

**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

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.

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) *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. Ramell
Chairman

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SEMESTER – I	SUBJECT: CHEMISTRY	COURSE CODE:
PAPER TITLE : INORGANIC &PHYSICAL CHEMISTRY, PAPER-I		
ACADEMIC YEAR-2021-2022		

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-H₂O 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.deAtkin'sPhysicalChemistryEd.,OxfordUniversityPress
10thEd(2014).
10. Castellan,G.W.PhysicalChemistry4thEd.Narosa(2004).
11. Mortimer,R. G.PhysicalChemistry3rdEd. Elsevier:NOIDA,UP(2009).
12. Barrow,G.M.PhysicalChemis

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SEMESTER-I	PAPER-I	PAPER CODE : CHE-101C
PAPER TITLE : INORGANIC & PHYSICAL CHEMISTRY		
ACADEMIC YEAR-2021-2022		

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**

Practical Paper – I Analysis of SALTMIXTURE	PAPER CODE : CHE-101 P ACADEMIC YEAR-2021-2022
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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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SEMESTER – III	SUBJECT: CHEMISTRY	COURSE CODE: CHE-
301C		
PAPER TITLE : ORGANIC CHEMISTRY & SPECTROSCOPY, PAPER-III		
ACADEMIC YEAR-2021-2022		

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)

SN¹, SN², and SNⁱ 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. NaHSO_3 , HCN , 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, LiAlH_4 and 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 (σ , π , 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 λ_{max} of conjugated dienes and α,β – unsaturated compounds.

Infrared radiation and types of molecular vibrations, functional group and fingerprint region. IR spectra of alkanes, alkenes and simple alcohols (inter and 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).

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SEMESTER – III	PAPER-III	PAPER CODE : CHE-301C
PAPER TITLE : ORGANIC CHEMISTRY & SPECTROSCOPY		
ACADEMIC YEAR-2021-2022		

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

SEMESTER – III SUBJECT: CHEMISTRY COURSE CODE: CHE-301C
PAPER TITLE : ORGANIC CHEMISTRY & SPECTROSCOPY
ACADEMIC YEAR-2021-2022

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 (15 Marks)	1	1
Unit-3 (30 Marks)	1+1	1+1
Unit-4 (35 Marks)	1+1+1	1+1
Unit-5 (10 Marks)	---	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**

Practical Paper – III Organic preparations and IR Spectral Analysis	PAPER CODE : CHE-301 P ACADEMIC YEAR-2021-2022
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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 (β -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__
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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

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SEMESTER – V	PAPER-V	PAPER CODE : CHE-501C
PAPER TITLE : INORGANIC, ORGANIC & PHYSICAL CHEMISTRY		
ACADEMIC YEAR-2021-2022		

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**

SEMESTER – V SUBJECT: CHEMISTRY COURSE CODE: CHE-501C
PAPER TITLE : INORGANIC,ORGANIC & PHYSICAL CHEMISTRY, Paper –V
ACADEMIC YEAR-2021-2022

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.

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PRACTICAL SYLLABUS

Practical Paper – V Organic Qualitative Analysis	PAPER CODE : CHE-501 P ACADEMIC YEAR-2021-2022
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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__

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SEMESTER – V Paper – VI SUBJECT: CHEMISTRY PAPER CODE: CHE- 502C
PAPER TITLE : INORGANIC,ORGANIC & PHYSICAL CHEMISTRY ACADEMIC YEAR-2021-2022

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 (ketohexose) - Evidence of 2 - ketohexose 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

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SEMESTER – V	PAPER-VI	PAPER CODE : CHE-502C
PAPER TITLE : INORGANIC,ORGANIC & PHYSICAL CHEMISTRY		
ACADEMIC YEAR-2021-2022		

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 α -amino acids with equations.
13. Give reactions to show the presence of NH_2 and COOH groups in α -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**

SEMESTER – V	SUBJECT: CHEMISTRY	PAPER CODE: CHE-502C
PAPER TITLE : INORGANIC,ORGANIC & PHYSICAL CHEMISTRY, Paper – VI		
ACADEMIC YEAR-2021-2022		

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.

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PRACTICAL SYLLABUS

Practical Paper –VI Physical Chemistry	COURSE CODE : CHE-502 P ACADEMIC YEAR-2021-2022
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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__

