

B.SC. CHEMISTRY SYLLABUS UNDER CBCS**SEMESTER – I – W.E.F. – 2016-17****PAPER I - INORGANIC & ORGANIC CHEMISTRY** **60hrs (4h/w)****INORGANIC CHEMISTRY** **30 hrs (2h / w)****UNIT –I****p-block elements –I** **15h**

Group-13: Synthesis and structure of diborane and higher boranes

(B₄H₁₀ and B₅H₉), boron-nitrogen compounds (B₃N₃H₆ and BN)

Group - 14: Preparation and applications of silanes and silicones.

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

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 H₂O, NH₃ & AlCl₃).

Bond polarization : Factors influencing the polarization of covalent bonds, electronegativity - 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 H₂O, HOX, H₂SO₄ 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 X₂, HX, H₂O (Tautomerism), Oxidation with KMnO₄, OsO₄, reduction and Polymerisation reaction of acetylene.

2. Alicyclic hydrocarbons (Cycloalkanes)

4 h

Nomenclature, Preparation by Freunds method, Wislicenus method. 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 NO₂ 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)

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 Morrison and Boyd
5. A Text Book of Organic chemistry by I L Finar Vol I
6. Concise Inorganic Chemistry by J.D.Lee

LABORATORY COURSE-I
Practical-I Simple Salt Analysis
(At the end of Semester-I)

30 hrs (2 h / w)

Qualitative inorganic analysis

Analysis of simple salt containing one anion and cation from the following

Anions: Carbonate, sulphate, chloride, bromide, acetate, nitrate, borate, phosphate.

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

MODEL PAPER

THREE YEAR B.Sc, DEGREE EXAMINATION FIRST YEAR EXAMINATIONS SEMESTER I

Paper –I: INORGANIC & ORGANIC CHEMISTRY - I

Time: 3 hours

Maximum Marks: 75

PART- A

Answer any **FIVE** of the following questions

Each carries **FIVE** marks

5x5 = 25 Marks

1. Define the electron deficient molecules and draw the structure of Borazole and Diborane.
2. Classify the Oxides based on the oxygen content with one example to each.
3. How the following are synthesized from Organo Lithium Compounds.
a) Acetic acid b) Ethyl alcohol
4. Define the Carbonium ion and explain the stability with no bond resonance.
5. Define the Markonikov's rule and explain the addition of 1- Propene with HBr.
6. Explain the acidity of the Acetylinic hydrogen with example.
7. Draw the conformational structures of Cyclohexane.
8. Define aromaticity and apply the Huckel's rule to benzene and naphthalene.

PART- B

Answer **ALL** the questions

Each carries **TEN** marks

5x10 = 50 Marks

9. (a) Write note on Preparation, Structure and Properties of Silicones.
(OR)
(b) Explain the Preparation and Oxidation- Reduction reactions of Hydroxylamine.
- 10.(a) Give an account on different types of interhalogen compounds.
(OR)
(b) How the following are prepared from the Methyl Magnesium bromide and methyl lithium
1) Formaldehyde 2) Acetaldehyde 3) Acetone 4) t- butyl alcohol
11. (a) Describe different types of Organic Reactions with one example to each.
(OR)
(b) Write notes on the following
1) Mesomeric effect 2) Hyper conjugation 3) Inductive effect
- 12.(a) Explain the addition of these reagents to alkenes with mechanism.
1) H₂O 2) HOX 3) H₂SO₄
(OR)
(b) Explain Baeyer's bond angle strain theory.
13. (a) Describe the Molecular Orbital structure of Benzene.
(OR)
(b) Explain the orientation in benzene with respect to alkyl and nitro groups.