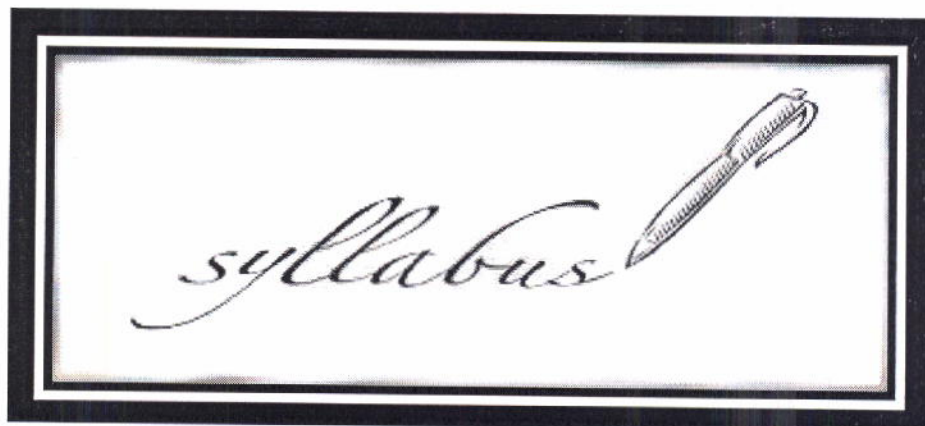


**DUVVURU RAMANAMMA WOMEN'S COLLEGE GUDURU  
(AUTONOMOUS)**

**Re-Accredited by NAAC with 'A' Grade  
Recognized by UGC as " College with Potential for Excellence**



**DEPARTMENT OF CHEMISTRY**

**2016-2017**

**CBCS UG PROPOSED SYLLABUS**  
**Subject: CHEMISTRY (wef. 2016-2017)**

**SEMESTER I**

**Paper I (Inorganic & Organic Chemistry) 60 hrs (4 h / w)**

**INORGANIC CHEMISTRY 30 hrs (2h / w)**

**UNIT -I**

**p-block elements -I 15h**

- Group-13: Synthesis and structure of diborane and higher boranes  
( $B_4H_{10}$  and  $B_5H_9$ ), boron-nitrogen compounds ( $B_3N_3H_6$  and BN)  
Group - 14: Preparation and applications of silanes and silicone  
Group - 15: Preparation and reactions of hydrazine, hydroxylamine.

**UNIT-II**

**1. p-block elements -II**

**8h**

- Group - 16: Classifications of oxides based on (i) Chemical behaviour and  
(ii) Oxygen content.

Group-17: Inter halogen compounds and pseudo halogens.

**2. Organometallic Chemistry**

**7h**

Definition and classification of Organometallic compounds, nomenclature, preparation, properties and applications of alkyls of Li and Mg elements.

**ORGANIC CHEMISTRY**

**30hrs (2h /w)**

**UNIT-III**

**Structural theory in Organic Chemistry 10 h**

Types of bond fission and organic reagents (Electrophilic, Nucleophilic, and free radical reagents including neutral molecules like  $H_2O$ ,  $NH_3$ , &  $AlCl_3$ ).

Bond polarization : Factors influencing the polarization of covalent bonds, electro negativity - inductive effect. Application of inductive effect (a) Basicity of amines (b) Acidity of carboxylic acids (c) Stability of carbonium ions. Resonance or Mesomeric effect, application to (a) acidity of phenol, and (b) acidity of carboxylic acids. Hyper conjugation and its application to stability of carbonium ions, Free radicals and alkenes, carbanions, carbenes and nitrenes.

Types of Organic reactions : Addition - electrophilic, nucleophilic and free radical. Substitution - electrophilic, nucleophilic and free radical. Elimination- Examples.

#### UNIT-IV

##### 1. Acyclic Hydrocarbons 6 h

Alkenes - Preparation of alkenes. Properties: Addition of hydrogen - heat of hydrogenation and stability of alkenes. Addition of halogen and its mechanism. Addition of HX, Markonikov's rule, addition of H<sub>2</sub>O, HOX, H<sub>2</sub>SO<sub>4</sub> with mechanism and addition of HBr in the presence of peroxide (anti - Markonikov's addition ). Dienes - Types of dienes, reactions of conjugated dienes - 1,2 and 1,4 addition of HBr to 1,3 - butadiene and Diel's - Alder reaction.

Alkynes - Preparation by dehydrohalogenation of dihalides, dehalogenation of tetrahalides, Properties; Acidity of acetylenic hydrogen (formation of Metal acetylides). Preparation of higher acetylenes, Metal ammonia reductions, Physical properties. Chemical reactivity - electrophilic addition of X<sub>2</sub>, HX, H<sub>2</sub>O (Tautomerism), Oxidation with KMnO<sub>4</sub>, OSO<sub>4</sub>, reduction and Polymerisation reaction of acetylene.

##### 2. Alicyclic hydrocarbons (Cycloalkanes)

4 h

Nomenclature, Preparation by Freunds methods, heating dicarboxylic metal salts. Properties - reactivity of cyclopropane and cyclobutane by comparing with alkanes, Stability of cycloalkanes - Baeyer's strain theory, Sachse and Mohr predictions and Pitzer's strain theory. Conformational structures of cyclobutane, cyclopentane, cyclohexane.

#### UNIT-V

##### Benzene and its reactivity 10h

Concept of resonance, resonance energy. Heat of hydrogenation, heat of combustion of Benzene, mention of C-C bond lengths and orbital picture of Benzene. Concept of aromaticity - aromaticity (definition), Huckel's rule - application to Benzenoid (Benzene, Naphthalene) and Non - Benzenoid compounds (cyclopropenyl cation, cyclopentadienyl anion and tropylium cation)

Reactions - General mechanism of electrophilic substitution, mechanism of nitration, Friedel Craft's alkylation and acylation. Orientation of aromatic substitution - Definition of ortho, para and meta directing groups. Ring activating and deactivating groups with examples (Electronic interpretation of various groups like NO<sub>2</sub> and Phenolic). 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)



**LABORATORY COURSE-I**  
**Practical-I (At the end of Semester-I)**

30 hrs (2 h / w)

**Qualitative inorganic analysis**

Analysis of simple salt containing the following one anion and cation

**Analysis of Anions:** Carbonate, sulphate, chloride, bromide, iodide, acetate, nitrate, borate, phosphate.

**Analysis of cations:** Lead, copper, cadmium, iron, aluminum, zinc, manganese, nickel, calcium, strontium, barium, potassium and ammonium.

**List of Text Books**

1. Unified chemistry Vol- I by O.P.Agarwal
2. Advanced Inorganic Chemistry Vol-I by Satyaprakash, Tuli, Basu and Madan
3. Selected topics in inorganic chemistry by W.D.Malik, G..D.Tuli, R.D.Madan
4. A Text Book of Organic Chemistry by Bahl and Arun bahl
5. Reactions and Mechanisms by P. S. Kelsi
6. Telugu Academy Textbook of Chemistry Vol- I
7. Unified chemistry Vol- I by K.Ramarao and Y. R. Sharma (KalyaniPublishers)

**List of Reference Books**

1. Inorganic Chemistry by J.E.Huheey
2. Basic Inorganic Chemistry by Cotton and Wilkinson
3. A textbook of qualitative inorganic analysis by A.I. Vogel
4. Organic Chemistry by Morrisson and Boyd
5. A Text Book of Organic chemistry by I L Finar Vol I
6. Concise Inorganic Chemistry by J.D.Lee

**SEMESTER II**  
**Paper II (Physical & General Chemistry) 60 hrs (4 h / w)**

**PHYSICAL CHEMISTRY      30 hrs (2h / w)**

**UNIT-I**

**Solidstate                  10h**

Symmetry in crystals. Law of constancy of interfacial angles. The law of rationality of indices. Miller indices, Miller indices. The law of symmetry. Definition of lattice point, space lattice, unit cell. Bravais lattices and crystal systems. Bragg's law. Defects in crystals. Stoichiometric and non-stoichiometric defects. And Applications.

**UNIT-II**

**1. Gaseous state            6 h**

Compression factors, deviation of real gases from ideal behavior. Vander Waal's equation of state. P-V Isotherms of real gases, Andrew's isotherms of carbon dioxide, continuity of state. Critical phenomena. The Vander Waal's equation and the critical state. Law of corresponding states. Relationship between critical constants and Vander Waal's constants. Joule Thomson effect.

**2. Liquid state 4 h**

Structural differences between solids, liquids and gases. Liquid crystals, the mesomorphic state. Classification of liquid crystals into Smectic and Nematic. Differences between liquid crystal and solid/liquid. Application of liquid crystals as LCD devices.

**UNIT-III**

**Solutions                    10h**

Liquid-liquid - ideal solutions, Raoult's law. Ideally dilute solutions, Henry's law. Non-ideal solutions. Vapour pressure - composition and vapour pressure- temperature curves. Azeotropes-HCl-H<sub>2</sub>O, ethanol-water systems and fractional distillation. Partially miscible liquids-phenol-water, trimethylamine-water, nicotine-water systems. Effect of impurity on consolute temperature. Immiscible liquids and steam distillation. Nernst distribution law. Calculation of the partition coefficient. Applications of distribution law.