

**NAGARJUNA GOVERNMENT COLLEGE, NALGONDA**

**Autonomous**


**Re-accredited by NAAC with 'A' Grade**


**BOARD OF STUDIES - 2015-16**


**DEPARTMENT OF CHEMISTRY**

## Resolutions

1. Unitization of syllabus in to 4 units for each paper.
2. To conduct 2 Internal Assessments for 20 marks, one student seminar for 5 marks and one assignment for 5 marks (total 30 marks) for I & II year students ,10 marks for III year students each in the form of essay type and short type Questions .
3. It is compulsory to pass in Internal examination and One has to secure 40% marks in each paper for I & II year students
4. To conduct semester End examination for 70 marks for I & II year students and 40 marks for III year students .
5. To pass semester End examination one has to get a minimum of 40 % of marks in each paper for I & II year students and 36% marks in each paper for III year students
6. To conduct I Internal examination in the first week of August, and II Internal examination in the last week of September -2015.
7. Approved the syllabus for I,II,III,IV,V,VI,VII, and VIII papers and model Question papers.
8. Approved to assign the project work for B.Sc final year students by giving grades.
9. To design Question paper Pattern in the following lines for III year students

  
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NALGONDA

  
**Dr. D. Ramesh M.Sc., Ph.D**  
Assistant Professor  
Department of Chemistry  
Mahatma Gandhi University  
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**PRINCIPAL**  
Govt. Degree College  
RAMANNAPET  
Dist. Nalgonda

# NAGARJUNA GOVT.COLLEGE, NALGONDA

(AUTONOMOUS)


## DEPARTMENT OF CHEMISTRY

### BOARD OF STUDIES MEETING

The members of Board of studies in chemistry Department, N.G.College, Nalgonda met under the chairmanship of P.Yedukondalu on 30.9.2015 and passed the following resolutions

#### AGENDA

1. To consider and approve the syllabus for B.Sc I, II, III years (I, II, III, IV, V & VI semesters) for the academic year 2015-16.
2. To consider and approve the choice based credit system(CBCS) and cumulative grade point average (CGPA)system for the I & II year (I,II,III,IV semester)students for the academic year2015-16
3. To consider and approve the any one of the General electives for the IV Semester Students.
  - i) cement industry
  - ii) medicinal chemistry
4. To Consider and approve the continuation of Internal Assessment for the Students admitted in to I, II& III year degree course during 2015-16.
5. To consider and approve to conduct year wise practical Examination for the students .
6. To consider and approve the list of examiners for paper setting and evaluation for B.Sc I,II,III years(I,II,III,IV, V & VI semesters ) for the academic year 2015-16.
7. To consider and approve the model Question papers for B.Sc I, II, and III Years for the academic year 2014-15
- 8 . Any other related academic matter.

  
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Section-A

4 X 8=32

- To give 4 long questions with internal choice and ask them to answer all questions

Section-B

4 X 2=8 marks

- To give Eight short questions and ask them to answer any 4 questions .

10. To design question paper Pattern in the following lines for I & II year students

Section -A

5 X 2=10 Marks

- To give five very short questions and ask them to answer all questions

Section-B

4 X 5=20 Marks


- To give Six Short questions and ask them to answer any four questions

Section-C


4 X 10 = 40 Marks

- To give 4 Long Questions with internal choice and ask them to answer all questions

1. To Prepare and supply of question banks and model papers to the students
2. Continuous Internal Assessment methods adopted to evaluate the progression of the student.

  
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**APPROVED THE PANEL OF EXAMINERS FOR PAPER SETTING AND  
EVALUATION FOR THE YEAR 2015-2016.**

| SNO | PAPER |   | NAME                 | DISIGNATION                         | CELL NO    |
|-----|-------|---|----------------------|-------------------------------------|------------|
| 1   | I     | 1 | Dr.D.RAMESH          | Assit.Prof.,<br>M.G.U, NLG          | 7702638320 |
| 2   |       | 2 | Dr.V.RAVINDHAR REDDY | Assit.Prof.,<br>GDC, SIDDIPET       | 9492915339 |
| 3   |       | 3 | Sri.D.KRISHNA KUMAR  | Assit.Prof.,<br>GDC,JADCHARLLA,MBNR | 9866219767 |
| 4   | II    | 1 | Dr .Y.PRASHANTHI     | Assit.Prof.,<br>M.G.U, NLG          | 9010203857 |
| 5   |       | 2 | Dr.D.RAMESH          | Assit.Prof.,<br>M.G.U, NLG          | 7702638320 |
| 6   |       | 3 | Dr.V.RAVINDHAR REDDY | Assit.Prof.,<br>GDC,SIDDIPET        | 9492915339 |
| 7   | III   | 1 | Dr.M.VASANTHA        | Assit.Prof.,<br>M.G.U, NLG          | 9849216947 |
| 8   |       | 2 | Dr .Y.PRASHANTHI     | Assit.Prof.,<br>M.G.U, NLG          | 9010203857 |
| 9   |       | 3 | Sri.D. KRISHNA KUMAR | Assit.Prof.,<br>GDC,JADCHARLLA,MBNR | 9866219767 |
| 10  | IV    | 1 | Dr .Y.PRASHANTHI     | Assit.Prof.,<br>M.G.U, NLG          | 9010203857 |
| 11  |       | 2 | Dr.V.RAVINDHAR REDDY | Assit.Prof.,<br>GDC, SIDDIPET       | 9492915339 |
| 12  |       | 3 | Dr.E.YADAI AH        | Assit.Prof.,<br>GDC, KAIRATHA BAD   | 9849535003 |
| 13  | V     | 1 | Dr.R.ROOPA           | Assit.Prof.,<br>M.G.U, NLG          | 9441780972 |
| 14  |       | 2 | Dr.K.PRAVEEN KUMAR   | Assit.Prof.,<br>GDC, KAIRATHA BAD   | 9885393125 |
| 15  |       | 3 | Dr.R.ASHOK REDDY     | PRINCIPAL,<br>GDC,NARAYANKED        | 9912644506 |
| 16  | VI    | 1 | Dr.K.RAJENDHAR REDDY | Assit.Prof.,<br>TARAGDC,SANGAREDDY  | 9959175314 |
| 17  | VI    | 2 | Sri.A.LAXMANA RAO    | ASSIT.PROF.<br>KRR GDC ,KODAD       |            |

|    |      |   |                         |                                    |            |
|----|------|---|-------------------------|------------------------------------|------------|
| 18 |      | 3 | Sri.K.NAGI REDDY        | ASSIT.PROF.<br>KRR GDC ,KODAD      |            |
| 19 | VII  | 1 | Dr.A.BHANU PRASAD       | PRINCIPAL,<br>GDC ,RAMANNAPET      | 9848385850 |
| 20 |      | 2 | Dr.K.RAJENDHAR REDDY    | Assit.Prof.,<br>TARAGDC,SANGAREDDY | 9959175314 |
| 21 |      | 3 | Dr.ANATHA LAXMI         | Assit.Prof<br>GDC(W),KOTI,HYD      |            |
| 22 | VIII | 1 | Dr.A.SRINIVASULU        | ASSIT.PROF.<br>KRR GDC ,KODAD      | 9440140506 |
| 23 |      | 2 | Dr.A.BHANU PRASAD       | PRINCIPAL,<br>GDC ,RAMANNAPET      | 9848385850 |
| 24 |      | 3 | Sri.JANARDHANA<br>SWAMY | LECTURER,<br>GDC ,RAMANNAPET       |            |

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*Dr. D. Ramesh 30/9/15*

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*Principal*

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 Dist. Nalgonda

**CONSTITUTED OF BOARD OF STUDIES : 2015-2016**

| SNO | DESIGNATION                                     | NAME  | CELL NO    |
|-----|---|---|------------|
| 1   | Chairman Board of studies                       | Sri.P.Yedukondalu,<br>N.G College,Nalgonda                  | 9849056316 |
| 2   | University Nominee                              | Dr.D.Ramesh,Asst.Prof.,<br>MGU,Nalgonda                     | 7702638320 |
| 3   | Subject Expert (from outside)                   | Dr.A.BhanuPrasad,<br>Principal,<br>GDC,Ramanapet, Nalgonda. | 9848385850 |
| 4   | Subject Expert (from outside)                   | Smt.K.Manjula<br>Lecturer in Chemistry<br>GDC(w),NLG        | 8143462182 |
| 5   | Members: All The Faculty<br>members of the Dept | 1. Sri.P.Ravi Kumar   | 9440208972 |
|     |   | 2. Dr.K.Venakata Krishana                                   | 9441993436 |
|     |   | 3.Sri.K.Ravi  | 9160616309 |
|     |   | 4.Sri.M.Venkateshwarlu                                      | 9441709821 |
|     |   | 5.Sri.K.Ravi kumar  | 9052999960 |
|     |   | 6.Smt.V.Bhavani   | 8019758494 |
|     |   | 7.Sri.T.Saidulu   | 9885004113 |
|     |   | 8.Kum.K.Saritha   | 7799674621 |
|     |   | 9.kum.A.Mamatha   |            |

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**NAGARJUNA GOVT.COLLEGE, NALGONDA (AUTONOMOUS)**

**DEPARTMENT OF CHEMISTRY**

**CONSTITUTED OF BOARD OF STUDIES : 2015-2016**

| SNO | CATEGORY   | NAME & DESIGNATION                                      | CONTACT NOS |
|-----|--|---|-------------|
| 1   | Chairman Board of studies                                      | Sri.P.Yedukondalu.                                      | 9849056316  |
| 2   | University Nominee   | Dr.D.Ramesh Asso.prof.<br>M.G.University,Nalgonda.      | 7702638320  |
| 3   | Subject expert from outside the college                        | Dr.A.BhanuPrasad,Principal.GDC,<br>Ramanapet, Nalgonda. | 9848385850  |
| 4   | Subject expert from outside the college                        | Smt.K.Manjula<br>Lecturer in chemistry GDC(w),NLG.      | 8143462182  |
| 5   | Members: All The Faculty members of the Dept.                  | 1. Sri.P.Ravi Kumar                                     | 9440208972  |
|     |  | 2. Dr.K.Venakata Krishana                               | 9441993436  |
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|     |  | 4.Sri.M.Venkateshwarlu                                  | 9441709821  |
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|     |  | 6.Smt.V.Bhavani   | 8019758494  |
|     |  | 7.Sri.T.Saidulu   | 9885004113  |
|     |  | 8.Kum.K.Saritha   | 7799674621  |
|     |  | 9.kum.A.Mamatha   |             |
| 6   | One representative from Industry/Corporate sector/Allied areas |   |             |

Submitted by

In-Charge /Chairman BOS

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Principal/ Chairman academic council



**NAGARAJUNA GOVERNMENT COLLEGE, NALGONDA**  
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**ALLOCATION OF CREDITS AT SUBJECT LEVEL**

**COURSE: B.Sc (SCIENCE)**

**SUBJECT: CHEMISTRY**

| SNO | SEMESTER                       | MODULE(PAPER)   | HOURS PER WEEK | MAX.MARKS | CREDITS |
|-----|--------------------------------|---|----------------|-----------|---------|
| 1   | I (CORE)                       | ORGANIC & GENERAL CHEMISTRY   | 04             | 100       | 3       |
| 2   | II (CORE)                      | PHYSICAL & IN ORGANIC CHEMISTRY   | 04             | 100       | 3       |
| 3   | PRACTICALS                     | SEMI MICRO ANALYSIS   | 03             | 50        | 2       |
| 4   | III (CORE)                     | ORGANIC & GENERAL CHEMISTRY   | 04             | 100       | 3       |
| 5   | IV (CORE)                      | PHYSICAL & IN ORGANIC CHEMISTRY   | 04             | 100       | 3       |
| 6   | iv ELACTIVE                    | MEDICINAL CHEMISTRY   |                |           | 2       |
| 7   | PRACTICALS                     | VOLUMETRIC ANALYSIS   | 03             | 50        | 2       |
| 8   | V-CORE                         | ORGANIC & SPECTROSCOPY  | 03             | 100       | 3       |
| 9   | V-(ADVANCE)<br>ELACTIVE-I      | SOLVENT EXTRACTION<br>CHROMATOGRAPHY,<br>CLASSIFICATION PAPER, TLC<br>COLUMN, HPLC, GLC | 03             | 100       | 2       |
| 10  | V-(ADVANCE)<br>ELACTIVE-II     | DRUGS, FORMULATION<br>, PESTICIDES, ALKALOIDS, TERPENOIDS                               |                |           |         |
| 11  | PRACTICALS                     | PREPARATION and FUNCTIONAL<br>GROUP IDENTIFICATION OF ORGANIC<br>COMPOUNDS              | 03             | 50        | 2       |
| 12  | VI-(CORE)                      | PHYSICAL CHEMISTRY & GREEN<br>CHEMISTRY, INORGANIC CHEMISTRY                            | 03             | 100       | 03      |
| 13  | VI-(SKILL BASED)<br>ELACTIVE-I | MACRO MOLECULES, MATERIAL<br>SCIENCES, NANOMATERIALS,<br>CATALYSIS                      | 03             | 100       | 2       |
| 14  | VI-(SKILL BASED)<br>ELACTIVE   | SPECTRAL PROBLEMS BASED ON NMR,<br>MASS, IR, UV SPECTRAL DATA                           |                |           |         |
| 15  | PRACTICALS                     | PHYSICAL CHEMISTRY PRACTICALS   | 3              | 50        | 2       |
| 16  | TOTAL                          |   |                |           | 30      |
| 16  | PROJECT WORK                   |   |                |           |         |

*30/9/15*

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**DEPARTMENT OF CHEMISTRY**  
**B.Sc I YEAR I SEMESTER, SYLLABUS**

**Structural theory in Organic Chemistry & Acyclic Hydrocarbons**

**UNIT-I**

**I. Structural theory in Organic Chemistry**

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 (mechanism not required)


**2. Acyclic Hydrocarbons**

Alkanes – IUPAC Nomenclature of Hydrocarbons. Method of preparation: Hydrogenation of alkynes, Wurtz reaction, Kolbe's electrolysis, Corey House reaction. Chemical reactivity – inert nature, free radical substitution mechanism. Halogenation example – reactivity, selectivity and orientation.

Alkenes – Preparation of alkenes (a) by dehydration of alcohols (b) by dehydrohalogenation of alkyl halides (c) dehalogenation of 1,2 dihalides (brief mechanism), Zaitsev's rule. Properties: Addition of hydrogen – heat of hydrogenation and stability of alkenes. Addition of halogen and its mechanism. Addition of HX, Markownikov's rule, addition of  $H_2O$ , HOX,  $H_2SO_4$  with mechanism and addition of HBr in the presence of peroxide (anti - Markownikov's addition). Oxidation - hydroxylation by  $KMnO_4$ ,  $OsO_4$ , peracids (via epoxidation) hydroboration. Dienes - types of dienes. reactions of conjugated dienes — 1,2 and 1,4 addition to 1,3 — butadiene and Diel's Alder reaction, HBr

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  $X_2$ , HX,  $H_2O$  (tautomerism), Oxidation with  $KMnO_4$ ,  $OsO_4$ , reduction and Polymerisation reaction of acetylene.

  
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**UNIT-II****Alicyclic hydrocarbons (Cycloalkanes) ,Aromatic Hydrocarbons****1. Alicyclic hydrocarbons (Cycloalkanes)****4 hrs**

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

**2. Benzene and its reactivity***Benzenoids***7 hrs**

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 crafts 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 (ij), Carboxyl.

nitro, nitrile, carbonyl and Sulfonic acid groups. (iii). Halogens (Explanation by taking minimum of one example from each type).

**3. Polynuclear Hydrocarbons.****3 hrs**

Structure of naphthalene and anthracene (Molecular Orbital diagram and resonance energy) Any two methods of preparation of naphthalene and reactivity. Reactivity towards electrophilic substitution. Nitration and sulfonation as examples.

**(General Chemistry-I****1. Atomic Structure and elementary quantum mechanics****8 hrs**

Blackbody radiation, Planck's radiation law, photoelectric effect, Compton effect, de Broglie's hypothesis, Heisenberg's uncertainty principle. Postulates of quantum mechanics. Schrodinger wave equation and a particle in a box energy levels, wave functions and probability densities. Schrodinger wave equation for H-atom. Separation of variables, Radial and angular functions. hydrogen like wave functions, quantum numbers and their importance.

**2. Chemical Bonding .****8hrs**

Valence bond theory, hybridization, VB theory as applied to ClF<sub>3</sub>, BrF, Ni(CO)<sub>4</sub>, XeF<sub>2</sub>.

Dipole moment -- orientation of dipoles in an electric field. dipole moment, induced dipole moment, dipole moment and structure of molecules. Molecular orbital theory — LCAO method, construction of MO. diagrams for homo-nuclear and hetero-nuclear diatomic molecules (N<sub>2</sub>, O<sub>2</sub>, HCl, CO and NO). comparison of VB and MO theories.

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**UNIT III**

**UNIT-IV****3. Stereochemistry of carbon compounds****10 hrs**

Molecular representations- Wedge, Fischer, Newman and Saw-Horse formulae.

Stereoisomerism, Stereoisomers: enantiomers. diastereomers- definition and examples.

Conformational and configurational isomerism— definition.

Conformational isomerism of ethane and n-butane.

Enantiomers: Optical activity- wave nature of light, plane polarised light. interaction with molecules, optical rotation and specific rotation. Chiral molecules- definition and criteria- absence of plane, Center. and Sn axis of symmetry- asymmetric and disymmetric molecules. Examples of asymmetric molecules (Glyceraldehyde. Lactic acid, Alanine) and disymmetric molecules (trans -1,2-dichloro cyclopropane).

Chiral centers: definition— molecules with similar chiral carbon ( tartaric acid ). definition of mesomers- molecules with dissimilar chiral carbons (2,3-dibromopentane). Number of enantiomers and mesomers- calculation


D.L. and R,S configuration for asymmetric and disymmetric molecules. Cahn-Ingold-Prelog rules.


Racemic mixture- racemisation and resolution techniques.

Diastereomers: definition- geometrical isomerism with reference to alkenes- cis, trans and E,Z-configuration.

**4. General Principles of Inorganic qualitative analysis**

Solubility product. common ion effect, characteristic reactions of anions, elimination of interfering anions, separation of cations into groups. group reagents, testing of cations

  
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**B.Sc I YEAR II SEMESTER SYLIABUS**

|                 |   |  |
|-----------------|---|--|
| <b>UNIT - I</b> | <p><b>Inorganic Chemistry — I</b></p> <p><b>1. s-block elements:</b> General characteristics of groups I &amp; II elements, diagonal relationship between Li &amp; Mg, Be &amp; Al.</p> <p><b>2. p-block elements:</b></p> <p>General characteristics of elements of groups 13, 14, and 15</p> <p>Group 13: Synthesis and structure of diborane and higher boranes (<math>B_4H_{10}</math> and <math>B_5H_9</math>) boron-nitrogen compounds (<math>B_3N_3H_6</math> and BN)</p> <p>Group 14: Preparation and applications of silanes and silicones. Graphitic compounds.</p> <p>Group 15: Preparation and reactions of hydrazine, hydroxylamine. phosphazenes.</p>   | <p><b>3 hrs</b></p> <p><b>12 hrs</b></p> |
| <b>UNIT -II</b> | <p><b>1.GENRAL CHARACTERISTICS OF GROUPS 16 and 17</b></p> <p>Group - 16: Classifications of oxides based on (i) Chemical behaviour and (ii) Oxygen content.</p> <p>Group - 17: Inter halogen compounds and pseudo halogens</p> <p><b>2. Organo metallic Chemistry</b></p> <p>Definition and classification of organometallic compounds, nomenclature. preparation. properties and applications of alkyls of 1, 2 and 13 group elements.</p>  | <p><b>8 hrs</b></p> <p><b>7 hrs</b></p>  |
| <b>UNIT-III</b> | <p style="text-align: center;"><b>PHYSICAL CHEMISTRY</b></p> <p><u><b>Gaseous state , Liquid state, Solid State Solutions , Colloids and surface chemistry I</b></u></p> <p><b>1.Gaseous state</b></p> <p>Compression factors, deviation of real gases from ideal behavior. Van der Waal's equation of state. PV - Isotherms of real gases, Andrew's isotherms of carbon dioxide, continuity of state. Critical phenomena. The Vander Waal's equation and the critical state. Relationship between critical constants and Vander Waal' constants. The law of corresponding states and reduced equation of states. Joule Thomson effect. Liquefaction of gases: i) Linde's method and ii) Claude's method.</p> | <p><b>6 hrs</b></p>                      |

UNIT\_IV

2.SOLID STATE

Symmetry in crystals, Law of constancy of interfacial angles. The law of rationality of indices. The Law of symmetry. Definition of lattice point, space lattice, unit cell . Bravis lattices and crystal systems. X-ray diffraction and crystal structure, Braggs Law. Determination of crystal structure . Braggs law Determination of crystal structure by Braggs method and the powder method . Indexing of planes and structure of NaCl and KCl crystal,

Defects in crystals. Stoichiometric and non-stoichiometric defects. Band theory of semiconductors . Extrinsic and intrinsic semiconductors, n and p type semiconductors and their applications in photo electrochemical cells.

1. Liquid state

Intermolecular forces, structure of liquids (qualitative description). 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.

2. Solutions

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. Triethylamine-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.

3. Colloids and surface chemistry


Definition of colloids. Solids in liquids (sols), preparation, purification, properties - kinetic, optical, electrical. Stability of colloids, Hardy- Schulze law, protective colloid. Liquids in liquids (emulsions) preparation, properties, uses. Liquids in solids (gels) preparation, uses. Adsorption: Physical adsorption, chemisorption. Freundlich, Langmuir adsorption isotherms. Applications of adsorption.

10 hrs

2 hrs

6 hrs

6 hrs

  
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## LABORATORY COURSE - I

90 hrs (3h/w)

### PRACTICALS:

#### Qualitative analysis:

Analaysis of mixture contain two anions (one simple & one interfering) and two cations (of different groups) from the following


2. anions: carbonate, sulfide, sulphate, chloride, bromide, iodide, acetate, nitrate, oxalate, tatorate borate, phosphate, arsentate, and chromate.


3. Cations: lead, copper, bismuth, cadmium, tin, antimony, iron, aluminum, zinc, manganese, nickel, cobalt, calcium, strontium, barium, potassium and ammonium

### PART - II

#### Preparations of Any Three of the Inorganic Compunds.

1. Ferrous Ammonium Sulphate.
2. Tetrammine Cupper (II) sulphate.
3. Potassium Tris Oxalate Chrimate.
4. Potash Alum  $KAl(SO_4) \cdot 12 H_2O$ .
5. Hexammine Cobalt (III) Chloride.

  
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**UNIT-I**

**NAGARJUNA GOVT. DEGREE COLLEGE, NALGONDA  
(AUTONOMOUS)  
DEPARTMENT OF CHEMISTRY  
B.Sc II YEAR III SEMESTER, SYLLABUS  
PAPER-III**

4hrs

**1. Halogen compounds**

Nomenclature and classification of alkyl (into primary, secondary, tertiary), aryl, aralkyl, allyl, vinyl, benzyl halides. Chemical Reactivity, formation of RMgX  
Nucleophilic aliphatic substitution reaction- classification into SN1 and SN2. Energy profile diagram of SN1 and SN2 reactions. Stereochemistry of SN2 (Walden Inversion) SN1 (Racemisation). Explanation of both by taking the example of optically active alkyl halide — 2-bromobutane, Ease of hydrolysis — comparison of alkyl, benzyl, allyl, vinyl and aryl halides.

**2. Hydroxy compounds**

Nomenclature and classification of hydroxy compounds.

Alcohols: Preparation with hydroboration reaction, Grignard synthesis of alcohols.

Phenols: Preparation, i) from diazonium salt, ii) from aryl sulphonates, iii) from Cumene.

Physical properties — Hydrogen bonding (intermolecular and intramolecular).

Effect of hydrogen bonding on boiling point and solubility in water.

Chemical properties:

- (a) . acidic nature of phenols.
- (b) . formation of alkoxides/phenoxides and their reaction with RX.
- (c) . replacement of OH by X using PCl<sub>5</sub>, PCl<sub>3</sub>, PBr<sub>3</sub>, SOCl<sub>2</sub> and with HX/ZnCl<sub>2</sub>.
- (d) . esterification by acids ( mechanism).
- (e) . dehydration of alcohols.
- (f) special reaction of phenols: Bromination, Kolb-Schmidt reaction. Reimer-Tiemann reaction. Fries rearrangement. azocoupling.

**3. Carboxylic acids and derivatives**

Nomenclature, classification and structure of carboxylic acids.

Methods of preparation by a) hydrolysis of nitriles, amides and esters.

b) carbonation of Grignard reagents.

Special methods of preparation of aromatic acids by a) oxidation of side chain. b) hydrolysis by benzotrichlorides, c) Kolbe reaction.

Physical properties: Hydrogen bonding, dimeric association, acidity- strength of acids with examples of trimethyl acetic acid and trichloroacetic acid. Relative differences in

6 hrs

6 hrs



|                        |   |   |
|------------------------|---|---|
| <p><b>UNIT-II</b></p>  | <p>the acidities of aromatic and aliphatic acids.</p> <p>Chemical properties.: Reactions involving H, OH and COOH groups-salt formation, acid chloride formation, amide formation and esterification (mechanism).</p> <p>Degradation of carboxylic acids by Huns-Diecker reaction.</p> <p>decarboxylation by Schimidt reaction. Arndt-Eistert synThesis, halogenation by I ell-Voihard- Zehnskv reaction.</p> <p>Derivatives of carboxylic acids: Reaction of acid chlorides, acid anhydrides. acid amides, esters (mechanism of the hydrolysis of esters by acids and bases).</p> <p><b>1. Carbonyl compounds</b></p> <p>Nomenclature of aliphatic and aromatic carbonyl compounds, structure of the carbonyl group.</p> <p>Synthesis of aldehydes from acid chlorides. Synthesis of aldehydes and ketones using 1,3-dithianes, synthesis of ketones from nitriles and from carboxylic acids.</p> <p>Physical properties: absence of hydrogen bonding, keto-enol tautomerism. reactivity of carbonyl group in aldehydes and ketones.</p> <p>Nueleophilic addition reaction with a) NaHSO. h) HCN, c) RMgX. d) NH<sub>2</sub>OI l. e)PhNHNH<sub>2</sub>, f) 2,4 DNPH, g) Alcohols-formation of heniactal and acetal.</p> <p>Halogenation using PCL<sub>5</sub> with mechanism.</p> <p>Base catalysed reactions: a) Aldol, b) Cannizzaro reaction, c) Perkin reaction, d) Benzoin condensation, e) Haloform reaction, f) Knoevenagel reaction.</p> <p>Oxidation of aldehydes- Baeyer-Villiger oxidation of ketones.</p> <p>Reduction: Clemmensen reduction, Woif-Kishner reduction, MPV reduction. reduction with LiAlH<sub>4</sub> and NaBH<sub>4</sub>.</p> <p>Analysis of aldehydes and ketones with a) 2,4-DNT test. h) Tollen's test, c) Fehling test, d) Schiff test e) Haloform test (with equation).</p> <p><b>2. Active methylene compounds</b></p> <p>Acetoacetic esters: preparation by Claisen condensation, keto-enol tauomerism. Acid hydrolysis and ketonic hydrolysis. Preparation of a) monocarboxylic acids.b)dicarboxylic acids.Reaction with urea Malonic ester: preparation from acetic acid.Synthetic applications: Preparation o a)monocarboxylic acids (propionic acid and n-hutyric acid)(h)Dicarboxylic acids (succinic acid and adipic acid),.-unsaturatedcarboxylic acids (crotonic acid).Reaction with urea.</p> <p><b>3.Exercises in interconversion</b></p> | <p><b>10 hrs</b></p> <p><b>4 hrs</b></p> <p><b>2 hrs</b></p> <p><b>5hrs</b></p> |
| <p><b>UNIT III</b></p> | <p style="text-align: center;"><b>(GENRAL CHEMISTRY)</b></p> <p><b>1. Molecular symmetry</b></p> <p>Concept of symmetry in chemistry-symmetry operations, symmetiy elements. Rotational axis of symmetry and types of rotational axes. Planes of symmetry</p>   |   |

UNIT IV

and types of planes. Improper rotational axis of symmetry. Inversion centre. Identity element. The symmetry operations of a molecule form a group. Flow chart for the identification of molecular point group.

**2. Theory of quantitative analysis**

a) Principles of volumetric analysis. Theories of acid-base, redox, complexometric, iodometric and precipitation titrations, choice of indicators for these titrations.

a) Principles of gravimetric analysis: precipitation, coagulation, peptization, coprecipitation, post precipitation, digestion, filtration and washing of precipitate, drying and ignition, precipitation from homogeneous solutions, requirements of gravimetric analysis.

**3. Evaluation of analytical data.**

Theory of errors, idea of 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.

**. Introductory treatment to:**

**a) Pericyclic Reactions**

Concerted reactions, Molecular orbitals, Symmetry properties HOMO, LUMO. Thermal and photochemical pericyclic reactions. Types of pericyclic reactions – electrocyclic, cycloaddition and sigmatropic reactions - one example each.


**b) Synthetic strategies**


Terminology – Disconnection (dis), Symbol ( ), synthon, synthetic equivalent (St). Functional group interconversion (FGI), Linear, Convergent and Combinatorial syntheses, Target molecule TM, Retrosynthesis of the following molecules

1) acetophenone 2) cyclohexene 3) phenylethylbromide

**c) Asymmetric (Chiral) synthesis**

1) Enantiomers- Asymmetric synthesis, enantiomeric excess, diastereomeric excess, stereospecific reaction, definition, example, dehalogenation of 1,2-dibromides by I<sub>2</sub>, stereoselective reaction, definition, example, acid catalysed dehydration of 1-phenylpropanol.

  
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8 hrs

4 hrs

5 hrs

4 hrs

4 hrs

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| <p style="text-align: center;"><b>UNIT-I</b></p>   | <p style="text-align: center;"><b>SEMESTER IV</b></p> <p style="text-align: center;"><b>IN ORGANIC CHEMISTRY</b></p> <p><b>1. Chemistry of d-block elements:</b> Characteristics of d-block elements with special reference to electronic configuration, variable valence, magnetic properties, catalytic properties and ability treatment of second and third transition series with their 3d analogues., Study of Ti, Cr and Cu traids in respect of electronic configuration and reactivity Of different oxidation states.</p> <p><b>2. Chemistry of f-block elements:</b> Chemistry of lanthanides — electronic structure, oxidation states, lanthanide contraction, consequences of lanthanide contraction, magnetic properties, spectral properties and separation of lanthanides by ion exchange and solvent extraction methods. Chemistry of actinides — electronic configuration, oxidation states, actinide contraction. position of actinides in the periodic table, comparison with lanthanides in terms of magnetic properties. spectral properties and complex formation.</p> | <p style="text-align: center;">9 hrs</p>   |
| <p style="text-align: center;"><b>UNIT II</b></p>  | <p><b>1. Theories of bonding in metals:</b> Valence bond theory, Explanation of metallic properties and its limitations, Free electron theory, thermal and electrical conductivity of metals, limitations, Bond theory, formation of bands, explanation of conductors, semiconductors and insulators.</p> <p><b>2. Metal carbonyls and related compounds</b> — EAN rule, classification of metal carbonyls, structures and shapes of metal carbonyls of V, Cr, Mn, Fe, Co and Ni. Metal nitrosyls and metallocenes (only ferrocene).</p>  | <p style="text-align: center;">7 hrs</p>   |
| <p style="text-align: center;"><b>UNIT III</b></p> | <p style="text-align: center;"><b>(PHYSICAL CHEMISTRY)</b></p> <p><b>1. Phase rule</b><br/>         Concept of phase, components, degree of freedom. Derivation of Gibbs phase rule. Phase equilibrium of one component — water system. Phase equilibrium of two-component system, solid-liquid equilibrium. Simple eutectic diagram of Pb-Ag system, desilverisation of lead. Solid solutions-compound with congruent melting point- (Mg-Zn) system, cnpound with incongruent melting point- NaCl- water system. Freezing mixtures.</p> <p><b>2. Dilute solutions</b></p>  | <p style="text-align: center;">5 hrs</p> <p style="text-align: center;">8hrs</p> |

**LABORATORY COURSE -II**

**Practical Paper -II(Inorganic Chemistry)**

**90 hrs (3h/w)**

**I. Titrimetric analysis:**

1. Calibration of weights.
2. Determination of carbonate and bicarbonate in a mixture.
3. Determination of Fe (II) Using  $K_2Cr_2O_7$
4. Determination of Fe (II) using  $KMnO_4$
5. Determination of Cu (II) using  $Na_2S_2O_3$
6. Determination of Zn using EDTA
7. Determination of hardness of water
8. Determination of Zn by ferrocyanide

**II. Gravimetric Analysis (Any three of following )**

1. Determination of Barium as barium sulphate .
2. Determination of sulphate as barium sulphate .
3. Determination of lead as lead chromate.
4. Determination of nickel as Ni-DMG complex.
5. Determination of magnesium as magnesium pyrophosphate.

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Colligative properties. Raoult's law, relative lowering of vapour pressure, its relation to molecular weight of non-volatile solute Elevation of boiling point and depression of freezing point. Derivation of relation between molecular weight and elevation in boiling point and depression in freezing point. Experimental methods of determination. Osmosis, osmotic pressure, experimental determination. Theory of dilute solutions. Determination of molecular weight of non-volatile solute from osmotic pressure. Abnormal colligative properties. Van't Hoff factor, degree of dissociation and association.

**1). Electrochemistry**

Specific conductance, equivalent conductance, measurement of equivalent conductance. Variation of equivalent conductance with dilution. Migration of ions, Kohlrausch's law. Arrhenius theory of electrolyte dissociation and its limitations Ostwald's dilution law. Debye-Huckel-Onsager's equation of conductivity (elementary treatment only). Definition of transport number, determination by Hittorf's method. Application of conductivity measurements-determination of dissociation constant ( $K_a$ ) of an acid. determination of solubility product of sparingly soluble salt, conductometric titration. Types of reversible electrodes-the gas electrode, metal-metal ion, metal-insoluble salt and redox electrodes

Electrode reactions, Nernst equation, single electrode potential, standard Hydrogen electrode, reference electrodes, standard electrode potential. sign, convention, electrochemical series and its significance.

Reversible and irreversible cells, conventional representation of electrochemical cells. EMF of a cell and its measurements. Computation of cell EMF. Applications of EMF measurements, Calculation of thermodynamic quantities of cell reactions ( $\Delta G$ ,  $\Delta H$  and  $K$ ). determination of p[H] using quinhydrone electrode, Solubility product of AgCl. Potentiometric titrations..

**UNIT-IV**

**17 hrs**

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**Organic Chemistry**

**1. Nitrogen compounds**

Nitro hydrocarbons: Nomenclature and classification – nitro hydrocarbons – structure.  
Tautomerism of nitroalkanes leading to aci and keto form. Preparation of Nitroalkanes.

**UNIT - I**

**9hrs**

Reactivity – halogenation, reaction with HONO (Nitrous acid), Nef reaction and Mannich reaction leading to Michael addition and reduction.  
 Amines (Aliphatic and Aromatic): Nomenclature, Classification into 1<sup>o</sup>, 2<sup>o</sup>, 3<sup>o</sup> Amines and Quaternary ammonium compounds. Preparative methods -1. Ammonolysis of alkyl halides 2. Gabriel synthesis, 3. Hoffman's bromamide reaction (mechanism). 4. 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-dimethylaniline (in aqueous and non-aqueous medium), steric effects and substituent effects. Use of amine salts as phase transfer catalysts. Chemical properties: a) Alkylation b) Acylation c) Carbylamine reaction d) Hinsberg separation e) Reaction with Nitrous acid of 1<sup>o</sup>, 2<sup>o</sup>, 3<sup>o</sup> (Aliphatic and aromatic amines). Electrophilic substitutions of Aromatic amines – Bromination and Nitration. oxidation of aryl and 3<sup>o</sup> Amines. Diazotization  
 Cyanides and isocyanides: Nomenclature (aliphatic and aromatic) structure. Preparation of cyanides from a) Alkyl halides b) from amides c) from aldoximes. Preparation of isocyanides from Alkyl halides and Amines. Properties of cyanides and isocyanides, a) hydrolysis b) addition of Grignard reagent iii) reduction iv) oxidation

### 1. Heterocyclic Compounds

Introduction and definition: Simple 5 membered ring compounds with one hetero atom  
 Ex. Furan. Thiophene and pyrrole. Importance of ring system – presence in important natural products like hemoglobin and chlorophyll. Numbering the ring systems as per Greek letter and Numbers. Aromatic character – 6- electron system (four-electrons from two double bonds and a pair of non-bonded electrons from the hetero atom). Tendency to undergo substitution reactions.  
 Resonance structures: Indicating electron surplus carbons and electron deficient hetero atom. Explanation of feebly acidic character of pyrrole, electrophilic substitution at 2 or

## UNIT-II

5 hrs

5 position, Halogenation, Nitration and Sulphonation under mild conditions. Reactivity of furan as 1,3-diene, Diels Alder reactions (one example). Sulphonation of thiophene purification of Benzene obtained from coal tar). Preparation of furan, Pyrrole and thiophene from 1,4,- dicarbonyl compounds only, Paul-Knorr synthesis, structure of pyridine, Basicity – Aromaticity – Comparison with pyrrole – one method of preparation and properties – Reactivity towards Nucleophilic substitution reaction – chichibabin reaction.

## 2. Carbohydrates

Monosaccharides: All discussion to be confined to (+) glucose as an example of aldohexoses and (-) fructose as example of ketohexoses. Chemical properties and structural elucidation: Evidences for straight chain pentahydroxy aldehyde structure (Acetylation, reduction to n-hexane, cyanohydrin formation, reduction of Tollen's and Fehling's reagents and oxidation to gluconic and saccharic acid).

Number of optically active isomers possible for the structure, configuration of glucose based on D-glyceraldehyde as primary standard (no proof for configuration is required). Evidence for cyclic structure of glucose (some negative aldehydes tests and mutarotation). Cyclic structure of glucose. Decomposition of cyclic structure (Pyranose structure, anomeric Carbon and anomers). Proof for the ring size (methylation, hydrolysis and oxidation reactions). Different ways of writing pyranose structure (Haworth formula and chair conformational formula). Structure of fructose: Evidence of 2 – ketohexose structure (formation of pentaacetate, formation of cyanohydrin its hydrolysis and reduction by HI to give 2-Carboxy-nhexane). Same osazone formation from glucose and fructose, Hydrogen bonding in osazones, cyclic structure for fructose (Furanose structure and Haworth formula). Interconversion of Monosaccharides: Aldopentose to aldohexose – eg: Arabinose to DGlucose, D-Mannose (Kiliani - Fischer method). Epimers, Epimerisation – Lobry de bruyn van Ekenstein rearrangement. Aldohexose to Aldopentose eg: D-glucose

6 hrs

8 hrs

to Darabinose  
by Ruff degradation. Aldohexose (+) (glucose) to ketohexose (-) (Fructose)  
and Ketohexose (fructose) to aldohexose (Glucose)

**1. Aminoacids and proteins**

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) Malonic ester synthesis c) strecker's synthesis.

Physical properties: Optical activity of naturally occurring amino acids: L-configuration, irrespective of sign rotation, Zwitterion 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.

**2. Mass Spectrometry:**

Basic principles – Molecular ion / parent ion, fragment ions / daughter ions. Theory – formation of parent ions. Representation of mass spectrum. Identification of parent ion, (M+1), (M+2), base peaks (relative abundance 100%) Determination of molecular formula – Mass spectra of ethylbenzene, acetophenone, n-butyl amine and 1-propanal.

**1.Reactivity of metal complexes:**

1. Labile and inert complexes, ligand substitution reactions – SN1 and SN2, substitution reactions of square planar complexes – Trans effect and applications of trans effect.

2. Stability of metal complexes: Thermodynamic stability and kinetic stability, factors affecting the stability of metal complexes, chelate effect, determination of composition of

UNIT -III

5hrs

5hrs

4 hrs

UNIT-IV

4 hrs



complex by Job's method and mole ratio method.

4 hrs

**2. HARD OAN SOFT ACIDS ,BASES (HSAB);**

**Classification, pearson's concept of hardness and softness, application of HSAB principles- stability of compounds/complexes, predicting the feasibility of reaction**

**4.Bio inorganic chemistry:** Essential elements, biological significance of Na, K, Mg, Ca, Fe, Co, Ni, Cu, Zn and chloride (Cl-). Metalloporphyrins – hemoglobin, structure and Function, Chlorophyll, structure and role in photosynthesis.

4 hrs

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**V - SEMESTER – CHEMISTRY SYLLABUS**

**Paper – 6<sup>th</sup> Paper**

**physical chemistry**

9 hrs

Unit-I

**1. Chemical kinetics**

Rate of reaction, factors influencing the rate of a reaction-concentration, temperature, pressure, solvent, light, catalyst. Experimental methods to determine the 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. Kinetics of complex reactions (first order only):

opposing reactions, parallel reactions, consecutive reactions and chain reactions. Effect of

temperature on rate of reaction, Arrhenius equation, concept of activation energy.

Theories of reaction rates- collision theory-derivation of rate constant for bimolecular

reaction. The transition state theory (elementary treatment).

**1. Photochemistry**

5 hrs

|                         |   |                           |
|-------------------------|---|---------------------------|
| <p><b>UNIT -II</b></p>  | <p>Difference between thermal and photochemical processes. Laws of photochemistry- Grothus-Draper's law and Stark-Einstein's law of photochemical equivalence. Quantum yield. Ferrioxalate actinometry. Photochemical hydrogen- chlorine, hydrogen-bromine reaction. Jablonski diagram depicting various processes occurring in the excited state, qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing). Photosensitized reactions- energy transfer processes (simple example)</p> <p><b>2. Thermodynamics -I</b><br/>The first law of thermodynamics-statement, definition of internal energy and enthalpy. Heat capacities and their relationship. Joule's law-Joule-Thomson coefficient. Calculation of w, q, dU and dH 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.</p> | <p>6hrs</p> <p>10 hrs</p> |
| <p><b>UNIT -III</b></p> | <p><b>Thermodynamics -II</b><br/>Second law of thermodynamics. Different Statements of the law. Carnot cycle and its efficiency. Carnot theorem. Thermodynamic scale of temperature. Concept of entropy, entropy as a state function, entropy changes in cyclic, reversible, and irreversible processes and reversible phase change. Calculation of entropy changes with changes in V &amp; T and P&amp;T. Entropy of mixing inert perfect gases. Entropy changes in spontaneous and equilibrium processes. The Gibbs (G) and Hlmholtz (A) energies. A &amp; G as criteria for thermodynamic equilibrium and spontaneity-advantage over entropy change. Gibbs equations and the Maxwell relations. Variation of G with P, V and T.</p>  |                           |
| <p><b>UNIT-IV</b></p>   | <p style="text-align: center;"><b><u>Inorganic chemistry</u></b></p> <p><b>1. Coordination Chemistry:</b> 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 field theory, splitting of d-orbitals in octahedral, tetrahedral and square-planar complexes – low spin and high spin complexes</p>  | <p>10 hrs</p>             |

factors affecting crystalfield 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.

4 hrs

5. **Spectral and magnetic properties of metal complexes:** Electronic absorption spectrum of  $[Ti(H_2O)_6]^{3+}$  ion. Types of magnetic behavior, spin-only formula, calculation of magnetic moments, experimental determination of magnetic susceptibility – Gouy method.

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### VI - SEMESTER – CHEMISTRY SYLLABUS

#### Paper – 7<sup>th</sup> Paper

#### Physico Chemical methods of analysis

12 hrs

#### Unit – I

##### 1. Separation techniques

1. Solvent extraction: Principle and process, Batch extraction, continuous extraction

and counter current extraction. Application – Determination of Iron (III)

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

a. 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.

b. 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.

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

d. High Performance Liquid Chromatography (HPLC): Principles and Applications.

e. Gas Liquid Chromatography (GLC): Principles and Applications

4 hrs

#### UNIT -II

##### 2. Spectrophotometry

General features of absorption – spectroscopy, Beer-Lambert's law and its limitations,

transmittance, Absorbance, and molar absorptivity. Single and double beam spectrophotometers. Application of Beer-Lambert law for quantitative analysis

|          |  |                    |
|----------|--|--------------------|
|          | <p>of</p> <ol style="list-style-type: none"> <li>1. Chromium in <math>K_2Cr_2O_7</math></li> <li>2. Manganese in manganous sulphate</li> <li>3. Iron (III) with thiocyanate.</li> </ol>  |                    |
| UNIT-III | <p><b>2. Electronic spectroscopy;</b><br/>Interaction of electromagnetic radiation with molecules and types of molecular spectra.<br/>Potential energy curves for bonding and antibonding molecular orbitals. Energy levels of molecules (<math>\sigma, \delta, n</math>). Selection rules for electronic spectra. Types of electronic transitions in molecules effect of conjugation. Concept of chromophore.</p> <p><b>1. Infra red spectroscopy</b><br/>Energy levels of simple harmonic oscillator, molecular vibration spectrum, selection rules. Determination of force constant. Qualitative relation of force constant to bond energies. Anharmonic motion of real molecules and energy levels. Modes of vibrations in polyatomic molecules. Characteristic absorption bands of various functional groups.<br/>Finger print nature of infrared spectrum.</p> | 4 hrs<br><br>4 hrs |
|          | <p><b>2. Raman spectroscopy</b><br/>Concept of polarizability, selection rules, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules.</p> <p><b>3. Proton magnetic resonance spectroscopy (<math>^1H</math>-NMR)</b><br/>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.</p>  | 3hrs<br><br>5 hrs  |
| UNIT-IV  | <p><b>(v) Spectral interpretation</b><br/>Interpretation of IR, UV-Visible, <math>^1H</math>-NMR and mass spectral data of the following compounds 1. Phenyl acetylene 2. Acetophenone 3. Cinnamic Acid 4. para-nitro aniline.</p> <p><b>1. Pesticides</b><br/>1. Introduction to pesticides – types – Insecticides, Fungicides, Herbicides, Weedicides, Rodenticides plant growth regulators, Pheromones and Hormones. Brief</p>  | 3 hrs<br><br>5 hrs |

discussion with  
examples, Structure and uses.

ii. Synthesis and present status of the following.

DDT, BHC, Malathion, Parathion, Endrin, Baygon, 2,4-D and Endo-sulphon

5hrs

## 2. Green Chemistry

**Introduction:** Definition of green Chemistry, need of green chemistry, basic principles of green chemistry

**Green synthesis:** Evaluation of the type of the reaction i) Rearrangements (100% atom economic), ii) Addition reaction (100% atom economic), Pericyclic reactions (no by-product).

Selection of solvent:

i) Aqueous phase reactions ii) Reactions in ionic liquids iii) Solid supported synthesis

iv) Solvent free reactions (solid phase reactions)

ii) Green catalysts: i) Phase transfer catalysts (PTC) ii) Biocatalysts

Microwave and Ultrasound assisted green synthesis:

1. Aldol condensation
2. Cannizzaro reaction
3. Diels-Alder reactions
4. Strecker synthesis
5. Williamson synthesis
6. Dieckmann condensation

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**VI - SEMESTER – CHEMISTRY SYLLABUS**

**Paper – 8<sup>th</sup> Paper**

**Drugs, Macromolecules, Material Science & Catalysis**

**11 hrs**

**Drugs, formulations**

**Unit – I**

**1. Drugs**

1. Introduction: Drug, disease (definition), Historical evolution, Sources – Plant, Animal

synthetic, Biotechnology and human gene therapy

2. Terminology: Pharmacy, Pharmacology, Pharmacophore, Pharmacodynamics, Pharmacokinetics (ADME, Receptors – brief treatment) Metabolites and Anti metabolites.

3. Nomenclature: Chemical name, Generic name and trade names with examples

4. Classification: Classification based on structures and therapeutic activity with one example each.

5. Synthesis: Synthesis and therapeutic activity of the following drugs., L-Dopa, Chloroquin, Omeprazole, Albuterol and ciprofloxacin.

**DRUG DEVELOPMENT-HIV -AIDS AND FORMULATIONS**

**7 hrs**

**UNIT-II**

1. Drug Development:- Pencillin, Separation and isolation, structures of different pencillins

2. HIV-AIDS:-Immunity – CD-4 cells, CD-8 cells Retrovirus, replication in human body.

Investigation available, prevention of AIDS. Drugs available – examples with structures:

PIS: Indinavir (Crixivan), Nelfinavir (Viracept), NNRTIS: Efavirenz (Susrtiva),

Nevirapine (Viramune) NRTIs: Abacavir (Ziagen), Lamivudine (Epivir, 3TC)

Zidovudine (Retravir, AZT, ZDV)

Monographs of drugs: Eg Paracetamol, Sulpha methoxazole (Tablets)

**3. Formulations**

Need of conversion of drugs into medicine. Additives and their role (brief account only). Different types of formulations

**Macromolecules, and Super Conductivity**

**1. Macromolecules**

Classification of polymers, chemistry of polymerization, chain polymerization,

**10 hrs**

|                        |  |                            |
|------------------------|--|----------------------------|
| <p><b>UNIT-III</b></p> | <p>step<br/> polymerization, coordination polymerization – tacticity. Molecular weight of polymers number<br/> average and weight average molecular weight, degree of polymerization, determination of molecular weight of polymers by viscometry, Osmometry and light scattering methods. Kinetics of free radical polymerization, derivation of rate law.<br/> Preparation and industrial application of polyethylene, PVC, Teflon, polyacrylonitrile, terelene and Nylon66. Introduction to biodegradability.</p> <p><b>2. Super Conductivity</b><br/> Superconductivity, characteristics of superconductors, Meissner effect, types of superconductors and applications.</p>   | <p>4 hrs</p>               |
| <p><b>UNIT-IV</b></p>  | <p><b>1. Catalysis</b><br/> Homogeneous and heterogeneous catalysis, comparison with examples. Kinetics of specific acid catalyzed reactions, inversion of cane sugar. Kinetics of specific base catalyzed reactions, base catalyzed conversion of acetone to diacetone alcohol. Acid and base catalyzed reactions- hydrolysis of esters, mutarotation of glucose. Catalytic activity at surfaces. Mechanisms of heterogeneous catalysis. Langmuir-Hinshelwood mechanism.<br/> Enzyme catalysis: Classification, characteristics of enzyme catalysis. Kinetics of enzyme catalyzed reactions-Michaelis Menton law, significance of Michaelis constant (<math>K_m</math>) and maximum velocity (<math>V_{max}</math>). Factors affecting enzyme catalysis- effect of temperature, pH, concentration and inhibitor. Catalytic efficiency. Mechanism of oxidation of ethanol by alcohol dehydrogenase.</p> <p>Nanomaterials- synthetic techniques, bottom-up-sol-gel method, top-down-electro deposition method. Properties and applications of nano-materials</p> <p>Composites-definition, general characteristics, particle reinforce and fiber reinforce composites and their applications.</p> | <p>10 hrs</p> <p>4 hrs</p> |

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**1. Synthesis of Organic Compounds**

- i. Aromatic electrophilic substitution Nitration: Preparation of nitro benzene and p-nitro acetanilide, Halogenation: Preparation of p-bromo acetanilide – preparation of 2,4,6-tribromo phenol.
  - ii. Diazotization and coupling: Preparation of phenyl azo  $\alpha$ -naphthol
  - iii. Oxidation: Preparation of benzoic acid from benzoyl chloride
  - iv. Reduction: Preparation of m-nitro aniline from m-dinitro benzene
  - v. Esterification: Preparation of methyl p-nitro benzoate from p-nitro benzoic acid.
  - vi. Methylation: Preparation of  $\alpha$ -naphthyl methyl ether
- Condensation: Preparation of benzilidene aniline and Benzoyl aniline.

**2. Thin layer Chromatography & Column Chromatography**


- i. Preparation of the TLC plates. Checking the purity of the compounds by TLC: Acetylation of salicylic acid, aniline, Benzoylation of Aniline and Phenol  
Determination of R<sub>f</sub> values and identification of organic compounds by TLC: preparation and separation of 2,4-dinitrophenyl hydrazones of acetone and 2-butanone using toluene and light petroleum(40:60)
- ii. Separation of ortho & para nitro aniline mixture by column chromatography


**3. Organic Qualitative Analysis:**

- i. Identification of an organic compound through the functional group analysis, determination of melting point and preparation of suitable derivatives.
- ii. Separation of two component mixtures
  - 1) Aniline + Naphthalene 2) Benzoic acid + Benzophenone 3) p-Cresol + Chlorobenzene.

**4. Demonstration experiments:**

1. Steam distillation experiment: separation of ortho and para nitro phenols 2) Microwave assisted Green synthesis, two examples: 1. Hydrolysis of Benzamide 2. Oxidation of Toluene

  
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## LABORATORY COURSE - IV

### Practical Paper IV (Physical Chemistry)

90hrs (3 h / w)

#### 1. Chemical kinetics

- i. Determination of specific reaction rate of the hydrolysis of methyl acetate catalyzed by hydrogen ion at room temperature.
- ii. Determination of rate of decomposition of hydrogen peroxide.
- iii. Determination of overall order of saponification of ethyl acetate

#### 2. Distribution law

- i. Determination of distribution coefficient of iodine between water and carbon Tetrachloride.
- ii. Determination of molecular status and partition coefficient of benzoic acid in Toluene and water.

#### 3. Electrochemistry

- i. Determination of concentration of HCl conductometrically using standard NaOH solution.
- ii. Determination of concentration of acetic acid conductometrically using standard NaOH solution.
- iii. Determination of dissociation constant ( $K_a$ ) of acetic acid by conductivity measurements.
- iv. Determination of solubility and solubility product of  $BaSO_4$ .
- v. Determination of redox potentials of  $Fe^{2+}/Fe^{3+}$  by potentiometric titration of ferrous ammonium sulphate vs. potassium dichromate.

#### 4. pH metry

- i. Preparation phosphate buffer solutions
- ii. pH metric titration of weak acid, acetic acid with strong base NaOH and calculation of dissociation constant.

#### 5. Colorimetry

- i. Verification of Beer-Lambert law for  $KMnO_4$ ,  $K_2Cr_2O_7$  and determination of concentration of the given solution.
- ii. Verification of Beer-Lambert law for  $CuSO_4$  and determination of concentration of the given solution.
- iii. Composition of complex of  $Cu^{2+}$  - EDTA disodium salt

#### 6. Adsorption


- i. Surface tension and viscosity of liquids.
- ii. Adsorption of acetic acid on animal charcoal, verification of Freundlich isotherm


#### 7. Project Work:

Collection of spectral data of a minimum of six compounds belonging to different functional groups (other than those included in the syllabus) and submission of the report.

NOTE: Apart from the experiments (1 to 6) the project work (7) shall also be included in the

  
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University Examination.

### **Recommended Text Books and Reference Books**

#### **Inorganic Chemistry**

1. Concise Inorganic Chemistry by J.D.Lee
2. Basic Inorganic Chemistry by Cotton and Wilkinson
3. Advanced Inorganic Chemistry Vol-I by Satyaprakash, Tuli, Basu and Madan
4. Inorganic Chemistry by R R Heslop and P.L. Robinson
5. Modern Inorganic Chemistry by C F Bell and K A K Lott
6. University Chemistry by Bruce Mahan
7. Qualitative Inorganic analysis by A.I.Vogel
8. A textbook of qualitative inorganic analysis by A.I. Vogel
9. Inorganic Chemistry by J.E.Huheey
10. Inorganic Chemistry by Chopra and Kapoor
11. Coordination Chemistry by Basalo and Johnson
12. Organometallic Chemistry – An introduction by R.C.Mehrotra and A.Singh
13. Inorganic Chemistry by D.F.Shriver, P.W.Atkins and C.H.Langford
14. Inorganic Chemistry by Philips and Williams, Lab Manuals
15. Introduction to inorganic reactions mechanisms by A.C.Lockhart
16. Theoretical inorganic chemistry by McDay and J.Selbin
17. Chemical bonding and molecular geometry by R.J.Gillepsy and P.L.Popelier
18. Advanced Inorganic Chemistry By Gurudeep Raj
19. Analytical chemistry by Gary D Christian, Wiley India
20. Analytical Chemistry by G.L.David Krupadanam, et al, Univ. Press
21. Selected topics in inorganic chemistry by W.D.Malik, G..D.Tuli, R.D.Madan
22. Concepts and models of Inorganic Chemistry by Bodie Douglas, D.McDaniel and J.Alexander
23. Modern Inorganic Chemistry by William L. Jolly
24. Concise coordination chemistry by Gopalan and Ramalingam
25. Satyaprakash's modern inorganic chemistry by R.D.Madan.

#### ***Chemistry 12 of 13***

### **Recommended Text Books and Reference Books**


#### **Organic Chemistry**

1. Organic Chemistry By R T Morrison and R.N.Boyd
2. Organic Chemistry by T.J.Solomons
3. Organic Chemistry by L.G.Wade Sr
4. Organic Chemistry by D.Cram, G.S.Hammond and Herdricks
5. Modern Organic Chemistry by J.D.Roberts and M.C.Caserio

6. Text book of Organic Chemistry by Ferguson
7. Problems and their solutions in organic Chemistry by I.L.Finar
8. Reaction mechanisms in Organic Chemistry by S.M.Mukherji and S.P.Singh
9. A guide book to mechanisms in Organic Chemistry by Peter Sykes
10. Organic spectroscopy by J.R.Dyer
11. Organic Spectroscopy by William Kemp
12. Fundamentals of organic synthesis and retrosynthetic analysis by Ratna Kumar Kar
13. Comprehensive practical organic qualitative analysis by V.K.Ahluwalia & Sumta Dhingra
14. Comprehensive practical organic chemistry: Preparation and quantitative analysis by V.K.Ahluwalia and Reena Agarwal.
15. Organic Chemistry by Janice Gorzynski
16. Organic Chemistry by Stanley H Pine
17. Fundamentals of Organic Chemistry by John Mc Murray, Eric Simanek
18. Organic Chemistry by Francis A Carey
19. Text book of Organic Chemistry by K.S.Mukherjee
20. Organic Chemistry by Bhupinder Meha & Manju Mehta
21. Organic Chemistry by L.G.Wade Jr, Maya Shankar Singh
22. Elementary organic spectroscopy by Y.R. Sharma
23. Chemistry & Industry by Gurdeep R. Chatwal
24. Applied Chemistry by Jayashree Ghosh
25. Drugs by David Krupadanam
26. Pharmacodynamics by R.C.Srivastava, Subit Ghosh
27. Analytical Chemistry by David Krupadanam
28. Green Chemistry – V.K.Ahluwalia
29. Organic Synthesis by V.K.Ahluwalia and R.Agarwal
30. New trends in Green Chemistry –by V.K.Ahluwalia & M.Kidwai
31. Industrial Chemistry by B.K.Sharma
32. Industrial Chemistry by Banerji
33. Industrial Chemistry by M.G.Arora
34. Industrial Chemistry by O.P.Veramani & A.K.Narula
35. Synthetic Drugs by O.D.Tyagi & M.Yadav
36. Medicinal Chemistry by Ashutoshkar
37. Medicinal Chemistry by P.Parimoo
38. Pharmacology & Pharmacotherapeutics by R.S Satoshkar & S.D.Bhandenkar
39. Medicinal Chemistry by Kadametal P-I & P.II
40. European Pharmacopoeia
41. Vogel's Qualitative organic analysis.
42. Laboratory manual of Organic Chemistry by Raj K Bansal

### Physical chemistry books.

1. Physical chemistry A molecular approach by Donald A. Mcquarrie and John D. Simon.
2. Physical chemistry by G M Barrow
3. Principles of physical chemistry by Prutton and Marron
4. Physical chemistry by Peter Atkins, Julio D. Paula
5. Physical Chemistry by Ira N Levine
6. Elements of Physical Chemistry by Peter Atkins, Julio D. Paula
7. Text book of Physical Chemistry by P.L.Soni, O.P.Dharmarha and Q.N.Dash.
8. Solid State Chemistry and its applications by Anthony R. West
- 9 Text book of physical chemistry by K L Kapoor
10. Thermodynamics for Chemists by S Glasston
11. Chemical Kinetics by K J Laidler
12. An Introduction to Electrochemistry by S Glasston
13. Physical chemistry through problems By S K Dogra
14. Thermodynamics by J Jayaram and J C Kuriakose
15. Introductory Quantum Chemistry by A K Chandra
16. Physical Chemistry by J W Moore
17. Kinetics and mechanism by J W Moore and R G Pearson
18. Fundamentals of photochemistry by K K Rohtagi Mukharjee
19. Chemical thermodynamics by R P Rastogi and S S Misra
20. Advanced physical chemistry by Gurudeep Raj
21. Physical chemistry by G W castellan
22. Physical chemistry by Silbey, Alberty and Bawendi.
23. Elements of physical chemistry by Glasstone and Lewis
24. Text book of physical chemistry by S. Glasstone
25. Fundamentals of Molecular spectroscopy by C.N.Banwell and E.M.McCash
26. Nanochemistry by Geoffrey Ozin and Andre Arsenault
27. Catalysis: Concepts and green applications by Gadi Rotherberg
28. Green Chemistry: Theory and practice by P.T.Anastas and J.C. Warner
29. Polymer Science by Gowriker, Viswanathan and Jayadev Sridhar
30. Introduction polymer Chemistry By G.S.Misra
31. Polymer Chemistry by Bilmayer
32. Kinetics and Mechanism of Chemical Transformations by Rajaram and Kuriacose.
33. Senior practical physical chemistry by Khosla

  
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Faculty of Science  
B.Sc. I Yr. I Semester (Bac & Imp) Examination, Mar/Apr 2015  
**CHEMISTRY - I**

Time: 2 ½ Hrs.

Max.Marks: 70

**SECTION - A** (5x 2 = 10)**Answer the following questions.**

1. What is the mesomeric effect? Give an example.
2. Write about the markovnikov's rule.
3. Define the terms (i) ring activating group (ii) ring deactivating group?
4. What is the photo electric effect?
5. Describe the geometrical isomerism.

**SECTION - B** (4 x 5 = 20)**Answer any FOUR of the following questions.**

6. Write a note on wurtz reaction.
7. Explain the basicity of amines.
8. Discuss the Baeyer's strain theory.
9. Write about the valence Bond theory.
10. Write a short note on solubility Product.
11. What are the enantiomers? Give the properties.

**SECTION - C** (4 x 10 = 40)**Answer the following questions.**

12. (a) Explain the zaitsev's rule with an example.  
(b) Explain the relative stability of Primary, Secondary & Tertiary carbocations.  
(OR)  
(c) Give any two methods for the preparation of alkenes.  
(d) Write the polymerisation reactions of acetylene.

13. (a) Explain the aromaticity of Non-benzenoid compounds by Huckel rule.  
(b) Write the mechanism of Friedal - Crafts alkylation of Benzene.  
(OR)  
(c) Write the methods for the preparation of cyclo propane and cyclo butane.  
(d) Write the reactions of sulphonation and Nitration of Napthalence?

14. (a) Discuss the Heisenberg's uncertainty principle.  
(b) Draw the molecular energy diagram of NO - molecule.  
(OR)  
(c) Define the following terms and give the examples.  
1) Dipolemoment                      2) Induced dipolemoment  
(d) Explain the hybridisation of XeF<sub>2</sub> & Ni(CO)<sub>4</sub>.

15. (a) What is the common ion effect? Give the applications.  
(b) Explain the R,S-Configuration in alanine?  
(OR)  
(c) How to identify the ammonium ion in qualitative analysis.  
(d) Write a note on Fischer and Newmann projections.



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Faculty of Science  
B.Sc. I Yr. II Semester-End Examination, Mar/Apr 2015  
**CHEMISTRY - II**

Time: 2 ½ Hrs.

Max.Marks: 70

**SECTION - A (5x 2 = 10)****Answer the following questions.**

1. Give one method of preparation of hydroxyl amine and one property of it.
2. What are psuedo halogens?
3. Define lattice point and unit cell?
4. What is Hardy-Schulze law?
5. State Nernst's distribution law?

**SECTION - B (4 x 5 = 20)****Answer any FOUR of the following questions.**

6. What is Inorganic benzene? How do you justify it?
7. Write any two methods of preparation and applications of silanes?
8. Discuss the nature of M-C bond in organometallic compounds?
9. Explain Joule-Thomson effect?
10. What are Schottky and Frankel defects?
11. Explain the terms (i) Electrophoresis (ii) Dialysis (iii) Gold number

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**Answer the following questions.****SECTION - C (4 x 10= 40)**

12. (a) What is diagonal relationship? Write about diagonal relationship between Li and Mg?  
(b) Write the synthesis and structure of Diborane.  
(OR)  
(c) Write the preparation and applications of silicones?  
(d) Write a brief note on graphitic compounds and phosphazenes.
13. (a) Classify the oxides based on the chemical behavior.  
(b) Write about Interhalogen compounds.  
(OR)  
(c) What are organometallic compounds? Discuss about their classification on the basis of M-C bond.  
(d) Write about any three synthetic applications of grignard reagent.
14. (a) Derive the relationship between critical constants and Vanderwaal's constant.  
(b) Deduce the Vanderwaal's equation of state of a real gas.  
(OR)  
(c) Derive Bragg's equation.  
(d) What are semiconductors? Distinguish between P-type and n-type semi conductors.
15. (a) What are liquid crystals? How are they classified?  
(b) What is critical solution temperature (CST)? Explain the critical solution temperature of (i) Water-phenol (ii) Water-Triethyl amine.  
(OR)  
(c) What are emulsions? How are they prepared?  
(d) Discuss the differences between physical and chemical adsorption with examples.

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**CHEMISTRY - III** ~~III~~ <sup>IV</sup>

Time: 2 ½ Hrs.

Max.Marks: 70

**SECTION - A** (5 x 2 = 10)

Answer the following questions.

- 1.
- 2.
- 3.
- 4.
- 5.

**SECTION - B** (4 x 5 = 20)

Answer any FOUR of the following questions.

- 6.
- 7.
- 8.
- 9.
- 10.
- 11.

**SECTION - C** (4 x 10 = 40)

Answer the following questions.

12. (a)  
(b)

(OR)

- (c)  
(d)

13. (a)  
(b)

(OR)

- (c)  
(d)

14. (a)  
(b)


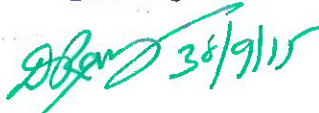
(OR)

- (c)  
(d)


15. (a)  
(b)

(OR)

- (c)  
(d)

  
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Faculty of Science  
B.Sc. III Yr. V Semester (Bac & Imp) Examination, Mar/Apr 2015  
**CHEMISTRY**  
**Paper - V**

Time: 2 ½ Hrs.

Max.Marks: 40

**SECTION - A (4 x 8 = 32)****Answer all the following questions.**

అన్ని ప్రశ్నలకు నమాధానములు వ్రాయండి.

1. (a) Discuss the action of Nitrous acid with primary secondary and tertiary Amines.  
నైట్రస్ ఆమ్లంతో ప్రైమరీ, సెకండరీ మరియు టెర్షరీ ఎమీనుల చర్యను చర్చించుము.

(b) Explain the Hoffmann's bromamide reaction with mechanism.  
హోఫ్మన్ బ్రోమైడ్ చర్యను చర్చించుము విధానముతో వివరించుము.

**(OR)**

(c) How do you separate primary, Secondary and tertiary amines from a mixture by a Hinsberg method.

హిన్స్బర్గ్ పద్ధతిని ఉపయోగించి ప్రైమరీ, సెకండరీ మరియు టెర్షరీ ఎమీనులను మిశ్రమము నుండి ఏ విధముగా వేరు చేయుదురు.

(d) Write any two methods of preparation of Isocyanides.  
ఐసోసైనైడ్లను తయారుచేయు ఏవేని రెండు పద్ధతులను వ్రాయుము.

2. (a) Write an account on the aromatic character of pyridine.  
పిరడిన్ యొక్క అరోమాటిక్ స్వభావాన్ని వివరించుము?

(b) Explain the Diel's alder reaction of furan.  
ఫ్యూరాన్ యొక్క డీల్స్ - ఆల్డర్ చర్యను వివరించుము.

**(OR)**

(c) Explain the phenomenon of mutarotation with respect to glucose.  
గ్లూకోజ్ యొక్క క్షీణభ్రమణత గురించి వివరించుము.

(d) How do you convert a ketose into an Aldose. Explain with a suitable example.  
కీటోజ్ను ఆల్డోజ్గా మార్చే చర్యను ఉదాహరణతో తెల్పుము.

3. (a) Explain essential and non-essential amino acids with suitable example.  
అత్యవసర, అత్యవసరము కాని ఎమీనో ఆమ్లాలను సరియైన ఉదాహరణలతో వివరించుము.

(b) Write any two general methods of preparation of  $\alpha$  - amino acids.  
 $\alpha$  -ఎమీనో ఆమ్లాలను తయారుచేయు ఏవేని రెండు పద్ధతులను వ్రాయుము?

**(OR)**

(c) Write a note on Isoelectric point?  
సమ విద్యుత్తు స్థానముపై లఘుటీక వ్రాయుము.


(d) Draw the mass spectrum of Acetophenone.  
ఎసిటోఫినోన్ యొక్క ద్రవ్యరాశి వర్ణ పటాన్ని గీయుము.



**PRINCIPAL**  
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## Faculty of Science

B.Sc. III Yr. V Semester (Bac &amp; Imp) Examination, Mar/Apr 2015

## CHEMISTRY - Paper - VI

Time: 2 ½ Hrs.

Max.Marks: 40

## SECTION - A (4 x 8 = 32)

Answer all the following questions.

అన్ని ప్రశ్నలకు సమాధానములు వ్రాయండి.

1. (a) What is Activation Energy? What are factors effect on the rate of reaction.  
ఉత్తేజక శక్తి అనగానేమి? చర్యరేటుపై ప్రభావితము చేయు అంశములు వ్రాయుము.
- (b) In first order rate of reaction rate constant  $40 \times 10^{-5} \text{ min}^{-1}$  at  $25^\circ\text{C}$ . The temperature of the reaction changes from  $25^\circ\text{C}$  to  $45^\circ\text{C}$  with change of temperature rate constant changes  $40 \times 10^{-5} \text{ min}^{-1}$  to  $80 \times 10^{-5} \text{ min}^{-1}$  Calculate activation energy of reactions.  
మొదటి క్రమాంక చర్య రేటు స్థిరాంకము  $40 \times 10^{-5} \text{ min}^{-1}$   $25^\circ\text{C}$  ఉష్ణోగ్రత వద్ద కలదు ఆ చర్య ఉష్ణోగ్రత  $25^\circ\text{C}$  నుండి  $45^\circ\text{C}$  కు ఉష్ణోగ్రత మార్పు చెందినపుడు రేటు స్థిరాంకము  $80 \times 10^{-5} \text{ min}^{-1}$  అ చర్య యొక్క ఉత్తేజకశక్తిని గణించండి.
- (OR)
- (c) Derive an equation for second order rate constant and write relation between Half-life period and initial concentration of reaction for second order reaction.  
ద్వితీయ క్రమాంక చర్య రేటు స్థిరాంకము సమీకరణస్రమమును సాధించుము మరియు ద్వితీయ క్రమాంక రేటు సమీకరణము అర్థాయువు కు ప్రారంభగాఢతకు మధ్య గల సంబంధమును సాధించుము.
- (d) In second order reaction for completion reaction about 20% time of reaction is 800 sec. How much time required for completion of 60% of reaction.  
ద్వితీయక్రమాంక చర్య 20% పూర్తి అగుటకు పట్టినకాలము 800 సెకన్ పట్టిన 60% చర్య పూర్తి అగుటకు పట్టుకాలము ఎంత?
2. (a) Explain Grothus - Draper Law.  
గ్రోథస్ - డ్రాపర్ నియమమును వివరింపుము.
- (b) A photo chemical system absorbs  $3 \times 10^{20}$  quantas of light per second on irradiation for 2 minutes 0.002 mole of the reactant was found to have reacted. Calculate the quantum yeild of the photo chemical process.  
ఒక కాంతి రసాయన వ్యవస్థ ఒక సెకనుకు  $3 \times 10^{20}$  క్వాంటములు శోషించుకొనుము. 0.02 మోల్ ల క్రియాజనకము 2 నిమిషాల పాటు కాంతివికిరణమునకు గురిచేసినపుడు ఆ కాంతి రసాయన వ్యవస్థ యొక్క క్వాంటమ్ ప్రొఫైని లెక్కకట్టుము.
- (OR)
- (c) (i) Explain the terms of thermodynamic reversible process and thermodynamic irreversible process.  
(ii) How can distinguish thermodynamic system and thermodynamic surrounding.  
(1) ఉష్ణయాంత్రిక ఉత్పాదకీయ మరియు ఉష్ణయాంత్రిక అనుత్పాదకీయ ప్రక్రియలను వివరింపుము.  
(2) ఉష్ణయాంత్రిక వ్యవస్థలకు మరియు ఉష్ణయాంత్రిక పరిసరాలను ఎట్లా బేదపరుచుదువు.
- (d) (i) Derive an equation  $C_p - C_v = R$ .  
(ii) Calculate the maximum workdone by 5 moles of an ideal gas when it expands from 5 atm to 2 atm at constant temperature of  $27^\circ\text{C}$ .  
(1)  $C_p - C_v = R$  అను సమీకరణమును సాధించుము.  
(2) 5 మోల్స్ ఆదర్శవాయువు 5 అట్మాస్ఫియర్ల పీడనము 2 అట్మాస్ఫియర్ల పీడనము  $27^\circ\text{C}$  స్థిరఉష్ణోగ్రత వద్ద వ్యాకోచము చెందినపుడు ఆ వాయువు జరిపే గరిష్ట పనిని గణించుము.

Faculty of Science  
B.Sc. III Yr. VI Semester End Examination, Mar/Apr 2014  
**CHEMISTRY**  
**Paper - VII**

Time: 2 ½ Hrs.

Max.Marks: 40

**SECTION - A (4 x 8 = 32)****Answer all the following questions.**

అన్ని ప్రశ్నలకు సమాధానములు వ్రాయండి.

1. (a) What is solvent Extraction? Explain craig- Counter method of solvent Extraction.  
ద్రావణ నిష్కర్షణము అనగా ఏమి? ప్రతికూల ప్రవాహ నిష్కర్షణ విధానమును వివరింపుము.

(b) Write Note on continuous solvent Extraction.  
అవిరళ ద్రావణ నిష్కర్షణను గూర్చి వాణ్ని వ్రాయుము.

**(OR)**

(c) How can Distignguish one Dimensional and Two Dimensional chromatography.  
ఏకమితీయ మరియు ద్విమితీయ క్రొమటోగ్రఫీని ఎట్లు విభేదించుదువు తెలుపుము.

(d) Explain following (i) Defferential migration (ii) Retardation factor values  $R_f$ .  
ఈ కింది వాటిని వివరింపుము  
(i) బేదాత్మకవలన (ii) మందన విలువలు (Retardation factor  $R_f$ )

2. (a) Define Beer ` Lambert Law and define the term of transmittance.  
బీర్ - లాంబర్ట్ నియమమును నిర్వచించుము? ప్రసర్పతను నిర్వచించుము.

(b) Write types of Electronic Transitions.  
వివిధ రకములైన ఎలక్ట్రానిక్ పరివర్తనములు గూర్చి వ్రాయుము.

**(OR)**

(c) Write modes of vibrations in polyatomic molecules.  
బహుపరమాణుక అణువులలో కంపనాలు గురించి వ్రాయుము.

(d) Explain following  
(i) Finger print Region (ii) Overtones.  
ఈ కింది వాటిని వివరింపుము.  
(i) వేలిముద్ర ప్రాంతము (ii) ఒవర్టోన్స్

3. (a) Write note on polarizability.  
దృవ్యాత్మకత గురించి వాణ్ని వ్రాయుము.

(b) How stokes and Anti stokes formed in Raman spectroscopy.  
రామన్ వర్ణపటములోని స్టోక్స్ మరియు అంటిస్టోక్స్ ఎట్లు ఏర్పడును.

**(OR)**

(c) Explain NMR spectrum of 1,1,2 tribromo Ethane.  
1,1,2 బ్రోమోఈథేన్ NMR వర్ణ పటమును వివరింపుము.

**Contd.....2**

Faculty of Science  
B.Sc. III Yr. VI Semester-End Examination, Mar/Apr 2015  
**CHEMISTRY**  
**Paper - VIII**

Time: 2 ½ Hrs.

Max.Marks: 40

**SECTION - A (4 x 8 = 32)****Answer all the following questions.**

అన్ని ప్రశ్నలకు సమాధానములు వ్రాయండి.

1. (a) Explain the terms Metabolites and Antimetabolites.  
మెటబోలైట్ లు మరియు ఆంటిమెటబోలైట్లు అనే వదాలను వివరించుము.
- (b) What is human gene therapy.  
మానవ జన్యు చికిత్స అంటే ఏమిటో తెలుపుము.
- (OR)**
- (c) Give the synthesis and therapeutic activity of ciprofloxacin.  
సిప్రోఫ్లోక్సాసిన్ సంశ్లేషణ మరియు ఔషధక్రియను వివరింపుము.
- (d) Give the synthesis and therapeutic activity of albuterol.  
ఆల్బుటెరాల్ సంశ్లేషణ మరియు ఔషధక్రియను వివరింపుము.
2. (a) Write the structures of Retravir (zidovudine) and Nevirapine (viramune) and their drug action.  
లట్రోవర్ (జిడోవుడిన్) మరియు నివిరాపిన్ (విరామున్) ల యొక్క నిర్మాణాలను, ఔషధ క్రియను వ్రాయుము.
- (b) Write the different structures of penicillin.  
వివిధ పెన్సిలిన్ నిర్మాణాలను వ్రాయుము.
- (OR)**
- (c) How AIDS can be prevented.  
ఎయిడ్స్ వ్యాధిని ఏ విధముగా నివారించవచ్చునో తెలుపుము.
- (d) Describe the role played by additives in the drug formulations.  
ఔషధ రూపకల్పనలో సంకలితాలు పోషించే పాత్రను వివరించుము.
3. (a) Describe the synthesis of Teflon and polyacrylonitile.  
టిఫ్లన్ మరియు పాలిఆక్రిలైట్ సంశ్లేషణను వివరించుము.
- (b) Explain the terms number average and weight average molecular weight.  
సంఖ్యాసరాసరి అణుభారము మరియు భారసరాసరి అణుభారాలను వివరింపుము.
- (OR)**
- (c) Write the preparation and industrial applications of Terelene.  
టెరెలెన్ యొక్క తయారీ మరియు పారిశ్రామిక అనువర్తనాలను వ్రాయుము.
- (d) Write the important applications of super-conductors.  
సూపర్ కండక్టర్ల యొక్క ప్రాముఖ్యత కల్గిన అనువర్తనాలను తెలుపుము.
4. (a) What is meant by specific acid and specific base catalysed reaction.  
విశిష్ట ఆమ్ల మరియు విశిష్టక్షార ఉత్పేరక చర్యలనగానేమి?

Contd.....2