

**ADUSUMILLI GOPALAKRISHNAIAH & SUGAR CANE  
GROWERS SIDDHARTHA DEGREE COLLEGE OF ARTS &  
SCIENCE, VUYYURU-521165, KRISHNA Dt., A.P.  
(AUTONOMOUS)**

**DEPARTMENT OF CHEMISTRY**

**2018-2019**



**BOARD OF STUDIES**

**Minutes of Meeting**

**11-04-2017**

Minutes of the meeting of Board of studies in Chemistry for the Autonomous course of A.G. & S.G.Siddhartha Degree College of Arts & Science, Vuyyuru held at 10.30 A.M on 11-04-2018 in the Department of Chemistry.

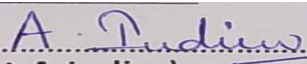
*Smt A.INDIRA Presiding*

Members Present:

- 1)..... *A. Indira* ..... Chairman  
(Smt.A.INDIRA) Head, Department of Chemistry  
A.G. & S.G.S.Degree College of Arts & Science, Vuyyuru - 521165.
- 2)..... *B. V. - - -* ..... University Nominee  
(Prof.B.Venkateswara Rao) Professor,  
Department of Chemistry,  
Andhra University, Vizag.
- 3)..... ..... Academic Council  
(Dr.K.A.Rama Raju) Nominee Associate Professor in Chemistry,  
Sir C.R.Reddy College,  
Eluru.
- 4)..... *S. Sivanadh* ..... Academic Council  
(Dr.M.Sivanadh) Nominee Associate Professor in Chemistry,  
A.N.R.College  
Gudivada.
- 5)..... *J. Nageswara Rao* ..... Member  
(Sri.J.Nageswara Rao) Lecturer in Chemistry,  
A.G. & S.G.S.Degree College of Arts & Science, Vuyyuru - 521165.
- 6)..... *K. Ramesh* ..... Member  
(Sri.K.Ramesh) Lecturer in Chemistry,  
A.G. & S.G.S.Degree College of Arts & Science, Vuyyuru - 521165.
- 7)..... *B. Navaneeta* ..... Member  
(Smt.B.Navaneeta) Lecturer in Chemistry,  
A.G. & S.G.S.Degree College of Arts & Science, Vuyyuru - 521165.
- 8)..... *M. Venkata Santhi* ..... Member  
(Smt.M.V.Santhi) Lecturer in Chemistry,  
A.G. & S.G.S.Degree College of Arts & Science, Vuyyuru - 521165.
- 9)..... *G. Ramesh* ..... Member  
(Sri. G.Ramesh) Lecturer in Chemistry,  
A.G. & S.G.S.Degree College of Arts & Science, Vuyyuru - 521165.

## **Agenda for B.O.S Meeting**

- 1 .To recommend the syllabus and model paper for I and II semesters of I Degree B.Sc., Chemistry for the Academic year 2018-2019.
2. To recommend the syllabus and model papers for III and IV semesters of II Degree B.Sc., Chemistry for the Academic year 2018-2019.
3. To recommend the syllabus and model papers for V and VI semesters of III Degree B.Sc. Chemistry for the Academic year 2018-19.
- 4.To recommend the Blue print of I,II,III,IV,V & VI semesters of B.Sc. Chemistry for the Academic year 2018-19.
5. To recommend the Guidelines to be followed by the question paper setters in Chemistry for I, II, III, IV, V & VI Semester – end exams.
6. To recommend the teaching and evaluation methods to be followed under Autonomous status.
7. Any suggestions regarding certificate course, seminars, workshops, Guest lecture to be organized.
8. Recommend the panel of paper setters and Examiners to the controller of Examinations of autonomous Courses of A.G. & S.G.S.Degree colleges of Arts & Science, Vuyyuru.
9. Any other matter.

  
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(Smt.A.Indira)

Chairman.

## RESOLUTIONS

- 1) It is resolved to continue the same **syllabus and modified model paper for I & II semesters of I B.Sc.** under Choice Based Credit System (CBCS) for the Academic year 2018-19 also.
- 2) It is resolved to implement the same **syllabus and model papers** under Choice Based Credit System (CBCS) for the Academic year 2018-19 for **III and IV semesters of II B.Sc.**
- 3) It is resolved to implement the same **syllabus and model papers** under Choice Based Credit System (CBCS) of 2017-18 for the Academic year 2018-19 for **V and VI semesters (General elective-A and cluster Elective-C) of III B.Sc.**
  - It Resolved to add the topic gas chromatography in V<sup>th</sup> unit of semester VI of 601 GE-Analytical methods in chemistry.
- 4) It is resolved to follow the **Blue prints** of I, II, semesters of Degree B.Sc. for the Academic year 2018-19. It is resolved to continue the same **Blue prints** of III, IV, V and VI semesters of Degree B.Sc. for the Academic year 2018-19.
- 5) It is resolved to follow the same guidelines to be followed by the question paper setters for Chemistry I, II, semesters of Degree B.Sc. for the Academic Year 2018-19. III, IV, V and VI semesters of Degree B.Sc. for the Academic Year 2018-19.
- 6) It is resolved to continue the following teaching and evaluation methods for Academic year 2018-19.

### Teaching Methods:

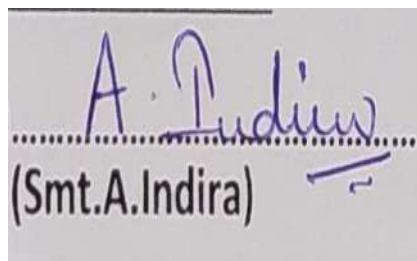
Besides the conventional methods of teaching, we use modern technology i.e. using of LCD projector to display on U boards etc, for better understanding of concepts.

### Evaluation of a student is done by the following procedure:

- Internal Assessment Examinations:
- Out of maximum 100 marks in each paper for IB.Sc , 30 marks shall be allocated for internal assessment .
- Out of these 30 marks, **20 marks are allocated for announced tests (i.e.IA-1 & IA-2)**. Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, **5 marks** are allocated on the basis of candidate's **percentage of attendance and remaining 5 marks are allocated for the innovative component like assignment/quiz/seminars for IB.Sc.**
- There is **no passing minimum** for internal assessment for I.B.Sc.
- Out of maximum 100 marks in each paper for II&III, 25 marks shall be allocated for internal assessment.
- Out of these 25 marks, **15 marks are allocated for announced tests (i.e.IA-1 & IA-2)**. Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, **5 marks** are allocated on the basis of candidate's **percentage of attendance and remaining 5 marks are allocated for the assignment for II, &III B.Sc.**
- Semester – End Examination:
- The maximum mark for IB.Sc Semester – End examination shall be 70 marks and duration of the examination shall be 3 hours. Even though the candidate is absent for two IA exams /obtain

Zero marks the external marks are considered (if the candidate gets 40/70) and the result shall be declared as "PASS".

- The maximum marks for II & III B.Sc Semester – End examination shall be 75 marks and duration of the examination shall be 3 hours.
  - Semester – End examinations shall be conducted in theory papers at the end of every semester, while in practical papers, these examinations are conducted at the end of I, II, III, IV, V, VI semesters **for I, II & III B.Sc.**
- 7) Discussed and recommended for organizing **certificate course, seminars, Guest lecturers, workshops** to upgrade the knowledge of students, for the approval of the academic council.
- 1) Discussed and empowered the Head of the department of Chemistry to suggest the panel of paper setters and examiners to the controller of examinations. **Department of Chemistry Adopted Value Added Course "Basic Segments of Environmental Chemistry".**
- 8) NIL.



A. Indira  
(Smt.A.Indira)

Chairman

**A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU**  
**(Accredited at "A" Grade by NAAC, Bangalore) ACADEMIC YEAR-2018-19**

<b>SEMESTER-I</b>	<b>PAPER CODE : CHE-101C</b>
<b>PAPER TITLE : INORGANIC &amp; ORGANIC CHEMISTRY, PAPER – I</b>	

**INORGANIC CHEMISTRY**

**TOTAL PERIODS - 60 (4hrs/week)**

**Credits - 3**

**UNIT –I Weightage 10+10+5**

**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 silicones.

Group - 15: Preparation and reactions of hydrazine, hydroxylamine.

**UNIT-II Weightage 10+5**

**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 10+5**

**7h**

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

**ORGANIC CHEMISTRY**

**UNIT-III Weightage 10+ 10 +5**

**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- Examp

## **UNIT-IV Weightage 5+5**

### **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 Diels - 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) Weightage 10**

**4h**

Nomenclature, Preparation by Freund's 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 Weightage 10+5**

### **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)

### **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 an

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.  
ACADEMIC YEAR-2018-19

SEMESTER - I	PAPER CODE : CHE-101C
PAPER TITLE : INORGANIC AND ORGANIC CHEMISTRY, PAPER-I	

Time: 3Hours

Maximum marks: 70

Pass marks: 28

**SECTION-A**

Answer any FOUR of the following. Each question carries 5 marks. 4X5=20

1. Write any two preparations and two properties of Hydrazine ?

2. Write a short note on Ferrocene ?

3. How are oxides classified on the basis of Chemical behaviour?

4. What is Mesomeric effect? Explain acidity of carboxylic acids ?

5. Write any two preparation methods of Alkenes?

6. Explain about Diel's-Alder reaction with one example?

7. Explain about reaction and mechanism of Nitration of benzene?

**SECTION-B**

Answer any FIVE questions. Each question carries 10 marks. 5X10=50

8. Explain about preparations, structure and properties of Borazole ?

9. What are silicones ? How they are classified? Write any two methods of preparation of silicones?

10. What are Inter Halogen Compounds? Write the structures of AX<sub>3</sub>, AX<sub>5</sub>?

11. What is Grignard reagent ? write any five synthetic applications?

12. Write about Hyper conjugation and Resonance effect with each one example?

13. Explain the following a. Carbenes b. Nitrenes

14. Write the conformational structures of Cyclobutane, Cyclopentane?

15. Define orientation effect? What are ortho, meta, para directing groups?



**The Guidelines to be followed by the question paper setters in chemistry for the  
I-Semester - end exams      ACADEMIC YEAR-2018-19**

<b>SEMESTER-I</b>	<b>PAPER CODE : CHE-101C</b>
<b>PAPER TITLE : INORGANIC &amp; ORGANIC CHEMISTRY, PAPER – I</b>	

**Weightage for the question paper**

<b>syllabus</b>	<b>Section-A (Short answer questions)</b>	<b>Section-B (essay questions)</b>
<b>Unit-1 (25 Marks)</b>	<b>1</b>	<b>1 + 1</b>
<b>Unit-2 (30 Marks)</b>	<b>1+1</b>	<b>1 + 1</b>
<b>Unit-3 (25 Marks)</b>	<b>1</b>	<b>1 + 1</b>
<b>Unit-4 (20Marks)</b>	<b>1 + 1</b>	<b>1</b>
<b>Unit-5 (15Marks)</b>	<b>1</b>	<b>1</b>

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

**A.G.&S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU**  
**(Accredited at A Grade by NAAC, Bangalore) ACADEMIC YEAR-2018-19**

<b>Simple Salt Analysis</b>	<b>PAPER CODE : CHE-101P</b>
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**Simple Salt Analysis**

(At the end of Semester-I)

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

**Credits: 2**

**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.**

- 1. Analysis of simple salt-I**
- 2. Analysis of simple salt-II**
- 3. Analysis of simple salt-III**
- 4. Analysis of simple salt-IV**
- 5. Analysis of simple salt-V**
- 6. Analysis of simple salt-VI**

A.G.&S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU

(Accredited at 'A'Grade by NAAC, Bangalore)

Simple Salt Analysis	COURSE CODE : CHE-101 P
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### SCHEME OF VALUATION

#### INTERNAL MARKS

- Record =10 M

#### EXTERNAL MARKS (40)

- Viva questions = 10 M

#### **PRACTICAL EXAMINATION (30M)**

- Identification of anion ..... 6M
- Confirmation test for anion ..... 6 M
- Group separation table with correct group ..... 10 M
- Confirmation test for cation ..... 5M
- Report ..... 3 M

**TOTAL: 30 M**

**A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.**  
**(Accredited at "A" Grade by NAAC, Bangalore)\_ACADEMIC YEAR-2018-19**

<b>SEMESTER - II</b>	<b>PAPER CODE :CHE-201C</b>
<b>PAPER TITLE : PHYSICAL AND GENERAL CHEMISTRY, PAPER- II</b>	

**PHYSICAL CHEMISTRY**

**UNIT-I** **Total Periods - 60 (4hrs/week)**    **Credits-3**

**Solid state** **Marks weightage (10+5+5)**    **10h**

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. Bravais lattices and crystal systems. X-ray diffraction and crystal structure. Bragg's law. Defects in crystals. Stoichiometric and non-stoichiometric defects.

**UNIT-II**

**1. Gaseous state** **Marks weightage (10+5)**    **6h**

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** **Marks weightage (10)**    **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** **Marks weightage (10+10+5)**    **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.

## GENERAL CHEMISTRY

### UNIT-IV

#### **I. Surface chemistry** **Marks weightage (10)** **8h**

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

#### **2. Chemical Bonding** **Marks weightage (10+5)** **7h**

Valence bond theory, hybridization, VB theory as applied to  $\text{ClF}_3$ ,  $\text{Ni}(\text{CO})_4$ , Molecular orbital theory - LCAO method, construction of M.O. diagrams for homonuclear and hetero-nuclear diatomic molecules ( $\text{N}_2$ ,  $\text{O}_2$ ,  $\text{CO}$  and  $\text{NO}$ ).

### UNIT-V

#### **Stereochemistry of carbon compounds** **Marks weightage (10+5+5)** **15h**

Molecular representations- Wedge, Fischer, Newman and Saw-Horse formulae. Optical isomerism: Optical activity- wave nature of light, plane polarised light, optical rotation and specific rotation.

Chiral molecules- definition and criteria (Symmetry elements)- Definition of enantiomers and diastereomers – Explanation of optical isomerism with examples Glyceraldehyde, Lactic acid, Alanine, Tartaric acid, 2,3-dibromopentane. D,L and R,S configuration methods and E,Z- configuration with examples.

#### **List of Reference Books**

1. Principles of physical chemistry by Prutton and Marron
2. Solid State Chemistry and its applications by Anthony R. West
3. Text book of physical chemistry by K L Kapoor
4. Text book of physical chemistry by S Glasstone
5. Stereochemistry of Organic compounds by E L Eliel
6. Advanced Organic Chemistry by F A Carey and R J Sundberg
7. Stereochemistry by P.S.Kalsi
8. Stereochemistry of Organic compounds by D. Nasipuri
9. Advanced physical chemistry by Bahl and Tuli
10. Advanced Inorganic Chemistry Vol-I by Satyaprakash, Tuli, Basu and Madan

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.  
ACADEMIC YEAR-2018-19

SEMESTER – II	COURSE CODE : CHE-201C
PAPER TITLE : PHYSICAL AND GENERAL CHEMISTRY, PAPER - II	

Time: 3Hours

Maximum marks: 70

Pass marks: 28

SECTION-A

Answer any FOUR of the following. Each question carries 5 marks. 4X5=20

1. Define and explain space lattice and unit cell.?
2. Define law of symmetry? Explain about centre of symmetry?
3. Define critical constants?
4. Define Henry's law and their limitations?
5. Define and explain Bond order?
6. Explain about symmetry elements?
7. Explain about Specific rotation?

SECTION-B

Answer any FIVE questions. Each question carries 10 marks. 5X10=50

8. Derive Bragg's equation?
9. Derive Vanderwaal's equation of real gases.?
10. Write the differences between Solids and Liquids?
11. Define Nernst distribution law and their limitations. Explain two applications of distribution law/
12. Explain about Fractional distillation and steam distillation
13. Explain Langmuir adsorption isotherms.
14. Explain the shape of  $\text{Ni}(\text{CO})_4$  based on valence bond theory
15. Explain about optical isomerism of Tartaric acid?

**The Guidelines to be followed by the question paper setters in chemistry for the  
II-Semester - end exams ACADEMIC YEAR-2018-19**

<b>SEMESTER – II</b>	<b>PAPER CODE : CHE-201C</b>
<b>PAPER TITLE : PHYSICAL AND GENERAL CHEMISTRY, PAPER - II</b>	

**Weightage for the question paper**

syllabus	Section-A (Short answer questions)	Section-B (essay questions)
Unit-1 (20 Marks)	1 + 1	1
Unit-2 (25 Marks)	1	1 + 1
Unit-3 (25Marks)	1	1 + 1
Unit-4 (25 Marks)	1	1 + 1
Unit-5 (20 Marks)	1+1	1

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

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**PRACTICAL SYLLABUS ACADEMIC YEAR-2018-19**

<b>Analysis of Salt mixture</b>	<b>PAPER CODE : CHE-201P</b>
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**30 hrs (2 h / w)    Credits: 2**

**Qualitative inorganic analysis:**

**Analysis of mixture salt containing two anions and two cations (From two different groups) from the following:**

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

**Cations: Lead, copper, iron, aluminum, zinc, manganese, calcium, strontium, barium, Potassium and ammonium.**

- 1. Analysis of salt mixture-I**
- 2. Analysis of salt mixture -II**
- 3. Analysis of salt mixture-III**
- 4. Analysis of salt mixture -IV**
- 5. Analysis of salt mixture -V**
- 6. Analysis of salt mixture-VI**



**A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU**  
**(Accredited at "A" Grade by NAAC, Bangalore) ACADEMIC YEAR-2018-19**

<b>Analysis of Salt mixture</b>	<b>PAPER CODE : CHE-201P</b>
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**SCHEME OF VALUATION**

**INTERNAL MARKS**

- Record =10 M

**EXTERNAL MARKS (40 marks)**

- Viva.....10M
- PRACTICAL EXAMINATION -30M
  - Identification of anion ..... 6 M
  - Confirmation test for anion ..... 6M
  - Group separation table with correct group ..... 10 M
  - Confirmation test for cation ..... 6 M
  - Report ..... 2 M

**TOTAL=50 M**

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.  
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SEMESTER – III	SUBJECT: CHEMISTRY	PAPER CODE: CHE-301C
PAPER TITLE : INORGANIC & ORGANIC CHEMISTRY, PAPER - III		

### INORGANIC CHEMISTRY

60 hrs (4 h / w) Credits - 3

#### UNIT – I

**1. Chemistry of d-block elements** (Marks-Weightage – 10 + 5) (6 hrs)

Characteristics of d-block elements with special reference to electronic configuration, variable valence, magnetic properties, catalytic properties and ability to form complexes. Stability of various oxidation states

**2. Theories of bonding in metals:** (Marks-Weightage – 10) (6 hrs)

Metallic properties and its limitations, Valence bond theory, Free electron theory, Explanation of thermal and electrical conductivity of metals, limitations, Band theory, formation of bands, explanation of conductors, semiconductors and insulators.

#### UNIT – II

**3. Metal carbonyls and related compounds:** (Marks-Weightage – 5) (4 hrs)

EAN rule, classification of metal carbonyls, structures and shapes of metal carbonyls of V, Cr, Mn, Fe, Co and Ni.

**4. Chemistry of f-block elements:** (Marks-Weightage – 10 + 5) (6 hrs)

Chemistry of lanthanides - electronic structure, oxidation states, lanthanide contraction, consequences of lanthanide contraction, magnetic properties. Chemistry of actinides - electronic configuration, oxidation states, actinide contraction, comparison of lanthanides and actinides.

### ORGANIC CHEMISTRY

#### UNIT – III

**1. Halogen compounds** (Marks-Weightage – 10) (7 hrs)

Nomenclature and classification of alkyl (into primary, secondary, tertiary), aryl, aryl alkyl, allyl, vinyl, benzyl halides.

Nucleophilic aliphatic substitution reaction- classification into  $SN^1$  and  $SN^2$  – reaction mechanism with examples – Ethyl chloride, t-butyl chloride and optically active alkyl halide 2-bromobutane.

**2. Hydroxy compounds** (Marks-Weightage – 10+5 + 5) (7 hrs)

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.  
Identification of alcohols by oxidation with  $\text{KMnO}_4$ , Ceric ammonium nitrate, Lucas reagent and phenols by reaction with  $\text{FeCl}_3$ .

**Chemical properties:**

- a) Dehydration of alcohols.
- b) Oxidation of alcohols by  $\text{CrO}_3$ ,  $\text{KMnO}_4$ .
- c) Special reaction of phenols: Bromination, Kolbe-Schmidt reaction, Reimer-Tiemann reaction, Fries rearrangement, azocoupling, Pinacol-Pinacolone rearrangement.

**UNIT-IV**

**Carbonyl compounds (Marks-Weightage – 10 + 5) (10 hrs)**

Nomenclature of aliphatic and aromatic carbonyl compounds, structure of the carbonyl group. Synthesis of aldehydes from acid chlorides, synthesis of aldehydes and ketones using 1,3-dithianes, synthesis of ketones from nitriles and from carboxylic acids.

**Physical properties:** Reactivity of carbonyl group in aldehydes and ketones.

**Nucleophilic addition reaction** with a)  $\text{NaHSO}_3$ , b)  $\text{HCN}$ , c)  $\text{RMgX}$ , d)  $\text{NH}_2\text{OH}$ , e)  $\text{PhNHNH}_2$ , f) 2-4 DNPH, g) Alcohols-formation of hemiacetal and acetal.

**Base catalysed reactions:** a) Aldol, b) Cannizzaro reaction, c) Perkin reaction, d) Benzoin condensation, e) Haloform reaction, f) Knoevenagel reaction.

Oxidation of aldehydes- Baeyer-Villiger oxidation of ketones.

**Reduction:** Clemmensen reduction, Wolf-Kishner reduction, MPV reduction, reduction with  $\text{LiAlH}_4$  and  $\text{NaBH}_4$ .

**Analysis of aldehydes and ketones** with a) 2,4-DNT test, b) Tollen's test, c) Fehling test, d) Schiff's test, e) Haloform test (with equation)

**UNIT-V**

**1. Carboxylic acids and derivatives (Marks-Weightage – 10 + 5) (8 hrs)**

Nomenclature, classification and structure of carboxylic acids.

Methods of preparation by

- a) Hydrolysis of nitriles, amides
- b) Hydrolysis of esters by acids and bases with mechanism
- c) 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 the acidities of aromatic and aliphatic acids.

**Chemical properties:** Reactions involving H, OH and COOH groups- salt formation, anhydride formation, acid chloride formation, amide formation and esterification (mechanism). Degradation of carboxylic acids by Huns-Diecker reaction, decarboxylation by Schimdt reaction, Arndt-Eistert synthesis, halogenation by Hell-Volhard- Zelinsky reaction.

## **2. Active methylene compounds (Marks-Weightage – 10 + 5) (6 hrs)**

**Acetoacetic esters:** keto-enol tautomerism, preparation by Claisen condensation, Acid hydrolysis and ketonic hydrolysis.

Preparation of a) monocarboxylic acids(Acetic acid, Propionic acid).

b) Dicarboxylic acids(Succinic acid, Adipic acid).C)Reaction with urea

**Malonic ester:** preparation from acetic acid.

**Synthetic applications:** Preparation of

a) monocarboxylic acids (propionic acid and n-butyric acid).

b) Dicarboxylic acids (succinic acid and adipic acid)

c)  $\alpha,\beta$ -unsaturated carboxylic acids (crotonic acid).

Reaction with urea.

### **List of Text Books**

1. Selected topics in inorganic chemistry by W.D.Malik, G..D.Tuli,R.D.Madan
2. Inorganic Chemistry J E Huheey, E A Keiter and R L Keiter
3. A Text Book of Organic Chemistry by Bahl and Arun bahl
4. A Text Book of Organic chemistry by I L Finar Vol I
5. Telugu Academy Textbook of Chemistry Vol- II (English medium)
6. Unified chemistry Vol- II by O.P.Agarwal
7. Unified chemistry Vol- II by K.Ramarao and Y. R. Sharma (KalyaniPublishers)

### **List of Reference Books**

1. Organic chemistry by Bruice
2. Organic chemistry by Clayden
3. Advanced Inorganic chemistry by Gurudeep Raj
4. Basic Inorganic Chemistry by Cotton and Wilkinson
5. Concise Inorganic Chemistry by J.D.Lee
6. Pradeep's chemistry vol- I & II

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.  
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SEMESTER – III	PAPER CODE : CHE-301C
PAPER TITLE : INORGANIC AND ORGANIC CHEMISTRY, PAPER-III	

Time: 3Hours

Maximum marks: 75

Pass marks: 30

SECTION-A

Answer any FIVE of the following. Each question carries 5 marks. 5X5=25

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

SECTION-B

Answer any FIVE questions. Each question carries 10 marks. 5X10=50

- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
- 15.
- 16.

**The Guidelines to be followed by the question paper setters in chemistry for the  
III- Semester - end exams**

<b>SEMESTER – III</b>	<b>PAPER CODE : CHE-301C</b>
<b>PAPER TITLE : INORGANIC AND ORGANIC CHEMISTRY, PAPER-III</b>	

**Weightage for the question paper**

<b>syllabus</b>	<b>Section-A (Short answer questions)</b>	<b>Section-B (essay questions)</b>
<b>Unit-1 (25 Marks)</b>	<b>1</b>	<b>1 + 1</b>
<b>Unit-2 (20 Marks)</b>	<b>1 + 1</b>	<b>1</b>
<b>Unit-3 (30 Marks)</b>	<b>1 + 1</b>	<b>1+1</b>
<b>Unit-4 (15 Marks)</b>	<b>1</b>	<b>1</b>
<b>Unit-5 (30 Marks)</b>	<b>1 + 1</b>	<b>1 + 1</b>

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

**A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU**  
(Accredited at "A" Grade by NAAC, Bangalore)

<b>Titrimetric analysis &amp; Reactions of organic compounds</b>	<b>PAPER CODE : CHE-301 P</b>
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**PRACTICAL SYLLABUS**  
(At the end of Semester-III)      **30 hrs. (2h / w), Credits-2**

**I. Titrimetric analysis:**

1. Determination of Fe (II) using  $\text{KMnO}_4$  with oxalic acid as primary standard.
2. Determination of Cu (II) using  $\text{Na}_2\text{S}_2\text{O}_3$  with  $\text{K}_2\text{Cr}_2\text{O}_7$  as primary standard.

**II. Organic Functional Group Reactions**

Reactions of the following functional groups present in organic compounds  
(At least four) Alcohols, Phenols, Aldehydes, Ketones, Carboxylic acids and Amides

**SCHEME OF VALUATION**

1. INTERNAL MARKS-Record-10M
2. EXTERNAL MARKS-40
  - Titrimetric analysis-30M
  - Viva questions = 10 M

**TOTAL = 50 M**

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SEMESTER – IV	SUBJECT: CHEMISTRY	PAPER CODE: CHE-401C
PAPER TITLE :	SPECTROSCOPY & PHYSICAL CHEMISTRY, PAPER-IV	
	60 hrs(4h/w)	Credits-3

**SPECTROSCOPY**

**UNIT- I** ( 10+5 )marks 6h

**Spectrophotometry**

General features of absorption - 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 of 1. Chromium in  $K_2Cr_2O_7$   
2. Manganese in Manganous sulphate

**Electronic spectroscopy:** ( 10+5 )marks 8h

Interaction of electromagnetic radiation with molecules and types of molecular spectra. Energy levels of molecular orbitals ( $\sigma$ ,  $\pi$ ,  $n$ ). Selection rules for electronic spectra. Types of electronic transitions in molecules effect of conjugation. Concept of chromophore and auxochrome

**UNIT-II**

**Infra red spectroscopy** ( 10 )marks 8h

Different Regions in Infrared radiations. Modes of vibrations in diatomic and polyatomic molecules. Characteristic absorption bands of various functional groups. Interpretation of spectra-Alkanes, Aromatic, Alcohols carbonyls, and amines with one example to each.

**Proton magnetic resonance spectroscopy ( $^1H$ -NMR)** (10+5)marks 8h

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.



## PHYSICAL CHEMISTRY

### UNIT-III

#### Dilute solutions

(10+5) marks

10h

Colligative properties. Raoult's law, relative lowering of vapour pressure, its relation to molecular weight of non-volatile solute. Experimental method-Ostwald method  
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 –Cottrell's and Beckmann's method.  
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.

### UNIT-IV

#### Electrochemistry-I

(10+5+5) marks

10h

Specific conductance, 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 for strong electrolytes (elementary treatment only).  
Definition of transport number, determination by Hittorfs method. Application of conductivity measurements- conductometric titrations.

### UNIT-V

#### 1. Electrochemistry- II

(10+5) marks

4h

Single electrode potential, sign convention, Reversible and irreversible cells  
Nernst Equation- Reference electrode, Standard Hydrogen electrode, calomel electrode, Indicator electrode, metal – metal ion electrode, Inert electrode,  
Determination of EMF of cell, Applications of EMF measurements -  
Potentiometric titrations.

#### 2. Phase rule

(10+5) marks

6h

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. Freezing mixtures.

#### List of Text Books

1. Advanced physical chemistry by Guru deep Raj
2. Introduction to Electrochemistry by S. Glasstone
3. Elementary organic spectroscopy by Y.R. Sharma
4. Spectroscopy by P.S.Kelsi
5. Unified chemistry Vol- II by O.P. Agarwal
6. Unified chemistry Vol- II by K. Ramarao and Y. R. Sharma (Kalyani Publishers)

#### List of Reference Books

1. Spectroscopy by William Kemp
2. Spectroscopy by Pavia
3. Organic Spectroscopy by J. R. Dyer
4. Modern Electrochemistry by J.O. M. Bockris and A.K.N.Reddy

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.

SEMESTER – IV	PAPER CODE : CHE-401C
PAPER TITLE : SPECTROSCOPY AND PHYSICAL CHEMISTRY, PAPER-IV	

Time: 3Hours

Maximum marks: 75

Pass marks: 30

SECTION-A

Answer any FIVE of the following. Each question carries 5 marks.

5X5=25

1.

2.

3.

4.

5.

6.

7.

8.

SECTION-B

Answer any FIVE questions. Each question carries 10 marks.

5X10=50

9.

10.

11.

12.

13.

14.

15.

16

**The Guidelines to be followed by the question paper setters in chemistry for the  
IV-Semester - end exams**

<b>SEMESTER – IV</b>	<b>SUBJECT: CHEMISTRY</b>	<b>PAPER CODE: CHE-401C</b>
<b>PAPER TITLE :</b>	<b>SPECTROSCOPY &amp; PHYSICAL CHEMISTRY, PAPER-IV</b>	

**Weightage for the question paper**

<b>syllabus</b>	<b>Section-A (Short answer questions)</b>	<b>Section-B (essay questions)</b>
<b>Unit-1 (40 Marks)</b>	<b>1 + 1</b>	<b>1 + 1</b>
<b>Unit-2 (15 Marks)</b>	<b>1</b>	<b>1 + 1</b>
<b>Unit-3 (15 Marks)</b>	<b>1</b>	<b>1</b>
<b>Unit-4 (20 Marks)</b>	<b>1 + 1</b>	<b>1</b>
<b>Unit-5 (30 Marks)</b>	<b>1 +1</b>	<b>1 + 1</b>

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

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**PRACTICAL SYLLABUS**

Physical Chemistry and IR Spectral Analysis	PAPER CODE : CHE - 401 P
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**30 hrs (2h /w) Credits-2**

**Physical Chemistry**

1. Critical Solution Temperature of Phenol – water system
2. Determination of concentration of NaCl by CST method.
3. Determination of concentration of HCl conductometrically using standard NaOH solution.
4. Determination of concentration of acetic acid conductometrically using standard NaOH Solution.

**IR Spectral Analysis**

5. IR Spectral Analysis of the following functional groups with examples
  - a) Hydroxyl groups
  - b) Carbonyl groups
  - c) Amino groups
  - d) Aromatic groups

**SCHEME OF VALUATION**

1. Internal marks
  - Record = 10
2. External marks- 40
  - Practical-25
  - Viva = 10
  - IR Spectral analysis = 5 (Project work)

Total marks =50

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SEMESTER – V	SUBJECT: CHEMISTRY	COURSE CODE: CHE-501C
PAPER TITLE : INORGANIC,ORGANIC & PHYSICAL CHEMISTRY, Paper –V		
60 hrs(4h/w)		Credits-3

**INORGANIC CHEMISTRY**

**UNIT – I**

**Coordination Chemistry: (10+10+5)**

**12h**

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 - factors affecting crystal-field splitting energy, merits and demerits of crystal-field theory. Isomerism in coordination compounds - structural isomerism and stereo isomerism, stereochemistry of complexes with 4 and 6 coordination numbers

**UNIT-II**

**1. Spectral and magnetic properties of metal complexes: (10+5)**

**5h**

Types of magnetic behavior, spin-only formula, calculation of magnetic moments, experimental determination of magnetic susceptibility-Gouy method.

**2. Stability of metal complexes: (10+5)**

**6h**

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

**ORGANIC CHEMISTRY**

**UNIT- III**

**Nitro hydrocarbons: (10+5)**

**5h**

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

## UNIT – IV

### Nitrogen compounds: (10+10+5)

16h

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

1. Ammonolysis of alkyl halides 2. Gabriel synthesis 3. Hoffman's bromamide reaction (mechanism).

Reduction of Amides and Schmidt reaction. Physical properties and basic character -

Comparative basic strength of Ammonia, methyl amine, dimethyl amine, trimethyl amine and aniline - comparative basic strength of aniline, N-methylaniline and N,N-dimethyl aniline (in aqueous and non-aqueous medium), steric effects and substituent effects.

Chemical properties: a) Alkylation b) Acylation c) Carbylamine reaction d) Hinsberg separation e) Reaction with Nitrous acid of 1°, 2°, 3° (Aliphatic and aromatic amines).

Electrophilic substitution of Aromatic amines – Bromination and Nitration. Oxidation of aryl and Tertiary amines, Diazotization.

## PHYSICAL CHEMISTRY

### UNIT- V

#### Thermodynamics (10+5+5+5)

16h

The first law of thermodynamics-statement, definition of internal energy and enthalpy.

Heat capacities and their relationship. Joule-Thomson effect- coefficient. Calculation of

w, for the expansion of perfect gas under isothermal and adiabatic conditions for

reversible processes. State function. Temperature dependence of enthalpy of formation-

Kirchoff's equation. Second law of thermodynamics. Different Statements of the law.

Concept of entropy, entropy as a state function, entropy changes in reversible and

irreversible processes. Entropy changes in spontaneous and equilibrium processes.

#### List of Reference Books

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

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.

SEMESTER – V	PAPER-V	PAPER CODE : CHE-501C
PAPER TITLE : INORGANIC,ORGANIC & PHYSICAL CHEMISTRY		

Time: 3Hours

Maximum marks: 75

Pass marks: 30

**SECTION-A**

Answer any FIVE of the following. Each question carries 5 marks. 5X5=25

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

**SECTION-B**

Answer any FIVE questions. Each question carries 10 marks. 5X10=50

- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
- 15.
- 16.

**The Guidelines to be followed by the question paper setters in chemistry for the  
V- Semester - end exams**

<b>SEMESTER – V</b>	<b>SUBJECT: CHEMISTRY</b>	<b>COURSE CODE: CHE-501C</b>
<b>PAPER TITLE : INORGANIC,ORGANIC &amp; PHYSICAL CHEMISTRY, Paper –V</b>		

**Weightage for the question paper**

<b>syllabus</b>	<b>Section-A (Short answer questions)</b>	<b>Section-B (essay questions)</b>
<b>Unit-1 (25 Marks)</b>	<b>1</b>	<b>1 + 1</b>
<b>Unit-2 (30 Marks)</b>	<b>1 + 1</b>	<b>1+1</b>
<b>Unit-3 (15 Marks)</b>	<b>1</b>	<b>1</b>
<b>Unit-4 (25 Marks)</b>	<b>1</b>	<b>1 + 1</b>
<b>Unit-5 (25 Marks)</b>	<b>1 +1+1</b>	<b>1</b>

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.



**A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.  
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**PRACTICAL SYLLABUS**

<b>Practical Paper – V Organic Qualitative Analysis</b>	<b>PAPER CODE : CHE-501 P</b>
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**30 hrs (2 h/W)      Credits: 2**

**Organic Qualitative Analysis: 50M**

Analysis of an organic compound through systematic qualitative procedure for functional group identification including the determination of melting point and boiling point .

Alcohols, Phenols, Aldehydes, Ketones, Carbohydrates,  
Carboxylic acids, Aromatic Primary Amines.

**SCHEME OF VALUATION**

1. INTERNAL MARKS- Record-10M
2. EXTERNAL MARKS-40
  - Analysis of an organic compound and preparation of suitable derivative-30M
  - Viva questions = 10 M

TOTAL = 50 M

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS),VUYYURU.  
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SEMESTER – V	Paper – VI	SUBJECT: CHEMISTRY	PAPER CODE: CHE-502C	
PAPER TITLE : INORGANIC,ORGANIC & PHYSICAL CHEMISTRY				
			60 hrs (4h/w)	Credits-3

**INORGANIC CHEMISTRY**

**UNIT-I**

**1. Reactivity of metal complexes: (10+5)**

**5h**

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

**2. Bioinorganic chemistry: (10)**

**5h**

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

**ORGANIC CHEMISTRY**

**UNIT- II**

**Heterocyclic Compounds (10+5)**

**8h**

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

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

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

**UNIT-III**

**Carbohydrates (10+5+5+5)**

**12h**

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

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

**Interconversion of Monosaccharides:** Aldopentose to Aldohexose (Arabinose to D- Glucose, D-Mannose) (Kiliani - Fischer method). Epimers, Epimerisation - Lobry de bruyn van Ekenstein rearrangement. Aldohexose to Aldopentose (D-Glucose to D- Arabinose) by Ruff degradation. Aldohexose to Ketohehexose [(+) Glucose to (-) Fructose] and Ketohehexose to Aldohexose (Fructose to Glucose)

#### UNIT- IV

##### **Amino acids and proteins (10+10+5)**

12h

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

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

### PHYSICAL CHEMISTRY

#### UNIT-V

##### **1. Chemical kinetics (10+5)**

9h

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

##### **2. Photochemistry (10+5)**

9h

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

#### **List of Reference Books**

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

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.

SEMESTER – V	PAPER-VI	PAPER CODE : CHE-502C
PAPER TITLE : INORGANIC,ORGANIC & PHYSICAL CHEMISTRY		

Time: 3Hours

Maximum marks: 75

Pass marks: 30

SECTION-A

Answer any FIVE of the following. Each question carries 5 marks. 5X5=25

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

SECTION-B

Answer any FIVE questions. Each question carries 10 marks. 5X10=50

- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
- 15.
- 16.

**The Guidelines to be followed by the question paper setters in chemistry for the  
V- Semester - end exams**

<b>SEMESTER – V</b>	<b>SUBJECT: CHEMISTRY</b>	<b>PAPER CODE: CHE-502C</b>
<b>PAPER TITLE : INORGANIC,ORGANIC &amp; PHYSICAL CHEMISTRY, Paper – VI</b>		

**Weightage for the question paper**

<b>syllabus</b>	<b>Section-A (Short answer questions)</b>	<b>Section-B (essay questions)</b>
<b>Unit-1 (25 Marks)</b>	<b>1</b>	<b>1 + 1</b>
<b>Unit-2 (15 Marks)</b>	<b>1</b>	<b>1</b>
<b>Unit-3 (25 Marks)</b>	<b>1 + 1+1</b>	<b>1</b>
<b>Unit-4 (25 Marks)</b>	<b>1</b>	<b>1 + 1</b>
<b>Unit-5 (30 Marks)</b>	<b>1 +1</b>	<b>1 + 1</b>

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

**A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.**  
**(Accredited at "A" Grade by NAAC, Bangalore)**

**PRACTICAL SYLLABUS**

<b>Practical Paper –VI Physical Chemistry</b>	<b>COURSE CODE : CHE-502 P</b>
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**30 hrs (2 h/W)      Credits: 2**

1. Determination of rate constant for acid catalyzed ester hydrolysis.
2. Determination of molecular status and partition coefficient of benzoic acid in Benzene and water.
3. Determination of Surface tension of liquid
4. Determination of Viscosity of liquid.
5. Adsorption of oxalic acid on silica gel , verification of Freundlich isotherm.

**SCHEME OF VALUATION**

1. INTERNAL MARKS- Record-10M
2. EXTERNAL MARKS-40
  - Practical-30
  - Viva-10

**TOTAL = 50 M**

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.

(Accredited at "A" Grade by NAAC, Bangalore)

SEMESTER – VI	SUBJECT: CHEMISTRY	PAPER CODE:CHE-601GE
PAPER TITLE : ANALYTICAL METHODS IN CHEMISTRY, Paper – VII		

60hrs (4h / w) Credits-3

### UNIT-I

#### Quantitative analysis: (10+10+5+5)

15h

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

### UNIT-II

#### Treatment of analytical data: (10+5)

8h

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

### UNIT-III

#### Separation Techniques in Chemical analysis(10+10+5)

15h

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

**ION EXCHANGE**: Introduction, action of ion exchange resins, separation of inorganic mixtures, applications,

#### UNIT – IV

12h

##### **Chromatography(10+5+5)**

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

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

#### UNIT -V (10+10+5+5)

10h

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

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

**GC:**Principle and applications

**HPLC :** Basic principles and applications.

#### **List of Reference Books**

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



A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.

SEMESTER – VI	PAPER CODE : CHE-601GE
PAPER TITLE : ANALYTICAL METHODS IN CHEMISTRY, PAPER-VII	

Time: 3Hours

Maximum marks: 75

Pass marks: 30

**SECTION-A**

Answer any FIVE of the following. Each question carries 5 marks. 5X5=25

1. What are co-precipitation and post-precipitation?
2. Write a short note on coagulation and peptization ?
3. What are significant figures ? Explain their importance?
4. Write the applications of solvent extraction
- 5.
- 6.
- 7.
- 8.

**SECTION-B**

Answer any FIVE questions. Each question carries 10 marks. 5X10=50

- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
- 15.
- 16.

**The Guidelines to be followed by the question paper setters in chemistry for the  
VI- Semester - end exams**

<b>SEMESTER – VI</b>	<b>PAPER CODE : CHE-601GE</b>
<b>PAPER TITLE : ANALYTICAL METHODS IN CHEMISTRY, PAPER-VII</b>	

**Weightage for the question paper**

<b>syllabus</b>	<b>Section-A (Short answer questions)</b>	<b>Section-B (essay questions)</b>
<b>Unit-1 (30 Marks)</b>	<b>1+1</b>	<b>1 + 1</b>
<b>Unit-2 (15 Marks)</b>	<b>1</b>	<b>1</b>
<b>Unit-3 (25 Marks)</b>	<b>1</b>	<b>1+1</b>
<b>Unit-4 (20 Marks)</b>	<b>1+1</b>	<b>1</b>
<b>Unit-5 (30 Marks)</b>	<b>1 +1</b>	<b>1 + 1</b>

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

**A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU**  
**(Accredited at "A" Grade by NAAC, Bangalore)**

**PRACTICAL SYLLABUS**

<b>Paper title: Chromatography &amp; Volumetric analysis</b>	<b>Paper code : CHE-601GE-P</b>
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**Marks:50** 30hrs (2 h /W) Credits-2

1. Identification of amino acids by paper chromatography.
2. Determination of Zn using EDTA
3. Determination of Mg using EDTA
4. Hardness of water.

**SCHEME OF VALUATION**

1. INTERNAL MARKS- Record-10M
2. EXTERNAL MARKS-40
  - Titrimetric analysis -30
  - Viva-10

TOTAL = 50 M

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYURU.

(Accredited at "A" Grade by NAAC, Bangalore)

SEMESTER – VI	SUBJECT: CHEMISTRY	PAPER CODE:CHE-602CE
PAPER TITLE : ORGANIC SPECTROSCOPIC TECHNIQUES, Cluster Elective Paper – VIII		

60hrs (4h / w) Credits-3

**UNIT-I**

**NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY (10+10+5+5)**

**15h**

Nuclear spin, Principles of NMR-Classical and Quantum Mechanical methods, Larmour Frequency. Instrumentation. Saturation, Relaxation spin-spin & spin lattice relaxation. Chemical shifts, Shielding and Deshielding mechanism-Factors influencing Chemical shift.

**UNIT – II (10+5)**

**8h**

Spin-Spin interactions-factors affecting spin-spin interactions, Deuterium exchange ( $H^+$ ), coupling constant- types of coupling constant-vicinal, Geminal and long range coupling constant- Factors influencing coupling constants.  
Types of PMR Spectrums –AX, AX2 and AB type with one example.

**UNIT-III (10+10+5+5)**

**14h**

**Electron Spin Resonance Spectroscopy**

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

Applications:- Detection of free radicals; ESR spectra of (a)  $H^{\cdot}$  radical (b)Deuterium radical (c) Methyl radical( $CH_3$ ) (d) Benzene anion ( $C_6H_6^-$ ) (e)  $[Cu(H_2O)_6]^{+2}$

#### **UNIT-IV**

#### **UV & VISIBLE SPECTROSCOPY (10+10+5+5)**

**15h**

Electronic spectra of diatomic molecules. The Born-oppenheimer approximation. Vibrational coarse structure: Intensity of Vibrational-electronic spectra: The Franck-Condon principle. Electronic structure of diatomic molecules. Types of transitions, Chromophores, Auxochrome, types of shifts in UV Visible spectrum, Conjugated dienes, trienes and polyenes, unsaturated carbonyl compounds-Woodward – Fieser rules.

#### **UNIT-V (10+5)**

**8h**

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

#### **REFERENCE BOOKS:**

1. Electron Spin Resonance Elementary Theory and Practical Applications- John E. Wertz and James R. Bolton, Chapman and Hall, 1986.
2. Spectroscopic Identification of organic compounds – Silverstein, Basseler and Morrill.
3. Organic Spectroscopy- William Kemp.
4. Fundamentals of Molecular Spectroscopy- C.N.Banwell and E.A. Mc cash 4<sup>th</sup>Edition, Tata Mc GrawHillPublishing Co., Ltd. 1994.
5. Physical Methods in Inorganic Chemistry – R.S.Drago, Saunders Publications.
6. Application of Mössbauer Spectroscopy – Green Mood.
7. NMR, NQR, EPR and Mössbauer Spectroscopy in inorganic chemistry – R.VParish, Ellis, Harwood.
8. Instrumental Methods of Chemical Analysis- H.Kaur, Pragathi Prakashan, 2003.
9. Instrumental Methods of Analysis, 7<sup>th</sup> Edition – Willard, Merrit, Dean, Settle, CBS Publications, 1986.
10. Molecular Structure and Spectroscopy – G. Aruldas, Prentice Hall of IndiaPvt.Ltd, New Delhi, 2001.

SEMESTER – VI	PAPER-VIII	PAPER CODE : CHE-602CE
PAPER TITLE : ORGANIC SPECTROSCOPIC TECHNIQUES		

Time: 3Hours

Maximum marks: 75

Pass marks: 30

**SECTION-A**

Answer any FIVE of the following. Each question carries 5 marks. 5X5=25

1. Write about Nuclear spin?
2. What is Larmour frequency?
3. Write any two types of coupling constant?
4. Write about Kramer degeneracy?
5. What is isotropic and anisotropic constants?
6. Explain Woodward-Fieser rules?
7. Write a short note on Auxochrome?
8. Define and derive Beer-Lambert's law.

**SECTION-B**

Answer any FIVE questions. Each question carries 10 marks. 5X10=50

9. Explain the instrumentation of the NMR?
10. Explain Spin-Spin relaxation and spin lattice relaxation.
11. Write the types of PMR spectrums of AX,AX<sub>2</sub> & AB?
12. Explain the instrumentation of the ESR.
13. Explain the ESR splitting of a) Deuterium radical b)[Cu(H<sub>2</sub>O)<sub>6</sub>]<sup>+2</sup> ion
14. Explain the electronic spectra of di atomic molecule.
15. Write note on Vibrational coarse structure.
16. Explain the simultaneous determination of Chromium and Manganese in a mixture.

**The Guidelines to be followed by the question paper setters in chemistry for the VI-Semester - end exams**

**PAPER TITLE: ORGANIC SPECTROSCOPIC TECHNIQUES, PAPER CODE: CHE-602CE**

**Paper – VIII            Maximum marks : 75            Duration : 3 Hours**

**Weightage for the question paper**

<b>syllabus</b>	<b>Section-A (Short answer questions)</b>	<b>Section-B (essay questions)</b>
<b>Unit-1 ( Marks)</b>	<b>1+1</b>	<b>1+1</b>
<b>Unit-2 ( Marks)</b>	<b>1</b>	<b>1</b>
<b>Unit-3 ( Marks)</b>	<b>1+1</b>	<b>1+1</b>
<b>Unit-4 ( Marks)</b>	<b>1+1</b>	<b>1+1</b>
<b>Unit-5 (Marks)</b>	<b>1</b>	<b>1</b>

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS),VUYYURU.

(Accredited at "A" Grade by NAAC, Bangalore)

(An Autonomous college in the jurisdiction of Krishna University)

<b>SEMESTER – VI</b>	<b>SUBJECT: CHEMISTRY</b>	<b>PAPER CODE:CHE-603CE</b>
<b>PAPER TITLE : ADVANCED ORGANIC REACTIONS,</b>		<b>Cluster Elective Paper – IX</b>

**UNIT – I**

60hrs (4h / w) Credits-3

**ORGANIC PHOTOCHEMISTRY (10+10+5) 10hrs**

Organic photochemistry : Molecular orbitals, carbonyl chromophore–triplet states, Jablonski diagram, inter–system crossing. Energy transfer.

**Photochemical reactions:** Photo reduction, - mechanism, example-aromatic compounds. sensitizer and influence of sensitizer.

**UNIT – II**

**ORGANIC PHOTOCHEMISTRY (10+10+5) 12hrs**

Norrish cleavages, type -I: Mechanism, acyclic cyclicdiones, Photo Fries rearrangement. Norrish type II cleavage: Mechanism and stereochemistry, Type- II reactions of esters: 1: 2 diketones, photo decarboxylation., Di -  $\pi$  methane Rearrangement, Photochemistry – of conjugated dienes, Decomposition of nitrites – Barton reaction.

**UNIT – III**

**PROTECTING GROUPS AND ORGANIC REACTIONS (10+10+5+5) 15hrs**

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



#### **UNIT – IV**

#### **SYNTHETIC REACTIONS: (10+5+5)**

**8hrs**

Mannich reaction – Mannich bases – Robinson annulations. The Shapiro reaction, Stork–enamine reaction. Use of dithioacetals – Umpolung, phase transfer catalysis – mechanisms and use of benzyl trialkyl ammonium halides. Wittig reaction.

#### **UNIT –V : NEW SYNTHETIC REACTIONS(10+5+5) 15hrs**

**Define with example and mechanism-** Suzuki coupling, Click reaction, Baylis–Hillman reaction, RCM olefin metathesis, Mukayama aldol reaction.

**Define with one example:** (Mechanism not required)

Mitsunobu reaction, McMurry reaction, Julia–Lythgoe olefination, Stille coupling and Heck reaction,

#### **Recommended Books**

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

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.

SEMESTER – VI

PAPER-IX

PAPER CODE : CHE-603CE

PAPER TITLE : ADVANCED ORGANIC REACTIONS

Time: 3Hours

Maximum marks: 75

Pass marks: 30

**SECTION-A**

Answer any FIVE of the following. Each question carries 5 marks. 5X5=25

1. Write about Chromophore triplet state?
2. Write about Barton reaction?
3. Explain how to protect the Carbonyl group?
4. Explain how to protect the Diols?
5. Explain about Umpolung?
6. Explain PTC with mechanism?
7. Explain Suziki coupling?
8. Define with one example for Mc Murrey reaction and Stille coupling?

**SECTION-B**

Answer any FIVE questions. Each question carries 10 marks. 5X10=50

9. Explain about Jablonski diagram in organic photo chemistry?
10. Explain mechanism of photo reduction with examples?
11. Explain Norrish type –I cleavage with mechanism?
12. Explain Norrish type –II cleavage with mechanism?
13. Explain how to protect Alcohols?
14. Explain how to protect Carboxylic acids?
15. What is Mannich reaction? Explain with mechanism and Mannich bases?
16. Write the mechanism of Baylis-Hillman reaction and RCM Olefination?

**The Guidelines to be followed by the question paper setters in chemistry for the VI- Semester - end exams**

**PAPER TITLE: ADVANCED ORGANIC REACTIONS, PAPER CODE: CHE-603CE**

**Paper – IX      Semester – VI      Maximum marks : 75      Duration : 3 Hours**

**Weightage for the question paper**

<b>syllabus</b>	<b>Section-A (Short answer questions)</b>	<b>Section-B (essay questions)</b>
<b>Unit-1 ( Marks)</b>	<b>1</b>	<b>1+1</b>
<b>Unit-2 ( Marks)</b>	<b>1</b>	<b>1+1</b>
<b>Unit-3 ( Marks)</b>	<b>1+1</b>	<b>1+1</b>
<b>Unit-4 ( Marks)</b>	<b>1+1</b>	<b>1</b>
<b>Unit-5 ( Marks)</b>	<b>1+1</b>	<b>1</b>

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

**A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.**  
(Accredited at "A" Grade by NAAC, Bangalore)

<b>SEMESTER – VI</b>	<b>SUBJECT: CHEMISTRY</b>	<b>PAPER CODE:CHE-604CE</b>
<b>PAPER TITLE :PHARMACEUTICAL AND MEDICINAL CHEMISTRY Cluster Elective Paper –X</b>		

60hrs (4h / w) Credits-3

**UNIT-I (10+5+5) 12h**

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

**UNIT-II (10+10+5) 10h**

**Drugs:**

Nomenclature: Chemical name, Generic name and trade names with 10-examples  
Classification based on structures and therapeutic activity with one example each.

**UNIT-III**

**Synthesis and therapeutic activity of the compounds: 18h**

a. Chemotherapeutic Drugs (10+10+5)

1.Sulphadruugs(Sulphamethoxazole) 2.Antibiotics -  $\beta$ -Lactam Antibiotics-Isolation of Pencilline by submerged culture method, 3. Anti malarial Drugs (chloroquine)

b. Psycho therapeutic Drugs: (10+5)

1.Anti pyretics(Paracetamol) 2.Hypnotics, 3.Tranquilizers(Diazepam) 4.Levodopa

**UNIT-IV**

**Pharmacodynamic Drugs: (10+5+5) 8h**

1. Antiasthma Drugs (Solbutamol) 2. Antianginals (Glycerol Trinitrate)  
3. Diuretics (Frusemide)

**UNIT-V**

**HIV-AIDS: (10+5) 12h**

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

**List of Reference Books:**

1. Medicinal Chemistry by Dr. B.V.Ramana
2. Synthetic Drugs by O.D.Tyagi & M.Yadav
3. Medicinal Chemistry by Ashutoshkar
4. Medicinal Chemistry by P.Parimoo
5. Pharmacology & Pharmacotherapeutics R.S Satoshkar & S.D.Bhandenkar
6. Medicinal Chemistry by Kadametal P-I & P.II
7. European Pharmacopoeia

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.

SEMESTER – VI	PAPER-X	PAPER CODE : CHE-604CE
PAPER TITLE : PHARMACEUTICAL AND MEDICINAL CHEMISTRY		

Time: 3Hours

Maximum marks: 75

Pass marks: 30

**SECTION-A**

Answer any FIVE of the following. Each question carries 5 marks. 5X5=25

1. What are Metabolites and anti metabolites? Explain with example.
2. Write a note on Pharmacology and Pharmacophore.
3. Explain the classification of drugs on the basis of structure.
4. Describe the synthesis and therapeutic activities of Sulphamethoxazole.
5. Write the synthesis,therapeutic activity and side effects of paracetamol.
6. Write a note on Antianginals.
7. Write a note on Frusemide.
8. Explain about immunity.

**SECTION-B**

Answer any FIVE questions. Each question carries 10 marks. 5X10=50

9. What are Pharma cokinetics ? Describe Absorption,Distribution,Metabolism and Excretion(ADME)of drug.
10. Explain the classification of drugs based on therapeutic activity with examples.
11. Describe the nomenclature systems of drugs.
12. What are antibiotics ? Give examples. Explain the isolation method of pencillin by submerged culture method.
13. .Write the synthesis,therapeutic activity and side effects of Chloroquine.
14. Discuss the synthesis and therapeutic activity of Levodopa.
15. Explain in detail about antiasthma drugs.

16. What is AIDS? How it causes? Write the drugs available for the treatment of AIDS with their structure?

**The Guidelines to be followed by the question paper setters in chemistry for the VI- Semester - end exams**

**PAPER TITLE: PHARMACEUTICAL AND MEDICINAL CHEMISTRY, PAPER CODE: CHE-604CE**

**Paper – VIII-C-3      Semester – VI      Maximum marks : 75      Duration : 3 Hours**

**Weightage for the question paper**

<b>syllabus</b>	<b>Section-A (Short answer questions)</b>	<b>Section-B (essay questions)</b>
<b>Unit-1 ( Marks)</b>	<b>1+1</b>	<b>1</b>
<b>Unit-2 ( Marks)</b>	<b>1</b>	<b>1+1</b>
<b>Unit-3 ( Marks)</b>	<b>1+1</b>	<b>1+1+1</b>
<b>Unit-4 ( Marks)</b>	<b>1+1</b>	<b>1</b>
<b>Unit-5 ( Marks)</b>	<b>1</b>	<b>1</b>

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

**A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.**  
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**Practical syllabus**

<b>Paper title: Preparations of Organic compounds</b>
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<b>Paper code : CHE-602CE-P</b>
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**30 hrs (2 h / W)**

1. Preparation of Aspirin
2. Preparation of Paracetamol
3. Preparation of Acetanilide
4. Preparation of Barbituric Acid
5. Preparation of Phenyl Azo  $\beta$ -naphthol

**SCHEME OF VALUATION**

1. INTERNAL MARKS- Record-10M
2. EXTERNAL MARKS-40
  - Titrimetric analysis -30
  - Viva-10

TOTAL = 50 M



**A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.  
(Accredited at "A" Grade by NAAC, Bangalore)**

**Practical syllabus**

<b>Paper title: Preparations of Organic compounds by Green procedure</b>	<b>Paper code : CHE-603CE-P</b>
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**30 hrs (2h / W)**

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

**SCHEME OF VALUATION**

1. INTERNAL MARKS- Record-10M
2. EXTERNAL MARKS-40
  - Practical -30
  - Viva-10

TOTAL = 50 M

**A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.  
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**Department of Chemistry**

<b>Paper title: Project work</b>	<b>Paper code : CHE-604CE-P</b>
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The students have chosen chemistry as cluster elective. Three projects have been selected and distributed the same among the students.

S.no	Name of the Project	No. of students allotted
1.	Instrumentation	
2.	Laboratory Reagents	
3.	Effects of Drugs	

**SCHEME OF VALUATION**

1. EXTERNAL- 25M- given by the Examiner (Viva)

2. INTERNAL = 25 M

- Written viva-10 M
- Submission of the project book-15M

TOTAL = 50 M

**A.G& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS &  
SCIENCE**

**VUYYURU-521165, KRISHNA Dt., A.P.(Autonomous)**

**Accredited by NAAC with "A" Grade**

**2019-2020**



**DEPARTMENT OF CHEMISTRY**

**MINUTES OF BOARD OF STUDIES**

**ODD SEMESTER**

**16-04-2019**

Minutes of the meeting of Board of studies in Chemistry for the Autonomous course of A.G. & S.G.Siddhartha Degree College of Arts & Science, Vuyyuru held at 10.30 A.M on 16-04-2019 in the Department of Chemistry.

*Smt A.INDIRA Presiding*

Members Present:

- 1)  ..... Chairman  
(Smt.A.Indira) HOD, Dept. of Chemistry,  
A.G. & S.G.S.Degree College,Vuyyuru.
- 2)  ..... University Nominee  
(Prof.D.Ramasekhar Reddy) Assistant Professor,  
Dept. of Chemistry,Krishna University, MTM.
- 3)  ..... Academic Council Nominee  
(Dr.K.A.Emanuel) Associate Professor in Chemistry,  
Sir C.R.Reddy College,Eluru.
- 4)  ..... Academic Council Nominee  
(Dr.D.Bala karuna Kumar) Associate Professor in Chemistry,  
A.L.C College,Vijayawada.
- 5)  ..... Industrialist  
(Dr.Nadella Taraka Ramarao) Manager, Q.C, Divis Laboratories Ltd,  
Vizag.
- 6)  ..... Student Nominee  
(Dr.V.Phani Kumar) Lecturer in Chemistry,  
SRR&CVR Govt. Degree College, BZA.
- 7)  ..... Member  
(Sri.K.Ramesh) Lecturer in Chemistry,  
A.G. & S.G.S.Degree College,Vuyyuru
- 8)  ..... Member  
(Smt.B.Navaneeta) Lecturer in Chemistry,  
A.G. & S.G.S.Degree College,Vuyyuru.
- 9)  ..... Member  
(Smt.M.V.Santhi) Lecturer in Chemistry,  
A.G.& S.G.S.Degree College, Vuyyuru.
- 10)  ..... Member  
(Sri.G.Ramesh) Lecturer in Chemistry,  
A.G. & S.G.S.Degree College,Vuyyuru.
- 11)  ..... Member  
(Sri.J.Nageswara Rao) Rtd.Lecturer in Chemistry,  
A.G.& S.G.S.Degree College,Vuyyuru.

## Agenda for B.O.S Meeting

1. To recommend the syllabus and model paper for I semester of I Degree B.Sc., Chemistry for the Academic year 2019-2020.
2. To recommend the syllabus and model papers for III semester of II Degree B.Sc., Chemistry for the Academic year 2019-2020.
3. To recommend the syllabus and model papers for V semester of III Degree B.Sc. Chemistry for the Academic year 2019-2020.
4. To recommend the Blue print of I,III,V semesters of B.Sc. Chemistry for the Academic year 2019-2020.
5. To recommend the Guidelines to be followed by the question paper setters in Chemistry for I, III, V Semester – end exams.
6. To recommend the teaching and evaluation methods to be followed under Autonomous status.
7. Any suggestions regarding certificate course, seminars, workshops, Guest lecture to be organized.
8. Recommend the panel of paper setters and Examiners to the controller of Examinations of autonomous Courses of A.G. & S.G.S.Degree colleges of Arts & Science, Vuyyuru.
9. Any other matter.

  
A. A. S. Chairman.

## RESOLUTIONS

- 1) It is resolved to continue the same **syllabus and model paper for I semesters of I B.Sc.** under Choice Based Credit System (CBCS) for the Academic year 2019-20.
- 2) It is resolved to implement the same **syllabus and model papers** under Choice Based Credit System (CBCS) for the Academic year 2019-20 for **III semester of II B.Sc.**
- 3) It is resolved to implement the same **syllabus and model papers** under Choice Based Credit System (CBCS) for the Academic year 2019-20 for **V semester of III B.Sc.**
- 4) It is resolved to follow the **Blue prints** of I, III semesters of Degree B.Sc. for the Academic year 2019-20. It is resolved to continue the same **Blue prints** of V semesters of Degree B.Sc. for the Academic year 2019-20.
- 5) It is resolved to follow the **guidelines** to be followed by the question paper setters of Chemistry for I,III semesters of Degree B.Sc. for the Academic Year 2019-20. It is resolved to continue the same **guidelines** to be followed by the question paper setters of Chemistry for V semester of Degree B.Sc. for the Academic Year 2019-20.
- 6) It is resolved to continue the following teaching and evaluation methods for Academic year 2019-20.

### Teaching Methods:

Besides the conventional methods of teaching, we use modern technology i.e. using of LCD projector to display on U boards etc, for better understanding of concepts.

### Evaluation of a student is done by the following procedure:

#### ● Internal Assessment Examinations:

- Out of maximum 100 marks in each paper for I, II B.Sc, 30 marks shall be allocated for internal assessment.
- Out of these 30 marks, **20 marks are allocated for announced tests (i.e.IA-1 & IA-2)**. Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, **5 marks** are allocated on the basis of candidate's **percentage of attendance and remaining 5 marks are allocated for the innovative component like assignment/quiz/seminars for IB.Sc.**
- There is **no pass minimum** for internal assessment for I, II B.Sc.
- Out of maximum 100 marks in each paper for III B.Sc, 25 marks shall be allocated for internal assessment.
- Out of these 25 marks, **15 marks are allocated for announced tests (i.e.IA-1 & IA-2)**. Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, **5 marks** are allocated on the basis of candidate's **percentage of attendance and remaining 5 marks are allocated for the assignment for III B.Sc.**
- Semester – End Examination:
- The maximum mark for I, II B.Sc Semester – End examination shall be 70 marks and duration of the examination shall be 3 hours. Even though the candidate is absent for two IA exams /obtain Zero marks the external marks are considered (if the candidate gets 40/70) and the result shall be declared as "PASS".
- The maximum marks for III B.Sc Semester – End examination shall be 75 marks and duration of the examination shall be 3 hours.
- Semester – End examinations shall be conducted in theory papers at the end of every semester, while in practical papers, these examinations are conducted at the end of I,III, & V semesters **for I, II & III B.Sc.**

- 7) Discussed and recommended for organizing **certificate course, seminars, Guest lecturers, workshops** to upgrade the knowledge of students, for the approval of the academic council.
- 8) Discussed and empowered the Head of the department of Chemistry to suggest the panel of paper setters and examiners to the controller of examinations.
- 9) NIL.

  
.....Chairman

SEMESTER-I	PAPER CODE : CHE-101C
PAPER TITLE : INORGANIC ,ORGANIC &PHYSICAL CHEMISTRY, PAPER – I	

TOTAL PERIODS - 60 (4hrs/week) Credits – 3

### INORGANIC CHEMISTRY

#### UNIT –I

**P-block elements –I** Marks weightage (10 + 10 + 5) **15h**

- **Group-13:** Synthesis and structure of diborane .
- Structures of higher boranes( $B_4H_{10}$  and  $B_5H_9$ )
- boron-nitrogen compounds ( $B_3N_3H_6$  and BN) Structure and Synthesis.
- **Group - 14:** Silicones Defination, Classification,Preparation(Straightchain,Cyclic,& Cross linked),Types Of Silicones and Applications of Silicones(uses).
- **Group - 15:** Preparation, reactions and Structure of hydrazine.  
Preparation, reactions and Structure of hydroxylamine.

#### UNIT-II

**P-block elements –II** Marks weightage (10 + 5 )

**8h**

- **Group - 16:** Classifications of oxides based on (i) Chemical behaviour and (ii) Oxygen content.
- **Group-17:** Inter halogen compounds( $AX, AX_3, AX_5$  &  $AX_7$  Types)
- Pseudo halogens. ( Preparation & Properties)

**2. Organometallic Chemistry** Marks weightage (10 + 5) **7h**

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

### ORGANIC CHEMISTRY

#### UNIT-III

**Structural theory in Organic Chemistry** Marks weightage (10 + 10 + 5) **10h**

- Types of bond fission & Organic reagents-Examples (electrophiles, nucleophiles & free radicals including neutral molecules).Types of Carbenes and Nitrenes.
- Electron displacement effects in covalent bonds-Inductive effect-applications-Basicity of amines, acidity of carboxylic acids and stability of carbonium ions.
- Mesomeric / Resonance effect- applications- acidity of Phenol & carboxylic acids.  
Hyper conjugation-applications.
- Types of Organic reactions-Addition, Substitution & Elimination reactions.



## UNIT-IV

### 1. Acyclic Hydrocarbons

Marks weightage(5 + 5)

6h

- **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) Weightage ( 10 )

4h

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 Weightage ( 10+5)

### 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
- Friedel Craft's 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)

### 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 an

<b>SEMESTER - I</b>	<b>PAPER CODE : CHE-101C</b>
<b>PAPER TITLE : INORGANIC AND ORGANIC CHEMISTRY, PAPER-I</b>	

Time: 3Hours

Maximum marks: 70

Pass marks: 28

**SECTION-A**

Answer any **FOUR** of the following. Each question carries 5 marks. 4X5=20

1. Write any two preparations and two properties of Hydrazine ?

2. Write a short note on Ferrocene ?

3. How are oxides classified on the basis of Chemical behaviour?

4. What is Mesomeric effect? Explain acidity of carboxylic acids ?

5. Write any two preparation methods of Alkenes?

6. Explain about Diel's-Alder reaction with one example?

7. Explain about reaction and mechanism of Nitration of benzene?

**SECTION-B**

Answer **any FIVE** questions. Each question carries 10 marks. 5X10=50

8. Explain about preparations, structure and properties of Borazole ?

9. What are silicones ? How they are classified? Write any two methods of preparation of silicones?

10. What are Inter Halogen Compounds? Write the structures of AX<sub>3</sub>, AX<sub>5</sub>?

11. What is Grignard reagent ? write any five synthetic applications?

12. Write about Hyper conjugation and Resonance effect with each one example?

13. Explain the following a. Carbenes b. Nitrenes

14. Write the conformational structures of Cyclobutane, Cyclopentane?

15. Define orientation effect? What are ortho ,meta,para directing groups?

**The Guidelines to be followed by the question paper setters in chemistry for the  
I-Semester - end exams**      **ACADEMIC YEAR-2019-20**

<b>SEMESTER-I</b>	<b>PAPER CODE : CHE-101C</b>
<b>PAPER TITLE : INORGANIC &amp; ORGANIC CHEMISTRY, PAPER – I</b>	

**Weightage for the question paper**

syllabus	Section-A (Short answer questions)	Section-B (essay questions)
<b>Unit-1 (25 Marks)</b>	<b>1</b>	<b>1 + 1</b>
<b>Unit-2 (30 Marks)</b>	<b>1+1</b>	<b>1 + 1</b>
<b>Unit-3 (25 Marks)</b>	<b>1</b>	<b>1 + 1</b>
<b>Unit-4 (20Marks)</b>	<b>1 + 1</b>	<b>1</b>
<b>Unit-5 (15Marks)</b>	<b>1</b>	<b>1</b>

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

Simple Salt Analysis

PAPER CODE : CHE-101P

### Salt mixture Analysis

30 hrs (2h / w)

Credits: 2

Analysis of salt mixture containing two anions and two cations from the following.

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

**Cations:** Lead, copper, iron, aluminum, zinc, manganese, nickel, calcium, Strontium, barium, potassium and ammonium.

1. Analysis of simple salt-I
2. Analysis of simple salt-II
3. Analysis of simple salt-III
4. Analysis of simple salt-IV
5. Analysis of simple salt-V
6. Analysis of simple salt-VI

### SCHEME OF VALUATION

#### INTERNAL MARKS

- Record =10 M

#### EXTERNAL MARKS (40)

- Viva questions = 10 M

#### PRACTICAL EXAMINATION (30M)

- Identification of anion ..... 6M
- Confirmation test for anion ..... 6 M
- Group separation table with correct group ..... 10 M
- Confirmation test for cation ..... 5M
- Report ..... 3 M

TOTAL: 30 M

SEMESTER – III	SUBJECT: CHEMISTRY	PAPER CODE: CHE-301C
PAPER TITLE : INORGANIC, ORGANIC PHYSICAL CHEMISTRY, PAPER - III		

## INORGANIC CHEMISTRY

60 hrs (4 h / w) Credits - 3

### UNIT – I

#### Theories of bonding in metals:

- Metallic properties and its limitations, Valence bond theory, Free electron theory, Explanation of thermal and electrical conductivity of metals, limitations,
- Band theory, formation of bands, explanation of conductors, semiconductors and insulators.

### UNIT – II

#### 1. Metal carbonyls

- Effective atomic number(EAN), Calculation of EAN of metal atom. classification of metal carbonyls, structures and shapes of metal carbonyls of V, Cr, Mn, Fe, Co and Ni.

#### 2. Organometallic Chemistry

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

## ORGANIC CHEMISTRY

### UNIT-III

#### Carbonyl compounds

- Nomenclature of aliphatic and aromatic carbonyl compounds, structure of the carbonyl group. Synthesis of aldehydes from acid chlorides, synthesis of aldehydes and ketones using 1,3-dithianes, synthesis of ketones from nitriles and from carboxylic acids.
- **Physical properties:** Reactivity of carbonyl group in aldehydes and ketones.
- **Nucleophilic addition reaction** with a) NaHSO<sub>3</sub>, b) HCN, c) RMgX, d) NH<sub>2</sub>OH, e) PhNHNH<sub>2</sub>, f) 2,4-DNPH, g) Alcohols-formation of hemiacetal and acetal.
- **Base catalysed reactions:** a) Aldol, b) Cannizzaro reaction, c) Perkin reaction, d) Benzoin condensation, e) Haloform reaction, f) Knoevenagel reaction.
- Oxidation of aldehydes- Baeyer-Villiger oxidation of ketones.
- **Reduction:** Clemmensen reduction, Wolf-Kishner reduction, MPV reduction, reduction with LiAlH<sub>4</sub> and NaBH<sub>4</sub>.
- **Analysis of aldehydes and ketones** with a) 2,4-DNT test, b) Tollen's test, c) Fehling test, d) Schiff's test, e) Haloform test (with equation)

## UNIT-IV

### 1. Carboxylic acids and derivatives

- Nomenclature, classification and structure of carboxylic acids. Methods of preparation by a) Hydrolysis of nitriles, amides b) Hydrolysis of esters by acids and bases with mechanism c) 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 the acidities of aromatic and aliphatic acids.
- **Chemical properties:** Reactions involving H, OH and COOH groups- salt formation, anhydride formation, acid chloride formation, amide formation and esterification(mechanism). Degradation of carboxylic acids by Huns-Diecker reaction, decarboxylation by Schimdt reaction, Arndt-Eistert synthesis, halogenation by Hell-Volhard- Zelinsky reaction.

### 2. Active methylene compounds

- **Acetoacetic esters:** keto-enol tautomerism, preparation by Claisen condensation, Acidhydrolysis and ketonic hydrolysis.
- Preparation of a) monocarboxylic acids(Acetic acid, Propaonic acid). b) Dicarboxylic acids(Succinic acid, Adipic acid).C)Reaction with urea
- **Malonic ester:** preparation from acetic acid.  
**Synthetic applications:** Preparation of a) monocarboxylic acids (propionic acid and n-butyric acid). b) Dicarboxylic acids (succinic acid and adipic acid) c)  $\alpha,\beta$ -unsaturated carboxylic acids (crotonic acid).Reaction with urea.

## PHYSICAL CHEMISTRY

### UNIT-V

#### Dilute solutions

- Colligative properties. Raoult's law, relative lowering of vapour pressure, its relation to molecular weight of non-volatile solute. Experimental method-Ostwald method.
- Elevation of boiling point , Derivation of relation between molecular weight and elevation in boiling point, Experimental method –Cottrell's method
- Depression in freezing point. Derivation of relation between molecular weight and depression in freezing point, Experimental method – Beckmann's method.
- Osmosis,osmotic pressure, Determination of molecular weight of non-volatile solute from osmotic pressure. Experimental method-Berkeley-Hartley method. Abnormal Colligative properties- Van't Hoff factor.

### **List of Text Books**

1. Selected topics in inorganic chemistry by W.D.Malik, G..D.Tuli,R.D.Madan
2. Inorganic Chemistry J E Huheey, E A Keiter and R L Keiter
3. A Text Book of Organic Chemistry by Bahl and Arun bahl
4. A Text Book of Organic chemistry by I L Finar Vol I
5. Telugu Academy Textbook of Chemistry Vol- II (English medium)
6. Unified chemistry Vol- II by O.P.Agarwal
7. Unified chemistry Vol- II by K.Ramarao and Y. R. Sharma (KalyaniPublishers)

### **List of Reference Books**

1. Organic chemistry by Bruice
2. Organic chemistry by Clayden
3. Advanced Inorganic chemistry by Gurudeep Raj
4. Basic Inorganic Chemistry by Cotton and Wilkinson
5. Concise Inorganic Chemistry by J.D.Lee
6. Pradeep's chemistry vol- I & II

SEMESTER – III	PAPER CODE : CHE-301C
PAPER TITLE : INORGANIC AND ORGANIC CHEMISTRY, PAPER-III	

Time: 3Hours

Maximum marks: 75

Pass marks: 30

**SECTION-A**

Answer any FIVE of the following. Each question carries 5 marks. 5X5=25

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

**SECTION-B**

Answer any FIVE questions. Each question carries 10 marks. 5X10=50

- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
- 15.
- 16.



**The Guidelines to be followed by the question paper setters in chemistry for the  
III- Semester - end exams**

<b>SEMESTER – III</b>	<b>PAPER CODE : CHE-301C</b>
<b>PAPER TITLE : INORGANIC AND ORGANIC CHEMISTRY, PAPER-III</b>	

**Weightage for the question paper**

<b>syllabus</b>	<b>Section-A (Short answer questions)</b>	<b>Section-B (essay questions)</b>
<b>Unit-1 (25 Marks)</b>	<b>1</b>	<b>1 + 1</b>
<b>Unit-2 (20 Marks)</b>	<b>1 + 1</b>	<b>1</b>
<b>Unit-3 (30 Marks)</b>	<b>1 + 1</b>	<b>1+1</b>
<b>Unit-4 (15 Marks)</b>	<b>1</b>	<b>1</b>
<b>Unit-5 (30 Marks)</b>	<b>1 +1</b>	<b>1 + 1</b>

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

Organic qualitative analysis-I	PAPER CODE : CHE-301 P
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PRACTICAL SYLLABUS

30 hrs. (2h / w), Credits-2

**Organic Qualitative Analysis: 50M**

Analysis of an organic compound through systematic qualitative procedure for functional group identification including the determination of melting point and boiling point .

Alcohols, Phenols, Aldehydes, Ketones, ,Carboxylic acids,

SCHEME OF VALUATION

1. INTERNAL MARKS- Record-10M

2. EXTERNAL MARKS-40

- Analysis of an organic compound and preparation of suitable derivative-30M
- Viva questions = 10 M

TOTAL = 50 M

<b>SEMESTER – V</b>	<b>SUBJECT: CHEMISTRY</b>	<b>COURSE CODE: CHE-501C</b>
<b>PAPER TITLE : INORGANIC,ORGANIC &amp; PHYSICAL CHEMISTRY, Paper –V</b>		

60 hrs(4h/w)

Credits-3

### INORGANIC CHEMISTRY

#### UNIT – I

##### **Coordination Chemistry: (10+10+5)**

12h

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 - factors affecting crystal-field splitting energy, merits and demerits of crystal-field theory. Isomerism in coordination compounds - structural isomerism and stereo isomerism, stereochemistry of complexes with 4 and 6 coordination numbers

#### UNIT-II

##### **1. Spectral and magnetic properties of metal complexes: (10+5)**

5h

Types of magnetic behavior, spin-only formula, calculation of magnetic moments, experimental determination of magnetic susceptibility-Gouy method.

##### **2. Stability of metal complexes: (10+5)**

6h

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

### ORGANIC CHEMISTRY

#### UNIT- III

##### **Nitro hydrocarbons: (10+5)**

5h

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

#### UNIT – IV

##### **Nitrogen compounds: (10+10+5)**

16h

Amines (Aliphatic and Aromatic): Nomenclature, Classification into 1°, 2°, 3° Amines and Quarternary ammonium compounds. Preparative methods –  
1. Ammonolysis of alkyl halides 2. Gabriel synthesis 3. Hoffman's bromamide reaction (mechanism).  
Reduction of Amides and Schmidt reaction. Physical properties and basic character - Comparative basic strength of Ammonia, methyl amine, dimethyl amine, trimethyl amine and aniline - comparative basic strength of aniline, N-methylaniline and N,N-dimethyl aniline (in aqueous and non-aqueous medium), steric effects and substituent effects.

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

## PHYSICAL CHEMISTRY

### UNIT- V

#### **Thermodynamics (10+5+5+5)**

16h

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

#### **List of Reference Books**

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

SEMESTER – V	PAPER-V	PAPER CODE : CHE-501C
PAPER TITLE : INORGANIC,ORGANIC & PHYSICAL CHEMISTRY		

Time: 3Hours

Maximum marks: 75

Pass marks: 30

**SECTION-A**

Answer any FIVE of the following. Each question carries 5 marks. 5X5=25

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

**SECTION-B**

Answer any FIVE questions. Each question carries 10 marks. 5X10=50

- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
- 15.
- 16.

**The Guidelines to be followed by the question paper setters in chemistry for the  
V- Semester - end exams**

<b>SEMESTER – V</b>	<b>SUBJECT: CHEMISTRY</b>	<b>COURSE CODE: CHE-501C</b>
<b>PAPER TITLE : INORGANIC,ORGANIC &amp; PHYSICAL CHEMISTRY, Paper –V</b>		

**Weightage for the question paper**

syllabus	Section-A (Short answer questions)	Section-B (essay questions)
<b>Unit-1 (25 Marks)</b>	<b>1</b>	<b>1 + 1</b>
<b>Unit-2 (30 Marks)</b>	<b>1 + 1</b>	<b>1+1</b>
<b>Unit-3 (15 Marks)</b>	<b>1</b>	<b>1</b>
<b>Unit-4 (25 Marks)</b>	<b>1</b>	<b>1 + 1</b>
<b>Unit-5 (25 Marks)</b>	<b>1 +1+1</b>	<b>1</b>

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

PRACTICAL SYLLABUS

<b>Practical Paper – V Organic Qualitative Analysis</b>	<b>PAPER CODE : CHE-501 P</b>
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**30 hrs (2 h/W) Credits: 2**

**Organic Qualitative Analysis: 50M**

Analysis of an organic compound through systematic qualitative procedure for functional group identification including the determination of melting point and boiling point .

Alcohols, Phenols, Aldehydes, Ketones, Carbohydrates,  
Carboxylic acids, Aromatic Primary Amines.

**SCHEME OF VALUATION**

**1. INTERNAL MARKS- Record-10M**

**2. EXTERNAL MARKS-40**

- Analysis of an organic compound and preparation of suitable derivative-30M
- Viva questions = 10 M

**TOTAL = 50 M**

SEMESTER – V	Paper – VI	SUBJECT: CHEMISTRY	PAPER CODE: CHE-502C
PAPER TITLE : INORGANIC,ORGANIC & PHYSICAL CHEMISTRY			

60 hrs (4h/w) Credits-3

### INORGANIC CHEMISTRY

#### UNIT-I

##### 1. Reactivity of metal complexes: (10+5)

5h

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

##### 2. Bioinorganic chemistry: (10)

5h

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

### ORGANIC CHEMISTRY

#### UNIT- II

##### Heterocyclic Compounds (10+5)

8h

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

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

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

#### UNIT-III

##### Carbohydrates (10+5+5+5)

12h

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

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

**Interconversion of Monosaccharides:** Aldopentose to Aldohexose (Arabinose to D- Glucose, D-Mannose) (Kiliani - Fischer method). Epimers, Epimerisation - Lobry de bruyn van Ekenstein rearrangement. Aldohexose to Aldopentose (D-Glucose to D- Arabinose) by Ruff degradation. Aldohexose to Ketohexose [(+) Glucose to (-) Fructose] and Ketohexose to Aldohexose (Fructose to Glucose)

#### UNIT- IV



## **Amino acids and proteins (10+10+5)**

12h

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

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

## **PHYSICAL CHEMISTRY**

### **UNIT-V**

#### **1. Chemical kinetics (10+5)**

9h

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

#### **2. Photochemistry (10+5)**

9h

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

#### **List of Reference Books**

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

SEMESTER – V	PAPER-VI	PAPER CODE : CHE-502C
PAPER TITLE : INORGANIC,ORGANIC & PHYSICAL CHEMISTRY		

Time: 3Hours

Maximum marks: 75

Pass marks: 30

**SECTION-A**

Answer any FIVE of the following. Each question carries 5 marks. 5X5=25

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

**SECTION-B**

Answer any FIVE questions. Each question carries 10 marks. 5X10=50

- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
- 15.
- 16.

**The Guidelines to be followed by the question paper setters in chemistry for the  
V- Semester - end exams**

<b>SEMESTER – V</b>	<b>SUBJECT: CHEMISTRY</b>	<b>PAPER CODE: CHE-502C</b>
<b>PAPER TITLE : INORGANIC,ORGANIC &amp; PHYSICAL CHEMISTRY, Paper – VI</b>		

**Weightage for the question paper**

<b>syllabus</b>	<b>Section-A (Short answer questions)</b>	<b>Section-B (essay questions)</b>
<b>Unit-1 (25 Marks)</b>	<b>1</b>	<b>1 + 1</b>
<b>Unit-2 (15 Marks)</b>	<b>1</b>	<b>1</b>
<b>Unit-3 (25 Marks)</b>	<b>1 + 1+1</b>	<b>1</b>
<b>Unit-4 (25 Marks)</b>	<b>1</b>	<b>1 + 1</b>
<b>Unit-5 (30 Marks)</b>	<b>1 +1</b>	<b>1 + 1</b>

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

**PRACTICAL SYLLABUS**

<b>Practical Paper –VI Physical Chemistry</b>	<b>COURSE CODE : CHE-502 P</b>
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**30 hrs (2 h/W)      Credits: 2**

1. Determination of rate constant for acid catalyzed ester hydrolysis.
2. Determination of molecular status and partition coefficient of benzoic acid in Benzene and water.
3. Determination of Surface tension of liquid
4. Determination of Viscosity of liquid.
5. Adsorption of oxalic acid on silica gel , verification of Freundlich isotherm.

**SCHEME OF VALUATION**

**1. INTERNAL MARKS- Record-10M**

**2. EXTERNAL MARKS-40**

- Practical-30
- Viva-10

**TOTAL = 50 M**

**A.G& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS &  
SCIENCE**

**VUYYURU-521165, KRISHNA Dt., A.P.(Autonomous)**

**Accredited by NAAC with "A" Grade**

**2019-2020**



**DEPARTMENT OF CHEMISTRY**

**MINUTES OF BOARD OF STUDIES**

**EVEN SEMESTER**

**1-10-2019**

Minutes of the meeting of Board of studies in Chemistry for the Autonomous course of A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru held at 10.30 A.M on 01-10-2019 in the Department of Chemistry.

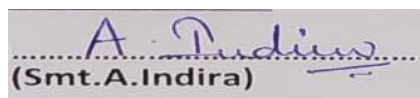
*Smt A.INDIRA Presiding*

Members Present:

- 1) *A. Indira* Chairman HOD, Dept. of Chemistry,  
(Smt.A.Indira) A.G. & S.G.S.Degree College,Vuyyuru.
- 2) *DR Ramasekhar Reddy* University Nominee Assistant Professor,  
(Prof.D.Ramasekhar Reddy) Dept. of Chemistry,Krishna University, MTM.
- 3) *Dr. K.A. Emanuel* Academic Council Nominee Associate Professor in Chemistry,  
(Dr.K.A.Emanuel) Sir C.R.Reddy College,Eluru.
- 4) *Dr. D. Bala karuna kumar* Academic Council Nominee Associate Professor in Chemistry,  
(Dr.D.Bala karuna kumar) A.L.C College,Vijayawada.
- 5) *Dr. Nadella Taraka Ramarao* Industrialist Manager, Q.C, Divis Laboratories Ltd,  
(Dr.Nadella Taraka Ramarao) Vizag.
- 6) *Dr. V. Phani Kumar* Student Nominee Lecturer in Chemistry,  
(Dr.V.Phani Kumar) SRR&CVR Govt. Degree College, BZA.
- 7) *K. Ramesh* Member Lecturer in Chemistry,  
(Sri.K.Ramesh) A.G. & S.G.S.Degree College,Vuyyuru
- 8) *M. Venkata Santhi* Member Lecturer in Chemistry,  
(Smt.M.V.Santhi) A.G. & S.G.S.Degree College,Vuyyuru.
- 9) *G. Ramesh* Member Lecturer in Chemistry,  
(Sri.G.Ramesh) A.G.& S.G.S.Degree College, Vuyyuru.
- 10) *P. Suresh* Member Lecturer in Chemistry,  
(Sri.P.Suresh) A.G. & S.G.S.Degree College,Vuyyuru.
- 11) *M. Santhi* Member Lecturer in Chemistry,  
(Ms.M.Santhi) A.G. & S.G.S.Degree College,Vuyyuru.
- 12) *J. Nageswara Rao* Member Rtd.Lecturer in Chemistry,  
(Sri.J.Nageswara Rao) A.G. & S.G.S.Degree College,Vuyyuru.

## Agenda for B.O.S Meeting

1. To recommend the syllabus and model paper for II semesters of I Degree B.Sc., Chemistry for the Academic year 2019-2020.
2. To recommend the syllabus and model papers for IV semesters of II Degree B.Sc., Chemistry for the Academic year 2019-2020.
3. To recommend the syllabus and model papers for VI semesters of III Degree B.Sc. Chemistry for the Academic year 2019-20.
4. To recommend the Blue print of II, IV, & VI semesters of B.Sc. Chemistry for the Academic year 2019-20.
5. To recommend the Guidelines to be followed by the question paper setters in Chemistry for Semester – end exams.
6. To recommend the teaching and evaluation methods to be followed under Autonomous status.
7. Any suggestions regarding certificate course, seminars, workshops, Guest lecture to be organized.
8. Recommend the panel of paper setters and Examiners to the controller of Examinations of autonomous Courses of A.G. & S.G.S.Degree colleges of Arts & Science, Vuyyuru.
9. Any other matter.



A. Indira  
(Smt. A. Indira)

Chairman.

## RESOLUTIONS

- 1) It is resolved to continue the same **syllabus and modified model paper for II semesters of I B.Sc.** under Choice Based Credit System (CBCS) for the Academic year 2019-20also.
- 2) It is resolved to implement the changed syllabus **and model papers** under Choice Based Credit System (CBCS) for the Academic year 2019-20 for **IV semesters of II B.Sc.**
  - **IN UNIT-4 Photo chemistry topic will be added & in unit-5 Phase rule will be added**
- 3) It is resolved to implement the same **syllabus and model papers** under Choice Based Credit System (CBCS) of 2018-19 for the Academic year 2019-20for **VI semesters (General elective-A and cluster Elective-C) of III B.Sc.**
- 4) It is resolved to follow the **Blue prints** of II, semesters of Degree B.Sc. for the Academic year 2019-20. It is resolved to continue the same **Blue prints** of IV, and VI semesters of Degree B.Sc. for the Academic year 2018-19.
- 5) It is resolved to follow the same guidelines to be followed by the question paper setters for Chemistry II, semesters of Degree B.Sc. for the Academic Year 2018-19. III, IV, V and VI semesters of Degree B.Sc. for the Academic Year 2019-20.
- 6) It is resolved to continue the following teaching and evaluation methods for Academic year 2019-20.

### Teaching Methods:

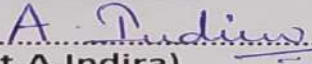
Besides the conventional methods of teaching, we use modern technology i.e. using of LCD projector to display on U boards etc, for better understanding of concepts.

### Evaluation of a student is done by the following procedure:

- **Internal Assessment Examinations:**
- Out of maximum 100 marks in each paper for IB.Sc , 30 marks shall be allocated for internal assessment .
- Out of these 30 marks, **20 marks are allocated for announced tests (i.e.IA-1 & IA-2)**. Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, **5 marks** are allocated on the basis of candidate's **percentage of attendance and remaining 5 marks are allocated for the innovative component like assignment/quiz/seminars for IB.Sc.**
- There is **no passing minimum** for internal assessment for I.B.Sc.
- Out of maximum 100 marks in each paper for II&III, 25 marks shall be allocated for internal assessment.
- Out of these 25 marks, **15 marks are allocated for announced tests (i.e.IA-1 & IA-2)**. Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, **5 marks** are allocated on the basis of candidate's **percentage of attendance and remaining 5 marks are allocated for the assignment for II, &III B.Sc.**
- **Semester – End Examination:**
- The maximum mark for IB.Sc Semester – End examination shall be 70 marks and duration of the examination shall be 3 hours. Even though the candidate is absent for two IA exams /obtain Zero marks the external marks are considered (if the candidate gets 40/70) and the result shall be declared as "PASS".
- The maximum marks for II & III B.Sc Semester – End examination shall be 75 marks and duration of the examination shall be 3 hours.



- Semester – End examinations shall be conducted in theory papers at the end of every semester, while in practical papers, these examinations are conducted at the end of I, II, III, IV, V, VI semesters **for I, II & III B.Sc.**
- 7) Discussed and recommended for organizing **certificate course, seminars, Guest lecturers, workshops** to upgrade the knowledge of students, for the approval of the academic council.
- 8) Discussed and empowered the Head of the department of Chemistry to suggest the panel of paper setters and examiners to the controller of examinations. **Department of Chemistry Adopted Value Added Course “Air Pollution”.**
- 9) NIL.

  
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(Smt.A.Indira)

Chairman

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYYURU.  
(Accredited at "A" Grade by NAAC, Bangalore)\_ACADEMIC YEAR-2019-20

SEMESTER - II	PAPER CODE :CHE-201C
PAPER TITLE : INORGANIC, ORGANIC & PHYSICAL CHEMISTRY, PAPER- II	

60 hrs (4 h / w) Credits - 3

## INORGANIC CHEMISTRY

### UNIT – I

#### 1. d-block elements

Characteristics of d-block elements with special reference to electronic configuration, variable valence, Colour, magnetic properties, catalytic properties and ability to form complexes. Stability of various oxidation states.

### UNIT-II

#### 1. f-block elements:

Chemistry of lanthanides - electronic structure, oxidation states, lanthanide contraction, Consequences of lanthanide contraction, magnetic properties. Chemistry of actinides - electronic configuration, oxidation states, actinide contraction, comparison of lanthanides and actinides.

#### 2. Chemical Bonding

Molecular orbital theory - LCAO method, construction of M.O. diagrams for homo nuclear and hetero-nuclear diatomic molecules (N<sub>2</sub>, O<sub>2</sub>, CO and NO).

## ORGANIC CHEMISTRY

### UNIT-III

#### Benzene and its reactivity

- Concept of resonance, resonance energy. Heat of hydrogenation, heat of combustion of Benzene, mention of C-C bond lengths and orbital picture of Benzene.
- Aromaticity - Huckel's rule - application to Benzenoid(Benzene & Naphthalene) Non - Benzenoid compounds (cyclopropenyl cation, cyclopentadienyl anion and tropylium cation)
- Reactions - General mechanism of electrophilic substitution, mechanism of nitration, Friede-Craft's alkylation and acylation.
- Orientation - Definition, ortho, para and meta directing groups, examples.
- 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)

## UNIT-IV

### 1. Halogen compounds

- Nomenclature and classification of alkyl (into primary, secondary, tertiary), aryl, arylalkyl, allyl, vinyl, benzyl halides.
- Nucleophilic aliphatic substitution reaction- classification into  $SN^1$  and  $SN^2$  – reaction mechanism with examples – Ethyl chloride, t-butyl chloride and optically active alkylhalide 2-bromobutane.

### 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.
- **Chemical properties:**  
Dehydration of alcohols. Oxidation of alcohols by  $CrO_3$ ,  $KMnO_4$ .
- Special reaction of Phenols: Bromination, Kolbe-Schmidt reaction, Riemer-Tiemann reaction, Fries rearrangement, azocoupling, Pinacol- Pinacolone rearrangement.

## PHYSICAL CHEMISTRY

## UNIT-V

### Solutions

- Types of solutions, Solutions of liquids in liquids, Raoult's law, Ideal & Non -ideal solutions, Difference b/n ideal and Non-ideal solutions.
- Liquid mixtures-Completely miscible liquid mixtures-examples-Azeotropes (a.HCl-H<sub>2</sub>O,b.Ethanol-water) Fractional distillation.
- Partially miscible liquids mixtures-Phenol –water, Triethyl amine-water & Nicotine-water system. Effect of impurity on consolute temperature.
- Immiscible liquid mixtures-steam distillation-Nernst distribution law & its applications. Henrys law-applications.

### List of Text & Reference Books

1. Inorganic Chemistry J E Huheey, E A Keiter and R L Keiter
3. A Text Book of Organic Chemistry by Bahl and Arun bahl
4. A Text Book of Organic chemistry by I L Finar Vol
5. Advanced Organic Chemistry by F A Carey and R J Sundberg
6. Advanced Physical chemistry by Bahl and Tuli
7. Advanced Inorganic Chemistry Vol-I by Satyaprakash, Tuli, Basu and Madan

SEMESTER – II	COURSE CODE : CHE-201C
PAPER TITLE : PHYSICAL AND GENERAL CHEMISTRY, PAPER – II	

Time: 3Hours

Maximum marks: 70

Pass marks: 28

**SECTION-A**

Answer any **FOUR** of the following. Each question carries 5 marks. 4X5=20

1. Define and explain space lattice and unit cell.?
2. Define law of symmetry? Explain about centre of symmetry?
3. Define critical constants?
4. Define Henry's law and their limitations?
5. Define and explain Bond order?
6. Explain about symmetry elements?
7. Explain about Specific rotation?

**SECTION-B**

Answer **any FIVE** questions. Each question carries 10 marks. 5X10=50

8. Derive Bragg's equation?
9. Derive Vanderwaal's equation of real gases.?
10. Write the differences between Solids and Liquids?
11. Define Nernst distribution law and their limitations. Explain two applications of distribution law/
12. Explain about Fractional distillation and steam distillation
13. Explain Langmuir adsorption isotherms.
14. Explain the shape of  $\text{Ni}(\text{CO})_4$  based on valence bond theory
15. Explain about optical isomerism of Tartaric acid?

**The Guidelines to be followed by the question paper setters in chemistry for the  
II-Semester - end exams ACADEMIC YEAR-2019-20**

<b>SEMESTER – II</b>	<b>PAPER CODE : CHE-201C</b>
<b>PAPER TITLE : PHYSICAL AND GENERAL CHEMISTRY, PAPER - II</b>	

**Weightage for the question paper**

syllabus	Section-A (Short answer questions)	Section-B (essay questions)
Unit-1 (20 Marks)	1 + 1	1
Unit-2 (25 Marks)	1	1 + 1
Unit-3 (25Marks)	1	1 + 1
Unit-4 (25 Marks)	1	1 + 1
Unit-5 (20 Marks)	1+1	1

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

**A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.  
(Accredited at "A" Grade by NAAC, Bangalore)**

**PRACTICAL SYLLABUS ACADEMIC YEAR-2019-20**

<b>Analysis of Salt mixture</b>	<b>PAPER CODE : CHE-201P</b>
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**30 hrs (2 h / w) Credits: 2**

**Qualitative inorganic analysis:**

**Analysis of mixture salt containing two anions and two cations (From two different groups) from the following:**

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

**Cations: Lead, copper, iron, aluminum, zinc, manganese, calcium, strontium, barium, Potassium and ammonium.**

- 1. Analysis of salt mixture-I**
- 2. Analysis of salt mixture -II**
- 3. Analysis of salt mixture-III**
- 4. Analysis of salt mixture -IV**
- 5. Analysis of salt mixture -V**
- 6. Analysis of salt mixture-VI**

**A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYURU**  
**(Accredited at "A" Grade by NAAC, Bangalore) ACADEMIC YEAR-2019-20**

Analysis of Salt mixture	PAPER CODE : CHE-201P
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**SCHEME OF VALUATION**

**INTERNAL MARKS**

- Record =10 M

**EXTERNAL MARKS (40 marks)**

- Viva.....10M
- PRACTICAL EXAMINATION -30M
  - Identification of anion ..... 6 M
  - Confirmation test for anion ..... 6M
  - Group separation table with correct group ..... 10 M
  - Confirmation test for cation ..... 6 M
  - Report ..... 2 M

**TOTAL=50 M**

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYURU.  
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SEMESTER – IV	SUBJECT: CHEMISTRY	PAPER CODE: CHE-401C
PAPER TITLE: INORGANIC,ORGANIC SPECTROSCOPY & PHYSICAL CHEMISTRY, PAPER-IV		

60 hrs (4h/w)

Credits-3

## INORGANIC CHEMISTRY

### UNIT- I

#### Coordination Chemistry-I:

- 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.

## ORGANIC SPECTROSCOPY

### UNIT-II

#### 1. Spectrophotometry

- General features of absorption - 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 of 1. Chromium in  $K_2Cr_2O_7$   
2. Manganese in Manganous sulphate

#### 2. Electronic spectroscopy:

- Interaction of electromagnetic radiation with molecules and types of molecular spectra. Energy levels of molecular orbitals ( $\sigma$ ,  $\pi$ ,  $n$ ). Selection rules for electronic spectra.
- Types of electronic transitions in molecules effect of conjugation.  
Concept of chromophore and auxochrome

### UNIT-III

#### 1. Infra red spectroscopy

- Different Regions in Infrared radiations. Modes of vibrations in diatomic and polyatomic molecules. Characteristic absorption bands of various functional groups. Interpretation of spectra-Alkanes, Aromatic, Alcohols carbonyls, and amines with one example to each.



## 2. Proton magnetic resonance spectroscopy (1H-NMR)

- 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.

## PHYSICAL CHEMISTRY

### UNIT-V

#### Electrochemistry

- Specific conductance, equivalent conductance. Variation of equivalent conductance with dilution. Application of conductivity measurements- conductometric titrations.
- Arrhenius theory of electrolyte dissociation and its limitations.
- Ostwald's dilution law. Debye-Huckel-Onsagar's equation for strong electrolytes (elementary treatment only).
- Definition of transport number, determination by Hittorfs method.
  
- Single electrode potential, Nernst equation, Reversible and irreversible cells, Types of electrode- Standard Hydrogen electrode, calomel electrode, Indicator electrode, metal – metal ion electrode, Inert electrode.
- Applications of EMF measurements -Potentiometric titrations.

#### Text of Text Books

1. Advanced physical chemistry by Guru deep Raj
2. Introduction to Electrochemistry by S. Glasstone
3. Elementary organic spectroscopy by Y.R. Sharma
4. Spectroscopy by P.S.Kelsi
5. Unified chemistry Vol- II by O.P.Agarwal
6. Unified chemistry Vol- II by K.Ramarao and Y. R. Sharma (Kalyani Publishers)

#### List of Reference Books

1. Spectroscopy by William Kemp
2. Spectroscopy by Pavia
3. Organic Spectroscopy by J. R. Dyer
4. Modern Electrochemistry by J.O. M. Bockris and A.K.N.Reddy

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.

SEMESTER – IV	PAPER CODE : CHE-401C
PAPER TITLE : SPECTROSCOPY AND PHYSICAL CHEMISTRY, PAPER-IV	

Time: 3Hours

Maximum marks: 75

Pass marks: 30

**SECTION-A**

Answer any **FIVE** of the following. Each question carries 5 marks. **5X5=25**

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

**SECTION-B**

Answer **any FIVE** questions. Each question carries 10 marks. **5X10=50**

- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
- 15.
- 16

**The Guidelines to be followed by the question paper setters in chemistry for the  
IV-Semester - end exams**

<b>SEMESTER – IV</b>	<b>SUBJECT: CHEMISTRY</b>	<b>PAPER CODE: CHE-401C</b>
<b>PAPER TITLE : SPECTROSCOPY &amp; PHYSICAL CHEMISTRY, PAPER-IV</b>		

**Weightage for the question paper**

<b>syllabus</b>	<b>Section-A (Short answer questions)</b>	<b>Section-B (essay questions)</b>
<b>Unit-1 (40 Marks)</b>	<b>1 + 1</b>	<b>1 + 1</b>
<b>Unit-2 (15 Marks)</b>	<b>1</b>	<b>1 + 1</b>
<b>Unit-3 (15 Marks)</b>	<b>1</b>	<b>1</b>
<b>Unit-4 (20 Marks)</b>	<b>1 + 1</b>	<b>1</b>
<b>Unit-5 (30 Marks)</b>	<b>1 + 1</b>	<b>1 + 1</b>

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

**A.G. &S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU**  
(Accredited at "A" Grade by NAAC, Bangalore)

<b>Instrumentation</b>	<b>PAPER CODE : CHE - 401 P</b>
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**PRACTICAL SYLLABUS**

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

**I. Conductometric Titrations**

1. Determination of concentration of HCl conductometrically using standard NaOH solution.
2. Determination of concentration of acetic acid conductometrically using standard NaOH Solution.

**II. Potentiometric titrations**

3. Determination of Concentration of Ferrous ion potentiometrically using standard  $\text{KMnO}_4$  solution.
4. Determination of concentration of ferrous ion potentiometrically using standard  $\text{K}_2\text{Cr}_2\text{O}_7$  Solution.

**III. Colorimetric titrations**

5. Verification of Beer-Lamberts Law for  $\text{KMnO}_4$  solution and determine the concentration of given test solution.
6. Verification of Beer-Lamberts Law for  $\text{K}_2\text{Cr}_2\text{O}_7$  solution and determine the concentration of given test solution.

**IR Spectral Analysis**

IR Spectral Analysis of the following functional groups with examples

- a) Hydroxyl groups
- b) Carbonyl groups
- c) Amino groups
- d) Aromatic groups

**SCHEME OF VALUATION**

1. Internal marks
  - Record = 10
2. External marks- 40
  - Practical-25
  - Viva = 10
  - IR Spectral analysis = 5 (Project work)

Total marks =50

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.

(Accredited at "A" Grade by NAAC, Bangalore)

SEMESTER – VI	SUBJECT: CHEMISTRY	PAPER CODE:CHE-601GE
PAPER TITLE : ANALYTICAL METHODS IN CHEMISTRY, Paper – VII		

60hrs (4h / w) Credits-3

#### UNIT-I

##### **Quantitative analysis: (10+10+5+5)**

**15h**

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

#### UNIT-II

##### **Treatment of analytical data: (10+5)**

**8h**

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

#### UNIT-III

##### **Separation Techniques in Chemical analysis(10+10+5)**

**15h**

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

**ION EXCHANGE:** Introduction, action of ion exchange resins, separation of inorganic mixtures, applications,

#### UNIT – IV

12h

##### **Chromatography(10+5+5)**

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

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

#### UNIT -V (10+10+5+5)

10h

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

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

**GC:**Principle and applications

**HPLC :** Basic principles and applications.

#### **List of Reference Books**

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

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.

SEMESTER – VI	PAPER CODE : CHE-601GE
PAPER TITLE : ANALYTICAL METHODS IN CHEMISTRY, PAPER-VII	

Time: 3Hours

Maximum marks: 75

Pass marks: 30

**SECTION-A**

Answer any FIVE of the following. Each question carries 5 marks. 5X5=25

1. What are co-precipitation and post-precipitation?
2. Write a short note on coagulation and peptization ?
3. What are significant figures? Explain their importance?
4. Write the applications of solvent extraction
- 5.
- 6.
- 7.
- 8.

**SECTION-B**

Answer any FIVE questions. Each question carries 10 marks. 5X10=50

- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
- 15.
- 16.

The Guidelines to be followed by the question paper setters in chemistry for the

### VI- Semester - end exams

<b>SEMESTER – VI</b>	<b>PAPER CODE : CHE-601GE</b>
<b>PAPER TITLE : ANALYTICAL METHODS IN CHEMISTRY, PAPER-VII</b>	

#### Weightage for the question paper

<b>syllabus</b>	<b>Section-A (Short answer questions)</b>	<b>Section-B (essay questions)</b>
<b>Unit-1 (30 Marks)</b>	<b>1+1</b>	<b>1 + 1</b>
<b>Unit-2 (15 Marks)</b>	<b>1</b>	<b>1</b>
<b>Unit-3 (25 Marks)</b>	<b>1</b>	<b>1+1</b>
<b>Unit-4 (20 Marks)</b>	<b>1+1</b>	<b>1</b>
<b>Unit-5 (30 Marks)</b>	<b>1 +1</b>	<b>1 + 1</b>

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.



**A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU**  
**(Accredited at "A" Grade by NAAC, Bangalore)**

**PRACTICAL SYLLABUS**

<b>Paper title:</b> Chromatography & Volumetric analysis	<b>Paper code :</b> CHE-601GE-P
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**Marks:50** 30hrs (2 h /W) Credits-2

1. Identification of amino acids by paper chromatography.
2. Determination of Zn using EDTA
3. Determination of Mg using EDTA
4. Hardness of water.

**SCHEME OF VALUATION**

1. INTERNAL MARKS- Record-10M
2. EXTERNAL MARKS-40
  - Titrimetric analysis -30
  - Viva-10

**TOTAL = 50 M**

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(Accredited at "A" Grade by NAAC, Bangalore)

SEMESTER – VI	SUBJECT: CHEMISTRY	PAPER CODE:CHE-602CE
PAPER TITLE : ORGANIC SPECTROSCOPIC TECHNIQUES, Cluster Elective Paper – VIII		

60hrs (4h / w) Credits-3

### UNIT-I

#### NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY (10+10+5+5)

15h

Nuclear spin, Principles of NMR-Classical and Quantum Mechanical methods, Larmour Frequency. Instrumentation. Saturation, Relaxation spin-spin & spin lattice relaxation. Chemical shifts, Shielding and Deshielding mechanism-Factors influencing Chemical shift.

### UNIT – II (10+5)

8h

Spin-Spin interactions-factors affecting spin-spin interactions, Deuterium exchange ( $H^+$ ), coupling constant- types of coupling constant-vicinal, Geminal and long range coupling constant-Factors influencing coupling constants.  
Types of PMR Spectrums –AX, AX2 and AB type with one example.

### UNIT-III (10+10+5+5)

14h

#### Electron Spin Resonance Spectroscopy

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

Applications:- Detection of free radicals; ESR spectra of (a)  $H^{\bullet}$  radical (b)Deuterium radical (c) Methyl radical( $CH_3$ ) (d) Benzene anion ( $C_6H_6^-$ ) (e)  $[Cu(H_2O)_6]^{+2}$

#### **UNIT-IV**

#### **UV & VISIBLE SPECTROSCOPY (10+10+5+5)**

**15h**

Electronic spectra of diatomic molecules. The Born-oppenheimer approximation.

Vibrational coarse structure: Intensity of Vibrational-electronic spectra: The Franck-Condon principle.

Electronic structure of diatomic molecules. Types of transitions, Chromophores, Auxochrome,

types of shifts in UV Visible spectrum, Conjugated dienes, trienes and polyenes,

unsaturated carbonyl compounds-Woodward – Fieser rules.

#### **UNIT-V (10+5)**

**8h**

**Electronic spectra of polyatomic molecules** Chemical analysis by Electronic Spectroscopy – Beer-Lambert's Law. Deviation from Beer's law.

Quantitative determination of metal ions ( $Mn^{+2}$ ,  $Fe^{+2}$ ).

Simultaneous determination of Chromium and Manganese in a mixture.

#### **REFERENCE BOOKS:**

1. Electron Spin Resonance Elementary Theory and Practical Applications- John E. Wertz and James R. Bolton, Chapman and Hall, 1986.
2. Spectroscopic Identification of organic compounds – Silverstein, Basseler and Morrill.
3. Organic Spectroscopy- William Kemp.
4. Fundamentals of Molecular Spectroscopy- C.N.Banwell and E.A. Mc cash 4<sup>th</sup> Edition, Tata Mc GrawHillPublishing Co., Ltd. 1994.
5. Physical Methods in Inorganic Chemistry – R.S.Drago, Saunders Publications.
6. Application of Mössbauer Spectroscopy – Green Mood.
7. NMR, NQR, EPR and Mössbauer Spectroscopy in inorganic chemistry – R.VParish, Ellis, Harwood.
8. Instrumental Methods of Chemical Analysis- H.Kaur, Pragathi Prakashan, 2003.
9. Instrumental Methods of Analysis, 7<sup>th</sup> Edition – Willard, Merrit, Dean, Settle,CBS Publications, 1986.
10. Molecular Structure and Spectroscopy – G. Aruldas, Prentice Hall of IndiaPvt.Ltd, New Delhi, 2001.

SEMESTER – VI

PAPER-VIII

PAPER CODE : CHE-602CE

PAPER TITLE : ORGANIC SPECTROSCOPIC TECHNIQUES

Time: 3Hours

Maximum marks: 75

Pass marks: 30

**SECTION-A**

Answer any FIVE of the following. Each question carries 5 marks. 5X5=25

1. Write about Nuclear spin?
2. What is Larmour frequency?
3. Write any two types of coupling constant?
4. Write about Kramer degeneracy?
5. What is isotropic and anisotropic constants?
6. Explain Woodward-Fieser rules?
7. Write a short note on Auxochrome?
8. Define and derive Beer-Lambert's law.

**SECTION-B**

Answer any FIVE questions. Each question carries 10 marks. 5X10=50

9. Explain the instrumentation of the NMR?
10. Explain Spin-Spin relaxation and spin lattice relaxation.
11. Write the types of PMR spectrums of AX,AX<sub>2</sub> & AB?
12. Explain the instrumentation of the ESR.
13. Explain the ESR splitting of a) Deuterium radical b)[Cu(H<sub>2</sub>O)<sub>6</sub>]<sup>+2</sup> ion
14. Explain the electronic spectra of di atomic molecule.
15. Write note on Vibrational coarse structure.
16. Explain the simultaneous determination of Chromium and Manganese in a mixture.

**The Guidelines to be followed by the question paper setters in chemistry for the VI-Semester - end exams**

**PAPER TITLE: ORGANIC SPECTROSCOPIC TECHNIQUES, PAPER CODE: CHE-602CE**

**Paper – VIII            Maximum marks : 75            Duration : 3 Hours**

**Weightage for the question paper**

<b>syllabus</b>	<b>Section-A (Short answer questions)</b>	<b>Section-B (essay questions)</b>
<b>Unit-1 ( Marks)</b>	<b>1+1</b>	<b>1+1</b>
<b>Unit-2 ( Marks)</b>	<b>1</b>	<b>1</b>
<b>Unit-3 ( Marks)</b>	<b>1+1</b>	<b>1+1</b>
<b>Unit-4 ( Marks)</b>	<b>1+1</b>	<b>1+1</b>
<b>Unit-5 (Marks)</b>	<b>1</b>	<b>1</b>

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS),VUYYURU.

(Accredited at "A" Grade by NAAC, Bangalore)

(An Autonomous college in the jurisdiction of Krishna University)

SEMESTER – VI	SUBJECT: CHEMISTRY	PAPER CODE:CHE-603CE
PAPER TITLE : ADVANCED ORGANIC REACTIONS, Cluster Elective Paper – IX		

**UNIT – I**

60hrs (4h / w) Credits-3

**ORGANIC PHOTOCHEMISTRY (10+10+5) 10hrs**

Organic photochemistry : Molecular orbitals, carbonyl chromophore–triplet states, Jablonski diagram, inter–system crossing. Energy transfer.

**Photochemical reactions:** Photo reduction, - mechanism, example-aromatic compounds. sensitizer and influence of sensitizer.

**UNIT – II**

**ORGANIC PHOTOCHEMISTRY (10+10+5) 12hrs**

Norrish cleavages, type -I: Mechanism, acyclic cyclicdiones, Photo Fries rearrangement. Norrish type II cleavage: Mechanism and stereochemistry, Type- II reactions of esters: 1: 2 diketones, photo decarboxylation., Di -  $\pi$  methane Rearrangement, Photochemistry – of conjugated dienes, Decomposition of nitrites – Barton reaction.

**UNIT – III**

**PROTECTING GROUPS AND ORGANIC REACTIONS (10+10+5+5) 15hrs**

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

#### **UNIT – IV**

##### **SYNTHETIC REACTIONS: (10+5+5)**

**8hrs**

Mannich reaction – Mannich bases – Robinson annulations. The Shapiro reaction, Stork–enamine reaction. Use of dithioacetals – Umpolung, phase transfer catalysis – mechanisms and use of benzyl trialkyl ammonium halides. Wittig reaction.

#### **UNIT – V : NEW SYNTHETIC REACTIONS(10+5+5) 15hrs**

**Define with example and mechanism-** Suzuki coupling, Click reaction, Baylis–Hillman reaction, RCM olefin metathesis, Mukayama aldol reaction.

**Define with one example:** (Mechanism not required)

Mitsunobu reaction, McMurry reaction, Julia–Lythgoe olefination, Stille coupling and Heck reaction,

#### **Recommended Books**

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

SEMESTER – VI	PAPER-IX	PAPER CODE : CHE-603CE
PAPER TITLE : ADVANCED ORGANIC REACTIONS		

Time: 3Hours

Maximum marks: 75

Pass marks: 30

**SECTION-A**

Answer any FIVE of the following. Each question carries 5 marks. 5X5=25

1. Write about Chromophore triplet state?
2. Write about Barton reaction?
3. Explain how to protect the Carbonyl group?
4. Explain how to protect the Diols?
5. Explain about Umpolung?
6. Explain PTC with mechanism?
7. Explain Suzuki coupling?
8. Define with one example for Mc Murrey reaction and Stille coupling?

**SECTION-B**

Answer any FIVE questions. Each question carries 10 marks. 5X10=50

9. Explain about Jablonski diagram in organic photo chemistry?
10. Explain mechanism of photo reduction with examples?
11. Explain Norrish type –I cleavage with mechanism?
12. Explain Norrish type –II cleavage with mechanism?
13. Explain how to protect Alcohols?
14. Explain how to protect Carboxylic acids?
15. What is Mannich reaction? Explain with mechanism and Mannich bases?
16. Write the mechanism of Baylis-Hillman reaction and RCM Olefination?



**The Guidelines to be followed by the question paper setters in chemistry for the VI- Semester - end exams**

**PAPER TITLE: ADVANCED ORGANIC REACTIONS, PAPER CODE: CHE-603CE**

**Paper – IX      Semester – VI      Maximum marks : 75      Duration : 3 Hours**

**Weightage for the question paper**

<b>syllabus</b>	<b>Section-A (Short answer questions)</b>	<b>Section-B (essay questions)</b>
<b>Unit-1 ( Marks)</b>	<b>1</b>	<b>1+1</b>
<b>Unit-2 ( Marks)</b>	<b>1</b>	<b>1+1</b>
<b>Unit-3 ( Marks)</b>	<b>1+1</b>	<b>1+1</b>
<b>Unit-4 ( Marks)</b>	<b>1+1</b>	<b>1</b>
<b>Unit-5 ( Marks)</b>	<b>1+1</b>	<b>1</b>

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

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<b>SEMESTER – VI</b>	<b>SUBJECT: CHEMISTRY</b>	<b>PAPER CODE:CHE-604CE</b>
<b>PAPER TITLE :PHARMACEUTICAL AND MEDICINAL CHEMISTRY Cluster Elective Paper –X</b>		

**60hrs (4h / w) Credits-3**

**UNIT-I (10+5+5) 12h**  
Pharmaceutical chemistry Terminology: Pharmacy, Pharmacology, Pharmacophore, Pharmacodynamics, Pharmacokinetics (ADME, Receptors - brief treatment) Metabolites and Anti metabolites.

**UNIT-II (10+10+5) 10h**  
**Drugs:**  
Nomenclature: Chemical name, Generic name and trade names with 10-examples  
Classification based on structures and therapeutic activity with one example each.

**UNIT-III 18h**  
**Synthesis and therapeutic activity of the compounds:**

a. Chemotherapeutic Drugs (10+10+5)  
1.Sulphadruugs(Sulphamethoxazole) 2.Antibiotics -  $\beta$ -Lactam Antibiotics-Isolation of Pencilline by submerged culture method, 3. Anti malarial Drugs (chloroquine)

b. Psycho therapeutic Drugs: (10+5)  
1.Anti pyretics(Paracetamol) 2.Hypnotics, 3.Tranquilizers(Diazepam) 4.Levodopa

**UNIT-IV 8h**  
**Pharmacodynamic Drugs: (10+5+5)**  
1. Antiasthma Drugs (Solbutamol) 2. Antianginals (Glycerol Trinitrate)  
3. Diuretics (Frusemide)

**UNIT-V 12h**  
**HIV-AIDS: (10+5)**  
Immunity - CD-4cells, CD-8cells, Retro virus, Replication in human body, Investigation available, prevention of AIDS, Drugs available - examples with structures: PIS: Indivanir (crixivan), Nelfinavir(Viracept).

**List of Reference Books:**

1. Medicinal Chemistry by Dr. B.V.Ramana
2. Synthetic Drugs by O.D.Tyagi & M.Yadav
3. Medicinal Chemistry by Ashutoshkar
4. Medicinal Chemistry by P.Parimoo
5. Pharmacology & Pharmacotherapeutics R.S Satoshkar & S.D.Bhandenkar
6. Medicinal Chemistry by Kadametal P-I & P.II
7. European Pharmacopoeia

SEMESTER – VI	PAPER-X	PAPER CODE : CHE-604CE
PAPER TITLE : PHARMACEUTICAL AND MEDICINAL CHEMISTRY		

Time: 3Hours

Maximum marks: 75

Pass marks: 30

**SECTION-A**

Answer any FIVE of the following. Each question carries 5 marks. 5X5=25

1. What are Metabolites and anti metabolites? Explain with example.
2. Write a note on Pharmacology and Pharmacophore.
3. Explain the classification of drugs on the basis of structure.
4. Describe the synthesis and therapeutic activities of Sulphamethoxazole.
5. Write the synthesis,therapeutic activity and side effects of paracetamol.
6. Write a note on Antianginals.
7. Write a note on Frusemide.
8. Explain about immunity.

**SECTION-B**

Answer any FIVE questions. Each question carries 10 marks. 5X10=50

9. What are Pharma cokinetics ? Describe Absorption,Distribution,Metabolism and Excretion(ADME)of drug.
10. Explain the classification of drugs based on therapeutic activity with examples.
11. Describe the nomenclature systems of drugs.
12. What are antibiotics ? Give examples. Explain the isolation method of pencillin by submerged culture method.
13. .Write the synthesis,therapeutic activity and side effects of Chloroquine.
14. Discuss the synthesis and therapeutic activity of Levodopa.
15. Explain in detail about antiasthma drugs.
16. What is AIDS?How it causes ? Write the drugs available for the treatment of AIDS with their structure?

**The Guidelines to be followed by the question paper setters in chemistry for the VI- Semester - end exams**

**PAPER TITLE: PHARMACEUTICAL AND MEDICINAL CHEMISTRY, PAPER CODE: CHE-604CE**

**Paper – VIII-C-3      Semester – VI      Maximum marks : 75      Duration : 3 Hours**

**Weightage for the question paper**

<b>syllabus</b>	<b>Section-A (Short answer questions)</b>	<b>Section-B (essay questions)</b>
<b>Unit-1 ( Marks)</b>	<b>1+1</b>	<b>1</b>
<b>Unit-2 ( Marks)</b>	<b>1</b>	<b>1+1</b>
<b>Unit-3 ( Marks)</b>	<b>1+1</b>	<b>1+1+1</b>
<b>Unit-4 ( Marks)</b>	<b>1+1</b>	<b>1</b>
<b>Unit-5 ( Marks)</b>	<b>1</b>	<b>1</b>

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

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**Practical syllabus**

Paper title: Preparations of Organic compounds	Paper code : CHE-602CE-P
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**30 hrs (2 h / W)**

1. Preparation of Aspirin
2. Preparation of Paracetamol
3. Preparation of Acetanilide
4. Preparation of Barbituric Acid
5. Preparation of Phenyl Azo  $\beta$ -naphthol

**SCHEME OF VALUATION**

1. INTERNAL MARKS- Record-10M
2. EXTERNAL MARKS-40
  - Titrimetric analysis -30
  - Viva-10

**TOTAL = 50 M**

**A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.  
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**Practical syllabus**

<b>Paper title: Preparations of Organic compounds by Green procedure</b>	<b>Paper code : CHE-603CE-P</b>
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**30 hrs (2h / W)**

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

**SCHEME OF VALUATION**

**1. INTERNAL MARKS- Record-10M**

**2. EXTERNAL MARKS-40**

- Practical -30
- Viva-10

**TOTAL = 50 M**

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.  
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**Department of Chemistry**

Paper title: <b>Project work</b>	Paper code : CHE-604CE-P
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The students have chosen chemistry as cluster elective. Three projects have been selected and distributed the same among the students.

S.no	Name of the Project	No. of students allotted
1.	Instrumentation	
2.	Laboratory Reagents	
3.	Effects of Drugs	

**SCHEME OF VALUATION**

1. EXTERNAL- 25M- given by the Examiner (Viva)

2. INTERNAL = 25 M

- Written viva-10 M
- Submission of the project book-15M

TOTAL = 50 M



**A.G& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS &  
SCIENCE**

**VUYYURU-521165, KRISHNA Dt., A.P.(Autonomous)**

**Accredited by NAAC with "A" Grade**

**2020-2021**



**DEPARTMENT OF CHEMISTRY**

**MINUTES OF BOARD OF STUDIES**

**EVEN SEMESTER**

**9-04-2021**

Dept: copy - Even-2020-21

Minutes of the Online meeting of Board of studies in Chemistry for the Autonomous course of A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru held at 9.30 am on 09-04-2021 in the Department of Chemistry.

Smt A.INDIRA Presiding

Members Present:

- 1)  ..... Chairman  
(Smt. A. Indira) HOD, Dept. of Chemistry,  
A.G. & S.G.S. Degree College, Vuyyuru.
- 2)  ..... University Nominee  
(Prof. D. Ramasekhara Reddy) Assistant Professor,  
Dept. of Chemistry, Krishna University, MTM.
- 3)  ..... B.O.S. Nominee  
(Dr. K. A. Emanuel) Associate Professor in Chemistry,  
Sir C.R. Reddy College, Eluru.
- 4) ..... B.O.S. Nominee  
(Dr. D. Bala karuna kumar) Associate Professor in Chemistry,  
A.L.C College, Vijayawada.
- 5) ..... Industrialist  
(Dr. Nadella Taraka Ramarao) Manager, Q.C, Divis Laboratories Ltd,  
Vizag.
- 6) ..... Student Nominee  
(Dr. V. Phani Kumar) Lecturer in Chemistry,  
SRR&CVR Govt. Degree College, BZA.
- 7)  ..... Member  
(Sri. K. Ramesh) Lecturer in Chemistry,  
A.G. & S.G.S. Degree College, Vuyyuru.
- 8)  ..... Member  
(Smt. M. V. Santhi) Lecturer in Chemistry,  
A.G. & S.G.S. Degree College, Vuyyuru.
- 9)  ..... Member  
(Sri. G. Ramesh) Lecturer in Chemistry,  
A.G. & S.G.S. Degree College, Vuyyuru.
- 10)  ..... Member  
(Sri. P. Suresh) Lecturer in Chemistry,  
A.G. & S.G.S. Degree College, Vuyyuru.
- 11)  ..... Member  
(Ms. M. Santhi) Lecturer in Chemistry,  
A.G. & S.G.S. Degree College, Vuyyuru.
- 12)  ..... Member  
(Sri. J. Nageswara Rao) Rtd. Lecturer in Chemistry,  
A.G. & S.G.S. Degree College, Vuyyuru.

## Agenda for B.O.S Meeting

1. To recommend the syllabus and model paper for II semesters of I Degree B.Sc., Chemistry for the Academic year 2020-2021.
2. To recommend the syllabus and model papers for IV semesters of II Degree B.Sc., Chemistry for the Academic year 2020-2021.
3. To recommend the syllabus and model papers for VI semesters of III Degree B.Sc. Chemistry for the Academic year 2020-21.
4. To recommend the Blue print of II, IV, & VI semesters of B.Sc. Chemistry for the Academic year 2020-21.
5. To recommend the Guidelines to be followed by the question paper setters in Chemistry for Semester – end exams.
6. To recommend the teaching and evaluation methods to be followed under Autonomous status.
7. Any suggestions regarding certificate course, seminars, workshops, Guest lecture to be organized.
8. Recommend the panel of paper setters and Examiners to the controller of Examinations of autonomous Courses of A.G. & S.G.S. Degree colleges of Arts & Science, Vuyyuru.
9. Any other matter.

  
Chairman.

## RESOLUTIONS

- 1) It is resolved to continue the **changed syllabus and modified model paper for II semesters of I B.Sc.** under Choice Based Credit System (CBCS) for the Academic year 2020-2021.  
**Adding Syllabus: Alkanes, Cyclo alkanes and alkenes.**
- 2) It is resolved to implement the same syllabus **and model papers** under Choice Based Credit System (CBCS) for the Academic year 2020-21 for **IV semesters of II B.Sc.**
- 3) It is resolved to implement the same **syllabus and model papers** under Choice Based Credit System (CBCS) of 2020-21 for the Academic year 2019-20 for **VI semesters (General elective-A and cluster Elective-C) of III B.Sc.**
- 4) It is resolved to follow the **Blue prints** of II, semesters of Degree B.Sc. for the Academic year 2019-20. It is resolved to continue the same **Blue prints** of IV, and VI semesters of Degree B.Sc. for the Academic year 2020-21.
- 5) It is resolved to follow the same guidelines to be followed by the question paper setters for Chemistry II, semesters of Degree B.Sc. for the Academic Year 2018-19. III, IV, V and VI semesters of Degree B.Sc. for the Academic Year 2020-21.
- 6) It is resolved to continue the following teaching and evaluation methods for Academic year 2020-21.

### Teaching Methods:

Besides the conventional methods of teaching, we use modern technology i.e. using of LCD projector to display on U boards etc, for better understanding of concepts.

### Evaluation of a student is done by the following procedure:

- **Internal Assessment Examinations:**
- Out of maximum 100 marks in each paper for IB.Sc , 30 marks shall be allocated for internal assessment .
- Out of these 30 marks, **20 marks are allocated for announced tests (i.e.IA-1 & IA-2)**. Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, **5 marks** are allocated on the basis of candidate's **percentage of attendance and remaining 5 marks are allocated for the innovative component like assignment/quiz/seminars for IB.Sc.**
- There is **no passing minimum** for internal assessment for I.B.Sc.
- Out of maximum 100 marks in each paper for II&III, 25 marks shall be allocated for internal assessment.
- Out of these 25 marks, **15 marks are allocated for announced tests (i.e.IA-1 & IA-2)**. Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, **5 marks** are allocated on the basis of candidate's **percentage of attendance and remaining 5 marks are allocated for the assignment for II, &III B.Sc.**
- **Semester – End Examination:**
- The maximum mark for IB.Sc Semester – End examination shall be 70 marks and duration of the examination shall be 3 hours. Even though the candidate is absent for two IA exams /obtain Zero marks the external marks are considered (if the candidate gets 40/70) and the result shall be declared as "PASS".
- The maximum marks for II & III B.Sc Semester – End examination shall be 75 marks and duration of the examination shall be 3 hours.
- Semester – End examinations shall be conducted in theory papers at the end of every semester, while in practical papers, these examinations are conducted at the end of I, II, III, IV, V, VI semesters **for I, II &III B.Sc.**

<b>SEMESTER - II</b>	<b>PAPER CODE : CHE-201</b>
<b>PAPER TITLE : ORGANIC AND GENERAL CHEMISTRY, PAPER- II</b>	

**Total Periods - 60 (4hrs/week) Credits-3**

### **ORGANIC CHEMISTRY**

#### **UNIT-I**

**Saturated Hydrocarbons** Marks weightage -10+10+5 **10h**

**Alkanes:** Preparation methods-Wurtz and Wurtz-Fittig reaction-Physical properties and Chemical Properties-Free radical substitution –Halogenation of Propane-concept of relative Reactivity vs Selectivity, Conformational analysis of Ethane-Propane.

**Cycloalkanes:** General Formula-Relative Stability of Cycloalkanes -Bayer's Strain theory-Conformational analysis of Cyclohexane and mono substituted Cyclohexane (Methyl cyclohexane).

#### **UNIT-II**

**Unsaturated Hydrocarbons** Marks weightage -10+5 **10h**

**Alkenes: Introduction to Alkenes,** Chemical Properties: Markonikov's rule, Anti - Markonikov's rule. Elimination reactions-E<sub>1</sub>, E<sub>2</sub>, E<sub>1</sub>cb reactions. Types of Dienes- Diel's - Alder reaction - 1, 2 and 1, 4 additions of HBr in 1,3-butadiene.

**Alkynes:** Acidity of acetylenic hydrogens-Electrophilic and Nucleophilic addition reactions-formation of carbonyl compounds-alkylation of terminal alkynes.

#### **UNIT-III**

**Benzene and its reactivity** Marks weightage -10+5+5 **10h**

Concept of aromaticity - Huckel's rule - application to Benzenoid (Benzene, Naphthalene) and Non - Benzenoid compounds (cyclopropenyl cation, cyclopentadienyl anion and tropylium cation)

Reactions - General mechanism of electrophonic substitution, mechanism of nitration, Friedel Craft's alkylation, Friedel Craft's acylation.

- 7) Discussed and recommended for organizing **certificate course, seminars, Guest lecturers, workshops** to upgrade the knowledge of students, for the approval of the academic council.
- 8) Discussed and empowered the Head of the department of Chemistry to suggest the panel of paper setters and examiners to the controller of examinations.
- 9) NIL.

  
Chairman

Orientation of aromatic substitution –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)

## GENERAL CHEMISTRY

### UNIT-IV

#### **1. Surface Chemistry          Marks weightage -10+5+5                          8h**

**Colloids:** Characteristic of Colloids, Coagulation of Colloids, Hardy-Schulze law, Stability of colloids, protection of colloid, Gold number.

**Adsorption:** Physical and Chemical adsorption, Langmuir adsorption isotherms. Applications of adsorption.

#### **2. Chemical Bonding          Marks weightage -10+5                          7h**

Valence bond theory, hybridization, VB theory as applied to ClF<sub>3</sub>, Ni (CO)<sub>4</sub>. Molecular orbital theory - LCAO method, construction of M.O. diagrams for homo-nuclear and hetero-nuclear diatomic molecules (N<sub>2</sub>, O<sub>2</sub>, CO and NO).

### UNIT-V

#### **Stereochemistry of Carbon compounds          Marks weightage -10+10+5                          15h**

Molecular representations- Wedge, Fischer, Newman and Saw-Horse formulae. Optical isomerism: Optical activity- wave nature of light, plane polarized light, optical rotation and specific rotation. Chiral molecules- definition and criteria (Symmetry elements) - Definition of enantiomers and diastereomers – Explanation of optical isomerism with examples Glyceraldehyde, Lactic acid, Alanine, Tartaric acid, 2,3-dibromopentane. D, L and R, S configuration methods and E, Z- configuration with examples. Racemic mixture- Resolution techniques.

#### List of Reference Books

1. Organic chemistry by Bahl & Arun Bahl
2. Organic chemistry by I L Finar Vol-I
3. Organic chemistry by Clayden
4. Surface & Colloid Chemistry by K.S.Birdi
5. Surface Chemistry by A Goel
6. Stereochemistry by P.S.Kalsi
7. Stereochemistry of Organic compounds by D. Nasipuri

<b>SEMESTER – II</b>	<b>COURSE CODE : CHE- 201</b>
<b>PAPER TITLE : ORGANIC AND GENERAL CHEMISTRY, PAPER - II</b>	

**Time: 3Hours**

**Maximum marks: 70**

**Pass marks: 28**

**SECTION-A**

Answer any FOUR of the following. Each question carries 5 marks.      4X5=20M

1. Write a note on selectivity and reactivity of halogenations of Alkanes.
2. Write E1, E2, E1 cb reactions with example.
3. Explain Orientation of amino group with one example?
4. Write general mechanism of electrophilic substitution of Benzene?
5. Write Coagulation of Colloids.
6. Write differences between physical and chemical adsorption.
7. Define and explain Bond order?
8. Explain about Specific rotation.

**SECTION-B**

Answer any FIVE questions. Each question carries 10 marks.      5X10=50M

9. Write physical and chemical properties of Alkanes?
10. Explain conformational analysis of Methyl cyclohexane
11. Write any three eletrophilic and nucleophilic reactions of Alkynes.
12. Write electronic interpretation of -NO<sub>2</sub> and -OH groups.
13. Explain characteristic of Colloids.
14. Define hybridization and explain the types of hybridizations with suitable examples.
15. Explain wave nature of light and plane polarized light.
16. Explain about optical isomerism of Tartaric acid?



The Guidelines to be followed by the question paper setters in Chemistry for the II-Semester - end exams. **ACADEMIC YEAR-2020-21**

<b>SEMESTER – II</b>	<b>PAPER CODE : CHE-201</b>
<b>PAPER TITLE : ORGANIC AND GENERAL CHEMISTRY, PAPER - II</b>	

Weightage for the question paper

syllabus	Section-A (Short answer questions)	Section-B (Essay questions)
Unit-1 (25 Marks)	1	1+1
Unit-2 (15 Marks)	1	1
Unit-3 (20Marks)	1+1	1
Unit-4 (35 Marks)	1+1+1	1 + 1
Unit-5 (25 Marks)	1	1+1

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

**A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.**  
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**PRACTICAL SYLLABUS ACADEMIC YEAR-2020-21**

<b>Volumetric analysis</b>	<b>Paper code : CHE-201</b>
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**30 hrs (2 h /w) Credits: 2**

- 1. Estimation of carbonate ion and bicarbonate ion present in a mixture.**
- 2. Determination of Fe (II) using  $\text{KMnO}_4$  with Oxalic acid as primary standard.**
- 3. Determination of Cu (II) using Hypo solution with  $\text{K}_2\text{Cr}_2\text{O}_7$  as primary standard.**
- 4. Estimation of water of crystallization in Mohr's salt by titrating with  $\text{KMnO}_4$ .**

**SCHEME OF VALUATION**

- 1. Record-10M**
- 2. Practical-40M**
  - Titrimetric analysis-30M**
  - Viva questions = 10 M**

**TOTAL = 50 M**

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.

(Accredited at "A" Grade by NAAC, Bangalore) ACADEMIC YEAR-2020-21

SEMESTER – IV

SUBJECT: CHEMISTRY

PAPER CODE: CHE-

401

PAPER TITLE : SPECTROSCOPY & PHYSICAL CHEMISTRY, PAPER-IV

60 hrs(4h/w)

Credits-3

## SPECTROSCOPY

### UNIT-I

#### 1. Spectrophotometry (10+5)

8h

General features of absorption - 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 of 1. Chromium in  $K_2Cr_2O_7$   
2. Manganese in Manganous sulphate.

#### 2. Electronic spectroscopy: (10+5)

6h

Interaction of electromagnetic radiation with molecules and types of molecular spectra. Energy levels of molecular orbitals ( $\sigma$ ,  $\pi$ ,  $n$ ). Selection rules for electronic spectra. Types of electronic transitions in molecules effect of conjugation. Concept of chromophore and auxochrome

### UNIT-II

#### 1. Infra red spectroscopy (10)

6h

Different Regions in Infrared radiations. Modes of vibrations in diatomic and polyatomic molecules. Characteristic absorption bands of various functional groups. Interpretation of spectra-Alkanes, Aromatic, Alcohols carbonyls, and amines with one example to each.

#### 2. Proton magnetic resonance spectroscopy ( $H^1$ -NMR) (10+10)

10h

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.

## PHYSICAL CHEMISTRY

### **UNIT-III**

#### **Photochemistry (10+5+5)**

**10h**

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

### **UNIT-IV**

#### **Electrochemistry (10+5+5)**

**15h**

Specific conductance, equivalent conductance. Variation of equivalent conductance with dilution. Application of conductivity measurements- conductometric titrations. Arrhenius theory of electrolyte dissociation and its limitations. Ostwald's dilution law. Debye-Huckel-Onsagar's equation for strong electrolytes (elementary treatment only). Definition of transport number, determination by Hittorf's method. Single electrode potential, Nernst equation, Reversible and irreversible cells, Types of electrode-Standard Hydrogen electrode, calomel electrode, Indicator electrode, metal – metal ion electrode, Inert electrode. Applications of EMF measurements - Potentiometric titrations.

### **UNIT-V**

#### **Phase rule**

**(10+5) marks**

**5h**

Concept of phase, components, degree of freedom. Derivation of Gibbs phase rule-reduced phase equation. Phase equilibrium of one component ( water system). Phase equilibrium of two- component system( Ag-Pb system), desilverisation of lead. Freezing mixtures.

#### **List of Text Books**

1. Advanced physical chemistry by Guru deep Raj
2. Introduction to Electrochemistry by S. Glasstone
3. Elementary organic spectroscopy by Y.R. Sharma
4. Spectroscopy by P.S.Kelsi
5. Unified chemistry Vol- II by O.P. Agarwal
6. Unified chemistry Vol- II by K. Ramarao and Y. R. Sharma (Kalyani Publishers)

**A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYURU.**

<b>SEMESTER – IV</b>	<b>PAPER CODE : CHE-401</b>	<b>ACADEMIC YEAR-2020-21</b>
<b>PAPER TITLE : SPECTROSCOPY AND PHYSICAL CHEMISTRY, PAPER-IV, Model question -paper2020-21</b>		
<b>Time: 3Hours</b>	<b>Maximum marks: 70</b>	<b>Pass marks: 28</b>

**SECTION-A**

Answer any Four of the following. Each question carries 5 marks.

4X5=20M

1. Write short notes on spectro photometers.
2. Explain the effect of Conjugation on UV spectrum.
3. Write the differences between thermal and photo chemical process.
4. Explain Stark-Einstein's law of photo chemical equivalence.
5. Write the applications of EMF measurements.
6. Derive Nernst equation.
7. State and explain Gibbs Phase rule.

**SECTION-B**

Answer any FIVE questions. Each question carries 10 marks.

5X10=50M

8. State and explain Beer- Lamberds law? Explain the qualitative analysis of manganese in manganous sulphate.
9. Explain the effect of polar solvents on  $n \rightarrow \pi^*$  and  $\pi \rightarrow \pi^*$  transitions.
10. Explain the origin and principle in the Infrared spectra.
11. What do you understand by the term splitting of the signals? Explain with example.
12. Give the principle and theory involved in PMR Spectroscopy.
13. What is quantum yield? Explain  $H_2-Br_2$  reaction with mechanism.
14. Explain the potentiometric titrations.
15. Write Phase rule. Draw and explain the phase diagram of water system.

**The Guidelines to be followed by the question paper setters in chemistry for the  
IV-Semester - end exams ACADEMIC YEAR-2020-21**

<b>SEMESTER – IV</b>	<b>SUBJECT: CHEMISTRY</b>	<b>PAPER CODE: CHE-401</b>
<b>PAPER TITLE : SPECTROSCOPY &amp; PHYSICAL CHEMISTRY, PAPER-IV</b>		

Weightage for the question paper

syllabus	Section-A (Short answer questions)	Section-B (Essay questions)
Unit-1 (30 Marks)	1 + 1	1 + 1
Unit-2 (30 Marks)	---	1 + 1+1
Unit-3 (20 Marks)	1 +1	1
Unit-4 (20 Marks)	1 + 1	1
Unit-5 (15Marks)	1	1

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

**A.G. &S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU**  
(Accredited at "A" Grade by NAAC, Bangalore) ACADEMIC YEAR-2020-21

**PRACTICAL SYLLABUS**

Physical Chemistry and IR Spectral Analysis

PAPER CODE : CHE - 401 P

30 hrs (2h /w) Credits-2

**Physical Chemistry**

1. Potentiometric titration of a Mohr's solution with  $\text{KMnO}_4$  Solution.
2. Potentiometric titration of a Mohr's solution with  $\text{K}_2\text{Cr}_2\text{O}_7$  solution.
3. Conductometric titration of a strong acid (HCl) ) with a strong base(NaOH).
4. Conductometric titration of a weak acid ( $\text{CH}_3\text{COOH}$ ) with a strong base (NaOH).
5. Conductometric titration of a mixture of a strong acid (HCl) and weak acid ( $\text{CH}_3\text{COOH}$ ) with a strong base (NaOH)

**Student study Project-( IR Spectral Analysis)**

IR Spectral Analysis of the following functional groups with examples

- a) Hydroxyl groups
- b) Carbonyl groups
- c) Amino groups
- d) Aromatic groups

**SCHEME OF VALUATION**

**1. Internal marks**

- Record = 10

**2. External marks- 40**

- Practical-25
- Viva = 10
- IR Spectral analysis = 5 (Student study Project)

**Total marks =50**

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYURU.  
(Accredited at "A" Grade by NAAC, Bangalore) ACADEMIC YEAR-2020-21

SEMESTER – VI	SUBJECT: CHEMISTRY	PAPER CODE:CHE-601GE
PAPER TITLE : ANALYTICAL METHODS IN CHEMISTRY, Paper – VII		

60hrs (4h / w) Credits-3

### UNIT-I

#### Quantitative analysis: (10+5)

15h

Methods of different types of chemical analysis, Principle of volumetric analysis. Theories of acid-base, redox, complexometric, iodometric and precipitation titrations - choice of indicators for these titrations.

### UNIT-II

#### Treatment of analytical data: (10+5)

8h

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

### UNIT-III

#### Separation Techniques in Chemical analysis (10+10+5)

15h

**Solvent extraction:** Introduction, principle, techniques, factors affecting solvent Extraction, Batch extraction, continuous extraction. Synergism. Application - Determination of Iron (III), organic mixture analysis.

### UNIT – IV

12h

#### Chromatography (10+10+5+5)

Classification of chromatography methods, principles of differential migration adsorption phenomenon, Nature of adsorbents, solvent systems, R<sub>f</sub> values, factors effecting R<sub>f</sub> values.

**Ion exchange Chromatography:** Introduction, action of ion exchange resins, separation of inorganic mixtures, applications.

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

### UNIT -V (10+10+5+5)

10h

#### Thin layer Chromatography (TLC):

Principles, Experimental procedures. Adsorbents and solvents.

Preparation of

plates. Development of the chromatogram. Detection of the spots. Applications.

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

**GC:** Principle and applications,**HPLC:** Basic principle and applications.



**List of Reference Books**

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

**A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.**

<b>SEMESTER – VI</b>	<b>PAPER CODE : CHE-601GE</b>
<b>PAPER TITLE : ANALYTICAL METHODS IN CHEMISTRY, PAPER-VII, <u>Model question paper- AC-2020-21</u></b>	

**Time: 3Hours**

**Maximum marks: 70**

**Pass marks: 28**

**SECTION-A**

Answer any FOUR of the following. Each question carries 5 marks.

4X5=20M

- 1.Explain in brief steps involved in chemical analysis
2. Define precession write the methods of expressive precession.
3. Write the applications of Solvent extraction.
- 4.Write the Principle of differential migration of adsorption phenomenon.
- 5.Write a short note on Nature of adsorbent
6. Write the Principles of TLC and give their applications.
7. Write the development methods of chromatograms.

**SECTION-B**

Answer any FIVE questions. Each question carries 10 marks.

5X10=50M

8. Explain about (a)Complexometric titrations (b) Idometric titrations
9. Explain the Choice of indicators for Acid -base and Redox titrations.
10. Define and explain the methods of expressing Accuracy.
11. Discuss the principle, factors affecting the solvent extraction and write the applications of solvent extraction.
12. Discuss the Separation of in organic mixtures by using ion exchange method.
13. Explain the classification of Chromatographic methods.
14. How to prepare plates in TLC.
15. Explain principle and applications of HPLC.

The Guidelines to be followed by the question paper setters in chemistry for the

VI- Semester - end exams –AC-2020-21

<b>SEMESTER – VI</b>	<b>PAPER CODE : CHE- 601GE</b>
<b>PAPER TITLE : ANALYTICAL METHODS IN CHEMISTRY, PAPER- VII</b>	

syllabus	Section-A (Short answer questions)	Section-B (Essay questions)
Unit-1 (15 Marks)	1	1
Unit-2 (15 Marks)	1	1
Unit-3 (25 Marks)	1	1+1
Unit-4 (30 Marks)	1+1	1+1
Unit-5 (30 Marks)	1 +1	1 + 1

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

**A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU**

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**PRACTICAL SYLLABUS**

<b>Paper title: Chromatography &amp; Volumetric analysis</b>	<b>Paper code : CHE-601GE-P</b>
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**30 hrs (2h /w) Credits-2**

1. Identification of amino acids by paper chromatography.
2. Determination of Zn using EDTA
3. Determination of Mg using EDTA
4. Hardness of water.

**SCHEME OF VALUATION**

**1. INTERNAL MARKS- Record-10M**

**2. EXTERNAL MARKS-40**

- **Titrimetric analysis -30**
- **Viva-10**

**TOTAL = 50 M**

<b>SEMESTER – VI</b>	<b>SUBJECT: CHEMISTRY</b>	<b>PAPER CODE:CHE-602CE</b>
<b>PAPER TITLE : ORGANIC SPECTROSCOPIC TECHNIQUES,</b>		<b>Cluster Elective Paper – VIII</b>

60hrs (4h / w) Credits-3

**UNIT-I**

**NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY (10+10+5) 15h**

Nuclear spin, Principles of NMR-Classical and Quantum Mechanical methods, Larmour Frequency. Instrumentation. Saturation, Relaxation spin-spin & spin lattice relaxation. Chemical shifts -Factors influencing Chemical shift, Shielding and De-shielding mechanism.

**UNIT-II (10+5)**

**NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY 8h**

Spin-Spin interactions-factors affecting spin-spin interactions, Deuterium exchange ( $H^+$ ) Coupling constant- types of coupling constant- vicinal, Geminal and long range coupling constant- Factors influencing coupling constants. Types of PMR Spectrums –AX, AX<sub>2</sub> and AB type with one example.

**UNIT-III (10+10+5+5) 14h**

**Electron Spin Resonance Spectroscopy**

Basic Principles, Theory of ESR, Comparison of NMR & ESR. Instrumentation, Factors affecting the 'g' value, determination of 'g' value. Isotropic and Anisotropic constants. Splitting hyper fine splitting coupling constants. Line width, Zero field splitting and Kramer degeneracy. Crystal field splitting, Crystal field effects. Applications:- Detection of free radicals, ESR spectra of (a) H<sup>-</sup> radical (b) Deuterium radical (c) Methyl radical (CH<sub>3</sub>) (d) Benzene anion (C<sub>6</sub>H<sub>6</sub>) (e) [Cu(H<sub>2</sub>O)<sub>6</sub>]<sup>+2</sup>

**UNIT-IV**

**UV & VISIBLE SPECTROSCOPY (10+10+5+5) 15h**

Electronic spectra of diatomic molecules. The Born- oppenheimer approximation.

Vibration coarse structure: Intensity of Vibrational-electronic spectra:

The Franck-Condon principle. Electronic structure of diatomic molecules.

Types of transitions, Chromophores, Auxochrome, types of shifts in UV Visible spectrum, Conjugated dienes, trienes and polyenes, unsaturated carbonyl compounds-Woodward – Fieser rules.

**UNIT-V (10+5) 8h**

**Electronic spectra of polyatomic molecules**

Chemical analysis by Electronic Spectroscopy – Beer-Lambert's Law. Deviation from Beer's law. Quantitative determination of metal ions (Mn<sup>+2</sup>, Fe<sup>+2</sup>). Simultaneous determination of Chromium and Manganese in a mixture.

**REFERENCE BOOKS:**

1. Electron Spin Resonance Elementary Theory and Practical Applications- John E. Wertz and James R. Bolton, Chapman and Hall, 1986.
2. Spectroscopic Identification of organic compounds – Silverstein, Basseler and Morrill.
3. Organic Spectroscopy- William Kemp.
4. Fundamentals of Molecular Spectroscopy- C.N.Banwell and E.A. Mc cash 4<sup>th</sup>Edition, Tata Mc GrawHillPublishing Co., Ltd. 1994.
5. Physical Methods in Inorganic Chemistry – R.S.Drago, Saunders Publications.
6. Application of Mössbauer Spectroscopy – Green Mood.
7. NMR, NQR, EPR and Mössbauer Spectroscopy in inorganic chemistry – R.VParish, Ellis, Harwood.

**A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.**

<b>SEMESTER – VI</b>	<b>PAPER-VIII</b>	<b>PAPER CODE : CHE-602CE</b>
<b>PAPER TITLE : ORGANIC SPECTROSCOPIC TECHNIQUES, Model question paper-AC-2020-21</b>		

**Time: 3Hours**

**Maximum marks: 70**

**Pass marks: 28**

SECTION-A

Answer any FOUR of the following. Each question carries 5 marks.

4X5=20M

1. Write about Nuclear spin?
2. Write any two types of coupling constant?
3. Write about Kramer degeneracy?
4. What is isotropic and anisotropic constants?
5. Explain Woodward-Fieser rules?
6. Write a short note on Auxochrome?
7. Define and derive Beer-Lambert's law.

SECTION-B

Answer any FIVE questions. Each question carries 10 marks.

5X10=50M

8. Explain the instrumentation of the NMR?
9. Explain Spin-Spin relaxation and spin lattice relaxation.
10. Write the types of PMR spectrums of AX, AX<sub>2</sub> & AB?
11. Explain the instrumentation of the ESR.
12. Explain the ESR splitting of a) Deuterium radical b) [Cu(H<sub>2</sub>O)<sub>6</sub>]<sup>+2</sup> ion
13. Explain the electronic spectra of di atomic molecule.
14. Write note on Vibrational coarse structure.
15. Explain the simultaneous determination of Chromium and Manganese in a mixture.

**The Guidelines to be followed by the question paper setters in chemistry for the VI- Semester - end exams**

**AC- 2020-21**

**PAPER TITLE: ORGANIC SPECTROSCOPIC TECHNIQUES, PAPER CODE: CHE-602CE**

**Paper – VIII**

**Maximum marks : 70**

**Duration : 3 Hours**

Weightage for the question paper

syllabus	Section-A (Short answer questions)	Section-B (essay questions)
Unit-1 ( 25Marks)	1	1+1
Unit-2 (15 Marks)	1	1
Unit-3 ( 30Marks)	1+1	1+1
Unit-4 ( 30Marks)	1+1	1+1
Unit-5 (15Marks)	1	1

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.



<b>SEMESTER – VI</b>	<b>SUBJECT: CHEMISTRY</b>	<b>PAPER CODE:CHE-</b>
<b>603CE</b>		
<b>PAPER TITLE : ADVANCED ORGANIC REACTIONS, Cluster Elective Paper – IX</b>		

60hrs (4h / w) Credits-3

#### UNIT – I

##### **ORGANIC PHOTOCHEMISTRY (10+10+5) 10hrs**

Organic photochemistry: Molecular orbitals, carbonyl chromophore–Jablonski diagram, Photochemical reactions- Photo reduction-mechanism, example-aromatic compounds. sensitizer and influence of sensitizer.

#### UNIT – II

##### **ORGANIC PHOTOCHEMISTRY (10+10+5) 12hrs**

Norrish cleavages, type -I: Mechanism, acyclic cyclic diones, Photo Fries rearrangement. Norrish type II cleavage: Mechanism and stereochemistry, Type- II reactions of esters: 1: 2 diketones, photo decarboxylation, Di -  $\pi$  methane Rearrangement, Photochemistry – of conjugated dienes, Decomposition of nitrites –Barton reaction.

#### UNIT – III

##### **PROTECTING GROUPS AND ORGANIC REACTIONS (10+10+5+5) 15hrs**

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

#### UNIT – IV

##### **SYNTHETIC REACTIONS: (10+5+5) 8hrs**

Mannich reaction – Mannich bases – Robinson annulations. The Shapiro reaction, Stork–enamine reaction. Use of dithioacetals – Umpolung, phase transfer catalysis – mechanisms and use of benzyl trialkyl ammonium halides. Wittig reaction.

#### UNIT – V : NEW SYNTHETIC REACTIONS(10+5) 15hrs

**Define with example and mechanism-** Suzuki coupling, Click reaction, Baylis–Hillman reaction, RCM olefin metathesis, Mukayama aldol reaction.

**Define with one example:** (Mechanism not required) Mitsunobu reaction, McMurry reaction, Julia–Lythgoe olefination, Stille coupling and Heck reaction.

### **Recommended Books**

1. Molecular reactions and Photochemistry by Charles Dupey and O.L. Chapman.
2. Molecular Photochemistry by Turru.
3. Importance of antibonding orbitals by Jaffe and Orchin.
4. Text Book of Organic Chemistry by Cram,. Hammand and Henrickson.
5. Some modern methods of organic synthesis by W. Carruthers.
6. Guide Book to Organic Synthesis by R.K. Meckie, D.M. Smith and R.A. Atken.
7. Organic Synthesis by O.House.
8. Organic synthesis by Michael B. Smith.

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.

SEMESTER – VI PAPER-IX

PAPER CODE : CHE-603CE

PAPER TITLE : ADVANCED ORGANIC REACTIONS , Model question paper-AC-2020-21

Time: 3Hours

Maximum marks: 70

Pass marks: 28

SECTION-A

Answer any FOUR of the following. Each question carries 5 marks.

4X5=20M

1. Write about Chromophore triplet state?
2. Write about Barton reaction?
3. Explain how to protect the Carbonyl group?
4. Explain how to protect the Diols?
5. Explain about Umpolung?
6. Explain PTC with mechanism?
7. Explain Suzuki coupling?

SECTION-B

Answer any FIVE questions. Each question carries 10 marks.

5X10=50M

8. Explain about Jablonski diagram in organic photo chemistry?
9. Explain mechanism of photo reduction with examples?
10. Explain Norrish type –I cleavage with mechanism?
11. Explain Norrish type –II cleavage with mechanism?
12. Explain how to protect Alcohols?
13. Explain how to protect Carboxylic acids?
14. What is Mannich reaction? Explain with mechanism and Mannich bases?
15. Write the mechanism of Baylis-Hillman reaction and RCM Olefination?

**The Guidelines to be followed by the question paper setters in chemistry for the VI- Semester - end exams –AC-2020-21**

**PAPER TITLE: ADVANCED ORGANIC REACTIONS, PAPER CODE: CHE-603CE**

**Paper – IX      Semester – VI      Maximum marks : 70      Duration : 3 Hours**

Weightage for the question paper

syllabus	Section-A (Short answer questions)	Section-B (essay questions)
Unit-1 ( 25Marks)	1	1+1
Unit-2 (25 Marks)	1	1+1
Unit-3 (30 Marks)	1+1	1+1
Unit-4 ( 20Marks)	1+1	1
Unit-5 (15 Marks)	1	1

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

<b>SEMESTER – VI</b>	<b>SUBJECT: CHEMISTRY</b>	<b>PAPER CODE:CHE-</b>
	<b>604CE</b>	
<b>PAPER TITLE : PHARMACEUTICAL AND MEDICINAL CHEMISTRY, Cluster Elective Paper –X</b>		

60hrs (4h / w) Credits-3

**UNIT-I (10+5+5) 12h**

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

**UNIT-II (10+10+5)**

**Drugs: 10h**

Nomenclature: Chemical name, Generic name and trade names with 10-examples  
Classification based on structures and therapeutic activity with one example each.

**UNIT-III**

**Synthesis and therapeutic activity of the compounds: 18h**

**Chemotherapeutic Drugs (10+10+5)**

1.Sulphadruugs(Sulphamethoxazole) 2.Antibiotics -  $\beta$ -Lactam Antibiotics-Isolation of Penciline  
by submerged culture method, 3. Anti malarial Drugs (chloroquine)

**Psycho therapeutic Drugs: (10+5)**

1.Anti pyretics (Paracetamol) 2.Hypnotics, 3.Tranquilizers(Diazepam) 4.Levodopa

**UNIT-IV**

**Pharmacodynamic Drugs: (10+5) 8h**

1.Antiasthma Drugs (Solbutamol) 2. Antianginals (Glycerol Trinitrate) 3.Diuretics (Frusemide)

**UNIT-V**

**HIV-AIDS: (10+5) 12h**

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

**List of Reference Books:**

1. Medicinal Chemistry by Dr. B.V.Ramana
2. Synthetic Drugs by O.D.Tyagi & M.Yadav
3. Medicinal Chemistry by Ashutoshkar
4. Medicinal Chemistry by P.Parimoo
5. Pharmacology & Pharmacotherapeutics R.S Satoshkar & S.D.Bhandenkar

**A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.**

<b>SEMESTER – VI</b>	<b>PAPER-X</b>	<b>PAPER CODE : CHE-604CE</b>
<b>PAPER TITLE : PHARMACEUTICAL AND MEDICINAL CHEMISTRY, Model question paper-AC-2020-21</b>		

**Time: 3Hours**

**Maximum marks: 70**

**Pass marks: 28**

**SECTION-A**

Answer any FOUR of the following. Each question carries 5 marks.

4X5=20M

1. What are Metabolites and anti metabolites? Explain with example.
2. Write a note on Pharmacology and Pharmacophore.
3. Explain the classification of drugs on the basis of structure.
4. Describe the synthesis and therapeutic activities of Sulphamethoxazole.
5. Write the synthesis,therapeutic activity and side effects of paracetamol.
6. Write a note on Antianginals.
7. Explain about immunity.

**SECTION-B**

Answer any FIVE questions. Each question carries 10 marks.

5X10=50M

8. What are Pharma cokinetics ? Describe Absorption,Distribution,Metabolism and Excretion(ADME)of drug.
9. Explain the classification of drugs based on therapeutic activity with examples.
10. Describe the nomenclature systems of drugs.
11. What are antibiotics? Give examples. Explain the isolation method of pencillin by submerged culture method.
12. Write the synthesis,therapeutic activity and side effects of Chloroquine.
13. Discuss the synthesis and therapeutic activity of Levodopa.
14. Explain in detail about antiasthma drugs.
15. What is AIDS?How it causes ? Write the drugs available for the treatment of AIDS with their structure?

**The Guidelines to be followed by the question paper setters in chemistry for the VI- Semester - end exams AC-2020-21**

**PAPER TITLE: PHARMACEUTICAL AND MEDICINAL CHEMISTRY, PAPER CODE: CHE-604CE**

**Paper – VIII-C-3      Semester – VI      Maximum marks : 70      Duration : 3 Hours**

Weightage for the question paper

syllabus	Section-A (Short answer questions)	Section-B (essay questions)
Unit-1 (20 Marks)	1+1	1
Unit-2 (25Marks)	1	1+1
Unit-3 (40Marks)	1+1	1+1+1
Unit-4 (15 Marks)	1	1
Unit-5 (15Marks)	1	1

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.  
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**Practical syllabus**

Paper title: Preparations of Organic compounds	Paper code : CHE-602CE-P
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30 hrs (2 h / W) Credits-2

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

**SCHEME OF VALUATION**

1. INTERNAL MARKS- Record-10M

2. EXTERNAL MARKS-40M

- Titrimetric analysis -30
- Viva-10

TOTAL = 50 M



**A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.**  
(Accredited at "A" Grade by NAAC, Bangalore)

**Practical syllabus**

<b>Paper title:</b> Preparations of Organic compounds by Green procedure	<b>Paper code :</b> CHE-603CE-P
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**30 hrs (2h / W), Credits-2**

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

**SCHEME OF VALUATION**

1. INTERNAL MARKS- Record-10M
2. EXTERNAL MARKS-40 M
  - Practical -30
  - Viva-10

**TOTAL = 50 M**

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**Department of Chemistry**

Paper title: <b>Project work</b>	Paper code : CHE-604CE-P
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The students have chosen chemistry as cluster elective. "Laboratory Reagents" is selected as a project work to the students for this academic year.

**SCHEME OF VALUATION**

1. EXTERNAL- 25M- given by the Examiner (Viva)

2. INTERNAL = 25 M

- Written viva-10 M
- Submission of the project book-15M

TOTAL = 50 M

A.G.&S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE(AUTONOMOUS),VUYURU

(Accredited at "A" Grade by NAAC) ACADEMIC YEAR-2020-21

<b>SEMESTER - II</b>	<b>PAPER CODE :</b>
<b>PAPER TITLE : FOOD ADULTERATION</b>	

**UNIT-I:** Total: 30Hrs (2h/week) 02 Credits

**Common Foods and Adulteration(10+10+5+5) 10Hrs**

Common Foods subjected to Adulteration-Adulteration-Definition –Types; Poisonous substances, Foreign matter, cheap substitutes, Spoiled parts. Adulteration through Food Additives –Intentional and incidental. General Impact on Human Health.

**UNIT-II :**

**Adulteration of Common Foods and Methods of Detection (10+10+5+5+5) 10Hrs**

Means of Adulteration Methods of Detection Adulterants in the following Foods; Milk, Oil, Grain, Sugar, Spices and Condiments, Processed Food, Fruits and Vegetables. Additives and Sweetening agents (at least three methods of detection for each food item).

**UNIT-III:**

## **Present Laws and Procedures on Adulteration(10+10+5+5+5)**

**10Hrs**

Highlights of Food Safety and Standards Act 2006 (FSSA) –Food Safety and Standards Authority of India- Rules and Procedures of Local Authorities.Role of Voluntary Agencies Suchas, Agmark, I.S.I. Quality control laboratories of Companies, Private testing laboratories, Quality control laboratories of Consumer co-operatives.

Consumer Education, Consumer's problems, rights and responsibilities, COPRA2019-Offenses and Penalties-Procedures to Complain –Compensation to Victims.

### Reference books and Websites:

- 1.A first course in Food Analysis – A.Y. Sathe,New Age International (p) Ltd, 1999
2. Food Safety, case studies –Ramesh.V.Bhat,NIN,1992
- 3.[https://old.fssai.gov.in/Portals/0/Pdf/](https://old.fssai.gov.in/Portals/0/Pdf/Draft%20Manuals/Beverages%20and%20Confectionary.pdf) Draft Manuals/ Beverages and Confectionary.pdf
- 4.<https://www.fssai.gov.in/>
- 5.<https://indianlegalsolution.com/laws-on-food-adulteration/>
- 6.<https://fssai.gov.in/dart/>
- 7.<https://byjus.com/biology/food-adulteration/>

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.  
ACADEMIC YEAR-2020-21

<b>SEMESTER – II</b>	<b>COURSE CODE :</b>
<b>PAPER TITLE : FOOD ADULTERATION ,PAPER - II</b>	

Time: 2 Hours

Maximum marks: 50

Pass marks:20

SECTION-A

Answer any FOUR Questions. Each question carries 5 marks. 4X5=20Marks

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

SECTION-B

Answer any THREE Questions. Each question carries 10 marks. 3X10=30M

- 9.
- 10.
- 11.
- 12.
- 13.
- 14.

The Guidelines to be followed by the question paper setters in Chemistry for the  
II-Semester - end exams. ACADEMIC YEAR-2020-21

Weightage for the question paper-FOOD ADULTERATION

syllabus	Section-A (Short answer questions)	Section-B (Essay questions)
Unit-1 (30Marks)	1+1	1+1
Unit-2 (35Marks)	1+1+1	1+1
Unit-3 (35Marks)	1+1+1	1+1

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

**A.G& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS &  
SCIENCE**

**VUYYURU-521165, KRISHNA Dt., A.P.(Autonomous)**

**Accredited by NAAC with "A" Grade**

**2020-2021**



**DEPARTMENT OF CHEMISTRY**

**MINUTES OF BOARD OF STUDIES**

**ODD SEMESTER**

**08-07-2020**

Minutes of the Online meeting of Board of studies in Chemistry for the Autonomous course of A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru held at 11.00 am on 08-07-2020.

*Smt A.INDIRA Presiding*

Members Present:

- 1) *A. Indira*  
(Smt.A.Indira) Chairman HOD, Dept. of Chemistry,  
A.G. & S.G.S.Degree College,Vuyyuru.
- 2) ..... University Nominee Assistant Professor,  
(Prof.D.Ramasekhar Reddy) Dept. of Chemistry,Krishna University, MTM.
- 3) ..... Academic Council Nominee Associate Professor in Chemistry,  
(Dr.K.A.Emanuel) Sir C.R.Reddy College,Eluru.
- 4) ..... Academic Council Nominee Associate Professor in Chemistry,  
(Dr.D.Bala karuna kumar) A.L.C College,Vijayawada.
- 5) ..... Industrialist Manager, Q.C, Divis Laboratories Ltd,  
(Dr.Nadella Taraka Ramarao) Vizag.
- 6) ..... Student Nominee Lecturer in Chemistry,  
(Dr.V.Phani Kumar) SRR&CVR Govt. Degree College, BZA.
- 7) *K. Ramesh*  
(Sri.K.Ramesh) Member Lecturer in Chemistry,  
A.G. & S.G.S.Degree College,Vuyyuru.
- 8) *M. Venkateswari*  
(Smt.M.V.Santhi) Member Lecturer in Chemistry,  
A.G. & S.G.S.Degree College,Vuyyuru.
- 9) *G. Ramesh*  
(Sri.G.Ramesh) Member Lecturer in Chemistry,  
A.G. & S.G.S.Degree College, Vuyyuru.
- 10) *P. Suresh*  
(Sri.P.Suresh) Member Lecturer in Chemistry,  
A.G. & S.G.S.Degree College,Vuyyuru.
- 11) *M. Santhi*  
(Ms.M.Santhi) Member Lecturer in Chemistry,  
A.G. & S.G.S.Degree College,Vuyyuru.
- 12) ..... Member Rtd.Lecturer in Chemistry,  
(Sri.J.Nageswara Rao) A.G. & S.G.S.Degree College,Vuyyuru.

## Agenda for B.O.S Meeting

1. To recommend the syllabus and model paper for I semester of I Degree B.Sc., Chemistry for the Academic year 2020-2021.
2. To recommend the syllabus and model papers for III semester of II Degree B.Sc., Chemistry for the Academic year 2020-2021.
3. To recommend the syllabus and model papers for V semester of III Degree B.Sc. Chemistry for the Academic year 2020-2021.
4. To recommend the Blue print of I,III,V semesters of B.Sc. Chemistry for the Academic year 2020-2021.
5. To recommend the Guidelines to be followed by the question paper setters in Chemistry for I, III, V Semester – end exams.
6. To recommend the teaching and evaluation methods to be followed under Autonomous status.
7. Any suggestions regarding certificate course, seminars, workshops, Guest lecture to be organized.
8. Recommend the panel of paper setters and Examiners to the controller of Examinations of autonomous  
Courses of A.G. & S.G.S.Degree colleges of Arts & Science, Vuyyuru.
9. Any other matter.

  
Chairman.



## RESOLUTIONS

- 1) It is resolved to change new **syllabus and model paper for I semesters of I B.Sc.** under Choice Based Credit System (CBCS) for the Academic year 2020-21.
  - **Syllabus of five units will be changed in sem-1 with paper title Inorganic and Physical chemistry.**
- 2) It is resolved to implement the same syllabus **and model papers** under Choice Based Credit System (CBCS) for the Academic year 2020-21 for **III semester of II B.Sc.**
- 3) It is resolved to implement the same **syllabus and model papers** under Choice Based Credit System (CBCS) for the Academic year 2020-21 for **V semester of III B.Sc.**
- 4) It is resolved to follow the **Blue prints** of I, III semesters of Degree B.Sc. for the Academic year 2019-20. It is resolved to continue the same **Blue prints** of V semesters of Degree B.Sc. for the Academic year 2020-21.
- 5) It is resolved to follow the **guidelines** to be followed by the question paper setters of Chemistry for I, III semesters of Degree B.Sc. for the Academic Year 2019-20. It is resolved to continue the same **guidelines** to be followed by the question paper setters of Chemistry for V semester of Degree B.Sc. for the Academic Year 2020-21.
- 6) It is resolved to continue the following teaching and evolution methods for Academic year 2020-21.

### Teaching Methods:

Besides the conventional methods of teaching, we use modern technology i.e. using of LCD projector to display on U boards etc, for better understanding of concepts.

### Evaluation of a student is done by the following procedure:

- **Internal Assessment Examinations:**
- Out of maximum 100 marks in each paper for I, II B.Sc, 30 marks shall be allocated for internal assessment.
- Out of these 30 marks, **20 marks are allocated for announced tests (i.e. IA-1 & IA-2)**. Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, **5 marks** are allocated on the basis of candidate's **percentage of attendance and remaining 5 marks are allocated for the innovative component like assignment/quiz/seminars for IB.Sc.**
- There is **no pass minimum** for internal assessment for I, II B.Sc.
- Out of maximum 100 marks in each paper for III B.Sc, 25 marks shall be allocated for internal assessment.
- Out of these 25 marks, **15 marks are allocated for announced tests (i.e. IA-1 & IA-2)**. Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, **5 marks** are allocated on the basis of candidate's **percentage of attendance and remaining 5 marks are allocated for the assignment for III B.Sc.**
- **Semester – End Examination:**

- The maximum mark for I, II B.Sc Semester – End examination shall be 70 marks and duration of the examination shall be 3 hours. Even though the candidate is absent for two IA exams /obtain Zero marks the external marks are considered (if the candidate gets 40/70) and the result shall be declared as “PASS”.
  - The maximum marks for III B.Sc Semester – End examination shall be 75 marks and duration of the examination shall be 3 hours.
  - Semester – End examinations shall be conducted in theory papers at the end of every semester, while in practical papers, these examinations are conducted at the end of I,III, & V semesters for I, II &III B.Sc.
- 7) Discussed and recommended for organizing **certificate course, seminars, Guest lecturers, workshops** to upgrade the knowledge of students, for the approval of the academic council.
  - 8) Discussed and empowered the Head of the department of Chemistry to suggest the panel of paper setters and examiners to the controller of examinations. **Department of Chemistry Adopted Value Added Course “Green Chemistry”.**
  - 9) NIL.

  
.....  
Chairman

SEMESTER-I	PAPER CODE : CHE-101C
PAPER TITLE : INORGANIC & PHYSICAL CHEMISTRY, PAPER – I	

TOTAL PERIODS - 60 (4hrs/week) Credits - 3

### INORGANIC CHEMISTRY

UNIT –I (M.W-10 + 10 + 5) 10h

Chemistry of P-block elements:

**Inorganic polymers** : Inert pair effect, types of inorganic polymers, comparison with organic polymers, synthesis & structure aspects and applications of, Borazines, Silicones, Silicates and Phosphazenes, Structures of Oxides and Oxoacids of Sulphur. Structures of Inter halogen compounds & Pseudo halogens.

UNIT –II

1. **Transition Elements:** (M.W-10 +5) 6hrs

Characteristics of d-block elements with special reference to electronic configuration, Variable valence, magnetic properties, catalytic properties and ability to form complexes. Stability of various oxidation states.

2. **Inner transition Elements:** (M.W – 5+5) 6 hrs

Chemistry of lanthanides - electronic configuration, oxidation states, lanthanide contraction & Its Consequences, Magnetic properties. Chemistry of actinides -Electronic configuration, Oxidation states, Actinide contraction, Comparison of Lanthanides and Actinides.

### PHYSICAL CHEMISTRY

UNIT-III

1. **Solid State:** (M.W-10+5) 10h

Characteristics of the Solid state, Law of constancy of interfacial angles, Law of rationality of indices. Miller indices, Symmetry in crystals. Definition of Lattice point, Space lattice, Unit cell. Seven crystal systems and 14 Bravais lattices, X-ray diffraction, Bragg's law. Defects in crystals.

2. **Gaseous state:** (M.W-10) 5h

Vander Waal's equation of state. Andrew's isotherms of Carbon dioxide, Continuity of state. Critical phenomena. Relationship between critical constants and Vander Waal's constants. Law of corresponding states.

UNIT-IV

1. **Liquid Crystals:** (M.W-10) 4 h

Liquid crystals, 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. **Liquid Mixtures:** (M.W-10+5) 10

Definition, Types of liquid mixtures, Examples. Miscible liquid mixture- Azeotropes -HCl-H<sub>2</sub>O Ethanol-water systems. Partially miscible liquid mixture-Phenol -Water. Critical Solution temperature- Effect of impurity on Consulate temperature. Immiscible liquid mixtures-steam distillation, Nernst distribution law calculation of partition coefficient & its applications.

## UNIT-V

### 1. Colligative Properties:

(M.W-10+5)

6h

Colligative properties. Relative lowering of vapour pressure, Elevation of boiling point -Experimental method -Cottrell's method, Depression in freezing point- Experimental method - Beckmann's method, Osmosis, Osmotic pressure- Experimental method-Berkeley-Hartley method. Abnormal Colligative properties Van't Hoff factor.

### 2. Ionic Equilibrium:

(M.W-5)

3h

Common ion effect, Ionic product, solubility and solubility product calculations based on solubility product.

#### List of Text Books

1. Selected topics in inorganic chemistry by W.D.Malik, G..D.Tuli,R.D.Madan
2. Inorganic Chemistry J E Huheey, E A Keiter and R L Keiter
3. Inorganic Chemistry by J.E.Huheey
4. Basic Inorganic Chemistry by Cotton and Wilkinson
5. Advanced Physical chemistry by Guru deep Raj
6. Advanced Physical chemistry by Bahl & Tuli
7. Text book of Physical Chemistry by S.Glasstone
8. Solid state Chemistry & its applications by Anthony R.West

SEMESTER - I	PAPER CODE : CHE-101C
PAPER TITLE : INORGANIC AND PHYSICAL CHEMISTRY, PAPER-I	

Time: 3Hours

Maximum marks: 70

Pass marks: 28

SECTION-A

Answer any FOUR of the following. Each question carries 5 marks. 4X5=20M

1. Write any two preparations methods of Silicones?
2. Write electronic configurations of 4d Series?
3. Write the electronic configuration of Actinides?
4. Write oxidation states of Lanthanides?
5. Explain characteristics of solids?
6. Explain about immiscible liquid mixture?
7. Explain solubility product with examples?
8. Write short note on Abnormal Colligative properties.

SECTION-B

Answer any FIVE questions. Each question carries 10 marks. 5X10=50M

9. What are Inorganic Polymers and write comparisons between Inorganic and Organic polymers ?
10. Explain the structures of oxoacids of Sulpher ?
11. Explain stability of variable oxidation states of d-block elements.
12. Discuss about x-ray diffraction and crystal structure.
13. Explain Andrew's isotherms of carbon dioxide.
14. Write the differences between Liquid crystal and Solid/liquid.
15. Explain Nernst distribution law for associated molecules.
16. Explain experimental Cottrell's method?

The Guidelines to be followed by the question paper setters in chemistry for the  
I-Semester - end exams      ACADEMIC YEAR-2020-2021

SEMESTER-I	PAPER CODE : CHE-101C
PAPER TITLE : INORGANIC & PHYSICAL CHEMISTRY, PAPER – I	

Weightage for the question paper

syllabus	Section-A (Short answer questions)	Section-B (essay questions)
Unit-1 (25 Marks)	1	1 + 1
Unit-2 (25 Marks)	1+1+1	1
Unit-3 (25 Marks)	1	1+1
Unit-4 (25Marks)	1	1+1
Unit-5 (20Marks)	1+1	1

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per weightage given by us.

Simple Salt Analysis

PAPER CODE : CHE-101P

### Salt mixture Analysis

30 hrs (2h / w)

Credits: 2

Analysis of salt mixture containing two anions and two cations from the following.

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

**Cations:** Lead, copper, iron, aluminum, zinc, manganese, nickel, calcium, Strontium, barium, potassium and ammonium.

1. Analysis of simple salt-I
2. Analysis of simple salt-II
3. Analysis of simple salt-III
4. Analysis of simple salt-IV
5. Analysis of simple salt-V
6. Analysis of simple salt-VI

### SCHEME OF VALUATION

#### INTERNAL MARKS

- Record =10 M

#### EXTERNAL MARKS (40)

- Viva questions = 10 M

#### PRACTICAL EXAMINATION (30M)

- Identification of anion ..... 6M
- Confirmation test for anion ..... 6 M
- Group separation table with correct group ..... 10 M
- Confirmation test for cation ..... 5M
- Report ..... 3 M

TOTAL: 30 M

SEMESTER – III	SUBJECT: CHEMISTRY	PAPER CODE: CHE-301C
PAPER TITLE : INORGANIC, ORGANIC PHYSICAL CHEMISTRY, PAPER - III		

## INORGANIC CHEMISTRY

60 hrs (4 h / w) Credits - 3

### UNIT – I

#### Theories of bonding in metals:

- Metallic properties and its limitations, Valence bond theory, Free electron theory, Explanation of thermal and electrical conductivity of metals, limitations,
- Band theory, formation of bands, explanation of conductors, semiconductors and insulators.

### UNIT – II

#### 1. Metal carbonyls

- Effective atomic number(EAN), Calculation of EAN of metal atom.classification of metal carbonyls, structures and shapes of metal carbonyls of V, Cr, Mn, Fe, Co and Ni.

#### 2. Organometallic Chemistry

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

## ORGANIC CHEMISTRY

### UNIT-III

#### Carbonyl compounds

- Nomenclature of aliphatic and aromatic carbonyl compounds, structure of the carbonyl group. Synthesis of aldehydes from acid chlorides, synthesis of aldehydes and ketones using 1,3-dithianes, synthesis of ketones from nitriles and from carboxylic acids.
- **Physical properties:** Reactivity of carbonyl group in aldehydes and ketones.
- **Nucleophilic addition reaction** with a) NaHSO<sub>3</sub>, b) HCN, c) RMgX, d) NH<sub>2</sub>OH, e) PhNHNH<sub>2</sub>, f) 2,4-DNPH, g) Alcohols-formation of hemiacetal and acetal.
- **Base catalysed reactions:** a) Aldol, b) Cannizzaro reaction, c) Perkin reaction, d) Benzoin condensation, e) Haloform reaction, f) Knoevenagel reaction.
- Oxidation of aldehydes- Baeyer-Villiger oxidation of ketones.
- **Reduction:** Clemmensen reduction, Wolf-Kishner reduction, MPV reduction, reduction with LiAlH<sub>4</sub> and NaBH<sub>4</sub>.
- **Analysis of aldehydes and ketones** with a) 2,4-DNT test, b) Tollen's test, c) Fehling test, d) Schiff's test, e) Haloform test (with equation)



## UNIT-IV

### 1. Carboxylic acids and derivatives

- Nomenclature, classification and structure of carboxylic acids. Methods of preparation by a) Hydrolysis of nitriles, amides  
b) Hydrolysis of esters by acids and bases with mechanism  
c) 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 the acidities of aromatic and aliphatic acids.
- **Chemical properties:** Reactions involving H, OH and COOH groups- salt formation, anhydride formation, acid chloride formation, amide formation and esterification(mechanism). Degradation of carboxylic acids by Huns-Diecker reaction, decarboxylation by Schimdt reaction, Arndt-Eistert synthesis, halogenation by Hell-Volhard- Zelinsky reaction.

### 2. Active methylene compounds

- **Acetoacetic esters:** keto-enol tautomerism, preparation by Claisen condensation, Acidhydrolysis and ketonic hydrolysis.
- Preparation of a) monocarboxylic acids(Acetic acid, Propaonic acid).  
b) Dicarboxylic acids(Succinic acid, Adipic acid).C)Reaction with urea
- **Malonic ester:** preparation from acetic acid.  
**Synthetic applications:** Preparation of a) monocarboxylic acids (propionic acid and n-butyric acid).  
b) Dicarboxylic acids (succinic acid and adipic acid)  
c)  $\alpha,\beta$ -unsaturated carboxylic acids (crotonic acid).Reaction with urea.

## PHYSICAL CHEMISTRY

### UNIT-V

#### Dilute solutions

- Colligative properties. Raoult's law, relative lowering of vapour pressure, its relation to molecular weight of non-volatile solute. Experimental method-Ostwald method.
- Elevation of boiling point , Derivation of relation between molecular weight and elevation in boiling point, Experimental method –Cottrell's method
- Depression in freezing point. Derivation of relation between molecular weight and depression in freezing point, Experimental method – Beckmann's method.
- Osmosis,osmotic pressure, Determination of molecular weight of non-volatile solute from osmotic pressure. Experimental method-Berkeley-Hartley method. Abnormal Colligative properties- Van't Hoff factor.

### **List of Text Books**

1. Selected topics in inorganic chemistry by W.D.Malik, G..D.Tuli,R.D.Madan
2. Inorganic Chemistry J E Huheey, E A Keiter and R L Keiter
3. A Text Book of Organic Chemistry by Bahl and Arun bahl
4. A Text Book of Organic chemistry by I L Finar Vol I
5. Telugu Academy Textbook of Chemistry Vol- II (English medium)
6. Unified chemistry Vol- II by O.P.Agarwal
7. Unified chemistry Vol- II by K.Ramarao and Y. R. Sharma (KalyaniPublishers)

### **List of Reference Books**

1. Organic chemistry by Bruice
2. Organic chemistry by Clayden
3. Advanced Inorganic chemistry by Gurudeep Raj
4. Basic Inorganic Chemistry by Cotton and Wilkinson
5. Concise Inorganic Chemistry by J.D.Lee
6. Pradeep's chemistry vol- I & II

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(Accredited at "A" Grade by NAAC, Bangalore)

SEMESTER – III	PAPER CODE : CHE-301C
PAPER TITLE : INORGANIC AND ORGANIC CHEMISTRY, PAPER-III	

Time: 3Hours

Maximum marks: 75

Pass marks: 30

**SECTION-A**

Answer any FIVE of the following. Each question carries 5 marks. 5X5=25

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

**SECTION-B**

Answer any FIVE questions. Each question carries 10 marks. 5X10=50

- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
- 15.
- 16.

**The Guidelines to be followed by the question paper setters in chemistry for the  
III- Semester - end exams**

<b>SEMESTER – III</b>	<b>PAPER CODE : CHE-301C</b>
<b>PAPER TITLE : INORGANIC AND ORGANIC CHEMISTRY, PAPER-III</b>	

**Weightage for the question paper**

<b>syllabus</b>	<b>Section-A (Short answer questions)</b>	<b>Section-B (essay questions)</b>
<b>Unit-1 (25 Marks)</b>	<b>1</b>	<b>1 + 1</b>
<b>Unit-2 (20 Marks)</b>	<b>1 + 1</b>	<b>1</b>
<b>Unit-3 (30 Marks)</b>	<b>1 + 1</b>	<b>1+1</b>
<b>Unit-4 (15 Marks)</b>	<b>1</b>	<b>1</b>
<b>Unit-5 (30 Marks)</b>	<b>1 +1</b>	<b>1 + 1</b>

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

Organic qualitative analysis-I	PAPER CODE : CHE-301 P
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**PRACTICAL SYLLABUS**

**30 hrs. (2h / w), Credits-2**

**Organic Qualitative Analysis: 50M**

Analysis of an organic compound through systematic qualitative procedure for functional group identification including the determination of melting point and boiling point .

Alcohols, Phenols, Aldehydes, Ketones, ,Carboxylic acids,

**SCHEME OF VALUATION**

1. INTERNAL MARKS- Record-10M

2. EXTERNAL MARKS-40

- Analysis of an organic compound and preparation of suitable derivative-30M
- Viva questions = 10 M

TOTAL = 50 M

<b>SEMESTER – V</b>	<b>SUBJECT: CHEMISTRY</b>	<b>COURSE CODE: CHE-501C</b>	
<b>PAPER TITLE : INORGANIC,ORGANIC &amp; PHYSICAL CHEMISTRY, Paper –V</b>			
		<b>60 hrs(4h/w)</b>	<b>Credits-3</b>

### INORGANIC CHEMISTRY

#### UNIT – I

**Coordination Chemistry: (10+10+5) 12h**

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 - factors affecting crystal-field splitting energy, merits and demerits of crystal-field theory. Isomerism in coordination compounds - structural isomerism and stereo isomerism, stereochemistry of complexes with 4 and 6 coordination numbers

#### UNIT-II

**1. Spectral and magnetic properties of metal complexes: (10+5) 5h**

Types of magnetic behavior, spin-only formula, calculation of magnetic moments, experimental determination of magnetic susceptibility-Gouy method.

**2. Stability of metal complexes: (10+5) 6h**

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

### ORGANIC CHEMISTRY

#### UNIT- III

**Nitro hydrocarbons: (10+5) 5h**

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

#### UNIT – IV

**Nitrogen compounds: (10+10+5) 16h**

Amines (Aliphatic and Aromatic): Nomenclature, Classification into 1°, 2°, 3° Amines and Quarternary ammonium compounds. Preparative methods –  
1. Ammonolysis of alkyl halides 2. Gabriel synthesis 3. Hoffman's bromamide reaction (mechanism).  
Reduction of Amides and Schmidt reaction. Physical properties and basic character - Comparative basic strength of Ammonia, methyl amine, dimethyl amine, trimethyl amine and aniline - comparative basic strength of aniline, N-methylaniline and N,N-dimethyl aniline (in aqueous and non-aqueous medium), steric effects and substituent effects.

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

## PHYSICAL CHEMISTRY

### UNIT- V

#### **Thermodynamics (10+5+5+5)**

**16h**

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

#### **List of Reference Books**

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

SEMESTER – V	PAPER-V	PAPER CODE : CHE-501C
PAPER TITLE : INORGANIC,ORGANIC & PHYSICAL CHEMISTRY		

Time: 3Hours

Maximum marks: 75

Pass marks: 30

**SECTION-A**

Answer any FIVE of the following. Each question carries 5 marks. 5X5=25

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

**SECTION-B**

Answer any FIVE questions. Each question carries 10 marks. 5X10=50

- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
- 15.
- 16.



**The Guidelines to be followed by the question paper setters in chemistry for the  
V- Semester - end exams**

<b>SEMESTER – V</b>	<b>SUBJECT: CHEMISTRY</b>	<b>COURSE CODE: CHE-501C</b>
<b>PAPER TITLE : INORGANIC,ORGANIC &amp; PHYSICAL CHEMISTRY, Paper –V</b>		

**Weightage for the question paper**

<b>syllabus</b>	<b>Section-A (Short answer questions)</b>	<b>Section-B (essay questions)</b>
<b>Unit-1 (25 Marks)</b>	<b>1</b>	<b>1 + 1</b>
<b>Unit-2 (30 Marks)</b>	<b>1 + 1</b>	<b>1+1</b>
<b>Unit-3 (15 Marks)</b>	<b>1</b>	<b>1</b>
<b>Unit-4 (25 Marks)</b>	<b>1</b>	<b>1 + 1</b>
<b>Unit-5 (25 Marks)</b>	<b>1 +1+1</b>	<b>1</b>

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

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**PRACTICAL SYLLABUS**

<b>Practical Paper – V</b> <b>Organic Qualitative Analysis</b>	<b>PAPER CODE : CHE-501 P</b>
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**30 hrs (2 h/W)      Credits: 2**

**Organic Qualitative Analysis: 50M**

Analysis of an organic compound through systematic qualitative procedure for functional group identification including the determination of melting point and boiling point .

Alcohols, Phenols, Aldehydes, Ketones, Carbohydrates,  
Carboxylic acids, Aromatic Primary Amines.

**SCHEME OF VALUATION**

**1. INTERNAL MARKS- Record-10M**

**2. EXTERNAL MARKS-40**

- **Analysis of an organic compound and preparation of suitable derivative-30M**
- **Viva questions = 10 M**

**TOTAL = 50 M**

SEMESTER – V	Paper – VI	SUBJECT: CHEMISTRY	PAPER CODE: CHE-502C
PAPER TITLE : INORGANIC,ORGANIC & PHYSICAL CHEMISTRY			
			60 hrs (4h/w) Credits-3

### INORGANIC CHEMISTRY

#### UNIT-I

##### **1. Reactivity of metal complexes: (10+5)**

5h

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

##### **2. Bioinorganic chemistry: (10)**

5h

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

### ORGANIC CHEMISTRY

#### UNIT- II

##### **Heterocyclic Compounds (10+5)**

8h

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

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

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

#### UNIT-III

##### **Carbohydrates (10+5+5+5)**

12h

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

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

**Interconversion of Monosaccharides:** Aldopentose to Aldohexose (Arabinose to D- Glucose, D-Mannose) (Kiliani - Fischer method). Epimers, Epimerisation - Lobry de

bruyen van Ekenstein rearrangement. Aldohexose to Aldopentose (D-Glucose to D- Arabinose) by Ruff degradation. Aldohexose to Keto-hexose [(+) Glucose to (-) Fructose] and Keto-hexose to Aldohexose (Fructose to Glucose)

#### **UNIT- IV**

##### **Amino acids and proteins (10+10+5)**

**12h**

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

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

### **PHYSICAL CHEMISTRY**

#### **UNIT-V**

##### **1. Chemical kinetics (10+5)**

**9h**

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

##### **2. Photochemistry (10+5 )**

**9h**

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

##### **List of Reference Books**

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

SEMESTER – V	PAPER-VI	PAPER CODE : CHE-502C
PAPER TITLE : INORGANIC,ORGANIC & PHYSICAL CHEMISTRY		

Time: 3Hours

Maximum marks: 75

Pass marks: 30

SECTION-A

Answer any FIVE of the following. Each question carries 5 marks. 5X5=25

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

SECTION-B

Answer any FIVE questions. Each question carries 10 marks. 5X10=50

- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
- 15.
- 16.

**The Guidelines to be followed by the question paper setters in chemistry for the  
V- Semester - end exams**

<b>SEMESTER – V</b>	<b>SUBJECT: CHEMISTRY</b>	<b>PAPER CODE: CHE-502C</b>
<b>PAPER TITLE : INORGANIC,ORGANIC &amp; PHYSICAL CHEMISTRY, Paper – VI</b>		

**Weightage for the question paper**

<b>syllabus</b>	<b>Section-A (Short answer questions)</b>	<b>Section-B (essay questions)</b>
<b>Unit-1 (25 Marks)</b>	<b>1</b>	<b>1 + 1</b>
<b>Unit-2 (15 Marks)</b>	<b>1</b>	<b>1</b>
<b>Unit-3 (25 Marks)</b>	<b>1 + 1+1</b>	<b>1</b>
<b>Unit-4 (25 Marks)</b>	<b>1</b>	<b>1 + 1</b>
<b>Unit-5 (30 Marks)</b>	<b>1 +1</b>	<b>1 + 1</b>

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

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**PRACTICAL SYLLABUS**

<b>Practical Paper –VI Physical Chemistry</b>	<b>COURSE CODE : CHE-502 P</b>
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**30 hrs (2 h/W)      Credits: 2**

1. Determination of rate constant for acid catalyzed ester hydrolysis.
2. Determination of molecular status and partition coefficient of benzoic acid in Benzene and water.
3. Determination of Surface tension of liquid
4. Determination of Viscosity of liquid.
5. Adsorption of oxalic acid on silica gel , verification of Freundlich isotherm.

**SCHEME OF VALUATION**

1. INTERNAL MARKS- Record-10M
2. EXTERNAL MARKS-40
  - Practical-30
  - Viva-10

**TOTAL = 50 M**

**A.G& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS &  
SCIENCE**

**VUYYURU-521165, KRISHNA Dt., A.P.(Autonomous)**

**Accredited by NAAC with "A" Grade**

**2021-2022**



**DEPARTMENT OF CHEMISTRY**

**MINUTES OF BOARD OF STUDIES**

**EVEN SEMESTER**

**06-04-2022**



Minutes of the Meeting of Board of Studies in Chemistry for the Autonomous Course

A.G. & S.G.Siddhartha Degree College of Arts & Science, Vuyyuru held at 11.00 A.M on 06-04--2022 in

the Department of Chemistry.

Sri. K.RAMESH

Presiding

**Members Present:**

- 1) K. Ramesh ..... Chairman HOD, Dept. of Chemistry,  
(Sri. K.RAMESH) A.G. & S.G.S.Degree College, Vuyyuru.
- 2) D. Ramasekhara Reddy ..... University Nominee Assistant Professor,  
(Prof.D.Ramasekhara Reddy) Dept. of Chemistry, Krishna University, MTM.
- 3) S. Kalpana ..... Academic Council Nominee HOD, Dept. of Chemistry,  
(Dr. S. Kalpana) SDMS M College, Vijayawada.
- 4) A. Indira ..... Academic Council Nominee Lecturer in Chemistry,  
(Smt. A. Indira) G.D.C, Dumpagadapa
- 5) ..... Industrialist Manager, Q.A, Biophore india  
(Dr. G Raja) Pharmaceuticals pvt ltd Hyd,
- 6) ..... Student Nominee Lecturer in Chemistry,  
(Smt. M. Sowjanya) ANR College Gudivada.
- 7) G. Giri Prasad ..... Member Lecturer in Chemistry,  
(Dr. G.Giri prasad) A.G. & S.G.S.Degree College, Vuyyuru
- 8) M. Venkatalakshmi ..... Member Lecturer in Chemistry,  
(Smt. M.V.Santhi) A.G. & S.G.S.Degree College, Vuyyuru.
- 9) P. Suresh ..... Member Lecturer in Chemistry,  
( Sri. P.Suresh) A.G. & S.G.S.Degree College, Vuyyuru.
- 10) M. Santhi ..... Member Lecturer in Chemistry,  
( MS. M.Santhi) A.G. & S.G.S.Degree College, Vuyyuru.
- 11) J. Nageswara Rao ..... Member Rtd.Lecturer in Chemistry,  
(Sri. J.Nageswara Rao) A.G. & S.G.S.Degree College, Vuyyuru.

## Agenda for B.O.S Meeting

1. To recommend the syllabus and model paper for II semester of I Degree B.Sc., Chemistry for the Academic year 2021-2022.
2. To recommend the syllabus and model papers for IV semester of II Degree B.Sc., Chemistry for the Academic year 2021-2022.
3. To recommend the syllabus and model papers for VI semester of III Degree B.Sc. Chemistry for the Academic year 2021-2022.
4. To recommend the Blue print of II, IV, VI semesters of B.Sc. Chemistry for the Academic year 2021--2022.
5. To recommend the Guidelines to be followed by the question paper setters in Chemistry for II, IV, VI Semester-end exams.
6. To recommend the teaching and evaluation methods to be followed under Autonomous status.
7. Any suggestions regarding certificate course, seminars, workshops, Guest lecture to be organized.
8. Recommend the panel of paper setters and Examiners to the controller of Examinations of autonomous Courses of A.G. & S.G.S. Degree colleges of Arts & Science, Vuyyuru.
9. Any other matter.

*K. Ramakrishna*  
Chairman.

## RESOLUTIONS

- 1) It is resolved to Change the **syllabus for II semesters of I B.Sc.** under Choice Based Credit System (CBCS) for the Academic year 2021--2022.

**Adding Syllabus: HSAB Unit-4**

- 2) It is resolved to follow the **syllabus of APSCHE for IV semesters of II B.Sc.** under Choice Based Credit System (CBCS) for the Academic year 2021--2022. II, IV, & VI

- In this academic year two papers will be introduced i.e. CHE-401(Inorganic, Organic and Physical chemistry) & CHE-402( Inorganic, Organic and Physical chemistry)

- 3) It is resolved to implement the same **syllabus** under Choice Based Credit System for the Academic year 2021-2022 for **VI semester of III B.Sc.**

- 4) It is resolved to follow the **Blue prints** as proposed by members of BOS II, IV & VI semester of Degree B.Sc. for the Academic year 2021-2022.

- 5) It is resolved to follow the **guidelines** to be followed by the question paper setters of Chemistry for II, IV & VI semesters of Degree B.Sc. for the Academic Year 2021-2022.

- 6) It is resolved to continue the following teaching and evolution methods for Academic year 2021-22.

### Teaching Methods:

Besides the conventional methods of teaching, we use modern technology i.e. using of LCD projector to display on U boards etc, for better understanding of concepts.

### Evaluation of a student is done by the following procedure:

#### • Internal Assessment Examinations:

- Out of maximum 100 marks in each paper for I B.Sc, 25 marks shall be allocated for internal assessment. Out of these 25 marks, 15 marks are allocated for announced tests (i.e. IA-1 & IA-2).
- Out of maximum 100 marks in each paper for II, III B.Sc, 30 marks shall be allocated for internal assessment. Out of these 30 marks, **20 marks are allocated for announced tests (i.e. IA-1 & IA-2).**
- Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, **5 marks** are allocated on the basis of candidate's **percentage of attendance and remaining 5 marks are allocated for the innovative component like assignment/quiz/seminars for II, IV, VI B.Sc.**
- There is **no pass minimum** for internal assessment for I, II, III B.Sc.

#### Semester – End Examination:

- The maximum marks for I B.Sc Semester – End examination shall be 75 marks and 70 marks for II, III B.Sc., duration of the examination shall be 3 hours. Even though the candidate is absent for two IA exams /obtain Zero marks the external marks are considered (if the candidate gets 40/70) and the result shall be declared as "PASS".
- Semester – End examinations shall be conducted in theory papers at the end of every semester, while in practical papers, these examinations are conducted at the end of II, IV, & VI semesters for I, II & III B.Sc for 50 marks.
- Discussed and recommended for organizing **certificate course, seminars, Guest lecturers, workshops** to upgrade the knowledge of students, for the approval of the academic council.
- Discussed and empowered the Head of the department of Chemistry to suggest the panel of paper setters and examiners to the controller of examinations.
- NIL.

*K. Ramani*

Chairman



**A.G & S.G. SIDDHARTHA DEGREE COLLEGE OF  
ARTS & SCIENCE**

Vuyyuru-521165

NAAC reaccredited at "A" level

Autonomous -ISO 9001 – 2015 Certified

**Title of the Paper: ORGANIC AND GENERAL CHEMISTRY**

**Semester: II**

Course Code	CHET21A	Course Delivery Method	Class Room / Blended Mode
Credits	3	CIA Marks	25
No. of Lecture Hours / Week	4	Semester End Exam Marks	75
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction : 2021-22	Year of Offering: 2021 - 22	Year of Revision: -----	Percentage of Revision: 0

**Course outcomes:**

At the end of the course, the student will be able to;

**CO1.** Understand and explain the differential behaviour of organic compounds based on fundamental concepts learnt.

**CO2.** Formulate the mechanism of organic reactions by recalling and correlating the fundamental properties of the reactants involved.

**CO3.** Learn and identify many organic reaction mechanisms including Free Radical Substitution, Electrophilic Addition and Electrophilic Aromatic Substitution.

**CO4.** Understand the concepts of absorption and adsorption, colloidal chemistry and nature of Chemical Bonding.

**CO5.** Correlate and describe the stereo chemical properties of organic compounds and reactions.

## **Learning Objectives:**

1. To understand the basic concepts of alkanes & cycloalkanes.
2. To identify the difference between saturated and unsaturated hydrocarbons.
3. To learn the basic concepts of aromatic compounds and its reactivity.
4. To understand the chemistry of adsorption, colloid chemistry, HSAB principle and Molecular Orbital theory.
5. To learn the fundamental aspects of stereo chemistry.

## Syllabus

### Course Details

Unit	Learning Units	Lecture Hours
<b>ORGANIC CHEMISTRY</b>		
I	<p><b>Recapitulation of Basics of Organic Chemistry</b>  <b>Carbon-Carbon sigma bonds (Alkanes and Cycloalkanes)</b></p> <p><b>1.1</b> General methods of preparation of alkanes- Wurtz and Wurtz - Fittig reaction, Corey House synthesis, physical and chemical properties of alkanes, Isomerism and its effect on properties.</p> <p><b>1.2</b> Free radical substitutions; Halogenation, concept of relative reactivity v/s selectivity.</p> <p><b>1.3</b> Conformational analysis of alkanes (Conformations, relative stability and energy diagrams of Ethane, Propane and butane).</p> <p><b>1.4</b> General molecular formulae of cycloalkanes and relative stability, Baeyer strain theory, Cyclohexane conformations with energy diagram, Conformations of mono substituted cyclohexane.</p>	<b>12h</b>
II	<p><b>Carbon-Carbon pi Bonds (Alkenes and Alkynes)</b></p> <p><b>2.1</b> General methods of preparation, physical and chemical properties.</p> <p><b>2.2</b> Mechanism of E1, E2, E1CB reactions, Saytzeff and Hoffmann eliminations, Electrophilic Additions, mechanism (Markownikoff / Antimarkownikoff addition) with suitable examples, <i>syn</i> and <i>anti</i>-addition; addition of H<sub>2</sub>, X<sub>2</sub>, HX. oxymercuration-9, demercuration, hydroboration-oxidation, ozonolysis, Hydroxylation, Diels alder reaction, 1,2 and 1,4 addition reaction in Conjugated Dienes.</p> <p><b>2.3</b> Reactions of alkynes; acidity, electrophilic and</p>	<b>12h</b>

	nucleophilic additions, hydration to form carbonyl compounds, Alkylation of terminal alkynes.	
III	<p><b>Benzene and its reactivity</b></p> <p><b>3.1</b> Concept of aromaticity, Huckel's rule - application to Benzenoid (Benzene, Naphthalene) and Non - Benzenoid compounds (cyclopropenylcation, cyclopentadienyl anion and tropyliumcation)</p> <p><b>3.2</b> Reactions - General mechanism of electrophilic aromatic substitution, mechanism of nitration, Friedel-Craft's alkylation and acylation.</p> <p><b>3.3</b> Orientation of aromatic substitution - 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)</p>	12h
<b>GENERAL CHEMISTRY</b>		
IV	<p><b>Surface chemistry and chemical bonding</b></p> <p><b>1. Surface chemistry</b></p> <p><b>4.1 Colloids-</b> Coagulation of colloids- Hardy-Schulze rule. Stability of colloids, Protection of Colloids, Gold number.</p> <p><b>4.2 Adsorption-</b>Physical and chemical adsorption, Langmuir adsorption isotherm, applications of adsorption.</p> <p><b>2. Chemical Bonding</b></p> <p><b>4.3</b> Valence bond theory, hybridization, VB theory as applied to ClF<sub>3</sub>, Ni(CO)<sub>4</sub></p>	14h

	<p><b>4.4</b> Molecular orbital theory -LCAO method, construction of M.O. diagrams for homo-nuclear and hetero-nuclear diatomic molecules (N<sub>2</sub>, O<sub>2</sub>, CO and NO).</p> <p><b>3. HSAB</b></p> <p><b>4.5</b> Pearson's concept, HSAB principle &amp; its importance, bonding in Hard-Hard and Soft-Soft combinations.</p>	
V	<p><b>Stereochemistry of carbon compounds</b></p> <p><b>5.1</b> Molecular representations- Wedge, Fischer, Newman and Saw-Horse formulae.</p> <p><b>5.2</b> Optical isomerism: Optical activity- wave nature of light, plane polarised light, optical rotation and specific rotation.</p> <p><b>5.3</b> Chiral molecules- definition and criteria(Symmetry elements)- Definition of enantiomers and diastereomers – Explanation of optical isomerism with examples- Glyceraldehyde, Lactic acid, Alanine, Tartaric acid, 2,3-dibromopentane.</p> <p><b>5.4</b> D, L, R,S and E,Z- configuration with examples. Definition of Racemic mixture – Resolution of racemic mixtures (any 3 techniques)</p>	10h



## Co-curricular activities and Assessment Methods

Continuous Evaluation: Monitoring the progress of student's learning

Class Tests, Worksheets and Quizzes

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

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

### List of Text Books

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

### List of Reference Books

#### Theory:

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

#### Practical:

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

#### Additional Resources:

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

**A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE  
(AUTONOMOUS), VUYYURU.**

<b>SEMESTER – II</b>	<b>PAPER-II</b>	<b>PAPER CODE : CHET21A</b>
<b>PAPER TITLE: ORGANIC &amp; GENERAL CHEMISTRY -I ACADEMIC YEAR-2021-2022</b>		

**Time: 3 Hours**

**Max. Marks: 75M**

**PART- A**

5 X 5 = 25 Marks

Answer any **FIVE** of the following questions. Each carries **FIVE** marks

1. Write different conformations of n-butane. Explain their relative stability. **L2- CO1**
2. Explain 1, 2- & 1,4- addition reactions of conjugated dienes. **L2- CO2**
3. Explain the orientation effect of halogens on mono substituted benzene. **L2- CO3**
4. Explain the mechanism of E<sub>1</sub>CB elimination reaction. **L2- CO2**
5. Explain the structure of ClF<sub>3</sub> by Valency Bond theory. **L2- CO4**
6. What are Hard & soft acids & bases? Explain with examples. **L1- CO4**
7. Draw the Wedge, Fischer, Newmann & saw-Horse representations for Tartaric acid. **L1- CO5**
8. Define Enantiomers and Diastereomers and give two examples for each. **L2- CO5**

**PART- B**

5 X 10 = 50 Marks

Answer **ALL** the questions. Each carries **TEN** marks

9. (a) (i) Write the preparation of alkanes by Wurtz and Corey-House reaction.  
(ii) Explain Halogenation of alkanes. Explain the reactivity and selectivity in free radical substitutions. **L2- CO1**  
(or)  
(b). (i) Explain Baeyer Strain Theory  
(ii) Draw the conformations of Cyclohexane and explain their stability by drawing energy profile diagram. **L2- CO1**
10. (a). (i) Write any two methods of preparation of alkenes.  
(ii) Explain the mechanism of Markownikoff and Anti-Markownikoff addition of HBr to alkene. **L2- CO2**  
(or)  
(b) (i) Explain the acidity of 1-alkynes  
(ii) How will you prepare acetaldehyde and acetone from alkynes?  
(iii) Write alkylation reaction of terminal alkyne. **L1- CO2**

11. (a) Define Huckel rule of aromatic compounds. What are Benzenoid and non-Benzenoid aromatic compounds? Give examples. **L1- CO3**

(or)

(b) Explain the mechanisms of Nitration and Friedel-Craft's alkylation of Benzene. **L2- CO3**

12. (a) (i) Define Hardy-Schulze rule & Gold number.

(ii) Differentiate Physisorption & Chemisorption. Explain Langmuir adsorption isotherm.

**L2- CO4**

(or)

(b) Construct the Molecular Orbital diagram for O<sub>2</sub> and NO and explain their bond order and magnetic property. **L2- CO4**

13. (a) Define racemic mixture. Explain any two techniques for resolution of racemic mixture. **L2- CO5**

(or)

(b) (i) Define Optical activity and Specific rotation.

(ii) Draw the R- & S- isomers of Alanine, Glyceraldehyde.

(iii) Write the E- & Z- isomers of 2-butene. **L1- CO5**

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PRACTICAL SYLLABUS.**

<b>Practical Paper – II Volumetric Analysis</b>	<b>PAPER CODE : CHEP21A ACADEMIC YEAR-2021-2022</b>
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**30 hrs (2h/w)**

**Credits-2**

**Course outcomes:**

At the end of the course, the student will be able to;

1. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
2. Understand and explain the volumetric analysis based on fundamental concepts learnt in ionic Equilibria
3. Learn and identify the concepts of standard solutions, primary and secondary standards
4. Facilitate the learner to make solutions of various molar concentrations. This may include: The concept of the mole; Converting moles to grams; Converting grams to moles; Defining concentration; Dilution of Solutions; Making different molar concentrations.

**Volumetric analysis 50 M**

1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture.
2. Determination of Fe (II) using  $\text{KMnO}_4$  with oxalic acid as primary standard.
3. Determination of Cu (II) using  $\text{Na}_2\text{S}_2\text{O}_3$  with  $\text{K}_2\text{Cr}_2\text{O}_7$  as primary standard
4. Estimation of water of crystallization in Mohr's salt by titrating with  $\text{KMnO}_4$



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**Title of the Paper:** INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY

**Semester:** IV

Course Code	CHE-401C	Course Delivery Method	Class Room / Blended Mode
Credits	3	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction : 2021 - 22	Year of Offering: 2021 - 22	Year of Revision: -----	Percentage of Revision: 0

### Program outcomes:

Main objectives of this paper is to give a basics, applications and updated knowledge for the students on Chemistry of Organometallic Compounds, Carbohydrates Amino acids and proteins, Nitrogen Containing Functional Groups, Photochemistry and Thermodynamics.

### Course Outcomes:

At the end of the course, the student will be able to:

1. To learn about the laws of absorption of light energy by molecules and the subsequent photochemical reactions.
2. To understand the concept of quantum efficiency and mechanisms of photochemical reactions

## Syllabus

### Course Details

Unit	Learning Units	Lecture Hours
<b>INORGANIC CHEMISTRY</b>		
<b>I</b>	<p><b>Organometallic Compounds ( Marks weightage 10+5)</b></p> <p>Definition and classification of organometallic Compounds on the basis of bond type, Concept of hapticity of organic ligands. Metal carbonyls: 18electronrule, electron count of mononuclear, poly nuclear and substituted metal carbonyls of Fe, Ni, Co.</p>	<b>8h</b>
<b>ORGANIC CHEMISTRY</b>		
<b>II</b>	<p><b>Carbohydrates ( Marks weightage 10 )</b></p> <p>Occurrence, classification, Monosaccharides: Constitution and absolute configuration of glucose and fructose, epimers and anomers, mutarotation, determination of ring size of glucose and fructose, Haworth projections and conformational structures;</p> <p><b>Interconversions ( Marks weightage 5 )</b></p> <p>1. Aldopentose to Aldohexose (Killiani-Fischer synthesis) 2. Aldohexose to Aldopentose (Ruff degradation). 3. Aldohexose to ketohexose 4. Ketohexose to Aldohexose</p>	<b>8h</b>
<b>III</b>	<p><b>1. Amino acids and proteins (Marks weightage 10)</b></p> <p><b>6h</b></p> <p>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) from malonic ester synthesis c) strecker's synthesis.</p>	<b>6h</b>

	<p>Physical properties: <b>(Marks weightage 5)</b>  Zwitter ion structure - salt like character - solubility, melting points, amphoteric character, definition of isoelectric point.</p> <p>Chemical properties: <b>(Marks weightage 5)</b>  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.</p> <p><b>2. Heterocyclic Compounds (Marks weightage 10)</b>  Introduction and definition: Simple five membered ring compounds with one hetero atom Ex. Furan. Thiophene and pyrrole - Aromatic character – Preparation from 1, 4, -dicarbonyl compounds, Paul-Knorr synthesis. Properties: Acidic character of pyrrole - electrophilic substitution at 2 or 5 position, Halogenation, Nitration and Sulphonation under mild conditions - Diels Alder reaction in furan.</p> <p><b>Pyridine (Marks weightage 5)</b>  Pyridine – Structure - Basicity - Aromaticity- Comparison with pyrrole- one method of preparation and properties - Reactivity towards Nucleophilic substitution reaction</p>	<b>7h</b>
<b>IV</b>	<p><b>Nitrogen Containing Functional Groups</b>  Preparation, properties and important reactions of nitro compounds, amines and diazonium salts.</p> <p><b>1. Nitrohydrocarbons</b>  <b>3h</b></p> <p>Nomenclature and classification-nitro hydrocarbons, structure - Tautomerism of nitroalkanes leading to aci and keto form, Preparation of Nitroalkanes, reactivity -halogenation, reaction with HONO (Nitrous acid),</p> <p><b>Reactions (Marks weightage 10)</b>  Nef reaction and Mannich reaction leading to Micheal addition</p>	<b>3h</b>

	<p>and reduction.</p> <p><b>2. Amines</b> <span style="float: right;"><b>(Marks weightage 10 +5)</b></span></p> <p>Introduction, classification, chirality in amines (pyramidal inversion), importance and general methods of preparation.</p> <p><b>Properties</b> : Physical properties, Basicity of amines: Effect of substituent, solvent and steric effects. Distinction between Primary, Secondary and tertiary amines using nitrous acid.</p> <p>Discussion of the following reactions; (Not required mechanism) Gabriel Phthalimide synthesis, Hoffmann-Bromamide reaction, Carbylamine reaction.</p> <p><b>Diazonium Salts:</b></p> <p>Synthetic applications of diazonium salts including preparation of arenes, haloarenes, Coupling reactions of diazonium salts (preparation of azo dyes).</p>	<b>11h</b>
<b>V</b>	<p><b>1.Photochemistry</b> <span style="float: right;"><b>(Marks weightage 10+5)</b></span></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- Photochemical reaction mechanism- hydrogen- chlorine and hydrogen- bromine reaction. Qualitative description of fluorescence, phosphorescence, Jablonski diagram, Photosensitized reactions- energy transfer processes (simple example).</p> <p><b>2. Thermodynamics</b> <span style="float: right;"><b>(Marks weightage 10+5)</b></span></p> <p>The first law of thermodynamics-statement, definition of internal energy and enthalpy, Heat capacities and their relationship, Joule-Thomson effect- coefficient, Calculation of work for the expansion of perfect gas under isothermal and adiabatic conditions for reversible processes, State function. Temperature dependence of enthalpy of formation- Kirchoff s equation, Second law of thermodynamics Different Statements of the law,</p>	<b>5h</b>



Carnot cycle and its efficiency, Carnot theorem, Concept of entropy, entropy as a state function, entropy changes in reversible and irreversible processes.	<b>12h</b>
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### **List of Reference Books**

1. Concise coordination chemistry by Gopalan and Ramalingam
2. Coordination Chemistry by Basalo and Johnson
3. Organic Chemistry by G.Mareloudan, Purdue Univ
4. Text book of physical chemistry by S Glasstone
5. Concise Inorganic Chemistry by J.D.Lee
6. Advanced Inorganic Chemistry Vol-I by Satyaprakash, Tuli, Basu and Madan
7. A Text Book of Organic Chemistry by Bahl and Arunbahl
8. A Text Book of Organic chemistry by I L FinarVol I
9. A Text Book of Organic chemistry by I L FinarVol II
10. Advanced physical chemistry by Gurudeep Raj

**A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE  
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<b>SEMESTER – IV IV</b>	<b>PAPER-</b>	<b>PAPER CODE : CHE-401C</b>
<b>PAPER TITLE: INORGANIC, ORGANIC &amp; PHYSICAL CHEMISTRY ACADEMIC YEAR-2021-2022</b>		

Time: 3 hours

Maximum Marks: 70

**PART- A**

4 X 5 = 20 Marks

Answer any **FOUR** of the following questions. Each carries **FIVE** marks

1. Describe the 18 electron rule of mono nuclear and polynuclear metal carbonyls with suitable examples.
2. What are epimers and anomers. Give examples.
3. Discuss about isoelectric point.
4. Write the reactions due to amino group.
5. Discuss the structure of pyridine.
6. Discuss the basic nature of amines.
7. Write the differences between thermal and photochemical reactions.
8. Derive heat capacities and derive  $C_p - C_v = R$ .

**PART- B**

Answer any FIVE questions. Each question carries 10 marks.

**5X10=50M**

9. What are organometallic compounds? Discuss their Classification on the basis of type of bonds with examples.
10. Discuss the structure illustration of fructose.
11. What are amino acids? Write any two general methods of preparation of amino acids.
12. Discuss the aromatic character of Furan, Thiophene and Pyrrole.
13. Write the mechanism for the following. (i). Nef reaction (ii) Mannich reaction
14. Discuss any three synthetic applications of diazonium salts
15. Explain about Jablonski diagram.
16. Define entropy. Describe entropy changes in the reversible and irreversible process.

**The Guidelines to be followed by the question paper setters in chemistry for the**

**IV- Semester - end exams**

<b>SEMESTER – IV      SUBJECT: CHEMISTRY      COURSE CODE: CHE-401C</b>
<b>PAPER TITLE : INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY</b>
<b>ACADEMIC YEAR-2021-2022</b>

**Weightage for the question paper**

<b>syllabus</b>	<b>Section-A (Short answer questions)</b>	<b>Section-B (essay questions)</b>
<b>Unit-1 (15 Marks)</b>	<b>1</b>	<b>1</b>
<b>Unit-2 (15 Marks)</b>	<b>1</b>	<b>1</b>
<b>Unit-3 (35 Marks)</b>	<b>1+1+1</b>	<b>1+1</b>
<b>Unit-4 (25 Marks)</b>	<b>1</b>	<b>1+1</b>
<b>Unit- 5 (30 Marks)</b>	<b>1+1</b>	<b>1+1</b>

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B

The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

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PRACTICAL SYLLABUS.**

<b>Practical Paper – IV Organic Qualitative analysis</b>	<b>PAPER CODE : CHE-401 P ACADEMIC YEAR-2021-2022</b>
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**30 hrs (2h/w)**

**Credits-2**

**Course outcomes:**

At the end of the course, the student will be able to;

1. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory.
2. Determine melting and boiling points of organic compounds
3. Understand the application of concepts of different organic reactions studied in theory part of organic chemistry.

**Organic Qualitative analysis**

**50 M**

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

Alcohols, Phenols, Aldehydes, Ketones, Carboxylic acids, Aromatic primary amines, amides and simple sugars.

**SCHEME OF VALUATION**

1. INTERNAL MARKS- Record-10M
  2. EXTERNAL MARKS-40
    - Analysis of an organic compound and preparation of suitable derivative-30M
    - Viva questions = 10 M
- TOTAL = 50 M\_



# A.G & S.G. SIDDHARTHA DEGREE COLLEGE OF

## ARTS & SCIENCE

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**Title of the Paper: INORGANIC & PHYSICAL CHEMISTRY**

**Semester: IV**

Course Code	CHE-402C	Course Delivery Method	Class Room / Blended Mode
Credits	3	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction : 2021 - 22	Year of Offering: 2021 - 22	Year of Revision: -----	Percentage of Revision: 0

### Program outcomes:

Main objectives of this paper is to give a basics, applications and updated knowledge for the students on Chemistry of Coordination Chemistry, Inorganic Reaction Mechanism Stability of metal complexes, Bioinorganic Chemistry, Phase rule, Chemical Kinetics and Electrochemistry.

### Course outcomes:

At the end of the course, the student will be able to;

1. Understand concepts of boundary conditions and quantization, probability distribution, most probable values, uncertainty and expectation value
2. Application of quantization to spectroscopy.

3. Various types of spectra and their use in structure determination.

### Syllabus

#### Course Details

Unit	Learning Units	Lecture Hours
<b>INORGANIC CHEMISTRY</b>		<b>26h</b>
<b>I</b>	<p><b>Coordination Chemistry (Marks weightage 10+10+5)</b>            IUPAC nomenclature of coordination compounds, Structural and stereoisomerism in complexes with coordination numbers 4 and 6. Valence Bond Theory (VBT): Inner and outer orbital complexes. Limitations of VBT, Crystal field effect, octahedral symmetry. Crystal field stabilization energy (CFSE), Crystal field effects for weak and strong fields. Tetrahedral symmetry, Factors affecting the magnitude of crystal field splitting energy, Spectro chemical series,</p>	<b>12h</b>
<b>II</b>	<p><b>1. Inorganic Reaction Mechanism (Marks weightage 10+5)</b>  <b>4h</b>            Labile and inert complexes, ligand substitution reactions <math>SN^1</math> and <math>SN^2</math>, Substitution reactions in square planar complexes, Trans-effect, theories of trans effect and its applications</p>	<b>4h</b>
	<p><b>2. Stability of metal complexes (Marks weightage 10+5)</b>            Thermodynamic stability and kinetic stability, factors affecting the stability of metal complexes, chelate effect, determination of composition of complex by Job's method and mole ratio method.</p>	<b>8h</b>
	<p><b>3. Bioinorganic Chemistry (Marks weightage 5+5)</b>            Metal ions present in biological systems, Importance of sodium, potassium and magnesium. Structure and functions of Hemoglobin.</p>	<b>2h</b>
<b>PHYSICAL CHEMISTRY</b>		<b>34h</b>
<b>III</b>	<p><b>1 .Phase rule (Marks weightage 10+5)</b>            Concept of phase, components, degrees of freedom. Phase diagram of one component system - water system, Study of Phase diagrams of Simple eutectic systems i) Pb-Ag system, desilverisation of lead Definition and</p>	<b>6h</b>

	examples for systems having congruent and incongruent melting point , freezing mixtures.	
<b>IV</b>	<p><b>Electrochemistry (Marks weightage 10+5)</b></p> <p>Specific conductance, equivalent conductance and molar conductance- Definition and effect of dilution. Cell constant. Strong and weak electrolytes, Kohlrausch's law and its applications, Definition of transport number, determination of transport number by Hittorf's method. Debye-Huckel-Onsagar's equation for strong electrolytes (elementary treatment only), Application of conductivity measurements- conductometric titrations. Electrochemical Cells- Single electrode potential, Types of electrodes with examples: Metal- metal ion, Gas electrode, Inert electrode, Redox electrode, Metal-metal insoluble salt- salt anion. Determination of EMF of a cell, Nernst equation, Applications of EMF measurements - Potentiometric titrations.</p>	<b>14h</b>
<b>V</b>	<p><b>Chemical Kinetics: (Marks weightage 10+10+5)</b></p> <p>The concept of reaction rates. Effect of temperature, pressure, catalyst and other factors on reaction rates. Order and molecularity of a reaction, Derivation of integrated rate equations for zero, first and second order reactions (both for equal and unequal concentrations of reactants). Half-life of a reaction. General methods for determination of order of a reaction. Concept of activation energy and its calculation from Arrhenius equation.</p>	<b>14 h</b>

### List of Reference Books

1. Text book of physical chemistry by S Glasstone
2. Concise Inorganic Chemistry by J.D.Lee
3. Advanced Inorganic Chemistry Vol-I by Satyaprakash, Tuli, Basu and Madan
4. Advanced physical chemistry by Gurudeep Raj
5. Principles of physical chemistry by Prutton and Marron
6. Advanced physical chemistry by Bahl and Tuli
7. Inorganic Chemistry by J.E.Huheey
8. Basic Inorganic Chemistry by Cotton and Wilkinson
9. A textbook of qualitative inorganic analysis by A.I. Vogel
10. Atkins,P.W.&Paula,J.deAtkin'sPhysicalChemistryEd.,OxfordUniversityPress 10thEd(2014).
11. Castellan,G.W.Physical Chemistry 4thEd.Narosa(2004).
12. Mortimer,R. G.PhysicalChemistry 3rdEd. Elsevier:NOIDA,UP(2009).
13. Barrow,G.M.Physical Chemistry



**The Guidelines to be followed by the question paper setters in chemistry for the**

**III- Semester - end exams**

<b>SEMESTER – IV      SUBJECT: CHEMISTRY      COURSE CODE: CHE-402C</b>
<b>PAPER TITLE :      INORGANIC &amp; PHYSICAL CHEMISTRY</b>
<b>ACADEMIC YEAR-2021-2022</b>

**Weightage for the question paper**

<b>syllabus</b>	<b>Section-A (Short answer questions)</b>	<b>Section-B (essay questions)</b>
<b>Unit-1 (25 Marks)</b>	<b>1</b>	<b>1+1</b>
<b>Unit-2 (40Marks)</b>	<b>1+1+1+1</b>	<b>1+1</b>
<b>Unit-3 (15Marks)</b>	<b>1</b>	<b>1</b>
<b>Unit-4 (15Marks)</b>	<b>1</b>	<b>1</b>
<b>Unit-5 (20Marks)</b>	<b>1</b>	<b>1+1</b>

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

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<b>SEMESTER – IV</b>	<b>PAPER-V</b>	<b>PAPER CODE : CHE-402C</b>
<b>PAPER TITLE : INORGANIC &amp; PHYSICAL CHEMISTRY</b>		
<b>ACADEMIC YEAR-2021-2022</b>		

Time: 3 hours

Maximum Marks: 70

**PART- A**

4X 5 = 20 Marks

**Answer any FOUR of the following questions. Each carries FIVE marks**

1. Write note structural isomerism.
2. Explain Labile & inert complexes.
3. Explain mole ratio method for determination of composition of complex.
4. write structure and functions of Haemoglobin.
5. Write the importance of metals Na and K.
6. Write about freezing mixtures.
7. Explain about kohltrausch's law.
8. Explain order and molecularity.

**PART- B**

Answer any FIVE questions. Each question carries 10 marks.

**5X10=50M**

9. Explain Valence Bond theory with Inner and Outer orbital complexes. Write limitations of VBT.
10. Define CFSE. Explain the factors affecting the magnitude of crystal field splitting energy.
11. Explain Trans effect. Explain the theories of trans effect and write any two applications of trans effect.
12. Write about factors affecting the stability of metal complexes.
13. Define Phase rule and terms involved in it. Explain phase diagram of Pb-Ag system.

14. Define Transport number. Write experimental method for the determination of transport number by Hittorf method.
15. Explain general methods for determination of order of a reaction.
16. Derive second order rate equation and half-life and units.

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PRACTICAL SYLLABUS

<b>Practical Paper – V</b> Conductometric and Potentiometric Titrimetry	<b>PAPER CODE : CHE-402P</b> <b>ACADEMIC YEAR-2021-2022</b>
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**30 hrs (2 h/W)**

**Credits: 2**

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

**50 M**

**Course outcomes:**

At the end of the course, the student will be able to;

1. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
2. Apply concepts of electrochemistry in experiments
3. Be familiar with electro analytical methods and techniques in analytical chemistry which study an analyte by measuring the potential ( volts) and/or current ( amperes) in an electrochemical cell containing the analyte

**Conductometric and Potentiometric Titrimetry**

**50 M**

1. Conductometric titration- Determination of concentration of HCl solution using standard NaOH solution.
2. Conductometric titration- Determination of concentration of CH<sub>3</sub>COOH Solution using standard NaOH solution.
3. Conductometric titration- Determination of concentration of CH<sub>3</sub>COOH and HCl in a mixture using standard NaOH solution.
4. Potentiometric titration- Determination of Fe (II) using standard K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> solution.  
Determination of rate constant for acid catalyzed ester hydrolysis



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**Title of the Paper: ANALYTICAL METHODS IN CHEMISTRY**

**Semester: VI**

<b>Course Code</b>	<b>CHE-601GE</b>	<b>Course Delivery Method</b>	<b>Class Room / Blended Mode</b>
Credits	<b>3</b>	CIA Marks	30
No. of Lecture Hours / Week	<b>4</b>	Semester End Exam Marks	<b>70</b>
Total Number of Lecture Hours	<b>60</b>	Total Marks	<b>100</b>
Year of Introduction : 2017-18	Year of Offering: 2021 - 22	Year of Revision: -----	Percentage of Revision: 0

## Syllabus

### Course Details

Unit	Learning Units	Lecture Hours
<b>I</b>	<p><b>Quantitative analysis: (Marks weightage 10+5)</b>                      Methods of different types of chemical analysis, Principle of volumetric analysis. Theories of acid-base, redox, complexometric, iodometric and precipitation titrations - choice of indicators for these titrations.</p>	<b>15h</b>
<b>II</b>	<p><b>Treatment of analytical data: (Marks weightage 10+5)</b>                      Types of errors, significant figures and its importance, accuracy - methods of expressing accuracy, error analysis and minimization of errors, precision - methods of expressing precision, standard deviation and confidence limit.</p>	<b>8h</b>
<b>III</b>	<p><b>Separation Techniques in Chemical analysis</b>                      (Marks weightage 10+10+5)  <b>Solvent extraction:</b> Introduction, principle, techniques, factors affecting solvent Extraction, Batch extraction, continuous extraction. Synergism. Application - Determination of Iron (III), organic mixture analysis.</p>	<b>15h</b>
<b>IV</b>	<p><b>Chromatography (Marks weightage 10+10+5+5)</b>                      Classification of chromatography methods, principles of differential migration adsorption phenomenon, Nature of adsorbents, solvent systems, Rf values, factors effecting Rf values.  <b>Ion exchange Chromatography:</b> Introduction, action of ion exchange resins, separation of inorganic mixtures, applications.  <b>Paper Chromatography :</b> Principle, experimental procedures, choice of paper and solvent systems, developments of chromatogram - ascending, descending and radial.</p>	<b>12h</b>

	Two dimensional chromatography, applications.	
<b>V</b>	<p><b>Thin layer Chromatography (TLC):</b>  <b>(Marks weightage 10+10+5+5)</b>  Principles, Experimental procedures. Adsorbents and solvents.  Preparation of plates. Development of the chromatogram.  Detection of the spots. Applications.</p> <p><b>Column Chromatography:</b> Principles, experimental procedures,  Stationary and mobile Phases, Separation technique.  Applications. <b>GC:</b> Principle and applications, <b>HPLC:</b> Basic  principle and applications.</p>	<b>10h</b>

#### **List of Reference Books**

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

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**Model question paper**

<b>SEMESTER – VI</b>	<b>PAPER CODE : CHE-601GE</b>	
<b>PAPER TITLE : ANALYTICAL METHODS IN CHEMISTRY, PAPER-VII, Model question paper- AC-2021-22</b>		
<b>Time: 3Hours</b>	<b>Maximum marks: 70</b>	<b>Pass marks: 28</b>

**SECTION-A**

Answer any **FOUR** of the following. Each question carries 5 marks. 4X5=20M

1. Explain the principals involved in chemical analysis
2. Define precession write the methods of expressive precession.
3. Write the applications of Solvent extraction.
4. Write the Principle of differential migration of adsorption phenomenon.
5. Write a short note on Nature of adsorbent
6. Write the Principles of TLC and give their applications.
7. Write the development methods of chromatograms.

**SECTION-B**

Answer any FIVE questions. Each question carries 10 marks. 5X10=50M

8. Explain about (a)Complexometric titrations (b) Idometric titrations
9. Explain the Choice of indicators for Acid -base and Redox titrations.
10. Define and explain the methods of expressing Accuracy.
11. Discuss the principle, factors affecting the solvent extraction and write the applications of solvent extraction.
12. Discuss the Separation of in organic mixtures by using ion exchange method.
13. Explain the classification of Chromatographic methods.
14. How to prepare plates in TLC.
15. Explain principle and applications of HPLC.



**The Guidelines to be followed by the question paper setters in chemistry for the  
VI- Semester - end exams –Academic year -2021-22**

<b>SEMESTER – VI</b>	<b>PAPER CODE : CHE-601GE</b>
<b>PAPER TITLE : ANALYTICAL METHODS IN CHEMISTRY, PAPER-VII</b>	

syllabus	Section-A (Short answer questions)	Section-B (Essay questions)
Unit-1 (15 Marks)	1	1
Unit-2 (15 Marks)	1	1
Unit-3 (25 Marks)	1	1+1
Unit-4 (30 Marks)	1+1	1+1
Unit-5 (30 Marks)	1 +1	1 + 1

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

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**PRACTICAL SYLLABUS**

<b>Practical Paper – I Analysis of SALTMIXTURE</b>	<b>PAPER CODE : CHE-601GE ACADEMIC YEAR-2021-2022</b>
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1. Identification of amino acids by paper chromatography.
2. Determination of Zn using EDTA
3. Determination of Mg using EDTA
4. Hardness of water.

**SCHEME OF VALUATION**

1. INTERNAL MARKS- Record-10M
2. EXTERNAL MARKS-40
  - Titrimetric analysis -30
  - Viva-10

TOTAL = 50 M\_\_



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**Title of the Paper: ORGANIC SPECTROSCOPIC TECHNIQUES**

**Semester: VI**

<b>Course Code</b>	<b>CHE-602CE</b>	<b>Course Delivery Method</b>	<b>Class Room / Blended Mode</b>
Credits	<b>3</b>	CIA Marks	30
No. of Lecture Hours / Week	<b>4</b>	Semester End Exam Marks	<b>70</b>
Total Number of Lecture Hours	<b>60</b>	Total Marks	<b>100</b>
Year of Introduction : 2017-18	Year of Offering: 2021 – 22	Year of Revision: -----	Percentage of Revision: 0

## Syllabus

### Course Details

Unit	Learning Units	Lecture Hours
<b>I</b>	<p><b>NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY</b> (Marks weightage 10+10+5)</p> <p>Nuclear spin, Principles of NMR-Classical and Quantum Mechanical methods, Larmour Frequency. Instrumentation. Saturation, Relaxation spin-spin &amp; spin lattice relaxation. Chemical shifts -Factors influencing Chemical shift, Shielding and De-shielding mechanism.</p>	<b>15h</b>
<b>II</b>	<p><b>NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY</b> (Marks weightage 10+5)</p> <p>Spin-Spin interactions-factors affecting spin-spin interactions, Deuterium exchange (<math>H^+</math>) Coupling constant- types of coupling constant-vicinal, Geminal and long range coupling constant-Factors influencing coupling constants. Types of PMR Spectrums –AX, AX<sub>2</sub> and AB type with one example.</p>	<b>8h</b>
<b>III</b>	<p><b>Electron Spin Resonance Spectroscopy</b> (Marks weightage 10+10+5+5)</p> <p>Basic Principles, Theory of ESR, Comparison of NMR &amp; ESR.Instrumentation, Factors affecting the 'g' value, determination of 'g' value. Isotropic and Anisotropic constants. Splitting hyper fine splitting coupling constants. Line width, Zero field splitting and Kramer degeneracy. Crystal field splitting,Crystal field effects.Applications:- Detection of free radicals, ESR spectra of (a) H- radical (b)Deuterium radical (c) Methyl radical(CH<sub>3</sub>) (d) Benzene anion (C<sub>6</sub>H<sub>6</sub>) (e) [Cu(H<sub>2</sub>O)<sub>6</sub>]<sup>+2</sup></p>	<b>14h</b>
<b>IV</b>	<b>UV &amp; VISIBLE SPECTROSCOPY</b>	

	<b>(Marks weightage 10+10+5+5)</b>	
	Electronic spectra of diatomic molecules. The Born- oppenheimer approximation. Vibration coarse structure: Intensity of Vibrational-electronic spectra: The Franck-Condon principle. Electronic structure of diatomic molecules. Types of transitions, Chromophores, Auxochrome, types of shifts in UV Visible spectrum, Conjugated dienes, trienes and polyenes, unsaturated carbonyl compounds-Woodward – Fieser rules.	<b>15h</b>
<b>V</b>	<p><b>Electronic spectra of polyatomic molecules</b></p> <p style="text-align: center;"><b>(Marks weightage 10+5)</b></p> <p>Chemical analysis by Electronic Spectroscopy – Beer-Lambert’s Law. Deviation from Beer’s law. Quantitative determination of metal ions (<math>Mn^{+2}</math>, <math>Fe^{+2}</math>). Simultaneous determination of Chromium and Manganese in a mixture.</p>	<b>8h</b>

**REFERENCE BOOKS:**

1. Electron Spin Resonance Elementary Theory and Practical Applications- John E. Wertz and James R. Bolton, Chapman and Hall, 1986.
2. Spectroscopic Identification of organic compounds – Silverstein, Basseler and Morrill.
3. Organic Spectroscopy- William Kemp.
4. Fundamentals of Molecular Spectroscopy- C.N.Banwell and E.A. Mc cash 4<sup>th</sup>Edition, Tata Mc GrawHillPublishing Co., Ltd. 1994.
5. Physical Methods in Inorganic Chemistry – R.S.Drago, Saunders Publications.
6. Application of Mössbauer Spectroscopy – Green Mood.
7. NMR, NQR, EPR and Mössbauer Spectroscopy in inorganic chemistry – R.VParish, Ellis, Harwood.

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**Model question paper**

**SEMESTER – VI**

**PAPER CODE : CHE-602CE**

**PAPER TITLE : : ORGANIC SPECTROSCOPIC TECHNIQUES, PAPER-VIII, Model question paper- AC-2021-**

**22**

**Time: 3Hours**

**Maximum marks: 70**

**Pass marks: 28**

**Answer any FOUR of the following. Each question carries 5 marks.**

**4X5=20M**

1. Write about Nuclear spin?
2. Write any two types of coupling constant?
3. Write about Kramer degeneracy?
4. What is isotropic and anisotropic constants?
5. Explain Woodward-Fieser rules?
6. Write a short note on Auxochrome?
7. Define and derive Beer-Lambert's law.

**SECTION-B**

**Answer any FIVE questions. Each question carries 10 marks.**

**5X10=50M**

8. Explain the instrumentation of the NMR?
9. Explain Spin-Spin relaxation and spin lattice relaxation.
10. Write the types of PMR spectrums of AX, AX<sub>2</sub> & AB?
11. Explain the instrumentation of the ESR.
12. Explain the ESR splitting of a) Deuterium radical b) [Cu(H<sub>2</sub>O)<sub>6</sub>]<sup>+2</sup> ion
13. Explain the electronic spectra of di atomic molecule.
14. Write note on Vibrational coarse structure.
15. Explain the simultaneous determination of Chromium and Manganese in a mixture.

**The Guidelines to be followed by the question paper setters in chemistry for the VI-Semester - end exams Academic year- 2021-22**

**PAPER TITLE: ORGANIC SPECTROSCOPIC TECHNIQUES,  
PAPER CODE: CHE-602CE**

**Paper – VIII                      Maximum marks : 70                      Duration : 3 Hours**

Weightage for the question paper

syllabus	Section-A (Short answer questions)	Section-B (essay questions)
Unit-1 ( 25Marks)	1	1+1
Unit-2 (15 Marks)	1	1
Unit-3 ( 30Marks)	1+1	1+1
Unit-4 ( 30Marks)	1+1	1+1
Unit-5 (15Marks)	1	1

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.



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**Title of the Paper: ADVANCED ORGANIC REACTIONS**

**Semester: VI**

<b>Course Code</b>	<b>CHE-603CE</b>	<b>Course Delivery Method</b>	<b>Class Room / Blended Mode</b>
Credits	<b>3</b>	CIA Marks	30
No. of Lecture Hours / Week	<b>4</b>	Semester End Exam Marks	<b>70</b>
Total Number of Lecture Hours	<b>60</b>	Total Marks	<b>100</b>
Year of Introduction : 2017-18	Year of Offering: 2021 – 22	Year of Revision: -----	Percentage of Revision: 0



## Syllabus

### Course Details

Unit	Learning Units	Lecture Hours
<b>I</b>	<p><b>ORGANIC PHOTO CHEMISTRY</b> (Marks weightage 10+10+5)</p> <p>Organic photochemistry: Molecular orbitals, carbonyl chromophore–Jablonski diagram, Photochemical reactions- Photo reduction-mechanism, example-aromatic compounds. Sensitizer and influence of sensitizer.</p>	<b>10h</b>
<b>II</b>	<p><b>ORGANIC PHOTOCHEMISTRY</b> (Marks weightage 10+10+5)</p> <p>Norrish cleavages, type -I: Mechanism, acyclic cyclic diones, Photo Fries rearrangement. Norrish type II cleavage: Mechanism and stereochemistry, Type- II reactions of esters: 1: 2 diketones, photo decarboxylation, Di-<math>\pi</math> methane Rearrangement, Photochemistry – of conjugated dienes, Decomposition of nitrites –Barton reaction.</p>	<b>12h</b>
<b>III</b>	<p><b>PROTECTING GROUPS AND ORGANIC REACTIONS</b> (Marks weightage 10+10+5+5)</p> <p>Principles of (1) Protection of alcohols – ether formation including silyl ethers – ester formation, (2) Protection of diols – acetal,ketal and carbonate formation, (3) Protection of carboxylic acids – ester formation, benzyl and t-butyl esters, (4) Protection of amines– acetylation, benzylation, benzyloxy carbonyl, triphenyl methyl groups and fmoc, (5)Protection of carbonyl groups – acetal, ketal, 1,2-glycols and 1,2-dithioglycols formation.</p>	<b>15h</b>
<b>IV</b>	<p><b>SYNTHETIC REACTIONS: (Marks weightage 10+5+5)</b></p> <p>Mannich reaction – Mannich bases – Robinson annulations. The Shapiro reaction, Stork–enamine reaction. Use of dithioacetals – Umpolung, phase transfercatalysis – mechanisms and use of</p>	<b>8h</b>

	benzyl trialkyl ammonium halides. Wittig reaction.	
V	<p><b>NEW SYNTHETIC REACTIONS (Marks weightage 10+5)</b></p> <p><b>Define with example and mechanism-</b> Suzuki coupling, Click reaction, Baylis–Hillman reaction, RCM olefin metathesis, Mukayama aldol reaction.</p> <p><b>Define with one example:</b> (Mechanism not required) Mitsunobu reaction, McMurrey reaction, Julia–Lythgoe olefination, Stille coupling and Heck reaction.</p>	15h

### Recommended Books

1. Molecular reactions and Photochemistry by Charles Dupey and O.L. Chapman.
2. Molecular Photochemistry by Turru.
3. Importance of antibonding orbitals by Jaffe and Orchin.
4. Text Book of Organic Chemistry by Cram, Hammand and Henrickson.
5. Some modern methods of organic synthesis by W. Carruthers.
6. Guide Book to Organic Synthesis by R.K. Meckie, D.M. Smith and R.A. Atken.
7. Organic Synthesis by O. House.
8. Organic synthesis by Michael B. Smith.

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**Model question paper**

<b>SEMESTER – VI</b>	<b>PAPER CODE : CHE-603CE</b>
<b>PAPER TITLE : ORGANIC SPECTROSCOPIC TECHNIQUES, PAPER-IX, <u>Model question paper- AC-2021-22</u></b>	

**Time: 3Hours**

**Maximum marks: 70**

**Pass marks: 28**

**SECTION-A**

**Answer any FOUR of the following. Each question carries 5 marks.**

**4X5=20M**

1. Write about Chromophore triplet state?
2. Write about Barton reaction?
3. Explain how to protect the Carbonyl group?
4. Explain how to protect the Diols?
5. Explain about Umpolung?
6. Explain PTC with mechanism?
7. Explain Suzuki coupling?

**SECTION-B**

**Answer any FIVE questions. Each question carries 10 marks.**

**5X10=50M**

8. Explain about Jablonski diagram in organic photo chemistry?
9. Explain mechanism of photo reduction with examples?
10. Explain Norrissch type –I cleavage with mechanism?
11. Explain Norrissch type –II cleavage with mechanism?
12. Explain how to protect Alcohols?
13. Explain how to protect Carboxylic acids?
14. What is Mannich reaction? Explain with mechanism and Mannich bases?
15. Write the mechanism of Baylis-Hillman reaction and RCM Olefination?

**The Guidelines to be followed by the question paper setters in chemistry for the VI-Semester - end exams Academic year- 2021-22**

**PAPER TITLE: ADVANCED ORGANIC REACTIONS, PAPER CODE: CHE-603CE**

**Paper – VIII**

**Maximum marks : 70**

**Duration : 3 Hours**

Weightage for the question paper

syllabus	Section-A (Short answer questions)	Section-B (essay questions)
Unit-1 ( 25Marks)	1	1+1
Unit-2 (25 Marks)	1	1+1
Unit-3 (30 Marks)	1+1	1+1
Unit-4 ( 20Marks)	1+1	1
Unit-5 (15 Marks)	1	1

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.



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**Title of the Paper: PHARMACEUTICAL AND MEDICINAL CHEMISTRY**

**Semester: VI**

<b>Course Code</b>	<b>CHE-604CE</b>	<b>Course Delivery Method</b>	<b>Class Room / Blended Mode</b>
Credits	<b>3</b>	CIA Marks	30
No. of Lecture Hours / Week	<b>4</b>	Semester End Exam Marks	<b>70</b>
Total Number of Lecture Hours	<b>60</b>	Total Marks	<b>100</b>
Year of Introduction : 2017-18	Year of Offering: 2021 - 22	Year of Revision: -----	Percentage of Revision: 0

## Syllabus

### Course Details

Unit	Learning Units	Lecture Hours
<b>I</b>	<p><b>Pharmaceutical chemistry Terminology:</b> (Marks weightage 10+5+5)</p> <p>Pharmacy, Pharmacology, Pharmacophore, Pharmacodynamics, Pharmacokinetics (ADME, Receptors - brief treatment) Metabolites and Anti metabolites.</p>	<b>12h</b>
<b>II</b>	<p><b>Drugs</b> (Marks weightage 10+10+5)</p> <p>Nomenclature: Chemical name, Generic name and trade names with 10-examples Classification based on structures and therapeutic activity with one example each.</p>	<b>10h</b>
<b>III</b>	<p><b>Synthesis and therapeutic activity of the compounds:</b></p> <p><b>Chemotherapeutic Drugs</b> (Marks weightage 10+10+5) 1.Sulphadruugs(Sulphamethoxazole) 2.Antibiotics - <math>\beta</math>-Lactam Antibiotics-Isolation of Pencilline by submerged culture method, 3. Anti malarial Drugs (chloroquine).</p> <p><b>Psycho therapeutic Drugs:</b> (Marks weightage 10+5) 1.Antipyretics(Paracetamol)2.Hypnotics,Tranquilizers (Diazepam) 3.Levodopa.</p>	<b>18h</b>
<b>IV</b>	<p><b>Pharmacodynamic Drugs:</b> (Marks weightage 10+5) 1.Antiasthma Drugs (Solbutamol) 2. Antianginals (Glycerol Trinitrate) 3.Diuretics (Frusemide)</p>	<b>8h</b>
<b>V</b>	<p><b>HIV-AIDS:</b> (Marks weightage 10+5)</p> <p>Immunity - CD-4cells, CD-8cells, Retro virus, Replication in human body, Investigation available, prevention of AIDS, Drugs available - examples with structures: PIS: Indivanir (crixivan), Nelfinavir(Viracept).</p>	<b>12h</b>

**List of Reference Books:**

1. Medicinal Chemistry by Dr. B.V.Ramana
2. Synthetic Drugs by O.D.Tyagi & M.Yadav
3. Medicinal Chemistry by Ashutoshkar
4. Medicinal Chemistry by P.Parimoo
5. Pharmacology& Pharmacotherapeutics R.S Satoshkar & S.D.Bhandenkar

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**Model question paper**

**SEMESTER – VI**

**PAPER CODE : CHE-604CE**

**PAPER TITLE : PHARMACEUTICAL AND MEDICINAL CHEMISTRY, PAPER-IX, Model question paper- AC-2021-22**

**Time: 3Hours**

**Maximum marks: 70**

**Pass marks: 28**

**SECTION-A**

**Answer any FOUR of the following. Each question carries 5 marks. 4X5=20M**

1. What are Metabolites and anti metabolites? Explain with example.
2. Write a note on Pharmacology and Pharmacophore.
3. Explain the classification of drugs on the basis of structure.
4. Describe the synthesis and therapeutic activities of Sulphamethoxazole.
5. Write the synthesis,therapeutic activity and side effects of paracetamol.
6. Write a note on Antianginals.
7. Explain about immunity.

**SECTION-B**

**Answer any FIVE questions. Each question carries 10 marks. 5X10=50M**

8. What are Pharma cokinetics ? Describe Absorption,Distribution,Metabolism and Excretion(ADME)of drug.
9. Explain the classification of drugs based on therapeutic activity with examples.
10. Describe the nomenclature systems of drugs.
11. What are antibiotics? Give examples. Explain the isolation method of Pencillin by submerged culture method.
12. Write the synthesis, therapeutic activity and side effects of Chloroquine.
13. Discuss the synthesis and therapeutic activity of Levodopa.
14. Explain in detail about antiasthma drugs.
15. What is AIDS ?How it causes ? Write the drugs available for the treatment of AIDS with their structure?



**The Guidelines to be followed by the question paper setters in chemistry for the VI-Semester - end exams Academic year-2021-22**

**PAPER TITLE: PHARMACEUTICAL AND MEDICINAL CHEMISTRY,**

**PAPER CODE: CHE-604CE**

**Paper – VIII-C-3      Semester – VI      Maximum marks : 70      Duration : 3 Hours**

Weightage for the question paper

syllabus	Section-A (Short answer questions)	Section-B (essay questions)
Unit-1 (20 Marks)	1+1	1
Unit-2 (25Marks)	1	1+1
Unit-3 (40Marks)	1+1	1+1+1
Unit-4 (15 Marks)	1	1
Unit-5 (15Marks)	1	1

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

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**PRACTICAL SYLLABUS**

<b>Practical Paper – I Preparations of Organic compounds</b>	<b>PAPER CODE : CHE-602CE ACADEMIC YEAR-2021-2022</b>
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**30 hrs (2 h / W)**

**Credits-2**

1. Preparation of Aspirin.
2. Preparation of Paracetamol.
3. Preparation of Acetanilide
4. Preparation of Barbituric Acid.
5. Preparation of Phenyl Azo  $\beta$ -naphthol.

**SCHEME OF VALUATION**

1. INTERNAL MARKS- Record-10M
2. EXTERNAL MARKS-40M
  - Titrimetric analysis -30
  - Viva-10

TOTAL = 50 M\_\_

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**PRACTICAL SYLLABUS**

<b>Practical Paper – I</b> <b>Preparations of Organic compounds by Green procedure</b>	<b>PAPER CODE : CHE-603CE</b> <b>ACADEMIC YEAR-2021-2022</b>
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**30 hrs (2h / W),**

**Credits-2**

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

**SCHEME OF VALUATION**

1. INTERNAL MARKS- Record-10M
2. EXTERNAL MARKS-40 M
  - Practical -30
  - Viva-10

TOTAL = 50 M\_\_

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**PRACTICAL SYLLABUS**

<b>Practical Paper – I Project work</b>	<b>PAPER CODE : CHE-604CE ACADEMIC YEAR-2021-2022</b>
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The students have chosen chemistry as cluster elective.

“*Spectral analysis of various shaded dried leaves powder extract with polar and non-polar solvents using IR and UV spectroscopies*” is selected as a project work to the students for this academic year.

**SCHEME OF VALUATION**

1. EXTERNAL- 25M- given by the Examiner (Viva)

2. INTERNAL = 25 M

- Written viva-10 M
- Submission of the project book-15M

TOTAL = 50 M\_\_

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SCIENCE**

**VUYYURU-521165, KRISHNA Dt., A.P.(Autonomous)**

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**2021-2022**



**DEPARTMENT OF CHEMISTRY**

**MINUTES OF BOARD OF STUDIES**

**ODD SEMESTER**

**03-11-2021**

Minutes of the Meeting of Board of Studies in Chemistry for the Autonomous Course

A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru Held at 11.00 A.M on 03-11-2021 in  
the Department of Chemistry.

**KRAMESH** Presiding

Members Present:

- 1) K. Ramesh ..... Chairman HOD, Dept. of Chemistry,  
(Sri. K.RAMESH) A.G. & S.G.S.Degree College, Vuyyuru.
- 2) Prof. D. Ramasekhar Reddy ..... University Nominee Assistant Professor,  
(Prof.D.Ramasekhar Reddy) Dept. of Chemistry, Krishna University, MTM.
- 3) Dr. S. Kalpana ..... Academic Council Nominee HOD, Dept. of Chemistry,  
(Dr. S. Kalpana) SDMS M College, Vijayawada.
- 4) Smt. A. Indira ..... Academic Council Nominee Lecturer in Chemistry,  
(Smt. A. Indira) G.D.C, Dumpagadapa
- 5) Dr. G. Raja ..... Industrialist Manager, Q.A, Biophore india  
(Dr. G Raja) Pharmaceuticals pvt ltd Hyd,
- 6) Smt. M. Sowjanya ..... Student Nominee Lecturer in Chemistry,  
(Smt. M. Sowjanya) ANR College Gudivada.
- 7) Dr. G. Giri Prasad ..... Member Lecturer in Chemistry,  
(Dr. G.Giri prasad) A.G. & S.G.S.Degree College, Vuyyuru
- 8) Smt. M.V. Santhi ..... Member Lecturer in Chemistry,  
(Smt. M.V.Santhi) A.G. & S.G.S.Degree College, Vuyyuru.
- 9) Sri. P. Suresh ..... Member Lecturer in Chemistry,  
(Sri. P.Suresh) A.G.& S.G.S.Degree College, Vuyyuru.
- 10) MS. M. Santhi ..... Member Lecturer in Chemistry,  
(MS. M.Santhi) A.G.& S.G.S.Degree College, Vuyyuru:
- 11) Sri. J. Nageswara Rao ..... Member Rtd.Lecturer in Chemistry,  
(Sri. J.Nageswara Rao) A.G.& S.G.S.Degree College, Vuyyuru.

## Agenda for B.O.S Meeting

1. To recommend the syllabus and model paper for I semester of I Degree B.Sc., Chemistry for the Academic year 2021-2022.
2. To recommend the syllabus and model papers for III semester of II Degree B.Sc., Chemistry for the Academic year 2021-2022.
3. To recommend the syllabus and model papers for V semester of III Degree B.Sc. Chemistry for the Academic year 2021-2022.
4. To recommend the Blue print of I, III, V semesters of B.Sc. Chemistry for the Academic year 2021-2022.
5. To recommend the Guidelines to be followed by the question paper setters in Chemistry for I, III, V Semester-end exams.
6. To recommend the teaching and evaluation methods to be followed under Autonomous status.
7. Any suggestions regarding certificate course, seminars, workshops, Guest lecture to be organized.
8. Recommend the panel of paper setters and Examiners to the controller of Examinations of autonomous Courses of A.G. & S.G.S. Degree colleges of Arts & Science, Vuyyuru.
9. Any other matter.

*K. Ramell*  
Chairman.

## RESOLUTIONS

- 1) It is resolved to Change the **syllabus of academic year 2020-2021 for I semesters of I B.Sc.** under Choice Based Credit System (CBCS) for the Academic year 2021–2022.
  - **Adding Syllabus:** P-block elements in unit-1, Dilute Solutions.
  - **Deleting Syllabus:** Inorganic Polymers and Collegative Properties.
- 2) It is resolved to implement the changed **syllabus and model papers** under Choice Based Credit System (CBCS) from this Academic year onwards for **III semester of II B.Sc** for the Academic year 2021-2022.
  - It is resolved to implement the new paper with title Organic chemistry and Spectroscopy with paper code CHE-301.
- 3) It is resolved to implement the same **syllabus (theory and practical)** under Choice Based Credit System for the Academic year 2021-2022 for **V semester of III B.Sc.**
- 4) It is resolved to follow the **Blue prints** as proposed by members of BOS I, III & V semester of Degree B.Sc. for the Academic year 2021-2022.
- 5) It is resolved to follow the guidelines to be followed by the question paper setters of Chemistry for I, III & V semesters of Degree B.Sc. for the Academic Year 2021-2022.
- 6) It is resolved to continue the following teaching and evaluation methods for Academic year 2021-22.

### Teaching Methods:

Besides the conventional methods of teaching, we use modern technology i.e. using of LCD projector to display on U boards etc, for better understanding of concepts.

### Evaluation of a student is done by the following procedure:

#### • Internal Assessment Examinations:

- Out of maximum 100 marks in each paper for I B.Sc, 25 marks shall be allocated for internal assessment. Out of these 25 marks, 15 marks are allocated for announced tests (i.e. IA-1 & IA-2).
- Out of maximum 100 marks in each paper for II, III B.Sc, 30 marks shall be allocated for internal assessment. Out of these 30 marks, **20 marks are allocated for announced tests (i.e. IA-1 & IA-2).**
- Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, **5 marks are allocated on the basis of candidate's percentage of attendance and remaining 5 marks are allocated for the innovative component like assignment/quiz/seminars for I, II, III B.Sc.**
- There is **no pass minimum** for internal assessment for I, II, III B.Sc.

#### Semester – End Examination:

- The maximum marks for I B.Sc Semester – End examination shall be 75 marks and 70 marks for II, III B.Sc., duration of the examination shall be 3 hours. Even though the candidate is absent for two IA exams /obtain Zero marks the external marks are considered (if the candidate gets 40/70) and the result shall be declared as "PASS".
- Semester – End examinations shall be conducted in theory papers at the end of every semester, while in practical papers, these examinations are conducted at the end of I, III, & V semesters **for I, II & III B.Sc for 50 marks.**
- Discussed and recommended for organizing **certificate course, seminars, Guest lecturers, workshops** to upgrade the knowledge of students, for the approval of the academic council.
- Discussed and empowered the Head of the department of Chemistry to suggest the panel of paper setters and examiners to the controller of examinations. **Department of Chemistry Adopted Value Added Course "Water Analysis".**
- NIL.

*K. Ramani*  
Chairman



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<b>SEMESTER – I</b>	<b>SUBJECT: CHEMISTRY</b>	<b>COURSE CODE:</b>
<b>PAPER TITLE : INORGANIC &amp; PHYSICAL CHEMISTRY, PAPER-I</b>		
<b>ACADEMIC YEAR-2021-2022</b>		

**60 hrs(4h/w)**

**Credits-3**

**COURSE OUTCOMES:**

At the end of the course, the student will be able to;

1. Understand the basic concepts of p-block elements.
2. Explain the difference between solid, liquid and gases in terms of inter molecular interactions.
3. Apply the concepts of gas equations, pH and electrolytes while studying other chemistry courses.

**INORGANIC CHEMISTRY** **24h**

**UNIT – I**

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

**Group 13:** Preparation & structure of Diborane, Borazine

**Group 14:** Preparation, classification and uses of silicones

**Group 15:** Preparation & structures of Phosphonitrilic halides  $\{(PNCI_2)_n\}$  where  $n=3, 4$

**Group 16:** Oxides and Oxoacids of Sulphur (structures only)

**Group 17:** Pseudo halogens, Structures of Interhalogen compounds.

**UNIT-II**

**1. Chemistry of d-block elements:** **6h**

Characteristics of d-block elements with special reference to electronic configuration, variable valence, magnetic properties, catalytic properties and ability to form complexes. Stability of various oxidation states.

**2. Chemistry of f-block elements: 6h**

Chemistry of lanthanides - electronic structure, oxidation states, lanthanide contraction, consequences of lanthanide contraction, magnetic properties. Chemistry of actinides - electronic configuration, oxidation states, actinide contraction, comparison of lanthanides and actinides.

**3. Theories of bonding in metals: 4h**

Valence bond theory and free electron theory, explanation of thermal and electrical conductivity of metals based on these theories, Band theory- formation of bands, explanation of conductors, semiconductors and insulators.

**PHYSICAL CHEMISTRY 36h**

**UNIT-III**

**Solid state 10h**

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

**UNIT-IV**

**1. Gaseous state 6h**

Van der Waal's equation of state. Andrew's isotherms of carbon dioxide, continuity of state. Critical phenomena. Relationship between critical constants and vander Waal's constants. Law of corresponding states. Joule- Thomson effect. Inversion temperature.

**2. Liquid state 4h**

Liquid crystals, mesomorphic state. Differences between liquid crystal and solid/liquid. Classification of liquid crystals into Smectic and Nematic. Application of liquid crystals as LCD devices.

**UNIT-V**

**Solutions, Ionic equilibrium & dilute solutions**

**1. Solutions 6h**

Azeotropes-HCl-H<sub>2</sub>O system and ethanol-water system. Partially miscible liquids-phenol-water system. Critical solution temperature (CST), Effect of impurity on consolute temperature. Immiscible liquids and steam distillation. Nernst distribution law. Calculation of the partition coefficient. Applications of distribution law.

## **2. Ionic equilibrium**

**3h**

Ionic product, common ion effect, solubility and solubility product. Calculations based on solubility product.

## **3. Dilute solutions**

**7h**

Colligative properties- RLVP, Osmotic pressure, Elevation in boiling point and depression in freezing point. Experimental methods for the determination of molar mass of a non-volatile. Solute using osmotic pressure, Elevation in boiling point and depression in freezing point. Abnormal colligative properties. Van't Hoff factor.

### **Co-curricular activities and Assessment Methods**

1. Continuous Evaluation: Monitoring the progress of student's learning.
2. Class Tests, Work sheets and Quizzes.
3. Presentations, Projects and Assignments and Group Discussions: Enhances critical thinking skills and personality.
4. Semester end Examination: critical indicator of student's learning and teaching methods adopted by teachers throughout the semester.

### **List of Reference Books**

1. Principles of physical chemistry by Prutton and Marron
2. Solid State Chemistry and its applications by Anthony R. West
3. Text book of physical chemistry by K L Kapoor
4. Text book of physical chemistry by S Glasstone
5. Advanced physical chemistry by Bahl and Tuli
6. Inorganic Chemistry by J.E.Huheey
7. Basic Inorganic Chemistry by Cotton and Wilkinson
8. A textbook of qualitative inorganic analysis by A.I. Vogel
9. Atkins, P. W. & Paula, J. de Atkin's Physical Chemistry Ed., Oxford University Press  
10th Ed (2014).
10. Castellan, G. W. Physical Chemistry 4th Ed. Narosa (2004).
11. Mortimer, R. G. Physical Chemistry 3rd Ed. Elsevier: NOIDA, UP (2009).
12. Barrow, G. M. Physical Chemis

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<b>SEMESTER-I</b>	<b>PAPER-I</b>	<b>PAPER CODE : CHE-101C</b>
<b>PAPER TITLE : INORGANIC &amp; PHYSICAL CHEMISTRY</b>		
<b>ACADEMIC YEAR-2021-2022</b>		

**Time: 3Hours**

**Maximum marks: 75**

**Pass marks:**

**Time: 3 Hours**

**Max. Marks: 75M**

**PART- A**

**Answer any FIVE of the following questions. Each carries FIVE marks 5 X 5 = 25 Marks**

1. Explain the preparation & structures of Phosphonitrilic compounds. **L2- CO1**
2. Explain in brief, catalytic properties & stability of various oxidation states of d- block elements.  
**L2-CO2**
3. Define Unit Cell , Space Lattice and Lattice Point. **L1- CO3**
4. What are Smectic & Nematic liquid Crystals? Explain. **L1- CO4**
5. Write account on Common ion effect & Solubility product. **L2- CO5**
6. Write a short note on Law of Corresponding States. **L1- CO4**
7. Explain Actinide Contraction. **L2- CO2**
8. Explain the structure of Borazine. **L2- CO1**

**PART-B**

**Answer All of the following questions. Each carries TEN marks**

**5 X 10 = 50 Marks**

9. (a). Explain Classification, Preparations & uses of Silicones **L2- CO1**

(or)

(b). (i). What are Pseudohalogens. **L2- CO1**

(ii). Explain the Structures of any one  $AX_3$  &  $AX_5$  interhalogen compounds. **L2- CO1**

10. (a). What is Lanthanide Contraction? Explain the Consequences of Lanthanide Contraction.

**L2- CO2**

(or)

(b). (i). Explain the magnetic properties of d- block elements. **L2- CO2**

(ii). Explain about Conductors, Semi-Conductors & Insulators using Band Theory. **L2- CO2**

11. (a). Write an essay on Crystal defects. **L1- CO3**

(or)

(b). what is Bragg's Law. Explain the determination of structure of a crystal by powder method.

**L2- CO3**

12. (a). Derive the relationship between Critical constants & Vander Waal's constants **L1- CO4**.

(or)

(b). (i). Write any 5 differences between liquid crystals & liquids, solids

(ii). Write the applications of Liquid crystals. **L2- CO4**

13. (a). Explain Nernst distribution Law. Explain its applications. **L2- CO5**

(or)

(b). What are colligative properties. Write experimental methods for determination of molar mass of a non-volatile solute by using Elevation in boiling point & depression in freezing point. **L2- CO5**

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PRACTICAL SYLLABUS**

<b>Practical Paper – I Analysis of SALTMIXTURE</b>	<b>PAPER CODE : CHE-101 P ACADEMIC YEAR-2021-2022</b>
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**LABORATORY COURSE -I**

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

**Practical-I**

**(At end of Semester-I)**

**Qualitative inorganic analysis (Minimum of Six mixtures should be analysed)**

**Course outcomes:**

At the end of the course, the student will be able to;

1. Understand the basic concepts of qualitative analysis of inorganic mixture.
2. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory.
3. Apply the concepts of common ion effect, solubility product and concepts related to qualitative analysis.

**Analysis of SALT MIXTURE**

**50 M**

Analysis of mixture salt containing two anions and two cations (From two different groups) from the following:

**Anions:** Carbonate, Sulphate, Chloride, Bromide, Acetate, Nitrate, Borate, Phosphate.

**Cations:** Lead, Copper, Iron, Aluminium, Zinc, Nickel, Manganese, Calcium, Strontium, Barium, Potassium and Ammonium.

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<b>SEMESTER – III</b>	<b>SUBJECT: CHEMISTRY</b>	<b>COURSE CODE: CHE-</b>
<b>301C</b>		
<b>PAPER TITLE : ORGANIC CHEMISTRY &amp; SPECTROSCOPY, PAPER-III</b>		
<b>ACADEMIC YEAR-2021-2022</b>		

**60 hrs(4h/w)**

**Credits-3**

**ORGANIC CHEMISTRY**

**UNIT – I**

**1. Chemistry of Halogenated Hydrocarbons: 6h**

Nomenclature, any two preparations of Alkyl halides, Aryl halides,

**Chemical properties**

**Marks Weightage-5**

a. Williamson's synthesis b. substitution vs elimination.

c. Relative reactivity of alkyl, allyl, vinyl, benzyl and aryl halides towards nucleophilic substitution reactions.

**Mechanisms**

**(Marks Weightage-10)**

SN<sup>1</sup>, SN<sup>2</sup>, and SN<sup>i</sup> Nucleophilic substitution reactions with stereo chemical aspects and effect of solvent.

**2. Chemistry of Alcohols & Phenols**

**6h**

Nomenclature, any two preparations of Alcohols & Phenols

**Chemical properties**

**(Marks Weightage-5)**

a. Acidity of phenols and factors affecting it b. Ring substitution reactions (Bromination, Nitration) c. Fries rearrangements d. Kolbe's-Schmidt Reactions, e. Oxidation of diols by periodic acid and lead tetra acetate,

**Mechanisms**

**(Marks Weightage-10)**

Reimer-Tieman reaction, Claisen rearrangements, and Pinacol-Pinacolone rearrangement.

## UNIT-II

### Carbonyl Compounds

6h

Nomenclature, any two preparations of (Carbonyl Compounds) Aldehyde and ketones.

#### Chemical properties

(Marks Weightage-5)

A. Nucleophilic addition reactions of A.  $\text{NaHSO}_3$ ,  $\text{HCN}$ ,  $\text{RMgX}$  B. Nucleophilic addition reactions with ammonia derivatives, C. Wittig Reaction, Halo form Reaction, Beckmann rearrangements, Michael-addition, Benzoin condensation, Perkin Reaction. and Reformatsky reactions. Reduction reactions: Clemmenson, wolf-kishner,  $\text{LiAlH}_4$  and  $\text{NaBH}_4$ .

#### Mechanisms

(Marks Weightage-10)

Aldol condensation, Cannizzaro Reaction, Baeyer-Villiger oxidation.

## UNIT-III

### Carboxylic Acids and their Derivatives

16h

Nomenclature, any two preparations of Carboxylic Acids, and their derivatives.

#### Chemical properties

(Marks Weightage-5)

A. Reactions involving H, OH and COOH groups- salt formation, anhydride formation, acid chloride formation, amide formation and esterification,

B. Huns-Diecker reaction, Schimdt reaction, Curtius rearrangement, Arndt-Eistert synthesis, C. Typical Reactions of dicarboxylic acids, hydroxy acids and unsaturated acids. Reactions of acid chlorides, anhydrides, esters and amides.

#### Mechanisms

(Marks Weightage-10)

Mechanism of acidic and alkaline hydrolysis of esters, Hell-Volhard- Zelinsky.

#### Active methylene compounds

(Marks Weightage-10+5)

Acetoacetic esters: keto-enol tautomerism, preparation by Claisen condensation (mechanism), Acid hydrolysis and ketonic hydrolysis. Synthetic applications:Preparation of a) monocarboxylic acids (Acetic acid, Propanoic acid) b) Dicarboxylic acids (Succinic acid, Adipic acid).

C) Reaction with urea.

Malonic ester: preparation from acetic acid.

Synthetic applications: Preparation of a) monocarboxylic acids (Acetic acid, Propanoic acid)

b) Dicarboxylic acids (succinic acid and adipic acid) C.Reaction with urea.



## SPECTROSCOPY

### UNIT-IV

#### **Spectrophotometry** **6h** **(Marks Weightage-5+5)**

General feature of absorption-Beer-Lambert's law and its application, transmittance Absorbance, and molecular absorptivity. Single and double beam Spectrophotometers. Applications of Beer-Lambert's for Quantitative analysis of 1. Chromium in  $K_2Cr_2O_7$  2. Manganese in Manganous sulphate.

#### **Electronic spectroscopy:** **6h** **(Marks Weightage-10)**

Interactions of electromagnetic radiations with molecules and types of molecular spectra. Energy levels of molecular orbital ( $\sigma$ ,  $\pi$ , n). Selection rules for electronic spectra. Types of electronic transitions in molecules, effect of conjugation. Concept of chromophore and auxochrome.

#### **Nuclear Magnetic Resonance (NMR) spectroscopy:** **6h** **(Marks Weightage-10+5)**

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

### UNIT-V

**8h**

#### **Application of Spectroscopy to Simple Organic Molecules** **(Marks Weightage-10)**

##### **Application of visible, ultraviolet and infrared spectroscopy in organic molecules.**

Application of electronic spectroscopy and Wood ward rules for calculating  $\lambda_{max}$  of conjugated dienes and  $\alpha,\beta$  – unsaturated compounds.

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

#### **List of Reference Books**

1. A Text Book of Organic Chemistry by Bahl and Arunbahl
2. A Text Book of Organic chemistry by I L Finar Vol I
3. Organic chemistry by Bruice
4. Organic chemistry by Clayden

5. Spectroscopy by William Kemp
6. Spectroscopy by Pavia
7. Organic Spectroscopy by J. R. Dyer
8. Elementary organic spectroscopy by Y.R. Sharma
9. Spectroscopy by P.S.Kalsi
10. Spectrometric Identification of Organic Compounds by Robert M Silverstein, Francis X Webster
11. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009)
12. Furniss, B.S., Hannaford, A.J., Smith, P.W.G. & Tatchell, A.R. Practical Organic Chemistry, 5th Ed. Pearson (2012).
13. Ahluwalia, V.K. & Aggarwal, R. Comprehensive Practical Organic Chemistry: Preparation and Quantitative Analysis, University Press (2000).

**A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE  
(AUTONOMOUS), VUYYURU.**

<b>SEMESTER – III</b>	<b>PAPER-III</b>	<b>PAPER CODE : CHE-301C</b>
<b>PAPER TITLE : ORGANIC CHEMISTRY &amp; SPECTROSCOPY</b>		
<b>ACADEMIC YEAR-2021-2022</b>		

**Time: 3Hours**

**Maximum marks: 70**

**Minimum marks: 28**

**SECTION-A**

**Answer any FOUR of the following. Each question carries 5 marks.**

**4X5=20**

1. Explain relative reactivity of aryl halides.
2. Explain ring substitution reaction (bromination) in phenols.
3. Explain the reaction Beckmann rearrangement.
4. Explain the reaction Curtius-rearrangement.
5. Explain Keto-enol Tautomerism.
6. Write a short note on single beam spectrophotometer.
7. Explain absorbance and molar absorptivity.
8. Write a short note on coupling constant.

**SECTION-B**

**Answer any FIVE questions. Each question carries 10 marks.**

**5X10=50**

9. Discuss the reaction and mechanism of  $S_N^i$  nucleophilic substitutions.
10. Discuss the reaction and mechanism of Reimer-Tiemann.
11. Explain Baeyer-villiger Oxidation reaction with mechanism.
12. Explain mechanism of ester hydrolysis through acidic medium.
13. Write the preparation of n- butyric acid, succinic acid and crotonic acid from malonic ester.
14. Explain the selection rules of electronic spectra.
15. Give the principle and theory involved in PMR spectroscopy.
16. Explain IR spectra of alkanes and alkenes.

**The Guidelines to be followed by the question paper setters in chemistry for the**

**III- Semester - end exams**

<b>SEMESTER – III      SUBJECT: CHEMISTRY      COURSE CODE: CHE-301C</b>
<b>PAPER TITLE :      ORGANIC CHEMISTRY &amp; SPECTROSCOPY</b>
<b>ACADEMIC YEAR-2021-2022</b>

**Weightage for the question paper**

<b>syllabus</b>	<b>Section-A (Short answer questions)</b>	<b>Section-B (essay questions)</b>
<b>Unit-1 (30 Marks)</b>	<b>1+1</b>	<b>1+1</b>
<b>Unit-2 (15 Marks)</b>	<b>1</b>	<b>1</b>
<b>Unit-3 (30 Marks)</b>	<b>1+1</b>	<b>1+1</b>
<b>Unit-4 (35 Marks)</b>	<b>1+1+1</b>	<b>1+1</b>
<b>Unit-5 (10 Marks)</b>	<b>---</b>	<b>1</b>

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

**A.G.&S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE  
(AUTONOMOUS), VUYYURU.  
(Accredited at “A” Grade by NAAC, Bangalore)  
PRACTICAL SYLLABUS**

<b>Practical Paper – III Organic preparations and IR Spectral Analysis</b>	<b>PAPER CODE : CHE-301 P ACADEMIC YEAR-2021-2022</b>
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**30 hrs (2 h/W)      Credits: 2**

**Organic preparations:**

- i. Acetylation of one of the following compounds: amines (aniline, o-, m-, p-toluidines and o-, m-, p-anisidine) and phenols ( $\beta$ -naphthol, vanillin, salicylic acid) by any one method: a. Using conventional method. b. Using green approach
- ii. Benzoylation of one of the following amines (aniline, o-, m-, p-toluidines and o-, m-, p-anisidine).
- iii. Nitration of any one of the following: a. Acetanilide/nitrobenzene by conventional method b. Salicylic acid by green approach (using ceric ammonium nitrate).

**IR Spectral Analysis**

IR Spectral Analysis of the following functional groups with examples

- a) Hydroxyl groups
- b) Carbonyl groups
- c) Amino groups
- d) Aromatic groups

**SCHEME OF VALUATION**

1. INTERNAL MARKS- Record-10M
2. EXTERNAL MARKS-40
  - preparations of an organic compound -25M
  - Viva questions = 10 M
  - Project = 5M

TOTAL = 50 M\_\_  
A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE  
(AUTONOMOUS), VUYYURU.  
(Accredited at "A" Grade by NAAC, Bangalore)

SEMESTER – V	SUBJECT: CHEMISTRY	COURSE CODE: CHE-
501C		
PAPER TITLE : INORGANIC,ORGANIC & PHYSICAL CHEMISTRY, Paper –V		
ACADEMIC YEAR-2021-2022		

### INORGANIC CHEMISTRY

60 hrs(4h/w) Credits-3

#### UNIT – I

##### Coordination Chemistry: (10+10+5)

12h

IUPAC nomenclature - bonding theories - Review of Werner's theory and Sidg-wick'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 - factors affecting crystal-field splitting energy, merits and demerits of crystal-field theory. Isomerism in coordination compounds – structural isomerism and stereo isomerism, stereochemistry of complexes with 4 and 6 coordination numbers

#### UNIT-II

##### 1. Magnetic properties of metal complexes: (10+5)

5h

Types of magnetic behavior, spin-only formula, calculation of magnetic moments, experimental determination of magnetic susceptibility-Gouy method.

##### 2. Stability of metal complexes: (10+5)

6h

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

### ORGANIC CHEMISTRY

#### UNIT- III

##### Nitro hydrocarbons: (10+5)

5h

Nomenclature and classification-nitro hydrocarbons, structure -Tautomerism of nitroalkanes leading to aci and keto form, Preparation of Nitroalkanes, reactivity-halogenation, reaction with

HONO (Nitrous acid), Nef reaction and Mannich reaction leading to Michael addition and reduction.

#### **UNIT – IV**

**Nitrogen compounds: (10+10+5)**

**16h**

Amines (Aliphatic and Aromatic): Nomenclature, Classification into 1°, 2°, 3° Amines and Quaternary ammonium compounds. Preparative methods – 1. Ammonolysis of alkyl halides 2. Gabriel synthesis 3. Hoffman's bromide reaction (mechanism). Reduction of Amides and Schmidt reaction. Physical properties and basic character - Comparative basic strength of Ammonia, methyl amine, dimethyl amine, tri methyl amine and aniline - comparative basic strength of aniline, N-methyl aniline and N,N-dimethyl aniline (in aqueous and non-aqueous medium), steric effects and substituent effects.

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

#### **PHYSICAL CHEMISTRY**

#### **UNIT- V**

**Thermodynamics (10+5+5)**

**16h**

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

#### **List of Reference Books**

1. Concise coordination chemistry by Gopalan and Ramalingam
2. Coordination Chemistry by Basalo and Johnson
3. Organic Chemistry by G. Mare loudan, Purdue Univ
4. Advanced Physical Chemistry by
5. Text book of physical chemistry by S Glasstone

6. Concise Inorganic Chemistry by J.D. Lee

**A.G. & S.G. SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE  
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<b>SEMESTER – V</b>	<b>PAPER-V</b>	<b>PAPER CODE : CHE-501C</b>
<b>PAPER TITLE : INORGANIC, ORGANIC &amp; PHYSICAL CHEMISTRY ACADEMIC YEAR-2021-2022</b>		

Time: 3 Hours

Maximum marks: 70

Minimum marks: 28

**SECTION-A**

**Answer any FOUR of the following. Each question carries 5 marks.**

**4X5=20**

1. Define Crystal field energy? Explain the factors affecting Crystal field energy?
2. Write short note on Magnetic behavior of metal complexes.
3. Define Stability constant? Explain Thermodynamic and kinetic stability.
4. Explain Tautomerism of Nitro alkanes.
5. Write comparative study of Basic strength of Aniline, N-methyl aniline and N,N dimethyl aniline.
6. Define the following terms (a) Enthalpy (b) Internal energy.
7. Explain entropy changes in Spontaneous and Non –Spontaneous processes.

**SECTION-B**

**Answer any FIVE questions. Each question carries 10 marks. 5X10=50**

8. Explain VBT of coordination compounds
9. Explain Crystal field splitting Theory
10. Describe Gouy's method
11. Explain Factors affecting the stability of Metal complexes.
12. What are Nitro alkanes? write any two preparation methods and two chemical reactions.
13. What are amines? Write any four chemical reactions of amines
14. Write about Electrophilic substitution of Aromatic amines
15. Define an equation for work done of an ideal gas under isothermal and adiabatic process.



**The Guidelines to be followed by the question paper setters in chemistry for the  
V- Semester - end exams**

<b>SEMESTER – V</b>	<b>SUBJECT: CHEMISTRY</b>	<b>COURSE CODE: CHE-501C</b>
<b>PAPER TITLE : INORGANIC,ORGANIC &amp; PHYSICAL CHEMISTRY, Paper –V</b>		
<b>ACADEMIC YEAR-2021-2022</b>		

Weightage for the question paper

syllabus	Section-A (Short answer questions)	Section-B (essay questions)
Unit-1 (25 Marks)	1	1 + 1
Unit-2 (30 Marks)	1 + 1	1+1
Unit-3 (15 Marks)	1	1
Unit-4 (25 Marks)	1	1 + 1
Unit-5 (20Marks)	1 +1	1

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

**A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS),  
VUYYURU.**

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**PRACTICAL SYLLABUS**

<b>Practical Paper – V Organic Qualitative Analysis</b>	<b>PAPER CODE : CHE-501 P ACADEMIC YEAR-2021-2022</b>
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**30 hrs (2 h/W)      Credits: 2**

**Organic Qualitative Analysis:**

**50M**

Analysis of an organic compound through systematic qualitative procedure for functional group identification including the determination of melting point and boiling point .

Alcohols, Phenols, Aldehydes, Ketones, Carbohydrates, Carboxylic acids, Aromatic Primary Amines.

**SCHEME OF VALUATION**

1. INTERNAL MARKS- Record-10M
2. EXTERNAL MARKS-40
  - Analysis of an organic compound and preparation of suitable derivative-30M
  - Viva questions = 10 M

TOTAL = 50 M\_\_

**A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE  
(AUTONOMOUS),VUYYURU.**

**(Accredited at "A" Grade by NAAC, Bangalore)**

<b>SEMESTER – V</b>	<b>Paper – VI</b>	<b>SUBJECT: CHEMISTRY</b>	<b>PAPER CODE: CHE-</b>
<b>502C</b>			
<b>PAPER TITLE : INORGANIC,ORGANIC &amp; PHYSICAL CHEMISTRY</b>			
<b>ACADEMIC YEAR-2021-2022</b>			

**60 hrs (4h/w) Credits-3**

**INORGANIC CHEMISTRY**

**UNIT-I**

**1. Reactivity of metal complexes: (10+5) 5h**

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

**2. Bio inorganic chemistry: (10) 5h**

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

**ORGANIC CHEMISTRY**

**UNIT- II**

**Heterocyclic Compounds (10+5) 10h**

Introduction and definition: Simple five membered ring compounds with one hetero atom Ex. Furan. Thiophene and pyrrole - Aromatic character – Preparation from 1,4,-dicarbonyl compounds, Paul-Knorr synthesis. Properties: Acidic character of pyrrole - electrophilic substitution at 2 or 5 position, Halogenation, Nitration and Sulphonation under mild conditions - Diels Alder reaction in furan. Pyridine – Structure - Basicity - Aromaticity - Comparison with pyrrole - one method of preparation and properties - Reactivity towards Nucleophilic substitution reaction.

### UNIT-III

#### Carbohydrates (10+5+5+5)

12h

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

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

**Interconversion of Monosaccharide's:** Aldopentose to Aldohexose (Arabinose to D- Glucose, D-Mannose) (Kiliani - Fischer method). Epimers, Epimerisation - Lobry de bruyn van Ekenstein rearrangement. Aldohexose to Aldopentose (D-Glucose to D- Arabinose) by Ruff degradation. Aldohexose to Ketohexose [(+) Glucose to (-) Fructose] and Ketohexose to Aldohexose (Fructose to Glucose)

### UNIT- IV

#### Amino acids and proteins (10+10+5)

12h

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

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

#### Mass Spectrometry: (10M)

6h

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 ethyl benzene, acetophenone,1-propanol.

## **PHYSICAL CHEMISTRY**

### **UNIT-V**

#### **1. Chemical kinetics (10+5)**

**10h**

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

#### **List of Reference Books**

1. Concise coordination chemistry by Gopalan and Ramalingam
2. Coordination Chemistry by Basalo and Johnson
3. Organic Chemistry by G.Mare loudan, Purdue Univ
4. Advanced Physical Chemistry by Atkins
5. Text book of physical chemistry by S Glasstone

**A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE  
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**(Accredited at "A" Grade by NAAC, Bangalore)**

<b>SEMESTER – V</b>	<b>PAPER-VI</b>	<b>PAPER CODE : CHE-502C</b>
<b>PAPER TITLE : INORGANIC,ORGANIC &amp; PHYSICAL CHEMISTRY</b>		
<b>ACADEMIC YEAR-2021-2022</b>		

Time: 3Hours

Maximum marks: 70

Minimum marks: 28

**SECTION-A**

**Answer any FOUR of the following. Each question carries 5 marks.**

**4X5=20**

1. Explain labile and inert complex with suitable examples.
2. Explain the aromatic character of pyrrole.
3. Write the classification of Carbohydrates with suitable examples
4. How do you convert Ketohexose to Aldohexose.
5. Write a note on Ruff's degradation of an Aldohexose.
6. Write the preparation of lactams from gamma and delta amino acids
7. What is Zero order reaction? give examples

**SECTION-B**

**Answer any FIVE questions. Each question carries 10 marks. 5X10=50**

8. Explain uni molecular and bi molecular nucleophilic substitution reactions and write mechanism of nucleophilic substitution in square planar complexes.
9. Explain the role of Fe, Co, Zn in biological systems.
10. What are Hetero cyclic compounds? Write the preparation and properties of Furan.
11. Explain the structure of Fructose.
12. What are amino acids and proteins? Give two methods of preparation of  $\alpha$ -amino acids with equations.
13. Give reactions to show the presence of  $\text{NH}_2$  and  $\text{COOH}$  groups in  $\alpha$ -amino acids.
14. Write the principles of Mass spectrometry.
15. Define order of the reaction. Explain any three methods for the determination of the order of the reaction

**The Guidelines to be followed by the question paper setters in chemistry for the  
V- Semester - end exams**

<b>SEMESTER – V</b>	<b>SUBJECT: CHEMISTRY</b>	<b>PAPER CODE: CHE-502C</b>
<b>PAPER TITLE : INORGANIC,ORGANIC &amp; PHYSICAL CHEMISTRY, Paper – VI</b>		
<b>ACADEMIC YEAR-2021-2022</b>		

Weightage for the question paper

syllabus	Section-A (Short answer questions)	Section-B (essay questions)
Unit-1 (25 Marks)	1	1 + 1
Unit-2 (15 Marks)	1	1
Unit-3 (25 Marks)	1 + 1+1	1
Unit-4 (35 Marks)	1	1 + 1 +1
Unit-5 (15 Marks)	1	1

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

**A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS),  
VUYYURU.**

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**PRACTICAL SYLLABUS**

<b>Practical Paper –VI Physical Chemistry</b>	<b>COURSE CODE : CHE-502 P ACADEMIC YEAR-2021-2022</b>
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**30 hrs (2 h/W) Credits: 2**

1. Determination of rate constant for acid catalyzed ester hydrolysis.
2. Determination of molecular status and partition coefficient of benzoic acid in Benzene and water.
3. Determination of Surface tension of liquid
4. Determination of Viscosity of liquid.
5. Adsorption of oxalic acid on silica gel, verification of Freundlich isotherm.

**SCHEME OF VALUATION**

2. INTERNAL MARKS- Record-10M

2. EXTERNAL MARKS-40

- Practical-30M
- Viva questions = 10 M

TOTAL = 50 M\_\_





**A.G& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS &  
SCIENCE**

**VUYYURU-521165, KRISHNA Dt., A.P.(Autonomous)**

**Accredited by NAAC with "A" Grade**

**2022-2023**



**DEPARTMENT OF CHEMISTRY**

**MINUTES OF BOARD OF STUDIES**

**ODD SEMESTER**

**27-10-2022**

Minutes of the Meeting of Board of Studies in Chemistry for the Autonomous Course  
A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru held at 11.00 A.M  
on 27-10-2022 in the Department of Chemistry

*Sri. K.RAMESH* *Presiding*

Members Present:

- 1) *K. Ramesh* ..... Chairman HOD, Dept. of Chemistry,  
(Sri. K.RAMESH) A.G. & S.G.S.Degree College, Vuyyuru.
- 2) ..... University Nominee Assistant Professor,  
(Prof.D.Ramasekhar Reddy) Dept. of Chemistry, Krishna University, MTM.
- 3) ..... Academic Council Nominee HOD, Dept. of Chemistry,  
(Dr. S. Kalpana) SDMS M College, Vijayawada.
- 4) ..... Academic Council Nominee Lecturer in Chemistry,  
(Smt. A. Indira) G.D.C, Dumpagadapa.
- 5) ..... Industrialist Manager, Q.A, Biophore india  
(Dr. G Raja) Pharmaceuticals pvt ltd Hyd.
- 6) ..... Student Nominee Lecturer in Chemistry,  
(Smt. M. Sowjanya) ANR College Gudivada.
- 7) *G. Giri Prasad* ..... Member Lecturer in Chemistry,  
(Dr. G.Giri prasad) A.GS.G.S.Degree College, Vuyyuru
- 8) *M. V. Santhi* ..... Member Lecturer in Chemistry,  
(Smt. M.V.Santhi) A.G. & S.G.S.Degree College, Vuyyuru.
- 9) *P. Suresh* ..... Member Lecturer in Chemistry,  
(Sri. P.Suresh) A.G.& S.G.S.Degree College, Vuyyuru.
- 10) *M. Santhi* ..... Member Lecturer in Chemistry,  
(MS M.Santhi) A.G.& S.G.S.Degree College, Vuyyuru.
- 11) *J. Nageswara Rao* ..... Member Rtd.Lecturer in Chemistry,  
(Sri. J.Nageswara Rao) A.G. & S.G.S.Degree College, Vuyyuru.

### Agenda for B.O.S Meeting

1. To recommend the syllabus and model paper for I semester of I Degree B.Sc., Chemistry for the Academic year 2022-2023.
2. To recommend the syllabus and model papers for III semester of II Degree B.Sc., Chemistry for the Academic year 2022-2023.
3. To recommend the syllabus and model papers for V semester of III Degree B.Sc. Chemistry for the Academic year 2022-2023.
4. To recommend the Blue print of I,III,V semesters of B.Sc. Chemistry for the Academic year 2022--2023.
5. To recommend the Guidelines to be followed by the question paper setters in Chemistry for I,III,V Semester – end exams.
6. To recommend the teaching and evaluation methods to be followed under Autonomous status.
7. Any suggestions regarding certificate course, seminars, workshops, Guest lecture to be organized.
8. Recommend the panel of paper setters and Examiners to the controller of Examinations of
9. Any other matter.

K. Ramani  
Chairman

## RESOLUTIONS

1. It is resolved to follow the **syllabus of APSCHE (theory and practical) for I semesters of I B.Sc.** under Choice Based Credit System (CBCS) for the Academic year 2022--2023.
2. It is resolved to follow the **syllabus of APSCHE (theory and practical) for III semesters of II B.Sc.** under Choice Based Credit System (CBCS) for the Academic year 2022--2023.
3. It is resolved to follow the **syllabus of APSCHE (theory and practical) for V semesters of III B.Sc.** under Choice Based Credit System (CBCS) for the Academic year 2022--2023.
4. It is resolved to follow the **Blue prints** as proposed by members of BOS I,III & V semester of Degree B.Sc. for the Academic year 2022-2023.
5. It is resolved to follow the **guidelines** to be followed by the question paper setters of Chemistry for I,III & V semesters of Degree B.Sc. for the Academic Year 2022-2023.
6. It is resolved to continue the following teaching and evolution methods for Academic year 2022-23.

### Teaching Methods:

- Besides the conventional methods of teaching, we use modern technology i.e. using of LCD projector to display on U boards etc, for better understanding of concepts.
  - **Evaluation of a student is done by the following procedure:**
  - **Internal Assessment Examinations:**
  - Out of maximum 100 marks in each paper for I B.Sc, 30 marks shall be allocated for internal assessment. Out of these 30 marks, 20 marks are allocated for announced tests (i.e.IA-1 & IA-2).
  - Out of maximum 100 marks in each paper for II B.Sc, 25 marks shall be allocated for internal assessment. Out of these 25 marks, 15 marks are allocated for announced tests (i.e.IA-1 & IA-2).
  - Out of maximum 100 marks in each paper for III B.Sc, 30 marks shall be allocated for internal assessment. Out of these 30 marks, 20 marks are allocated for announced tests (i.e.IA-1 & IA-2).
  - Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, 5 marks are allocated on the basis of candidate's percentage of attendance and remaining 5 marks are allocated for the innovative component like assignment/quiz/seminars for I,II,III B.Sc.
  - There is no pass minimum for internal assessment for I, II, III B.Sc.
  - **Semester – End Examination:**
  - The maximum marks for I,III,V B.Sc Semester – End examination shall be 70/75/70 marks duration of the examination shall be 3 hours. Even though the candidate is absent for two IA exams /obtain Zero marks the external marks are considered (if the candidate gets 40/70/75) and the result shall be declared as "PASS".
  - Semester – End examinations shall be conducted in theory papers at the end of every semester, while in practical papers, these examinations are conducted at the end of I,III & V semesters for I, II & III B.Sc for 50 marks.
7. Discussed and recommended for organizing certificate course, seminars, Guest lecturers, workshops to upgrade the knowledge of students, for the approval of the academic council.
  8. Discussed and empowered the Head of the department of Chemistry to suggest the panel of paper setters and examiners to the controller of examinations
  9. NIL.

  
**Chairman**

## RESOLUTIONS

1. It is resolved to follow the **syllabus of APSCHE (theory and practical) for I semesters of I B.Sc.** under Choice Based Credit System (CBCS) for the Academic year 2022--2023.
2. It is resolved to follow the **syllabus of APSCHE (theory and practical) for III semesters of II B.Sc.** under Choice Based Credit System (CBCS) for the Academic year 2022--2023.
3. It is resolved to follow the **syllabus of APSCHE (theory and practical) for V semesters of III B.Sc.** under Choice Based Credit System (CBCS) for the Academic year 2022--2023.
4. It is resolved to follow the **Blue prints** as proposed by members of BOS I,III & V semester of Degree B.Sc. for the Academic year 2022-2023.
5. It is resolved to follow the **guidelines** to be followed by the question paper setters of Chemistry for I,III & V semesters of Degree B.Sc. for the Academic Year 2022-2023.
6. It is resolved to continue the following teaching and evolution methods for Academic year 2022-23.

### Teaching Methods:

- Besides the conventional methods of teaching, we use modern technology i.e. using of LCD projector to display on U boards etc, for better understanding of concepts.

- **Evaluation of a student is done by the following procedure:**

- **Internal Assessment Examinations:**

- Out of maximum 100 marks in each paper for I B.Sc, 30 marks shall be allocated for internal assessment. Out of these 30 marks, 20 marks are allocated for announced tests (i.e.IA-1 & IA-2).
- Out of maximum 100 marks in each paper for II B.Sc, 25 marks shall be allocated for internal assessment. Out of these 25 marks, 15 marks are allocated for announced tests (i.e.IA-1 & IA-2).
- Out of maximum 100 marks in each paper for III B.Sc, 30 marks shall be allocated for internal assessment. Out of these 30 marks, 20 marks are allocated for announced tests (i.e.IA-1 & IA-2).
- Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, 5 marks are allocated on the basis of candidate's percentage of attendance and remaining 5 marks are allocated for the innovative component like assignment/quiz/seminars for I,II,III B.Sc.
- There is no pass minimum for internal assessment for I, II, III B.Sc.

- **Semester – End Examination:**

- The maximum marks for I,III,V B.Sc Semester – End examination shall be 70/75/70 marks duration of the examination shall be 3 hours. Even though the candidate is absent for two IA exams /obtain Zero marks the external marks are considered (if the candidate gets 40/70/75) and the result shall be declared as “PASS”.
  - Semester – End examinations shall be conducted in theory papers at the end of every semester, while in practical papers, these examinations are conducted at the end of I,III &V semesters for I, II & III B.Sc for 50 marks.
7. Discussed and recommended for organizing certificate course, seminars, Guest lecturers, workshops to upgrade the knowledge of students, for the approval of the academic council.
  8. Discussed and empowered the Head of the department of Chemistry to suggest the panel of paper setters and examiners to the controller of examinations
  9. NIL.

  
**Chairman**



# A.G & S.G. SIDDHARTHA DEGREE COLLEGE OF

## ARTS & SCIENCE

Vuyyuru-521165

NAAC reaccredited at "A" level

Autonomous -ISO 9001 – 2015 Certified

**Title of the Paper: Inorganic & Physical Chemistry**

**Semester: I (60 Hr)**

Course Code	CHET11A	Course Delivery Method	Class Room / Blended Mode
Credits	3	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction : 2021 - 22	Year of Offering: 2022 - 23	Year of Revision: -----	Percentage of Revision: 0

### Course outcomes:

- At the end of the course, the student will be able to;
- **CO1.** Understand the basic concepts of p-block elements.
- **CO2.** To compare the periodic properties of d and f block elements and explain the bonding and structures of metal carbonyls.
- **CO3.** To understand the properties and structure of Solid state.
- **CO4.** To understand the properties of gaseous and liquid states.
- **CO5.** To explain the properties of Solutions.

### Learning Objectives:

- To understand the preparation and structure of complex compounds.
- To explain the properties and structure of d and f block elements and understand the theories of bonding in metals
- To understand the symmetry in crystals and properties and structure of Solid state.
- To understand the properties and structure of gaseous and liquid states.
- To understand the properties of solutions.

## Syllabus

### Course Details

Unit	Learning Units	Lecture Hours
<b>INORGANIC CHEMISTRY</b>		<b>24h</b>
<b>I</b>	<p><b>Chemistry of p-block elements</b> <b>8h</b></p> <p>1.1 Group 13: Preparation &amp; structure of Diborane, Borazine 1.2 Group 14: Preparation, classification and uses of silicones 1.3 Group 15: Preparation &amp; structures of Phosphonitrilic halides {<math>(PNCl_2)_n</math> where <math>n=3, 4</math> 1.4 Group 16: Oxides and Oxoacids of Sulphur (structures only) 1.5 Group 17: Pseudohalogens, Structures of Interhalogen compounds.</p>	<b>8h</b>
	<p><b>d-block elements</b> <b>6h</b></p> <p>2.1 Characteristics of d-block elements with special reference to electronic configuration, 2.2 variable valence, magnetic properties, catalytic properties 2.3 and ability to form complexes. Stability of various oxidation states.</p>	<b>6h</b>
<b>II</b>	<p><b>f-block elements</b> <b>6h</b></p> <p>2.4 Chemistry of lanthanides - electronic structure, oxidation states, lanthanide contraction, consequences of lanthanide contraction, 2.5 Magnetic properties. Chemistry of actinides - electronic configuration, oxidation states, 2.6 actinide contraction, comparison of lanthanides and actinides.</p>	<b>6h</b>
	<p><b>Metals</b> <b>4h</b></p> <p>2.7 Valence bond theory and free electron theory, explanation of thermal and electrical conductivity of metals based on these theories, 2.8 Band theory- formation of bands, 2.9 Explanations of conductors, semiconductors and insulators.</p>	<b>4h</b>
<b>Physical Chemistry</b>		<b>36h</b>
<b>III</b>	<p><b>Solid State</b></p> <p>3.1 Symmetry in crystals. Law of constancy of interfacial angles. 3.2 The law of rationality of indices. The law of symmetry. Miller indices, 3.3 Definition of lattice point, space lattice, unit cell. Bravais lattices and crystal systems. 3.4 X-ray diffraction and crystal structure. Bragg's law. Powder method. Defects in crystals.</p>	<b>10h</b>



	<b>3.5</b> Stoichiometric and non-stoichiometric defects.	
IV	<b>Gaseous state</b> <b>4.1</b> van der Waal's equation of state. Andrew's isotherms of carbon dioxide, continuity of state. <b>4.2</b> Critical phenomena. Relationship between critical constants and vander Waal's constants. <b>4.3</b> Law of corresponding states. Joule- Thomson effect. Inversion temperature.	6h
	<b>Liquid state</b> <b>4.4</b> Liquid crystals, mesomorphic state. Differences between liquid crystal and solid/liquid. <b>4.5</b> Classification of liquid crystals into Smectic and Nematic. <b>4.6</b> Application of liquid crystals as LCD devices.	4h
V	<b>Solutions, Ionic equilibrium &amp; dilute solutions</b> <b>Solutions</b> <b>5.1</b> Azeotropes-HCl-H <sub>2</sub> O system and ethanol-water system. Partially miscible liquids-phenol- water system. <b>5.2</b> Critical solution temperature (CST), Effect of impurity on consolute temperature. Immiscible liquids and steam distillation. Nernst distribution law. <b>5.3</b> Calculation of the partition coefficient. Applications of distribution law.	6h
	<b>Ionic equilibrium</b> <b>5.4</b> Ionic product, common ion effect, solubility and solubility product. <b>5.5</b> Calculations based on solubility product.	3h
	<b>Dilute solutions</b> <b>5.6</b> Colligative properties- RLVP, Osmotic pressure, Elevation in boiling point and depression in freezing point. <b>5.7</b> Experimental methods for the determination of molar mass of a non-volatile solute using osmotic pressure, <b>5.8</b> Elevation in boiling point and depression in freezing point. Abnormal colligative properties. Van't Hoff factor.	7h

## Co-curricular activities and Assessment Methods

1. Continuous Evaluation: Monitoring the progress of student's learning
2. Class Tests, Worksheets and Quizzes
3. Presentations, Projects and Assignments and Group Discussions: Enhances critical thinking skills and personality
4. Semester- end Examination: critical indicator of student's learning and teaching methods adopted by teachers throughout the semester.

## List of Reference Books

1. Principles of physical chemistry by Prutton and Marron
2. Solid State Chemistry and its applications by Anthony R. West
3. Text book of physical chemistry by K L Kapoor
4. Text book of physical chemistry by S Glasstone
5. Advanced physical chemistry by Bahl and Tuli
6. Inorganic Chemistry by J.E.Huheey
7. Basic Inorganic Chemistry by Cotton and Wilkinson
8. A textbook of qualitative inorganic analysis by A.I. Vogel
- 9.

Atkins, P.W. & Paula, J. de Atkin's Physical Chemistry Ed.,  
Oxford University Press 10th Ed (2014).

10. Castellan, G. W. Physical Chemistry 4th Ed. Narosa (2004).
11. Mortimer, R. G. Physical Chemistry 3rd Ed. Elsevier: NOIDA, UP (2009).
12. Barrow, G. M. Physical Chemistry

## WEB Links:

<https://ncert.nic.in/ncerts/l/kech204.pdf>

<https://www.askiitians.com/iit-jee-chemistry/general-properties-of-the-transition-elements-d-block/>

<https://www.nptel.ac.in/courses/104/104/104104101/>

<https://physicscatalyst.com/chemistry/vander-waals-equations.php>

**A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE  
(AUTONOMOUS), VUYYURU.  
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**MODEL PAPER**

FIRST YEAR B.Sc., DEGREE EXAMINATION

**SEMESTER-I**

**CHEMISTRY Course-I: INORGANIC & PHYSICAL CHEMISTRY**

Time: 3 hours

Maximum Marks: 75

**PART- A**

5 X 5 = 25 Marks

Answer any **FIVE** of the following questions. Each carries **FIVE** marks

1. Explain the preparation & structures of Phosphonitrilic compounds.-L1
2. Explain in brief, catalytic properties & stability of various oxidation states of d- block elements.-L1
3. Write short note on Bravais lattices and crystal systems.-L2
4. What are Smectic & Nematic liquid Crystals? Explain.-L1
5. Write account on Common ion effect & Solubility product.-L1
6. Describe Andrew's isotherms of carbon dioxide. -L2
7. Explain Actinide Contraction. -L2
8. Explain the structure of Borazine. -L2

**PART- B**

5 X 10 = 50 Marks

Answer **ALL** the questions. Each carries **TEN** marks

9 (a). Explain Classification, Preparations & uses of Silicones.-L1  
(or)

- (b). (i) What are Pseudohalogens. -L1  
(ii) Explain the Structures of any one AX<sub>3</sub>& AX<sub>5</sub> interhalogen compounds. -L1

10 (a). What is Lanthanide Contraction? Explain the Consequences of Lanthanide Contraction. -L1  
(or)

- (b). (i) Explain the magnetic properties of d- block elements.

(ii) Explain about Conductors, Semi-Conductors & Insulators using Band Theory. **-L1**

11.(a). Write an essay on Crystal defects. **-L2**

(or)

(b). What is Bragg's Law. Explain the determination of structure of a crystal by powder method. **-L2**

12.(a). Derive the relationship between Critical constants & Vanderwaal constants **-L2**

(or)

(b).(i) Write any 5 differences between liquid crystals & liquids, solids

(ii) Write the applications of Liquid crystals. **-L2**

13.(a). Explain Nernst distribution Law. Explain its applications **-L2**

(or)

(b). What are colligative properties. Write experimental methods for determination of molar mass of a non-volatile solute by using Elevation in boiling point & depression in freezing point. –

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**MODEL PAPER**

FIRST YEAR B.Sc., DEGREE EXAMINATION

**SEMESTER-I**

**CHEMISTRY Course-I: INORGANIC & PHYSICAL CHEMISTRY**

Time: 3 hours

Maximum Marks: 70

Answer all questions

1. (a) -10M L1  
(b) - 4M L2  
(or)  
(c) -10M L1  
(d) - 4M L2
2. (a) -10M L3  
(b) - 4M L2  
(or)  
(c) -10M L2  
(d) - 4M L3
3. (a) -10M L1  
(b) - 4M L2  
(or)  
(c) -10M L1  
(d) - 4M L2
4. (a) -10M L3  
(b) - 4M L1  
(or)  
(c) -10M L1  
(d) - 4M L3
5. (a) -10M L2  
(b) - 4M L2  
(or)  
(c) -10M L2  
(d) - 4M L2

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**MODEL PAPER**

FIRST YEAR B.Sc., DEGREE EXAMINATION

**SEMESTER-I**

**CHEMISTRY Course-I: INORGANIC & PHYSICAL CHEMISTRY**

Time: 3 hours

Maximum Marks: 70

Section-A

Answer all questions .Each question carries 4 marks .....5 X 4 =20M

1. 4M  
(OR)  
4M
2. 4M  
(OR)  
4M
3. 4M  
(OR)  
4M
4. 4M  
(OR)  
4M
5. 4M  
(OR)  
4M

Section-B

Answer all questions .Each question carries 10 marks ..... 5 X 10 =50M

6. 10M  
(OR)  
10M
7. 10M  
(OR)  
10M
8. 10M  
(OR)  
10M
9. 10M  
(OR)  
10M
10. 10M  
(OR)  
10M

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**LABORATORY COURSE –I**

**Practical-I          ANALYSIS OF SALT MIXTURE      (At the end of Semester-I)**  
(Minimum of Six mixtures should be analyzed)

Credits:2

30 hrs (2 h / w)

10M+40M =50M

**Course outcomes:**

At the end of the course, the student will be able to;

2. Understand the basic concepts of qualitative analysis of inorganic mixture
3. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
4. Apply the concepts of common ion effect, solubility product and concepts related to qualitative analysis

**Analysis of Salt Mixture**

Analysis of mixture salt containing two anions and two cations (From two different groups) from the following:

Anions: Carbonate, Sulphate, Chloride, Bromide, Acetate, Nitrate, Borate, Phosphate.

Cations: Lead, Copper, Iron, Aluminium, Zinc, Nickel, Manganese, Calcium, Strontium, Barium, Potassium and Ammonium.

**Co-curricular activities:**

1. To attain skill in semi-micro inorganic qualitative analysis students are made to analyze the same on chemicals used in everyday life.

**Reference Books :**

1. Dr. V. V. Ramanujan inorganic semi micro qualitative analysis, The National publishing company.
2. Vogel's text book of qualitative inorganic analysis, addition Wesley longman 7<sup>th</sup> edition 2001.



# A.G & S.G. SIDDHARTHA DEGREE COLLEGE OF

## ARTS & SCIENCE

Vuyyuru-521165

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Autonomous -ISO 9001 – 2015 Certified

**Title of the Paper: ORGANIC CHEMISTRY & SPECTROSCOPY**

**Semester: III (60 Hr)**

Course Code	CHET31A	Course Delivery Method	Class Room / Blended Mode
Credits	3	CIA Marks	25
No. of Lecture Hours / Week	4	Semester End Exam Marks	75
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction : 2021 - 22	Year of Offering: 2022 - 23	Year of Revision: -----	Percentage of Revision:

### Course out comes:

Topics will include structure, stereochemistry, nomenclature, synthesis, properties, and reactions of the major classes of organic compounds. A mechanistic approach is used in the course to explain the reactions of these compounds.

Spectroscopy is general term used for the instrumental process by which information about molecular structure is obtained through careful analysis of absorption, scattering or emission of electromagnetic radiation by compounds.

### Learning Objectives:

1. Student will know the preparation, properties and reactions of halo alkanes, halo arenes and oxygen containing functional groups



2. Student Use the synthetic chemistry learnt in this course to do functional group transformations.
3. Will know the different types of carboxylic acids their preparations & properties
4. Knowing various applications of spectroscopy methods
5. Learn to apply spectroscopy to simple organic compounds

**Course Outcomes:**

At the end of this course, students should be able to:

CO1: Remember the preparations, properties and reactions of halo alkanes, halo arenes and oxygen containing functional groups.-**PO1**

CO2: Understand preparation, properties and reactions of carbonyl compounds -**PO1**

CO3: Apply preparation methods for carboxylic acids and their derivatives-**PO1**

CO4: Analyze various molecules and polyatomic molecules using different spectroscopy methods-**PO1, PO7**

CO5: Evaluate the functional groups of different organic compounds- **PO1, PO7**

CO6: Create applications of spectroscopy for various organic molecules- **PO1, PO7**

## Syllabus

### Course Details

Unit	Learning Units	Lecture Hours
I	<p><b>Chemistry of Halogenated Hydrocarbons</b></p> <p>Alkyl halides: Methods of preparation and properties, nucleophilic substitution reactions– SN<sup>1</sup>, SN<sup>2</sup> and SN<sup>i</sup> mechanisms with stereo chemical aspects and effect of solvent etc.; nucleophilic substitution vs. elimination, Williamson’s synthesis. Arylhalides: Preparation (including preparation from diazonium salts) and properties, nucleophilic aromatic substitution; S<sub>N</sub>Ar, Benzyne mechanism. Relative reactivity of alkyl, allyl, benzyl, vinyl and aryl halides towards nucleophilic substitution reactions.</p> <p><b>Alcohols &amp; Phenols</b></p> <p>Alcohols: preparation, properties and relative reactivity of 1°, 2°, 3° alcohols, Bouvaelt Blanc Reduction; Oxidation of diols by periodic acid and lead tetra acetate, Pinacol- Pinacolone rearrangement; Lucas Reagent</p> <p>Phenols: Preparation and properties; Acidity and factors effecting it, Ring substitution reactions, Reimer–Tiemann and Kolbe’s–Schmidt Reactions, Fries and Claisen rearrangements with mechanism;</p>	<b>12 Hrs</b>
II	<p><b>Carbonyl Compounds</b></p> <p>Structure, reactivity, preparation and properties; Nucleophilic additions, with NaHSO<sub>3</sub>, Formation of alcohols, HCN, Grignard’s Reagent(RMgX), hemiacetals, Fehling’s, Tollen’s, 2,4-Di Nitro Phenyl hydrazine (2,4-DNPH) and formation of oximes Nucleophilic addition-elimination reactions with ammonia derivatives Mechanisms of Aldol and Benzoin condensation, Claisen-Schmidt, Perkin, Cannizzaro and Wittig reaction, Beckmann halo form reaction and Baeyer Villiger oxidation, α-substitution reactions, oxidations and reductions (Clemmensen, Wolf – kishner, with LiAlH<sub>4</sub> &amp; NaBH<sub>4</sub>). Addition reactions of α,β-unsaturated carbonyl compounds: Michael addition.</p> <p>Active methylene compounds: Keto- Enol tautomerism. Preparation and synthetic applications of diethyl malonate and ethyl acetoacetate.</p>	<b>10 hrs</b>
	<b>Carboxylic Acids and their Derivatives</b>	

III	<p>General methods of preparation, physical properties and reactions of mono carboxylic acids, effect of Substituents on acidic strength. Typical reactions of dicarboxylic acids, hydroxyl acids and unsaturated acids. Preparation and reactions of acid chlorides, anhydrides, esters and amides; Comparative study of nucleophilic substitution at acyl group-Mechanism of acidic and alkaline hydrolysis of esters, Claisen condensation, Reform at sky reactions and Curtius rearrangement Reactions involving H, OH and COOH groups-salt formation, anhydride formation, acid chloride formation, amide formation and esterification (mechanism). Degradation of carboxylic acids by Huns-Diecker reaction, de carboxylation by Schimdt reaction, Arndt-Eistert synthesis, halogenation by Hell- Volhard- Zelinsky reaction.</p>	12 hrs
IV	<p><b>Molecular Spectroscopy:</b> Interaction of electromagnetic radiation with molecules and various types of spectra;</p> <p><b>Rotation spectroscopy:</b> Selection rules, intensities of spectral lines, determination of bond lengths of diatomic and linear triatomic molecules, isotopic substitution.</p> <p><b>Vibrational spectroscopy:</b> Classical equation of vibration, computation of force constant, Harmonic and an harmonic oscillator, Morse potential curve,vibrational degrees of freedom molecules, modes of vibration. Selection rules for vibrational transitions, Fundamental frequencies, overtones and hot bands.</p> <p><b>Electronic spectroscopy:</b> Energy levels of molecular orbitals (<math>\sigma</math>, <math>\pi</math>, <math>n</math>). Selection rules for electronic spectra. Types of electronic transitions in molecules, effect of conjugation. Concept of chromophore. Bathochromic and hypsochromic shifts.Beer-Lambert's law and its limitations.</p> <p><b>Nuclear Magnetic Resonance (NMR) spectroscopy:</b> 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>	18 hrs
	<p><b>Application of Spectroscopy to Simple Organic Molecules</b> Application of visible, ultraviolet and Infrared</p>	

V	<p><b>spectroscopy in organic molecules.</b></p> <p>Application of electronic spectroscopy and Woodward rules for calculating <math>\lambda_{\text{max}}</math> of conjugated dienes and <math>\alpha, \beta</math> – unsaturated compounds.</p> <p>Infrared radiation and types of molecular vibrations, functional group and fingerprint region. IR spectra of alkanes, alkenes and simple alcohols (inter and intramolecular hydrogen bonding), aldehydes, ketones, carboxylic acids and their derivatives (effect of substitution on <math>&gt;C=O</math> stretching absorptions).</p>	<b>8 hrs</b>
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**Textbook:**

1. B.S.Bhal, Arun Bhal Advanced Organic Chemistry, Ramnagar, New Delhi 2001
2. P K Bruice. Organic Chemistry by Bruice, Pearson Education, Patparganj, Delhi-2001
3. Jonathan Clyden, Nick Greaves, Organic Chemistry by Clyden, Oxford University press
4. William Kempf, Spectroscopy by William Kemp, Palgrave, USA-3<sup>rd</sup> edition
5. Y R Sharma, Elementary Organic Spectroscopy, S Chand, 4<sup>th</sup> revised edition.

**Recommended Reference book:**

1. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009)
2. Furniss, B.S., Hannaford, A.J., Smith, P.W.G. & Tatchell, A.R. Practical Organic Chemistry, 5th Ed. Pearson (2012)
3. Ahluwalia, V.K. & Aggarwal, R. Comprehensive Practical Organic Chemistry: Preparation and Quantitative Analysis, University Press (2000).

**Course Delivery method:** Face-to-face / Blended

**Course has focus on:**

Employability / Entrepreneurship

**Websites of Interest:**

1. <https://www.sydney.edu.au/science/chemistry/~george/halides.html>
- 2.

[https://chem.libretexts.org/Bookshelves/Organic\\_Chemistry/Organic\\_Chemistry\\_\(McMurry\)/17%3A\\_Alcohols\\_and\\_Phenols/17.00%3A\\_Introduction](https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Organic_Chemistry_(McMurry)/17%3A_Alcohols_and_Phenols/17.00%3A_Introduction)

- 3.

<https://nptel.ac.in/content/storage2/courses/104101005/downloads/LectureNotes/chapter%2010.pdf>

4. <https://www.khanacademy.org/science/organic-chemistry/carboxylic-acids-derivatives/formation-carboxylic-acid-derivatives-sal/v/fisher-esterification?modal=1>
5. <https://byjus.com/chemistry/infrared-spectroscopy/>
6. <https://www.lehigh.edu/~kjs0/carey-13.PDF>

**Co-curricular Activities:**

Continuous Evaluation: Monitoring the progress of student's learning Class Tests Work sheets and Quizzes Presentations, Assignments and Group Discussions.

**A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE  
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SEMESTER-III  
CHEMISTRY COURSE-III: ORGANIC CHEMISTRY &  
SPECTROSCOPY**

Time: 3 hours

Maximum Marks: 75

**PART- A**

**5 X 5 = 25 Marks**

Answer any **FIVE** of the following questions. Each carries **FIVE** marks

1. Tell any two methods for preparation of aryl halides- **L1-CO1**
2. Summarize the mechanism for Pinacol-Pinacolone rearrangement-**L2-CO2**
3. Interpret the mechanism for Bayer-villiger oxidation reaction.-**L2-CO2**
4. Explain the effect of substituents on acidic strength of mono-carboxylic acids.-**L1-CO3**
5. Interpret the mechanism for Claisen Condensation reaction. **L2-CO3**
6. Tell the selection rules in rotational spectroscopy.-**L1-CO4**
7. Explain Spin – Spin coupling and Coupling Constant.-**L1-CO4**
8. Classify types of electronic transitions in UV spectroscopy.**L2- CO4**

**PART- B**

**5 X 10 = 50 Marks**

Answer **ALL** the questions. Each carries **TEN** marks

9 (a). Explain the mechanism & stereochemistry of SN1& SN2 reactions of alkyl halides with suitable example.**L1-CO1**

(or)

(b). Explain the following reactions with mechanism. **L1-CO1**

(i) Reimer-Tiemann reaction (ii) Fries rearrangement.

10 (a). Interpret the mechanism for following reactions.**L2-CO2**

(i) Perkin reaction. (ii) Cannizaro reaction

(or)

(b). Summarize the preparation and any three synthetic applications of diethyl malonate. **L2-CO2**

11. (a). Explain acid and base hydrolysis reaction of esters with mechanism. **L1-CO3**

(or)

(b). Explain the mechanisms of Curtius rearrangement & Arndt –Eistert reaction. **L1-CO3**

12. (a). (i) Tell a note on vibrational degrees of freedom for polyatomic molecules. **L1-CO4**

(ii) Explain different modes of vibrations & selection rules in IR spectroscopy.

(or)

(b). (i) Define Bathochromic shift. Explain the effect of conjugation in U.V. spectroscopy. **L1-CO4**

(ii) Describe the principle of NMR spectroscopy.

13. (a). Relate Woodward-Fieser rules for calculating  $\lambda_{\max}$  for conjugated dienes and  $\alpha,\beta$  – unsaturated carbonyl compounds , and apply them for one example each. **L2-CO5**

(or)

(b). (i) Summarize Fingerprint region and its significance with an example. (ii) Write IR spectral data for any one alcohol, aldehyde and ketone – **L2-CO5**

**A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE  
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**Title of the Paper**

**(ORGANIC PREPARATIONS AND IR SPECTRAL ANALYSIS)**

**Laboratory Course-III**

**Semester: III**

**Credits: 1**

**Hours Taught:** 30 hrs. (2hr/W)

**Max.Time :** 2 Hours

**Course Prerequisites (if any):** Basics of Organic Preparations and IR Spectroscopy

**Course Description:** Preparation of different organic compounds using conventional, Green approach methods and IR spectral analysis for different functional groups

**Course Objectives:**

1. Student will know the safe laboratory practices by handling laboratory glassware, equipment, and chemical reagents appropriately.
2. Dispose of chemicals in a safe and responsible manner
3. Create and carry out work up and separation procedures

**Course Outcomes:** At the end of this course, students should be able to:

CO1: How to calculate limiting reagent, theoretical yield, and percent yield

CO2: How to perform common laboratory techniques including reflux, distillation, recrystallization, vacuum filtration.

CO3: How to critically evaluate data collected to determine the identity, purity, and percent yield of products and to summarize findings in writing in a clear and concise manner

## Syllabus

### Course Details

Unit	Learning Units	Practical Hours
I	<b>Organic preparations:</b> i. Acetylation of one of the following compounds: amines (aniline, o-, m-, ptoluidines and o-, m-, p-anisidine) and phenols ( $\beta$ -naphthol, vanillin, salicylic acid) by any one method: a. Using conventional method. b. Using green approach ii. Benzoylation of one of the following amines (aniline, o-, m-, p- toluidines and o-, m-, p-anisidine) iii. Nitration of any one of the following: a. Acetanilide/nitrobenzene by conventional method b. Salicylic acid by green approach (using ceric ammonium nitrate).	20 Hr
II	<b>IR Spectral Analysis</b> IR Spectral Analysis of the following functional groups with examples a) Hydroxyl groups b) Carbonyl groups c) Amino groups d) Aromatic groups	10Hr

### Text Book

Laboratory Manual

**Course Delivery method:** Demonstration of Practical

**Course has focus on:**

Employability / Entrepreneurship



**ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION REVISED  
UG SYLLABUS UNDER CBCS**

**(Implemented from Academic Year, 2020-21)**

**PROGRAMME: FOUR YEAR B.Sc.(Hons)**

**Domain Subject: CHEMISTRY**

**Skill Enhancement Courses (SECs) for Semester V, from 2022-23**

**(Syllabus with Learning Outcomes, References, Co-curricular Activities & Model Q.P. Pattern)**

**Structure of SECs for Semester-V (To choose One pair from the Five alternate pairs of SECs)**

Univ. Code	Course NO. 6&7	Name of Course	Th. Hrs / Week	IE Marks	EE Marks	Credits	Prac. Hrs./ Wk	Marks	Credits
	6A	Synthetic Organic Chemistry	3	25	75	3	3	50	2
	7A	Analysis of Organic Compounds	3	25	75	3	3	50	2

**OR**

	6B	Analytical Methods in Chemistry-1	3	25	75	3	3	50	2
	7B	Analytical Methods in Chemistry-1	3	25	75	3	3	50	2

**OR**

	6C	Industrial Chemistry-1	3	25	75	3	3	50	2
	7C	Industrial Chemistry-2	3	25	75	3	3	50	2

**OR**

	6D	Environmental Chemistry	3	25	75	3	3	50	2
	7D	Green Chemistry and Nanotechnology	3	25	75	3	3	50	2

**OR**

	6E	Analytical Methods in Chemistry	3	25	75	3	3	50	2
	7E	Cosmetics and Pharmaceutical Chemistry	3	25	75	3	3	50	2

**Note-1:** For Semester-V, for the domain subject Chemistry, any one of the five pairs of SECs shall be chosen as courses 6 and 7, i.e., 6A&7A or 6B&7B or 6C&7C or 6D&7D or 6E&7E. The pair shall not be broken (ABC allotment is random, not on any priority basis).

**Note-2:** One of the main objectives of Skill Enhancement Courses (SEC) is to inculcate skills related to the domain subject in students. The syllabus of SEC will be partially skill oriented. Hence, teachers shall also impart practical training to students on the skills embedded in syllabus citing related real field situations



# A.G & S.G. SIDDHARTHA DEGREE COLLEGE OF

## ARTS & SCIENCE

Vuyyuru-521165

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Autonomous -ISO 9001 – 2015 Certified

**Title of the Paper: Analytical Methods in Chemistry-I**

**Semester: V**

Course Code	CHE-501C-6B	Course Delivery Method	Class Room / Blended Mode
Credits	3	CIA Marks	30
No. of Lecture Hours / Week	3	Semester End Exam Marks	70
Total Number of Lecture Hours	45	Total Marks	100
Year of Introduction : 2022-23	Year of Offering: 2022-23	Year of Revision: -----	Percentage of Revision: 0

### Course Outcomes:

**Students after successful completion of the course will be able to:**

**CO1.** Remember the basic concepts of quantitative analysis data treatment, separation techniques and analysis of water (PO7)

**CO2.** Acquire knowledge on the concepts quantitative analysis data treatment, separation techniques and analysis of water (PO1, PO7)

**CO3.** Apply the conceptual knowledge gained in the areas of quantitative analysis data treatment, separation techniques and analysis of water in the chosen job role (PO1)

**CO4.** Analyse that how far the quantitative methods, data treatment methods separation techniques and Analysis of water (PO1).

## Syllabus

### Course Details

Unit	Learning Units	Lecture Hours
I	<p><b>Quantitative analysis-1</b> (Marks Weightage-10+5+5)</p> <p>1. A brief introduction to analytical methods in chemistry</p> <p>2. Principles of volumetric analysis, concentration terms- Molarity, Normality, v/v, w/v, ppm and ppb, preparing solutions- Standard solution, primary standards and secondary standards.</p> <p>3. Description and use of common laboratory apparatus- volumetric flask, burette, pipette, beakers, measuring cylinders.</p>	<b>10 Hr</b>
II	<p><b>Quantitative analysis-2</b> (Marks Weightage-10+10+5)</p> <p>1. Principles of volumetric analysis: Theories of acid-base (including study of acid-base titration curves), redox, complexometric, iodometric and precipitation titrations-choice of indicators for the saturations.</p> <p>2. Principles of gravimetric analysis: precipitation, coagulation, peptization, co-precipitation, post precipitation, digestion, filtration, and washing of precipitate, drying and ignition.</p>	<b>12 Hr</b>
III	<p><b>Treatment of analytical data</b> (Marks Weightage-10+10+5)</p> <p>Types of errors- Relative and absolute, significant figures and its importance, accuracy – methods of expressing accuracy, errors- Determinate and indeterminate and minimization of errors, precision-methods of expressing precision, standard deviation and confidence limit.</p>	<b>8 Hr</b>
IV	<p><b>Separation techniques</b> (Marks Weightage-10+10+5+5)</p>	<b>5 Hr</b>

	<p>1. Solvent Extraction: Introduction, principle, techniques, factors affecting solvent extraction, Batch extraction, continuous extraction and counter current extraction. Synergism. Application-Determination of Iron (III).</p> <p>2. Ion Exchange method: Introduction, action of ion exchange resins, applications</p>	
V	<p><b>Analysis of water (Marks weightage 10+5)</b></p> <p>Determination of dissolved solids, total hardness of water, turbidity, alkalinity, Dissolved oxygen, COD, determination of chloride using Mohr's method</p>	<b>10Hr</b>

### III References

1. Analytical Chemistry by Gary D.Christian, Purnendu K.Dasgupta and Kevin A.Schug, Seventh edition, Wiley.
2. Text book of Vogel's Quantitative Chemical Analysis, Sixth edition, Pearson.
3. Text book of Environmental Chemistry and Pollution Control by S.S.Dara and D.D.Mishra, Revised edition, S Chand & Co Ltd.

### Text Books:

1. Instrumental methods of chemical analysis by B K Sharma
2. Separation methods MN Sastry

### Reference materials on the web/web links:

1. [https://chem.libretexts.org/Bookshelves/Analytical\\_Chemistry/Supplemental\\_Modules\\_\(Analytical\\_Chemistry\)/Quantifying\\_Nature/Volumetric\\_Chemical\\_Analysis\\_\(Shiundu\)/14.1%3A\\_Sampling\\_and\\_Statistical\\_Analysis\\_of\\_Data](https://chem.libretexts.org/Bookshelves/Analytical_Chemistry/Supplemental_Modules_(Analytical_Chemistry)/Quantifying_Nature/Volumetric_Chemical_Analysis_(Shiundu)/14.1%3A_Sampling_and_Statistical_Analysis_of_Data)
2. <https://vlab.amrita.edu/?sub=2&brch=190&sim=338&cnt=1>

### IV Co-Curricular Activities:

**a) Mandatory** (Lab/field training of students by teacher (lab: 10 + field: 05) :

**1.For Teacher:** Training of students by the teacher in laboratory and field for not less than 15 hours on the field techniques/skills of calibration of pH meter, Strong acid vs strong base titration using pH meter, determination of chloride ion, estimation of water quality parameters and estimation of Iron(II).

Google classroom created during instruction of course by the teacher concerned for sharing relevant material and conducting exams.

**2. For Student:** Student shall visit a related industry/chemistry laboratory in universities/research organizations/private sector facility and observe. Write their observations and submit a hand written fieldwork/project work report not exceeding 10 pages in the given format to the teacher.

3. Max marks for Fieldwork/project work Report: 05.

4. Suggested Format for Fieldwork/project work: Title page, student details, index page, details of place visited, observations, findings, and acknowledgements.

5. Unit tests (IE).

**b) Suggested Co-Curricular Activities**

1. Training of students' by related industrial experts.

2. Assignments, Seminars and Quiz (on related topics).

3. Visits to facilities, firms, research organizations etc.

4. Invited lectures and presentations on related topics by field/industrial experts.

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**Model Paper**

<b>SEMESTER – V</b>	<b>PAPER-V</b>	<b>PAPER CODE : CHE-501C</b>
<b>PAPER TITLE : Analytical Methods in Chemistry-I Paper 6B</b>		
<b>ACADEMIC YEAR-2022-2023</b>		

Time: 3Hours

Maximum marks: 70

Minimum marks: 28

**Answer any FOUR of the following. Each question carries 5 marks. 4X5=20**

1. Explain the preparation of v/v based with suitable examples
2. Discuss the detail about primary and secondary standards with suitable examples
3. Explain the need of drying the precipitate in gravimetric analysis
4. Define accuracy and explain the methods of expressing accuracy
5. Discuss the principal and theory involved in solvent extraction
6. Explain about resins
7. Explain about COD

#### **SECTION-B**

**Answer any FIVE questions. Each question carries 10 marks. 5X10=50**

8. Describe the role of the following apparatus in analytical chemistry I) Volumetric flask II) Burette III) Pipette
9. Elaborate the theory involved in complexometric and acid base titrations
10. Write a note on the following terms in gravimetric analysis I) Precipitation II) Digestion III) Filtration
11. Define error, discuss in detail about various types of errors encountered in quantitative analysis
12. Elaborate the methods used for minimization of errors
13. Discuss the various factors which effect solvent extraction

14. Explain in detail about role of Ion exchange resins in separation of compounds

15. Explain the following (a) turbidity (b) alkalinity

**The Guidelines to be followed by the question paper setters in chemistry for the  
V- Semester - end exams**

<b>SEMESTER – V</b>	<b>PAPER-V</b>	<b>PAPER CODE : CHE-501-6B</b>
<b>PAPER TITLE : Analytical Methods in Chemistry-I Paper 6B</b>		
<b>ACADEMIC YEAR-2022-2023</b>		

Weightage for the question paper

syllabus	Section-A (Short answer questions)	Section-B (essay questions)
Unit-1 (20 Marks)	1+1	1
Unit-2 (25Marks)	1	1+1
Unit-3 (25Marks)	1	1+1
Unit-4 (30Marks)	1+1	1+1
Unit-5 (15 Marks)	1	1

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

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**PRACTICAL SYLLABUS**

**Laboratory Course-VI**

<b>Practical Paper – V Analytical methods in chemistry-I Practical syllabus</b>	<b>PAPER CODE : CHE-501 P ACADEMIC YEAR-2022-2023</b>
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### **Analytical methods in Chemistry-1-PRACTICAL SYLLABUS**

(Skill Enhancement Course (Elective), Credits: 02)

Practical Hrs ;45 (3hr/W)

**I Learning Outcomes: On successful completion of this practical course, student shall be able to:**

- CO1.** Estimate Iron (II) using standard Potassium dichromate solution (PO1)
- CO2.** Learn the procedure for the estimation of total hardness of water (PO7)
- CO3.** Demonstrate the determination of chloride using Mohr's method (PO1, PO7)
- CO4.** Acquire skills in the operation and calibration of pH meter (PO1)

#### **II Practical (Laboratory) Syllabus :( 30hrs)**

1. Estimation of Iron (II) using standard Potassium dichromate solution (using DPA indicator)
2. Estimation of total hardness of water using EDTA
3. Determination of chloride ion by Mohr's method
4. Study the effect on pH of addition of HCl/NaOH to solutions of acetic acid, sodium acetate and their mixtures.
5. Preparation of buffer solutions of different pH (i) Sodium acetate-acetic acid, (ii) Ammonium chloride-ammonium hydroxide.
6. pH metric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base.
7. Determination of dissociation constant of a weak acid.

#### **II Lab References:**

1. Text book of Vogel's Quantitative Chemical Analysis, Sixth edition, Pearson.

#### **SCHEME OF VALUATION**

**INTERNAL MARKS- Record-10M**

##### **1. EXTERNAL MARKS-40**

- **Practical -30M**
- **Viva questions = 10 M**



**TOTAL = 50 M\_**



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**Title of the Paper: Analytical Methods in Chemistry-2**

**Semester: V**

<b>Course Code</b>	<b>CHE-502C-7B</b>	<b>Course Delivery Method</b>	<b>Class Room / Blended Mode</b>
Credits	<b>3</b>	CIA Marks	30
No. of Lecture Hours / Week	<b>3</b>	Semester End Exam Marks	<b>70</b>
Total Number of Lecture Hours	<b>45</b>	Total Marks	<b>100</b>
Year of Introduction : 2022 - 23	Year of Offering: 2022 - 23	Year of Revision: -----	Percentage of Revision: 0

**Learning Outcomes: Students after successful completion of the course will be able to:**

**CO1.** Remember the basic concepts of Chromatography like paper, TLC, Column, GC & HPLC (PO7)

**CO2.** Understand the significance of paper, TLC, Column, GC & HPLC in separation and identification of compounds (PO1, PO7) .

**CO3.** Apply the conceptual knowledge gained in the techniques of chromatography in separating and identifying the chemical compounds as and when required (PO1).

**CO4.** Analyse that how far one chromatographic technique is much use full in separation and identification of compounds over the other chromatographic technique (PO1, PO7).

## Syllabus

### Course Details

Unit	Learning Units	Lecture Hours
I	<p><b>Chromatography-Introduction and classification</b> (Marks weightage 10+5)</p> <p>Principle, Classification of chromatographic methods, Nature of adsorbents, eluents, <math>R_f</math> values, factors affecting <math>R_f</math> values.</p>	7 hr
II	<p><b>TLC and paper chromatography</b> (Marks weightage 10+10+5+5)</p> <p>1. Thin layer chromatography: Principle, Experimental procedure, preparation of plates, adsorbents and solvents, development of chromatogram, detection of spots, applications and advantages.</p> <p>2. Paper Chromatography: Principle, Experimental procedure, choice of paper and solvents, various modes of development- ascending, descending, radial and two dimensional, applications.</p>	12 hr
III	<p><b>Column chromatography</b> (Marks weightage 10+10+5)</p> <p>1. Column chromatography: Principle, classification, Experimental procedure, stationary and mobile phases, development of the Chromatogram, applications, factors affecting the column efficiency.</p> <p>2. Applications:- Separation of Methylene Blue and Fluorene by column chromatography.</p>	10 Hr
IV	<p><b>Gas chromatography:</b> (Marks weightage 10+5+5)</p> <p>Basic principles. Different types of GC techniques. Selection of columns and carrier gases. Instrumentation. Detectors-Thermal conductivity detector, Flame ionization detector, <math>R_f</math> values. Applications in the separation of amino acids &amp; estrogens</p>	8 hr

V	<b>High Performance liquid chromatography (HPLC)</b> <b>(Marks weightage 10+10+5)</b> Basic principles. Normal and reversed Phases. Selection of column and mobile phase. Instrumentation. Detectors- RID, UV detector $R_f$ values. Applications in the separation, separation of anions, barbiturates, tropane alkaloids.	<b>8 Hr</b>
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### III References

1. Fundamental so Analytical Chemistry by F.James Holler, Stanley R Crouch, Donald M. Westand Douglas A.Skoog, Ninth edition, Cengage.
2. Analytical Chemistry by Gary D.Christian, Purnendu K.Dasgupta and KevinA.Schug, Seventh edition, Wiley.
3. Quantitative analysis by R.A.Day Jr. and A.L.Underwood, Sixth edition, Pearson.
4. Text book of Vogel's Quantitative Chemical Analysis, Sixth edition/ Pearson.

#### Text Books:

1. Instrumental methods of chemical analysis by B K Sharma
2. Instrumental methods of chemical analysis by Gurudeep & Chatwal Anand

#### Reference materials on the web/web links:

1. [https://chem.libretexts.org/Bookshelves/Analytical\\_Chemistry/Supplemental\\_Modules\\_\(Analytical\\_Chemistry\)/Instrumental\\_Analysis/Chromatography/Gas\\_Chromatography](https://chem.libretexts.org/Bookshelves/Analytical_Chemistry/Supplemental_Modules_(Analytical_Chemistry)/Instrumental_Analysis/Chromatography/Gas_Chromatography)
2. <https://lab-training.com/hplc-high-performance-liquid-chromatography/>

### VI Co-Curricular Activities:

**a) Mandatory :**( Lab/field training of students by teacher (lab: 10+ fields: 05):

**1. For Teacher:** Training of students by the teacher in laboratory and field for not less than 15 hours on the field techniques/skills of determination of hardness of water, using the calorimeter and or Spectrophotometer, preparation of TLC plate, identification of spots in TLC and Paper chromatographic techniques, loading of column, selection of solvent system, separation of amino acids and dyes mixture using chromatographic techniques.

Google classroom created during instruction of course by the teacher concerned for sharing relevant material and conducting exams.

**2. For Student:** Student shall visit a related industry/chemistry laboratory in universities/research organizations/private sector facility and observe the chromatographic

techniques used for the separation of compounds. Write their observations and submit a hand written fieldwork/project work report not exceeding 10 pages in the given format to the teacher.

3. Max marks for Fieldwork/project work Report: 05.

4. Suggested Format for Fieldwork/project work: Title page, student details, index page, details of place visited, observations, findings, and acknowledgements.

5. Unit tests (IE).

**b) Suggested Co-Curricular Activities**

1. Training of students by related industrial experts.

2. Assignments, Seminars and Quiz (on related topics).

3. Visits to facilities, firms, research organizations etc.

4. Invited lectures and presentations on related topics by field/industrial experts.

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**Model Paper**

<b>SEMESTER – V</b>	<b>PAPER-V</b>	<b>PAPER CODE : CHE-502-7B</b>
<b>PAPER TITLE : Analytical Methods in Chemistry-2 Paper 7B</b>		
<b>ACADEMIC YEAR-2022-2023</b>		

Time: 3Hours

Maximum marks: 70

Minimum marks: 28

**SECTION-A**

**Answer any FOUR of the following. Each question carries 5 marks. 4X5=20**

1. What is the basic principle involved in chromatography, explain nature of adsorbents
2. How to prepare TLC plates
3. Explain Ascending and descending techniques in paper chromatography
4. Explain the classification of column chromatography
5. Explain the schematic diagram of G.C
6. Explain about detectors in G.C
7. Explain schematic diagram of HPLC

**SECTION-B**

**Answer any FIVE questions. Each question carries 10 marks. 5X10=50**

8. How do the chromatographic methods are classified? Explain any one
9. Discuss the applications of TLC
10. Explain the applications of paper chromatography
- 11 Explain the factors effecting the column efficiency in CC
12. Discuss the separation of methylene blue and fluorescein by C C
13. Explain the separation of Amino acids by G.C
14. Explain the different detectors used in HPLC
15. Explain the separation of Anions and Barbiturates by HPLC

**The Guidelines to be followed by the question paper setters in chemistry for the  
V- Semester - end exams**

<b>SEMESTER – V</b>	<b>PAPER-V</b>	<b>PAPER CODE : CHE-502C-7B</b>
<b>PAPER TITLE : Analytical Methods in Chemistry-2 Paper 7B</b> <b>ACADEMIC YEAR-2022-2023</b>		

Weightage for the question paper

syllabus	Section-A (Short answer questions)	Section-B (essay questions)
Unit-1 ( 15Marks)	1	1
Unit-2 (30Marks)	1+1	1+1
Unit-3 (25 Marks)	1	1+1
Unit-4 ( 20Marks)	1+1	1
Unit-5 ( 25 Marks)	1	1+1

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

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**PRACTICAL SYLLABUS**

**Laboratory Course-VII**

<b>Practical Paper – V Analytical methods in chemistry-2 Practical syllabus</b>	<b>PAPER CODE : CHE-502 P ACADEMIC YEAR-2022-2023</b>
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**Analytical methods in Chemistry-2**

**PRACTICAL SYLLABUS**

**(Skill Enhancement Course (Elective), Credits: 02)**

**Practical Hrs./Week: 3**

**Learning Outcomes:**

On successful completion of this practical course, student shall be able to:

**CO1.** Perform the separation of a given dye mixture using TLC (PO1)

**CO2.** Learn the preparation of TLC plates (PO1, PO7)

**CO3.** Demonstrate the separation of mixture of amino acids using paper chromatography (PO1)

**CO4.** Acquire skills in using column chromatography for the separation of dye mixture (PO7)

**II Practical (Laboratory) Syllabus: (30hrs)**

1. Separation of a given dye mixture (methyl orange and methylene blue) using TLC (using alumina as adsorbent).
2. **Separation of different amino acids using paper chromatography.**
3. Separation of given mixture of amino acids (glycine and phenyl alanine) using ascending paper chromatography.
4. **Estimation of Fe<sup>+2</sup> by using thiocyanate by calorimeter.**
5. **Separation of sugars using TLC**
6. Verification of Beer lambert's law. (Using potassium permanganate solution) using colorimeter /spectrophotometer.

**III Lab References:**

1. Text book of Vogel's Quantitative Chemical Analysis, Sixth edition, Pearson.



2. Vogel A. I. Practical Organic Chemistry, Longman Group Ltd.
3. Bansal R.K. Laboratory Manual of Organic Chemistry, Wiley- Eastern.
4. Ahluwalia V. K. and Aggarwal R. Comprehensive Practical Organic Chemistry, University press.
5. Mann F.Gand Saunders B.C, Practical Organic Chemistry, Pearson Education.

### **SCHEME OF VALUATION**

**1. INTERNAL MARKS- Record-10M**

**2. EXTERNAL MARKS-40**

- **Practical-30M**
- **Viva questions = 10 M**

**TOTAL = 50 M**

SEMESTER – III (SDC)	PAPERCODE:SDCCHET01
PAPER TITLE : FOOD ADULTERATION	

**UNIT-I:** Total: 30Hrs (2h/week) 02 Credits

**Common Foods and Adulteration (10+10+5+5) 10Hrs**

Common Foods subjected to Adulteration-Adulteration-Definition –Types; Poisonous substances, Foreign matter, cheap substitutes, Spoiled parts. Adulteration through Food Additives –Intentional and incidental. General Impact on Human Health.

**UNIT-II :**

**Adulteration of Common Foods and Methods of Detection (10+10+5+5) 10Hrs**

Means of Adulteration Methods of Detection Adulterants in the following Foods; Milk, Oil, Grain, Sugar, Spices and Condiments, Processed Food, Fruits and Vegetables. Additives and Sweetening agents (at least three methods of detection for each food item).

**UNIT-III:**

**Present Laws and Procedures on Adulteration (10+10) 10Hrs**

Highlights of Food Safety and Standards Act 2006 (FSSA) –Food Safety and Standards Authority of India- Rules and Procedures of Local Authorities.Role of Voluntary Agencies Suchas, Agmark, I.S.I. Quality control laboratories of Companies, Private testing laboratories, Quality control laboratories of Consumer co-operatives.

Consumer Education, Consumer’s problems, rights and responsibilities, COPRA2019- Offenses and Penalties-Procedures to Complain –Compensation to Victims.

Reference books and Websites:

1. A first course in Food Analysis – A.Y. Sathe, New Age International (p) Ltd, 1999
2. Food Safety, case studies – Ramesh.V.Bhat, NIN, 1992
3. [https://old.fssai.gov.in/Portals/0/Pdf/](https://old.fssai.gov.in/Portals/0/Pdf/Draft%20Manuals/Beverages%20and%20Confectionary.pdf) Draft Manuals/ Beverages and Confectionary.pdf
4. <https://www.fssai.gov.in/>
5. <https://indianlegalsolution.com/laws-on-food-adulteration/>
6. <https://fssai.gov.in/dart/>
7. <https://byjus.com/biology/food-adulteration/>

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU.  
ACADEMIC YEAR-2022-23

<b>SEMESTER – III (SDC)</b>	<b>COURSE CODE:SDCCHET01</b>
<b>PAPER TITLE : FOOD ADULTERATION</b>	

Time: 2 Hours

Maximum marks: 40

Pass marks:

SECTION-A

Answer any TWO Questions. Each question carries 5 marks. 2X5=10Marks

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

SECTION-B

Answer any THREE Questions. Each question carries 10 marks. 3X10=30M

- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

**The Guidelines to be followed by the question paper setters in Chemistry for the  
II-Semester - end exams. ACADEMIC YEAR-2022-23**

Weightage for the question paper-FOOD ADULTERATION

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syllabus	Section-A (Short answer questions)	Section-B (Essay questions)
Unit-1 (30 Marks)	1+1	1+1
Unit-2 (30 Marks)	1+1	1+1
Unit-3 (20 Marks)	-----	1+1

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

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**Accredited by NAAC with "A" Grade**

**2022-2023**



**DEPARTMENT OF CHEMISTRY**

**MINUTES OF BOARD OF STUDIES**

**EVEN SEMESTER**

**29-03-2023**

151

Minutes of the Meeting of Board of Studies in Chemistry for the Autonomous Course  
A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru held at 11.00 A.M  
on 29-03-2023 in the Department of Chemistry

Sri. K.RAMESH Presiding

Members Present:

- 1).....K. Ramesh..... Chairman HOD, Dept. of Chemistry,  
(Sri. K.RAMESH) A.G. & S.G.S.Degree College,Vuyyuru.
- 2)..... University Nominee Assistant Professor,  
(Prof.D.Ramasekhar Reddy) Dept. of Chemistry,Krishna University, MTM.
- 3)..... Academic Council Nominee HOD, Dept. of Chemistry,  
(Dr. S. Kalpana) SDMS M College, Vijayawada.
- 4)..... Academic Council Nominee Lecturer in Chemistry,  
(Dr. A. Indira) G.D.C, Dumpagadapa.
- 5)..... Industrialist Manager, Q.A, Biophore india  
(Dr. G Raja) Pharmaceuticals pvt ltd Hyd.
- 6)..... Student Nominee Lecturer in Chemistry,  
(Smt. M. Sowjanya) ANR College Gudivada.
- 7).....G. Giri Prasad..... Member Lecturer in Chemistry,  
(Dr. G.Giri prasad) A.GS.G.S.Degree College,Vuyyuru
- 8).....M. Venkata Lakshmi..... Member Lecturer in Chemistry,  
(Smt. M.V.Santhi) A.G. & S.G.S.Degree College,Vuyyuru.
- 9).....P. Suresh..... Member Lecturer in Chemistry,  
( Sri. P.Suresh) A.G.& S.G.S.Degree College, Vuyyuru.
- 10).....M. Santhi..... Member Lecturer in Chemistry,  
( MS. M:Santhi) A.G. & S.G.S.Degree College,Vuyyuru.
- 11).....J. Nageswara Rao..... Member Rtd.Lecturer in Chemistry,  
(Sri. J.Nageswara Rao) A.G.& S.G.S.Degree College,Vuyyuru.

### Agenda for B.O.S Meeting

1. To recommend the syllabus and model paper for II semester of I Degree B.Sc., Chemistry for the Academic year 2022-2023.
2. To recommend the syllabus and model papers for IV semester of II Degree B.Sc., Chemistry for the Academic year 2022-2023.
3. To recommend the syllabus and model papers for V/VI semester of III Degree B.Sc. Chemistry for the Academic year 2022-2023.
4. To recommend the Blue print of V/VI semesters of B.Sc. Chemistry for the Academic year 2022-2023.
5. To recommend the Guidelines to be followed by the question paper setters in Chemistry for II, IV, V/VI Semester – end exams.
6. To introduce SDC programme
7. To recommend the teaching and evaluation methods to be followed under Autonomous status.
8. Any suggestions regarding certificate course, seminars, workshops, Guest lecture to be organized.
9. Recommend the panel of paper setters and Examiners to the controller of Examinations of
10. Any other matter.

*K. Ramiah*  
Chairman



### RESOLUTIONS

1. It is resolved to follow the **syllabus of APSCHE (theory and practical) for II semesters of I B.Sc.** under Choice Based Credit System (CBCS) for the Academic year 2022--2023.
2. It is resolved to follow the **syllabus of APSCHE (theory and practical) for IV semesters of II B.Sc.** under Choice Based Credit System (CBCS) for the Academic year 2022--2023.
3. It is resolved to change the **syllabus of APSCHE (theory and practical) for V/VI semesters of III B.Sc.** under Choice Based Credit System (CBCS) for the Academic year 2022--2023.
4. It is resolved to follow the **Blue print** as proposed by members of BOS Vsemester of Degree B.Sc. for the Academic year 2022-2023.
5. It is resolved to follow the **guidelines** to be followed by the question paper setters of Chemistry for II, IV & V/VI semesters of Degree B.Sc. for the Academic Year 2022-2023.
6. It is resolved to follow the SDC (FA) syllabus of APSCHE (theory) for II semesters of I B.Sc. under Choice Based Credit System (CBCS) for the Academic year 2022--2023.
7. It is resolved to continue the following teaching and evolution methods for Academic year 2022-23.

#### Teaching Methods:

- Besides the conventional methods of teaching, we use modern technology i.e. using of LCD projector to display on U boards etc, for better understanding of concepts.
  - Evaluation of a student is done by the following procedure:
  - Internal Assessment Examinations:
  - Out of maximum 100 marks in each paper for I B.Sc, 30 marks shall be allocated for internal assessment. Out of these 30 marks, 20 marks are allocated for announced tests (i.e. IA-1 & IA-2).
  - Out of maximum 100 marks in each paper for II B.Sc, 25 marks shall be allocated for internal assessment. Out of these 25 marks, 15 marks are allocated for announced tests (i.e. IA-1 & IA-2).
  - Out of maximum 100 marks in each paper for III B.Sc, 30 marks shall be allocated for internal assessment. Out of these 30 marks, 20 marks are allocated for announced tests (i.e. IA-1 & IA-2).
  - Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, 5 marks are allocated on the basis of candidate's percentage of attendance and remaining 5 marks are allocated for the innovative component like assignment/quiz/seminars for I, II, III B.Sc.
  - There is no pass minimum for internal assessment for I, II, III B.Sc.
  - Semester – End Examination:
  - The maximum marks for II, IV, V B.Sc Semester – End examination shall be 70/75/70 marks duration of the examination shall be 3 hours. Even though the candidate is absent for two IA exams /obtain Zero marks the external marks are considered (if the candidate gets 40/70/75) and the result shall be declared as "PASS".
  - Semester – End examinations shall be conducted in theory papers at the end of every semester, while in practical papers, these examinations are conducted at the end of II, IV & V/VI semesters for I, II & III B.Sc for 50 marks.
8. Discussed and recommended for organizing certificate course, seminars, Guest lecturers, workshops to upgrade the knowledge of students, for the approval of the academic council.
  9. Discussed and empowered the Head of the department of Chemistry to suggest the panel of paper setters and examiners to the controller of examinations
  10. NIL.

*K. Ramani*  
**Chairman**



**A.G & S.G. SIDDHARTHA DEGREE COLLEGE OF**

**ARTS & SCIENCE**

Vuyyuru-521165

NAAC reaccredited at "A" level

Autonomous -ISO 9001 – 2015 Certified

**Title of the Paper: ORGANIC AND GENERAL CHEMISTRY Semester: II**

<b>Course Code</b>	<b>CHE-201C</b>	<b>Course Delivery Method</b>	<b>Class Room / Blended Mode</b>
Credits	<b>3</b>	CIA Marks	30
No. of Lecture Hours / Week	<b>4</b>	Semester End Exam Marks	<b>70</b>
Total Number of Lecture Hours	<b>60</b>	Total Marks	<b>100</b>
Year of Introduction :	Year of Offering:	Year of Revision:	Percentage of Revision: 0
2021-22	2022-23	2022-23	

**Course outcomes:**

At the end of the course, the student will be able to;

**CO1.** Understand and explain the differential behaviour of organic compounds based on fundamental concepts learnt.

**CO2.** Formulate the mechanism of organic reactions by recalling and correlating the fundamental properties of the reactants involved.

**CO3.** Learn and identify many organic reaction mechanisms including Free Radical Substitution, Electrophilic Addition and Electrophilic Aromatic Substitution.

**CO4.** Understand the concepts of absorption and adsorption, colloidal chemistry and nature of Chemical Bonding.

**CO5.** Correlate and describe the stereo chemical properties of organic compounds and reactions.

**Learning Objectives:**

1. To understand the basic concepts of alkanes & cycloalkanes.
2. To identify the difference between saturated and unsaturated hydrocarbons.
3. To learn the basic concepts of aromatic compounds and its reactivity.
4. To understand the chemistry of adsorption, colloid chemistry, HSAB principle and Molecular Orbital theory.
5. To learn the fundamental aspects of stereo chemistry.

## Syllabus

### Course Details

Unit	Learning Units	Lecture Hours
<b>ORGANIC CHEMISTRY</b>		
I	<p><b>Recapitulation of Basics of Organic Chemistry Carbon-Carbon sigma bonds (Alkanes and Cycloalkanes)</b></p> <p><b>1.1</b> General methods of preparation of alkanes- Wurtz and Wurtz - Fittig reaction, Corey House synthesis, physical and chemical properties of alkanes, Isomerism and its effect on properties.</p> <p><b>1.2</b> Free radical substitutions; Halogenation, concept of relative reactivity v/s selectivity.</p> <p><b>1.3</b> Conformational analysis of alkanes (Conformations, relative stability and energy diagrams of Ethane, Propane and butane).</p> <p><b>1.4</b> General molecular formulae of cycloalkanes and relative stability, Baeyer strain theory, Cyclohexane conformations with energy diagram, Conformations of mono substituted cyclohexane.</p>	<b>12h</b>
II	<p><b>Carbon-Carbon pi Bonds (Alkenes and Alkynes)</b></p> <p><b>2.1</b> General methods of preparation, physical and chemical properties.</p> <p><b>2.2</b> Mechanism of E1, E2, E1cB reactions, Saytzeff and Hoffmann eliminations, Electrophilic Additions, mechanism (Markownikoff/Antimarkownikoff addition) with suitable examples, <i>syn</i> and <i>anti</i>-addition; addition of H<sub>2</sub>, X<sub>2</sub>, HX. oxymercuration-9, demercuration, hydroboration-oxidation, ozonolysis, Hydroxylation, Diels alder reaction, 1,2 and 1,4 addition reaction in Conjugated Dienes.</p> <p><b>2.3</b> Reactions of alkynes; acidity, electrophilic and nucleophilic additions, hydration to form carbonyl compounds, Alkylation of terminal alkynes.</p>	<b>12h</b>
III	<p><b>Benzene and its reactivity</b></p> <p><b>3.1</b> Concept of aromaticity, Huckel's rule - application to</p>	12h

	<p>Benzenoid (Benzene, Naphthalene) and Non - Benzenoid compounds (cyclopropenylcation, cyclopentadienyl anion and tropyliumcation)</p> <p><b>3.2</b> Reactions - General mechanism of electrophilic aromatic substitution, mechanism of nitration, Friedel- Craft's alkylation and acylation.</p> <p><b>3.3</b> Orientation of aromatic substitution - 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).</p> <p>Orientation of (i) Amino, methoxy and methyl groups (ii) Carboxy, nitro, nitrile, carbonyl and sulphonic acid groups (iii) Halogens</p> <p>(Explanation by taking minimum of one example from each type)</p>	
<b>GENERAL CHEMISTRY</b>		
IV	<p><b>Surface chemistry and chemical bonding</b></p> <p><b>1. Surface chemistry</b></p> <p><b>4.1 Colloids-</b> Coagulation of colloids- Hardy-Schulze rule. Stability of colloids, Protection of Colloids, Gold number.</p> <p><b>4.2 Adsorption-</b>Physical and chemical adsorption, Langmuir adsorption isotherm, applications of adsorption.</p> <p><b>2. Chemical Bonding</b></p> <p><b>4.3</b> Valence bond theory, hybridization, VB theory as applied to ClF<sub>3</sub>, Ni(CO)<sub>4</sub></p> <p><b>4.4</b> Molecular orbital theory -LCAO method, construction of M.O. diagrams for homo-nuclear and hetero-nuclear diatomic molecules (N<sub>2</sub>, O<sub>2</sub>, CO and NO).</p> <p><b>3. HSAB</b></p> <p><b>4.5</b> Pearson's concept, HSAB principle &amp; its importance, bonding in Hard-Hard and Soft-Soft combinations.</p>	14h
V	<p><b>Stereochemistry of carbon compounds</b></p> <p><b>5.1</b> Molecular representations- Wedge, Fischer, Newman and Saw-Horse formulae.</p>	10h

	<p><b>5.2</b> Optical isomerism: Optical activity- wave nature of light, plane polarised light, optical rotation and specific rotation.</p> <p><b>5.3</b> Chiral molecules- definition and criteria(Symmetry elements)- Definition of enantiomers and diastereomers – Explanation of optical isomerism with examples- Glyceraldehyde, Lactic acid, Alanine, Tartaric acid, 2,3-dibromopentane.</p> <p><b>5.4</b> D, L, R,S and E,Z- configuration with examples. Definition of Racemic mixture – Resolution of racemic mixtures (any 3 techniques)</p>	
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## Co-curricular activities and Assessment Methods

Continuous Evaluation: Monitoring the progress of student's learning

Class Tests, Worksheets and Quizzes

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

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

### List of Text Books

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

### List of Reference Books

#### Theory:

Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).

Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).

Finar, I. L. Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).

Eliel, E. L. & Wilen, S. H. Stereochemistry of Organic Compounds; Wiley: London, 1994.

Kalsi, P. S. Stereochemistry Conformation and Mechanism; New Age International, 2005.

**Practical:** 11 Ahluwalia, V.K. & Aggarwal, R. Comprehensive Practical Organic Chemistry: Preparation and Quantitative Analysis, University Press (2000).

Ahluwalia, V.K. & Dhingra, S. Comprehensive Practical Organic Chemistry: Qualitative Analysis, University Press (2000).

Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. Practical Organic Chemistry, 5th Ed., Pearson (2012)

#### Additional Resources:

Solomons, T. W. G.; Fryhle, C. B. & Snyder, S. A. Organic Chemistry, 12th Edition, Wiley.

Bruice, P. Y. Organic Chemistry, Eighth Edition, Pearson.

Clayden, J.; Greeves, N. & Warren, S. Organic Chemistry, Oxford.

Nasipuri, D. Stereochemistry of Organic Compounds: Principles and Applications, Third Edition, New Age International.

Gunstone, F. D. Guidebook to Stereochemistry, Prentice Hall Press, 1975.

**A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE  
(AUTONOMOUS), VUYYURU.**

<b>SEMESTER – II</b>	<b>PAPER-II</b>	<b>PAPER CODE : CHET-22</b>
<b>PAPER TITLE: ORGANIC &amp; GENERAL CHEMISTRY -I</b>		
<b>ACADEMIC YEAR-2022-23</b>		

**Time: 3 Hours**

**Max. Marks: 70M**

Answer all questions

1. (a) -10M  
(or)  
10M  
(b) – 4M  
(or)  
4M
2. (a) -10M  
(or)  
10M  
(b) – 4M  
(or)  
4M
3. (a) -10M  
(or)  
10M  
(b) – 4M  
(or)  
4M
4. (a) -10M  
(or)  
10M  
(b) – 4M  
(or)  
4M
5. (a) -10M  
(or)  
10M  
(b) – 4M  
(or)  
4M



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**PRACTICAL SYLLABUS.**

<b>Practical Paper – II</b>  <b>Volumetric Analysis</b>	<b>PAPER CODE : CHEP-21A</b> <b>ACADEMIC YEAR-2022-23</b>
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**30 hrs (2h/w)**

**Credits-2**

**Course outcomes:**

At the end of the course, the student will be able to;

1. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
2. Understand and explain the volumetric analysis based on fundamental concepts learnt in ionic Equilibria
3. Learn and identify the concepts of a standard solutions, primary and secondary standards
4. Facilitate the learner to make solutions of various molar concentrations. This may include: The concept of the mole; Converting moles to grams; Converting grams to moles; Defining concentration; Dilution of Solutions; Making different molar concentrations.

**Volumetric analysis 50 M**

1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture.
2. Determination of Fe (II) using  $\text{KMnO}_4$  with oxalic acid as primary standard.
3. Determination of Cu (II) using  $\text{Na}_2\text{S}_2\text{O}_3$  with  $\text{K}_2\text{Cr}_2\text{O}_7$  as primary standard
4. Estimation of water of crystallization in Mohr's salt by titrating with  $\text{KMnO}_4$



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ARTS & SCIENCE**

Vuyyuru-521165

NAAC reaccredited at "A" level

Autonomous -ISO 9001 – 2015 Certified

**Title of the Paper: INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY**

**Semester: IV**

<b>Course Code</b>	<b>CHE-401C</b>	<b>Course Delivery Method</b>	<b>Class Room / Blended Mode</b>
Credits	<b>3</b>	CIA Marks	25
No. of Lecture Hours / Week	<b>4</b>	Semester End Exam Marks	<b>75</b>
Total Number of Lecture Hours	<b>60</b>	Total Marks	<b>100</b>
Year of Introduction : 2021-22	Year of Offering: 2022-23	Year of Revision: 2022-23	Percentage of Revision: 0

**Course Outcomes:**

At the end of the course, the student will be able to:

1. To learn about the laws of absorption of light energy by molecules and the subsequent photochemical reactions.
2. To understand the concept of quantum efficiency and mechanisms of photochemical reactions

## Syllabus

### Course Details

Unit	Learning Units	Lecture Hours
<b>INORGANIC CHEMISTRY</b>		
<b>I</b>	<p><b>Organometallic Compounds</b></p> <p>Definition and classification of organometallic Compounds on the basis of bond type, Concept of hapticity of organic ligands. Metal carbonyls: 18 electron rule, electron count of mononuclear, poly nuclear and substituted metal carbonyls of 3d series. General methods of preparation of mono and binuclear carbonyls of 3d series. P-acceptor behavior of carbon monoxide. Synergic effects (VB approach) - (MO diagram of CO can be referred to for synergic effect to IR frequencies).</p>	<b>8h</b>
<b>ORGANIC CHEMISTRY</b>		
<b>II</b>	<p><b>Carbohydrates</b></p> <p>Occurrence, classification and their biological importance, Monosaccharides: Constitution and absolute configuration of glucose and fructose, epimers and anomers, mutarotation, determination of ring size of glucose and fructose, Haworth projections and conformational structures; Interconversions of aldoses and ketoses; Killiani-Fischer synthesis and Ruff degradation; Disaccharides – Elementary treatment of maltose, lactose and sucrose. Polysaccharides – Elementary treatment of starch.</p>	<b>8h</b>
<b>III</b>	<p><b>1. Amino acids and proteins</b></p> <p><b>6h</b></p> <p>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</p>	<b>6h</b>



	<p><b>Diazonium Salts:</b> Preparation and Synthetic applications of diazonium salts including preparation of arenes, haloarenes, phenols, cyano and nitro compounds. Coupling reactions of diazonium salts (preparation of azo dyes).</p>	
V	<p><b>1.Photochemistry</b>  Difference between thermal and photochemical processes, Laws of photochemistry- Grothus- Draper's law and Stark-Einstein's law of photochemical equivalence, Quantum yield- Photochemical reaction mechanism- hydrogen- chlorine and hydrogen- bromine reaction. Qualitative description of fluorescence, phosphorescence, Jablonski diagram, Photosensitized reactions- energy transfer processes (simple example).</p> <p><b>Thermodynamics</b>  The first law of thermodynamics-statement, definition of internal energy and enthalpy, Heat capacities and their relationship, Joule-Thomson effect-coefficient, Calculation of work for the expansion of perfect gas under isothermal and adiabatic conditions for reversible processes, State function. Temperature dependence of enthalpy of formation- Kirchoff s equation, Second law of thermodynamics Different Statements of the law, Carnot cycle and its efficiency, Carnot theorem, Concept of entropy, entropy as a state function, entropy changes in reversible and irreversible processes. Entropy changes in spontaneous and equilibrium processes. Third law of thermodynamics, Nernst heat theorem, Spontaneous and non- spontaneous processes, Helmholtz and Gibbs energies-Criteria for spontaneity.</p>	<p>5h</p> <p>12h</p>

### List of Reference Books

1. Concise coordination chemistry by Gopalan and Ramalingam
2. Coordination Chemistry by Basalo and Johnson
3. Organic Chemistry by G.Mareloudan, Purdue Univ
4. Text book of physical chemistry by S Glasstone
5. Concise Inorganic Chemistry by J.D.Lee
6. Advanced Inorganic Chemistry Vol-I by Satyaprakash, Tuli, Basu and Madan
7. A Text Book of Organic Chemistry by Bahl and Arunbahl
8. A Text Book of Organic chemistry by I L Finar Vol I
9. A Text Book of Organic chemistry by I L Finar Vol II

10. Advanced physical chemistry by GurudeepRaj

**A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE  
(AUTONOMOUS), VUYYURU.**

<b>SEMESTER – IV</b>	<b>PAPER-IV</b>	<b>PAPER CODE : CHE-401C</b>
<b>PAPER TITLE: INORGANIC, ORGANIC &amp; PHYSICAL CHEMISTRY</b>		
<b>ACADEMIC YEAR-2022-23</b>		

Time: 3 hours

Maximum Marks: 75

Time: 3 hours  
75

Maximum Marks:

**PART-A**  
25Marks

5 X 5 =

Answer any **FIVE** of the following questions. Each carries **FIVE** marks

- Describe the 18 electron rule of mono nuclear and polynuclear metal carbonyls with suitable examples. **L1-CO1**
- What are epimers and anomers. Give examples. **L1-CO2**
- Discuss about isoelectric point and zwitterion. **L2-CO3**
- Discuss the Paul-Knorr synthesis of five membered heterocyclic compounds. **L2-CO4**
- Explain Tautomerism shown by nitroalkanes **L2-CO5**
- Discuss the basic nature of amines. **L2-CO5**
- Write the differences between thermal and photochemical reactions. **L4-CO6**
- Derive heat capacities and derive  $C_p - C_v = R$  **L1-CO7**

**PART-B**  
50Marks

5 X 10 =

Answer **ALL** the questions. Each carries **TEN** marks

- (a). What are organometallic compounds? Discuss their Classification on the basis of type of bonds with examples. **L1-CO1**  
(or)  
(b). Discuss the general methods of preparations of mono & bi-nuclear carbonyls of 3d series. **L2-CO1**
- (a). Discuss the constitution, configuration and ring size of glucose. Draw the Haworth and Conformational

structure of glucose. **L2-CO2**

(or)

- (b). (i) Explain Ruff's degradation.  
(ii) Explain Kiliani- Fischer synthesis. **L2-CO2**

11.(a). What are amino acids? Write any three general methods of preparation of amino acids. **L1-CO3**

(or)

b) Discuss the aromatic character of Furan, Thiophene and Pyrrole. **L2-CO4**

12.(a). Write the mechanism for the following. **L3-O5**

i) Frenkel reaction (ii) Mannich reaction

(or)

- (b). (i) Explain Hinsberg separation of amines.  
(i) Discuss any three synthetic applications of diazonium salts. **L2-CO5**

13.(a). What is quantum yield? Explain the photochemical combination of Hydrogen- Chlorine and Hydrogen - Bromine. **L2-CO6**

(or)

(b). Define entropy. Describe entropy changes in the reversible and irreversible process. **L1-CO7**

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**PRACTICAL SYLLABUS.**

<b>Practical Paper – IV</b> <b>OrganicQualitativeanalysis</b>	<b>PAPER CODE :</b> <b>ACADEMIC YEAR-2022-23</b>
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**30 hrs (2h/w)**

**Credits-2**

**Course outcomes:**

At the end of the course, the student will be able to;

1. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory.
2. Determine melting and boiling points of organic compounds
3. Understand the application of concepts of different organic reactions studied in theory part of organic chemistry.

**OrganicQualitativeanalysis**

**50 M**

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

Alcohols, Phenols, Aldehydes, Ketones, Carboxylic acids, Aromatic primary amines, amides and simple sugars.

**SCHEME OF VALUATION**

1. **INTERNAL MARKS- Record-10M**
  2. **EXTERNAL MARKS-40**
    - **Analysis of an organic compound and preparation of suitable derivative-30M**
    - **Viva questions = 10 M**
- TOTAL = 50 M**



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Autonomous -ISO 9001 – 2015 Certified

**Title of the Paper: INORGANIC&PHYSICALCHEMISTRY**

**Semester: IV**

<b>Course Code</b>	<b>CHE-402C</b>	<b>Course Delivery Method</b>	<b>Class Room / Blended Mode</b>
Credits	<b>3</b>	CIA Marks	25
No. of Lecture Hours / Week	<b>4</b>	Semester End Exam Marks	<b>75</b>
Total Number of Lecture Hours	<b>60</b>	Total Marks	<b>100</b>
Year of Introduction : 2021-22	Year of Offering: 2022-23	Year of Revision: 2022-23	Percentage of Revision: 0

**Program outcomes:**

**Course outcomes:**

At the end of the course, the student will be able to;

1. Understand concepts of boundary conditions and quantization, probability distribution, most probable values, uncertainty and expectation value
2. Application of quantization to spectroscopy.
3. Various types of spectra and their use in structure determination.



	Toxicity of metal ions (Hg,Pb,Cd and As), reasons for toxicity, Use of chelating agents in medicine, Cis-platin as an anti-cancer drug. Iron and its application in bio-systems, Hemoglobin, Myoglobin.Storage and transfer of iron.	
<b>PHYSICALCHEMISTRY</b>		<b>34h</b>
<b>III</b>	<p><b>1 .Phase rule</b></p> <p>Concept of phase, components, degrees of freedom. Thermodynamic derivation of Gibbs phase rule. Phase diagram of one component system - water system, Study of Phase diagrams of Simple eutectic systems i) Pb-Ag system, desilverisation of lead ii) NaCl-Water system, Congruent and incongruent melting point- Definition and examples for systems having congruent and incongruent melting point , freezing mixtures.</p>	<b>6h</b>
<b>IV</b>	<p><b>Electrochemistry</b></p> <p>Specific conductance, equivalent conductance and molar conductance- Definition and effect of dilution. Cell constant. Strong and weak electrolytes, Kohlrausch's law and its applications, Definition of transport number, determination of transport number by Hittorf's method. Debye-Huckel-Onsagar's equation for strong electrolytes (elementary treatment only), Application of conductivity measurements- conductometric titrations. Electrochemical Cells- Single electrode potential, Types of electrodes with examples: Metal- metal ion, Gas electrode, Inert electrode, Redox electrode, Metal-metal insoluble salt- salt anion. Determination of EMF of a cell, Nernst equation, Applications of EMF measurements - Potentiometric titrations. Fuel cells- Basic concepts, examples and applications</p>	<b>14h</b>
<b>V</b>	<p><b>Chemical Kinetics:</b></p> <p>The concept of reaction rates. Effect of temperature, pressure, catalyst and other factors on reaction rates. Order and molecularity of a reaction, Derivation of integrated rate equations for zero, first and second order reactions (both for equal and unequal concentrations of reactants). Half-life of a reaction. General</p>	<b>14h</b>

<p>methods for determination of order of a reaction. Concept of activation energy and its calculation from Arrhenius equation. Theories of Reaction Rates: Collision theory and Activated Complex theory of bimolecular reactions. Comparison of the two theories (qualitative treatment only). Enzyme catalysis- Specificity, factors affecting enzyme catalysis, Inhibitors and Lock &amp; key model. Michaels- Menten equation- derivation, significance of Michaelis-Menten constant.</p>	
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### List of Reference Books

1. Text book of physical chemistry by S Glasstone
2. Concise Inorganic Chemistry by J.D. Lee
3. Advanced Inorganic Chemistry Vol-I by Satyaprakash, Tuli, Basu and Madan
4. Advanced physical chemistry by Gurudeep Raj
5. Principles of physical chemistry by Prutton and Marron
6. Advanced physical chemistry by Bahl and Tuli
7. Inorganic Chemistry by J.E. Huheey
8. Basic Inorganic Chemistry by Cotton and Wilkinson
9. A textbook of qualitative inorganic analysis by A.I. Vogel
10. Atkins, P. W. & Paula, J. de Atkin's Physical Chemistry Ed., Oxford University Press 10th Ed (2014).
11. Castellan, G. W. Physical Chemistry 4th Ed. Narosa (2004).
12. Mortimer, R. G. Physical Chemistry 3rd Ed. Elsevier: NOIDA, UP (2009).
13. Barrow, G. M. Physical Chemistry

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<b>SEMESTER – IV</b> <b>PAPER-V</b>	<b>PAPER CODE : CHE-402C</b>
<b>PAPER TITLE : INORGANIC &amp; PHYSICAL CHEMISTRY</b> <b>ACADEMIC YEAR-2022-23</b>	

Time: 3 hours  
75

Maximum Marks:

**PART- A5 X 5 = 25 Marks**

Answer any **FIVE** of the following questions. Each carries **FIVE** marks

1. Write note on Jahn-Teller distortion. **L2-CO1**
2. Explain Labile & inert complexes. **L2-CO2**
3. Explain Job's method for determination of composition of complex. **L2-CO2**
4. Explain Thermodynamic derivation of Gibb's phase rule. **L2-CO4**
5. Explain any two conductometric titrations. **L2-CO5**
6. Write note on Fuel Cells with examples and applications. **L2-CO5**
7. What is enzyme catalysis? Write any three factors effecting enzyme catalysis. **L1-CO6**
8. Derive Michaelis-Menten equation. **L1-CO6**

**PART-B**

5 X 10 = 50

Marks

Answer **ALL** the questions. Each carries **TEN** marks

- 9 (a). Explain Valence Bond theory with Inner and Outer orbital complexes. Write limitations of VBT. **L2-CO1**

(or)

- (b). Define CFSE. Explain the factors effecting the magnitude of crystal field splitting energy. **L1-CO1**

- 10 (a). Explain Trans effect. Explain the theories of trans effect

and write any two applications of trans effect. **L2-CO2**

(or)

- (b). (i) Write the biological functions of Haemoglobin and Myoglobin.  
(ii) Write note on use of chelating agents in medicines. **L2-CO3**

11.(a). Define Phase rule and terms involved in it. Explain phase diagram of Pb-Ag system. **L1-CO4**

(or)

- (b). (i) Explain phase diagram for NaCl-water system.  
(ii) Explain briefly about Freezing mixtures. **L2-CO4**

12.(a). Define Transport number. Write experimental method for the determination of transport number by Hittorf method. **L1-CO5**

(or)

- (b).(i) Define single electrode potential.  
(ii) Explain four types of electrodes with examples. **L1-CO5**

13.(a). Explain general methods for determination of order of a reaction. **L2-CO6**

(or)

(b). Explain Collision theory and Activated complex theory of bimolecular reactions. **L2-CO6**

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**PRACTICAL SYLLABUS**

<b>Practical Paper – V</b> Conductometric and Potentiometric Titrimetry	<b>PAPER CODE : CHE-402P</b> <b>ACADEMIC YEAR-2022-23</b>
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**30 hrs (2 h/W) Credits: 2**

**Practical-Course –V**

**Conductometric and Potentiometric Titrimetry 50 M**

**Course outcomes:**

At the end of the course, the student will be able to;

1. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
2. Apply concepts of electrochemistry in experiments
3. Be familiar with electro analytical methods and techniques in analytical chemistry which study an analyte by measuring the potential ( volts) and/or current ( amperes) in an electrochemical cell containing the analyte

**Conductometric and Potentiometric Titrimetry 50 M**

2. Conductometric titration- Determination of concentration of HCl solution using standard NaOH solution.
3. Conductometric titration- Determination of concentration of CH<sub>3</sub>COOH Solution using standard NaOH solution.
4. Conductometric titration- Determination of concentration of CH<sub>3</sub>COOH and HCl in a mixture using standard NaOH solution.
5. Potentiometric titration- Determination of Fe (II) using standard K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> solution.  
Determination of rate constant for acid catalyzed ester hydrolysis



**ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION REVISED  
UG SYLLABUS UNDER CBCS**

(Implemented from Academic Year, 2020-21)

**PROGRAMME: FOUR YEAR B.Sc.(Hons)**

**Domain Subject: CHEMISTRY**

**Skill Enhancement Courses (SECs) for Semester V/VI, from 2022-23**

**(Syllabus with Learning Outcomes, References, Co-curricular Activities & Model Q.P. Pattern)**

**Structure of SECs for Semester–V (To choose One pair from the Five alternate pairs of SECs)**

Univ. Code	Course NO. 6&7	Name of Course	Th. Hrs / Week	IE Marks	EE Marks	Credits	Prac. Hrs./Week	Marks	Credits
	6A	Synthetic Organic Chemistry	3	25	75	3	3	50	2
	7A	Analysis of Organic Compounds	3	25	75	3	3	50	2

OR

	6B	Analytical Methods in Chemistry-1	3	25	75	3	3	50	2
	7B	Analytical Methods in Chemistry-1	3	25	75	3	3	50	2

OR

	6C	Industrial Chemistry-1	3	25	75	3	3	50	2
	7C	Industrial Chemistry-2	3	25	75	3	3	50	2

OR

	6D	Environmental Chemistry	3	25	75	3	3	50	2
	7D	Green Chemistry and Nanotechnology	3	25	75	3	3	50	2

OR

	6E	Analytical Methods in Chemistry	3	25	75	3	3	50	2
	7E	Cosmetics and Pharmaceutical Chemistry	3	25	75	3	3	50	2

**Note-1:** For Semester–V/VI, for the domain subject Chemistry, any one of the five pairs of SECs shall be chosen as courses 6 and 7, i.e., 6A&7A or 6B&7B or 6C&7C or 6D&7D or 6E&7E. The pair shall not be broken (ABC allotment is random, not on any priority basis).

**Note-2:** One of the main objectives of Skill Enhancement Courses (SEC) is to inculcate skills related to the domain subject in students. The syllabus of SEC will be partially skill oriented. Hence, teachers shall also impart practical training to students on the skills embedded in syllabus citing related real field situations



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**Title of the Paper: Analytical Methods in Chemistry-I Semester: V/VI**

Course Code	CHE-501C-6B	Course Delivery Method	Class Room / Blended Mode
Credits	3	CIA Marks	30
No. of Lecture Hours / Week	3	Semester End Exam Marks	70
Total Number of Lecture Hours	45	Total Marks	100
Year of Introduction : 2022-23	Year of Offering: 2022-23	Year of Revision: -----	Percentage of Revision: 0

**Course Outcomes:**

**Students after successful completion of the course will be able to:**

**CO1.** Remember the basic concepts of quantitative analysis data treatment, separation techniques and analysis of water (PO7)

**CO2.** Acquire knowledge on the concepts quantitative analysis data treatment, separation techniques and analysis of water (PO1, PO7)

**CO3.** Apply the conceptual knowledge gained in the areas of quantitative analysis data treatment, separation techniques and analysis of water in the chosen job role (PO1)

**CO4.** Analyse that how far the quantitative methods, data treatment methods separation techniques and Analysis of water (PO1).

## Syllabus

### Course Details

Unit	Learning Units
I	<p><b>Quantitative analysis-1</b></p> <p>1. A brief introduction to analytical methods in chemistry</p> <p>2. Principles of volumetric analysis, concentration terms- Molarity, Normality, v/v, w/v, ppm and ppb, and secondary standards.</p> <p>3. Description and use of common laboratory apparatus- volumetric flask, burette, pipette, beakers, etc.</p>
II	<p><b>Quantitative analysis-2</b></p> <p>1. Principles of volumetric analysis: Theories of acid-base (including study of acid-base titration choice of indicators for the saturations).</p> <p>2. Principles of gravimetric analysis: precipitation, coagulation, peptization, co-precipitation, post precipitation.</p>
III	<p><b>Treatment of analytical data</b></p> <p>Types of errors- Relative and absolute, significant figures and its importance, accuracy – method minimization of errors, precision- methods of expressing precision, standard deviation and confidence limit</p>
IV	<p><b>Separation techniques</b></p> <p>1. Solvent Extraction: Introduction, principle, techniques, factors affecting solvent extraction, Batch extraction Determination of Iron(III).</p> <p>2. Ion Exchange method: Introduction, action of ion exchange resins, applications</p>
V	<p><b>Analysis of water (Marks weightage 10+5)</b></p> <p>Determination of dissolved solids, total hardness of water, turbidity, alkalinity, Dissolved oxygen, CO</p>

### III References

- Analytical Chemistry by Gary D. Christian, Purnendu K. Dasgupta and Kevin A. Schug, Seventh edition, Wiley.
- Textbook of Vogel's Quantitative Chemical Analysis, Sixth edition, Pearson.

3. Text book of Environmental Chemistry and Pollution Control by S.S.Dara and D.D.Mishra, Revised edition, S Chand & Co Ltd.

**Text Books:**

1. Instrumental methods of chemical analysis by B K Sharma
2. Separation methods MN Sastry

**Reference materials on the web/web links:**

1. [https://chem.libretexts.org/Bookshelves/Analytical\\_Chemistry/Supplemental\\_Modules\\_\(Analytical\\_Chemistry\)/Quantifying\\_Nature/Volumetric\\_Chemical\\_Analysis\\_\(Shiundu\)/14.1%3A\\_Sampling\\_and\\_Statistical\\_Analysis\\_of\\_Data](https://chem.libretexts.org/Bookshelves/Analytical_Chemistry/Supplemental_Modules_(Analytical_Chemistry)/Quantifying_Nature/Volumetric_Chemical_Analysis_(Shiundu)/14.1%3A_Sampling_and_Statistical_Analysis_of_Data)
2. <https://vlab.amrita.edu/?sub=2&brch=190&sim=338&cnt=1>

**IV Co-Curricular Activities:**

**a) Mandatory** (Lab/field training of students by teacher (lab: 10 + field: 05) :

**1. For Teacher:** Training of students by the teacher in laboratory and field for not less than 15 hours on the field techniques/skills of calibration of pH meter, Strong acid vs strong base titration using pH meter, determination of chloride ion, estimation of water quality parameters and estimation of Iron(II).

Google classroom created during instruction of course by the teacher concerned for sharing relevant material and conducting exams.

**2. For Student:** Students shall visit a related industry/chemistry laboratory in universities/research organizations/private sector facility and observe. Write their observations and submit a hand written fieldwork/project work report not exceeding 10 pages in the given format to the teacher.

3. Max marks for Fieldwork/project work Report: 05.

4. Suggested Format for Fieldwork/project work: Title page, student details, index page, detail of place visited, observations, findings, and acknowledgements.

5. Unit tests (IE).

**b) Suggested Co-Curricular Activities**

1. Training of students by related industrial experts.
2. Assignments, Seminars and Quiz (on related topics).
3. Visits to facilities, firms, research organizations etc.
4. Invited lectures and presentations on related topics by field/industrial experts.

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**Model Paper**

<b>SEMESTER – V</b>	<b>PAPER-V</b>	<b>PAPER CODE : CHE-501C</b>
<b>PAPER TITLE : Analytical Methods in Chemistry-I Paper 6B</b>		
<b>ACADEMIC YEAR-2022-2023</b>		

Time: 3Hours

Maximum marks: 70

Minimum marks: 28

**Answer any FOUR of the following. Each question carries 5 marks. 4X5=20**

1. Explain the preparation of v/v based with suitable examples
2. Discuss the detail about primary and secondary standards with suitable examples
3. Explain the need of drying the precipitate in gravimetric analysis
4. Define accuracy and explain the methods of expressing accuracy
5. Discuss the principal and theory involved in solvent extraction

6.Explain about resins

7.Explain about COD

### SECTION-B

**Answer any FIVE questions. Each question carries 10 marks. 5X10=50**

8.Describe the role of the following apparatus in analytical chemistry I) Volumetric flask II) Burette III) Pipette

9.Elaborate the theory involved in complexometric and acid base titrations

10.Write a note on the following terms in gravimetric analysis I)Precipitation II) Digestion III) Filtration

11.Define error, discuss in detail about various types of errors encountered in quantitative analysis

12.Elaborate the methods used for minimization of errors

13.Discuss the various factors which effect solvent extraction

14.Explain in detail about role of Ion exchange resins in separation of compounds

15.Explain the following (a) turbidity (b) alkalinity

**The Guidelines to be followed by the question paper setters in chemistry for the V- Semester - end exams**

<b>SEMESTER – V</b>	<b>PAPER-V</b>	<b>PAPER CODE : CHE-501-6B</b>
<b>PAPER TITLE : Analytical Methods in Chemistry-I Paper 6B</b>		
<b>ACADEMIC YEAR-2022-2023</b>		

Weightage for the question paper

syllabus	Section-A (Short answer questions)	Section-B (essay questions)
Unit-1 (20 Marks)	1+1	1
Unit-2 (25Marks)	1	1+1
Unit-3 (25Marks)	1	1+1
Unit-4 (30Marks)	1+1	1+1

Unit-5 ( 15 Marks)	1	1
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- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

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**PRACTICAL SYLLABUS**

**Laboratory Course-VI**

<b>Practical Paper – V Analytical methods in chemistry-I Practical syllabus</b>	<b>PAPER CODE : CHE-501 P ACADEMIC YEAR-2022-2023</b>
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**Analytical methods in Chemistry-1-PRACTICAL SYLLABUS**  
(Skill Enhancement Course (Elective), Credits: 02)

Practical Hrs ;45 (3hr/W)

**I Learning Outcomes: On successful completion of this practical course, students shall be able to:**

- CO1.** Estimate Iron (II) using standard Potassium dichromate solution (PO1)  
**CO2.** Learn the procedure for the estimation of total hardness of water (PO7)  
**CO3.** Demonstrate the determination of chloride using Mohr's method (PO1, PO7)  
**CO4.** Acquire skills in the operation and calibration of pH meter (PO1)

## **II Practical(Laboratory) Syllabus :( 30hrs)**

1. Estimation of Iron(II) using standard Potassium dichromate solution (using DPA indicator)
2. Estimation of total hardness of water using EDTA
3. Determination of chloride ion by Mohr's method
4. Study the effect on pH of addition of HCl/NaOH to solutions of acetic acid, sodium acetate and their mixtures.
5. Preparation of buffer solutions of different pH (i) Sodium acetate-acetic acid, (ii) Ammonium chloride-ammonium hydroxide.
6. pH metric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base.
7. Determination of dissociation constant of a weak acid.

## **II Lab References:**

1. Textbook of Vogel's Quantitative Chemical Analysis, Sixth edition, Pearson.

### **SCHEME OF VALUATION**

**INTERNAL MARKS- Record-10M**

#### **1. EXTERNAL MARKS-40**

- **Practical -30M**
- **Viva questions = 10 M**

**TOTAL = 50 M**





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**Title of the Paper: Analytical Methods in Chemistry-2Semester: V/VI**

Course Code	CHE-502C-7B	Course Delivery Method	Class Room / Blended Mode
Credits	3	CIA Marks	30
No. of Lecture Hours / Week	3	Semester End Exam Marks	70
Total Number of Lecture Hours	45	Total Marks	100
Year of Introduction :	Year of Offering:	Year of Revision:	Percentage of Revision: 0
2022 - 23	2022 - 23	-----	

**Learning Outcomes: Students after successful completion of the course will be able to:**

**CO1.** Remember the basic concepts of Chromatography like paper, TLC, Column, GC & HPLC (PO7)

**CO2.** Understand the significance of paper, TLC, Column, GC & HPLC in separation and identification of compounds (PO1, PO7) .

**CO3.** Apply the conceptual knowledge gained in the techniques of chromatography in separating and identifying the chemical compounds as and when required (PO1).

**CO4.** Analyse that how far one chromatographic technique is much use full in separation and identification of compounds over the other chromatographic technique (PO1,PO7).

## Syllabus

### Course Details

Unit	Learning Units
I	<p><b>Chromatography-Introductionandclassification</b> (Marks weightage 10+5)</p> <p>Principle, Classification of chromatographic methods, Nature of adsorbents, eluents, <math>R_f</math> values, factors affecting <math>R_f</math> values.</p>
II	<p><b>TLC and paper chromatography</b> (Marks weightage 10+10+5+5)</p> <p>1. Thin layer chromatography: Principle, Experimental procedure, preparation of plates, adsorbents and solvents, development of chromatogram, detection of spots, applications and advantages.</p> <p>2. Paper Chromatography: Principle, Experimental procedure, choice of paper and solvents, various modes of development- ascending, descending, radial and two dimensional, applications.</p>
III	<p><b>Column chromatography</b> (Marks weightage 10+10+5)</p> <p>1. Column chromatography: Principle, classification, Experimental procedure, stationary and mobile phases, development of the Chromatogram, applications, factors affecting the column efficiency.</p> <p>2. Applications:- Separation of Methylene Blue and Fluorene by column chromatography.</p>
IV	<p><b>Gas chromatography:</b> (Marks weightage 10+5+5)</p> <p>Basic principles. Different types of GC techniques. Selection of columns and carrier gases. Instrumentation. Detectors- Thermal conductivity detector, Flame ionization detector, <math>R_f</math> values. Applications in the separation of amino acids &amp; estrogens</p>
V	<p><b>High Performance liquid chromatography (HPLC)</b> (Marks weightage 10+10+5)</p> <p>Basic principles. Normal and reversed Phases. Selection of column and mobile phase. Instrumentation. Detectors- RID, UV detector <math>R_f</math> values. Applications in the separation, separation of anions, barbiturates, tropane alkaloids.</p>

### III References

1. Fundamental so Analytical Chemistry by F. James Holler, Stanley R Crouch, Donald M. West and Douglas A. Skoog, Ninth edition, Cengage.
2. Analytical Chemistry by Gary D. Christian, Purnendu K. Dasgupta and Kevin A. Schug, Seventh edition, Wiley.
3. Quantitative analysis by R. A. Day Jr. and A. L. Underwood, Sixth edition, Pearson.
4. Textbook of Vogel's Quantitative Chemical Analysis, Sixth edition/Pearson.

**Text Books:**

1. Instrumental methods of chemical analysis by B K Sharma
2. Instrumental methods of chemical analysis by Gurudeep & Chatwal Anand

**Reference materials on the web/weblinks:**

1. [https://chem.libretexts.org/Bookshelves/Analytical\\_Chemistry/Supplemental\\_Modules\\_\(Analytical\\_Chemistry\)/Instrumental\\_Analysis/Chromatography/Gas\\_Chromatography](https://chem.libretexts.org/Bookshelves/Analytical_Chemistry/Supplemental_Modules_(Analytical_Chemistry)/Instrumental_Analysis/Chromatography/Gas_Chromatography)
2. <https://lab-training.com/hplc-high-performance-liquid-chromatography/>

**VICo-Curricular Activities:**

**a) Mandatory :** ( Lab/field training of students by teacher (lab: 10+ fields: 05):

**1. For Teacher:** Training of students by the teacher in laboratory and field for not less than 15 hours on the field techniques/skills of determination of hardness of water, using the calorimeter and/or Spectrophotometer, preparation of TLC plate, identification of spots in TLC and Paper chromatographic techniques, loading of column, selection of solvent system, separation of amino acids and dyes mixture using chromatographic techniques.

Google classroom created during instruction of course by the teacher concerned for sharing relevant material and conducting exams.

2.

**For Student:** Students shall visit a related industry/chemistry laboratory in universities/research organizations/private sector facility and observe the chromatographic techniques used for the separation of compounds. Write their observations and submit a handwritten fieldwork/project work report not exceeding 10 pages in the given format to the teacher.

3. Max marks for Fieldwork/project work Report: 05.

4. Suggested Format for Fieldwork/project work: Title page, student details, index page, details of place visited, observations, findings, and acknowledgements.

5. Unit tests (IE).

**b) Suggested Co-Curricular Activities**

1. Training of students by related industrial experts.
2. Assignments, Seminars and Quiz (on related topics).

3. Visits to facilities, firms, research organizations etc.

4. Invited lectures and presentations on related topics by field/industrial experts.

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**Model Paper**

<b>SEMESTER – V</b>	<b>PAPER-V</b>	<b>PAPER CODE : CHE-502-7B</b>
<b>PAPER TITLE : Analytical Methods in Chemistry-2 Paper 7B</b>		
<b>ACADEMIC YEAR-2022-2023</b>		

Time: 3Hours

Maximum marks: 70Minimum marks: 28

**SECTION-A**

**Answer any FOUR of the following. Each question carries 5 marks. 4X5=20**

1. What is the basic principle involved in chromatography, explain nature of adsorbents
2. How to prepare TLC plates
3. Explain Ascending and descending techniques in paper chromatography
4. Explain the classification of column chromatography
5. Explain the schematic diagram of G.C
6. Explain about detectors in G.C
7. Explain schematic diagram of HPLC

**SECTION-B**

**Answer any FIVE questions. Each question carries 10 marks. 5X10=50**

8. How do the chromatographic methods are classified? Explain any one
9. Discuss the applications of TLC
10. Explain the applications of paper chromatography
11. Explain the factors effecting the column efficiency in CC
12. Discuss the separation of methylene blue and fluorescein by CC
13. Explain the separation of Amino acids by G.C
14. Explain the different detectors used in HPLC
15. Explain the separation of Anions and Barbiturates by HPLC

**The Guidelines to be followed by the question paper setters in chemistry for the  
V- Semester - end exams**

<b>SEMESTER – V</b>	<b>PAPER-V</b>	<b>PAPER CODE : CHE-502C-7B</b>
<b>PAPER TITLE : Analytical Methods in Chemistry-2 Paper 7B</b> <b>ACADEMIC YEAR-2022-2023</b>		

Weightage for the question paper

syllabus	Section-A (Short answer questions)	Section-B (essay questions)
Unit-1 (15Marks)	1	1
Unit-2 (30Marks)	1+1	1+1
Unit-3 (25 Marks)	1	1+1
Unit-4 (20Marks)	1+1	1
Unit-5 ( 25 Marks)	1	1+1

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.

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**PRACTICAL SYLLABUS**

**Laboratory Course-VII**

<b>Practical Paper – V Analytical methods in chemistry-2 Practical syllabus</b>	<b>PAPER CODE : CHE-502 P ACADEMIC YEAR-2022-2023</b>
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**Analytical methods in Chemistry-2**

**PRACTICAL SYLLABUS**

**(Skill Enhancement Course (Elective), Credits: 02)**

**Practical Hrs./Week: 3**

**Learning Outcomes:**

On successful completion of this practical course, students shall be able to:

**CO1.** Perform the separation of a given dye mixture using TLC (PO1)

**CO2.** Learn the preparation of TLC plates (PO1, PO7)

**CO3.** Demonstrate the separation of a mixture of amino acids using paper chromatography (PO1)

**CO4.** Acquire skills in using column chromatography for the separation of a dye mixture (PO7)

**II Practical (Laboratory) Syllabus: (30 hrs)**

1. Separation of a given dye mixture (methyl orange and methylene blue) using TLC (using alumina as adsorbent).

2. **Separation of different amino acids using paper chromatography.**

3. Separation of given mixture of amino acids (glycine and phenyl alanine) using ascending paper chromatography.

4. **Estimation of Fe<sup>+2</sup> by using thiocyanate by calorimeter.**

5. **Separation of sugars using TLC**

6. Verification of Beer Lambert's law. (Using potassium permanganate solution) using colorimeter/spectrophotometer.

**III Lab References:**

1. Textbook of Vogel's Quantitative Chemical Analysis, Sixth edition, Pearson.

2. Vogel A.I. Practical Organic Chemistry, Longman Group Ltd.

3. Bansal R.K. Laboratory Manual of Organic Chemistry, Wiley-Eastern.
4. Ahluwalia V. K. and Aggarwal R. Comprehensive Practical Organic Chemistry, University press.
5. Mann F.G. and Saunders B.C, Practical Organic Chemistry, Pearson Education.

### **SCHEME OF VALUATION**

**1. INTERNAL MARKS- Record-10M**

**2. EXTERNAL MARKS-40**

- **Practical-30M**
- **Viva questions = 10 M**

**TOTAL = 50 M**



SEMESTER – III (SDC)	PAPERCODE:SDCCHET01
PAPER TITLE : FOOD ADULTERATION	

**UNIT-I:**Total: 30Hrs (2h/week) 02 Credits

**Common Foods and Adulteration(10+10+5+5) 10Hrs**

Common Foods subjected to Adulteration-Adulteration-Definition –Types;Poisonous substances,Foreign matter, cheap substitutes, Spoiled parts.Adulteration through Food Additives –Intentional and incidental.General Impact on Human Health.

**UNIT-II :**

**Adulteration of Common Foods and Methods of Detection (10+10+5+5) 10Hrs**

Means of Adulteration Methods of Detection Adulterants in the following Foods; Milk,Oil, Grain, Sugar,Spices and Condiments, Processed Food, Fruits and Vegetables.Additives and Sweetening agents (at least three methods of detection for each food item).

**UNIT-III:**

**Present Laws and Procedures on Adulteration(10+10) 10Hrs**

Highlights of Food Safety and Standards Act 2006 (FSSA) –Food Safety and Standards Authority of India- Rules and Procedures of Local Authorities.Role of Voluntary Agencies Such as,Agmark, I.S.I. Quality control laboratories of Companies, Private testing laboratories, Quality control laboratories of Consumer co-operatives.

Consumer Education, Consumer's problems, rights and responsibilities, COPRA 2019- Offenses and Penalties-Procedures to Complain –Compensation to Victims.

Reference books and Websites:

1. A first course in Food Analysis – A.Y. Sathe, New Age International (p) Ltd, 1999
2. Food Safety, case studies – Ramesh.V.Bhat, NIN, 1992
3. [https://old.fssai.gov.in/Portals/0/Pdf/ Draft Manuals/ Beverages and Confectionary.pdf](https://old.fssai.gov.in/Portals/0/Pdf/Draft%20Manuals/Beverages%20and%20Confectionary.pdf)
4. <https://www.fssai.gov.in/>
5. <https://indianlegalsolution.com/laws-on-food-adulteration/>
6. <https://fssai.gov.in/dart/>
7. <https://byjus.com/biology/food-adulteration/>

<b>SEMESTER – III (SDC)</b>	<b>COURSE CODE:</b>
<b>PAPER TITLE : FOOD ADULTERATION</b>	

Time: 2 Hours

Maximum marks: 35

Pass marks:16

SECTION-A

Answer any THREE Questions. Each question carries 5 marks 3X5=15Marks

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

SECTION-B

Answer any TWO Questions. Each question carries 10 marks. 2X10=20M

- 7.
- 8.
- 9.
- 10.

**The Guidelines to be followed by the question paper setters in Chemistry for the  
II-Semester - end exams. ACADEMIC YEAR-2022-23**

Weightage for the question paper-FOOD ADULTERATION

syllabus	Section-A (Short answer questions)	Section-B (Essay questions)
Unit-1 (30Marks)	1+1	1+1
Unit-2 (30 Marks)	1+1	1+1
Unit-3 (20 Marks)	-----	1+1

- Each Short answer question carries 5 marks in Section –A
- Each Essay question carries 10 marks in Section –B
- The Question papers setters are requested to cover all the topics in the syllabus stipulated as per the weightage given by us.