraporavala & sons,

5.J.J.Elving and I.M.kolthoff- chemical analysis - A series of monographs onanalytical chemistry and its applications -- Inter Science- Vol I to VII.,

6.G.Z.Weig - Analytical methods for pesticides,plant growth regulators andFood additives - Vols I to VII,

7. Aanalytical Agricultrual chemistry by S.L.chopra & J.S.Kanwar -- kalyanipublishers

8. Mannual of soil, plant, water and fertilizer analysis, R.M.upadhyay and N.lsharma,Kalyani publishers

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CHEMISTRY	**CHEPWCL67**	**2017-18**	**B.Sc. (PMC,BZC, FMC&MCCS)**
		2018-19	

SEMESTER – VI **PRACTICALS** **PAPER –II** **Credits: 1**

VII-B-3 Practical:- Project Work / Intern Ship

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CHEMISTRY	**CHETCLS614**	**2017-18**	**B.Sc. (PMC,BZC,FMC&MCCS)**
		2018-19	

Semester: VI Credits: 3

ORGANICSPECTROSCOPIC TECHNIQUES

UNIT-I **10H**

NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY

Nuclear spin, Principles of NMR-Classical and Quantum mechanical methods, Magnetic Moment and Spin angular momentum. Larmour Frequency. Instrumentation. Relaxation- spin-spin & spin lattice relaxation. Shielding constants, chemical shifts, shielding and deshielding mechanism-Factors influencing chemical shift. Spin-Spin interactions-AX, AX2 and AB types. Vicinal, Geminal and Long range coupling- Factors influencing coupling constants.

UNIT–II **5H**

Spin decoupling, Spin tickling, Deuterium exchange, chemical shift reagents and Nuclear overhauser effect. Applications in Medical diagnostics, Reaction kinetics and mechanically induced dynamic nuclear polarization. FT NMR and its Advantages.

UNIT-III **10H**

UV&VISIBLE SPECTROSCOPY

Electronic spectra of diatomic molecules. The Born-oppenheimer approximation. Vibrational coarse structure: Bond association and Bond sequence. Intensity of Vibrational-electronic spectra: the Franck-Condon principle. Rotational fine structure of electronic vibration transitions. Electronic structure of diatomic molecules.

Types of transitions, chromophores, Conjugated dienes, trienes and polyenes, unsaturated carbonyl compounds-Woodward – Fieser rules.

UNIT-IV **5H**

Electronic spectra of polyatomic molecules. Chemical analysis by Electronic Spectroscopy – Beer-Lambert's Law. Deviation from Beer's law. Quantitative determination of metal ions (Mn+2, Fe+2, NO2-, Pb+2). Simultaneous determination of chromium and Manganese in a mixture.

UNIT-V **15H**

Electron Spin Resonance Spectroscopy

Basic Principles, theory of ESR, Comparison of NMR & ESR. Instrumentaion, Factors affecting the 'g' value,determination of 'g' value. Isotropic and Anisotropic constants. Splitting Hyper fine splitting coupling constants. Line width, Zero field splitting and Kramer degeneracy. Crystal field splitting, Crystal field effects.

Applications:- Detection of free radicals; ESR spectra of (a) methyl radical (CH3·), (b) Benzene anion (C6H6-) (c) Isoquinine (d) [Cu(H2O)6]+2 (e) [Fe(CN)5NO]-3 (f)

REFERENCE BOOKS:

1. Electron Spin Resonance Elementary Theory and Practical Applications- John E.Wertz and James R. Bolton, Chapman and Hall, 1986.
2. Spectroscopic Identification of organic compounds – Silverstein, Basseler andmorril.
3. Organic Spectroscopy- William Kemp.
4. Fundamentals of Molecular Spectroscopy- C.N.Banwell and E.A. Mc cash 4thedition, Tata Mc Graw Hill Publishing Co., Ltd. 1994.
5. Physical Methods in Inorganic Chemistry – R.S.Drago, Saunders Publications.
6. Application of mössbauer Spectroscopy – Green Mood.

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CHEMISTRY	**CHEPCL65**	**2017-18**	**B.Sc. (PMC,BZC, FMC&MCCS)**
		2018-19	

SEMESTER – VI **PRACTICALS** **PAPER –II** **Credits: 1**

I. LABORATORY COURSE – VIII

Practical Paper – VIII-C-1: (at the end of semester VI) 30 H

1. Preparation of Aspirin
2. Preparation of Paracetamol
3. Preparation of Acetanilide
4. Preparation of Barbutiric Acid
5. Preparation of Phenyl Azo β-naphthol

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CHEMISTRY	**CHETCLS615**	**2017-18**	**B.Sc. (PMC,BZC,FMC&MCCS)**
		2018-19	

Semester: VI Credits: 3 45Hrs

ADVANCED ORGANIC REACTIONS—

UNIT – I

ORGANIC PHOTOCHEMISTRY

Organic photochemistry : Molecular orbitals, carbonyl chromophore–triplet states, Jablonski diagram, inter– system crossing. Energy transfer. Energies properties and reaction of singlet and triplet states of and transitions.

Photochemical reactions : (a) Photoreduction, mechanism, influence of temperature, solvent,nature

ofhydrogen donors, structure of substrates on the course of photo reduction,.

UNIT – II--

ORGNAIC PHOTOCHEMISTRY

Norrisch cleavages, type I : Mechanism, acyclic cyclicdiones, influence of sensitizer, photo Fries rearrangement. Norrisch type II cleavage : Mechanism and stereochemistry, type II reactions of esters : 1: 2 diketones, photo decarboxylation., Di - π methane rearrangement, Photochemistry – of conjugated dienes, Decomposition of nitrites – Barton reaction

UNIT – III

PROTECTING GROUPS AND ORGANIC REACTIONS

Principles of (1) Protection of alcohols – ether formation including silyl ethers – ester formation, (2) Protection of diols – acetal,ketal and carbonate formation, (3) Protection of carboxylic acids – ester formation, benzyl and t–butyl esters, (4) Protection of amines acetylation, benzoylation, benzyloxy carbonyl, triphenyl methyl groups and fmoc, (5) Protection of carbonyl groups – acetal, ketal, 1,2–glycols and 1,2–dithioglycols formation.

UNIT – IV

Synthetic reactions : Mannich reaction – Mannich bases – Robinson annulations. The Shapiro reaction, Stork–enamine reaction. Use of dithioacetals – Umpolung, phase transfercatalysis – mechanisms and use of benzyl trialkyl ammonium halides. Witting reaction

UNIT –V : NEW SYNTHETIC REACTIONS

Baylis–Hillman reaction, RCM olefm metathesis, Grubb catalyst, Mukayama aldol reaction, Mitsunobu reaction, McMurrey reaction, Julia–Lythgoe olefination, and Peterson's stereoselective olefination, Heck reaction, Suziki coupling, Stille coupling and Sonogishira coupling, Buchwald–Hartwig coupling. Ugi reaction, Click reaction.

Recommended Books

1. Molecular reactions and Photochemistry by Charles Dupey and O.L. Chapman.
2. Molecular Photochemistry by Turru.
3. Importance of antibonding orbitals by Jaffe and Orchin.
4. Text Book of Organic Chemistry by Cram,. Hammand and Henrickson.
5. Some modern methods of organic synthesis by W. Carruthers.
6. Guide Book to Organic Synthesis by R.K. Meckie, D.M. Smith and R.A. Atken.
7. Organic Synthesis by O.House.
8. Organic synthesis by Michael B. Smith.
9. Organic Chemistry Claydon and others 2005.
10. Name Reactions by Jie Jack Li
11. Reagents in Organic synthesis by B.P. Mundy and others.

12. Tandem Organic Reactions by Tse–Lok Ho.

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		2018-19	

SEMESTER – VI **PRACTICALS** **PAPER –II**
Credits: 1

II. LABORATORY COURSE – VIII -- Skill Development/ Employability

Practical Paper – VIII-B-2: (at the end of semester VI)

30 h

1.Green procedure for organic qualitative analysis: Detection of N, S andhalogens2.Acetylation of 10 amine by green method: Preparation of acetanilide

3. Rearrangement reaction in green conditions: Benzil-Benzilic acid rearrangement
4. Electrophilic aromatic substitution reaction: Nitration of phenol
5. Radical coupling reaction: Preparation of 1,1-bis -2-naphthol
6. Green oxidation reaction: Synthesis of adipic acid
7. Green procedure for Diels Alder reaction between furan and maleic anhydride

Qualitative analysis

1. Estimation of carbonate and Bicarbonate in washing soda.
2. Dichrometry- Estimation of Fe^{+2} and Fe^{+3} ions

Electro Chemistry

1. Determination of redox potential of Fe^{+2} or Fe^{+3} by potentiometric titration using ferrous ammonium sulphate.

Determination of pH of solution by using pH meter.