

A.S.D. GOVT. DEGREE COLLEGE FOR WOMEN (A)

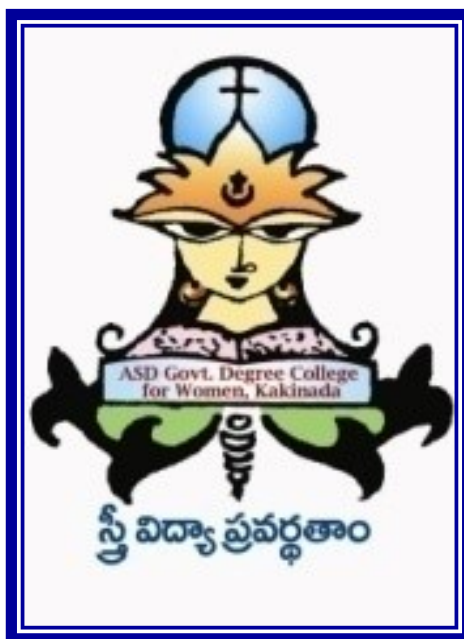
(Accredited by NAAC with 'B' Grade, Cycle 3)

KAKINADA – 533 002, EAST GODAVARI, A.P.

**BOARD OF STUDIES (BOS)
DEPARTMENT OF CHEMISTRY**

SYLLABUS & MODEL PAPERS

2020-2021



Convened on 30th June 2020

**A.S.D GOVT.DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)
KAKINADA
DEPARTMENT OF CHEMISTRY**

AGENDA FOR THE BOARD OF STUDIES MEETING 2020-2021

1. To discuss the semester System and Choice Based Credit System (CBCS) being implemented for the past 06 years.
2. To discuss the continuation/Upgradation of the syllabus for the odd and even Semesters of I Year w.e.f 2020-21.
3. Minor modification in Question paper Model in view of COVID-19 and to approve the blue print of each paper.
4. Possibilities to follow Teaching-Learning-Evaluation by 70:30 (Offline: Online) ratio.
5. Panel of paper setters and examiners.
6. To discuss the weightage to be given to continuous internal assessment (CIA) and external assessment.
7. Introduction of New Courses of Study – Possibilities.
8. Admission criteria for programmes offered by the Departments.
9. Proposals for Community Services / Extension Activities / Projects for the benefit of the Society.
10. To follow B.Sc. First year instruction as per APSCHE/University Syllabus.
11. To discuss and resolve the minor modifications/refinement if any, in the Cluster electives A1, A2 and A3 as majority of the students opting this Cluster as their choice.
12. Any other matter of academic interest.

A.S.D. GOVT.DEGREE COLLEGE FOR WOMEN (A), KAKINADA
COMPOSITION OF THE BOARD OF STUDIES OF CHEMISTRY

I Composition

1. Head of the Department concerned (Chairman):
Dr. D. Chenna Rao, M.Sc., NET, Ph.D.
 2. The entire faculty of each specialization:
 1. Smt. V Anantha Lakshmi M.Sc., M.Phil., B.Ed.
 2. Sri. V. Badari Narayana Rao, M.Sc., B.Ed.
 3. Dr.S. Priya Darshini, M.Sc., Ph.D.
 4. Smt. M. Subba Lakshmi, M.Sc.
 3. Two experts in the subject from outside the college to be nominated by the Academic Council:
 1. Sri. N.V. Sudhakar, M.Sc., M.Phil., Lecturer in Chemistry, Govt. Degree College(A), Tuni. Ph: 9642238976. Mail Id: vijayasudha19@gmail.com
 2. Sri. V. Sanjeeva Kumar, M.Sc., NET, Lecturer in Chemistry, Govt. Degree College, Mandapeta, Ph:9849324966, Mail Id: skvudi1972@gmail.com
 5. One expert to be nominated by the Vice-Chancellor from a panel of six recommended by the College Principal:

Dr. D. Rama Rao, M.Sc., Ph.D., Lecturer in Chemistry, P.R. Govt. College (A), Kakinada. Ph: 9949308203.
 6. One representative from industry/ Corporate Sector/ allied area relating to placement.

Dr. B. Ramesh Babu, BogaR laboratories, Peddapuram. Ph: 9701712028.
 7. One postgraduate meritorious alumnus to be nominated by the Principal.
The chairman, Board of Studies, may with the approval of the Principal of the College, Co-opt
Kum. S. Vijaya Lakshmi, M.Sc. (Organic Chemistry)
- II. Term: The term of the nominated members shall be two years.

III Meeting:

The Principal to the College shall draw the schedule for meeting of the Board of Studies for different Departments. The meeting may be scheduled as and when necessary but at least once a year.

IV Functions:

The Board of Studies of a Department in the College shall:

- a) Prepare syllabus and various courses keeping in view the objectives of the interest of the College stakeholders and national requirement for consideration and approval of the Academic Council.
- b) Suggest methodologies for innovative teaching and evaluation techniques.
- c) Suggest panel of names to the Academic Council for appointment of examiners
- d) Coordinate research, Teaching, Extension and other academic activities in the Department/College.

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS) KAKINADA

Course Structure and Scheme of Examination Pattern

As per the orders of the Commissioner of Collegiate Education (CCE), Hyderabad, A.S.D. Govt. Degree College for Women (Autonomous), Kakinada has resolved to adopt the “Choice Based Credit System” (CBCS) from the academic year 2015 – 16 after detailed discussion in the staff meeting on 02-06-2015 and 10-07-2015. This new system i.e. CBCS would be applicable to 2015 – 16 onwards, i.e. come into force from the Academic year 2015 – 16 onwards. The entire B.Sc. Program consists of M.P.C, CBZ, CBMB & CZAqT groups. The courses, number of credits and total number of credits have shown in the table form (see table).

Therefore, the Department of Chemistry A.S.D. Govt. Degree College (Autonomous), Kakinada, has resolved to adopt the Choice Based Credit System, from the Academic Year i.e. 2015 – 2016 onwards. This system applicable to the 2016-17, 2017-18, 2018-19, 2019-20 & 2020-2021 admitted batch students. The semesters, course code, course title, allocated hours, total marks and allocated credits have shown in the table (see table).

A.S.D. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)

KAKINADA – 533 002, EAST GODAVARI, A.P.

REVISED SYLLABUS OF B.Sc. (Chemistry)

UNDER CBCS FRAMEWORK WITH EFFECT FROM 2020-2021

PROGRAMME: THREE-YEAR B.Sc. (B.Sc. Chemistry)

(With Learning Outcomes, Unit-wise Syllabus, References, Co-curricular Activities &

Model Q.P.)

For Fifteen Courses of 1, 2, 3 & 4 Semesters)

(To be Implemented from 2020-21 Academic Year)

Andhra Pradesh State Council of Higher Education

A.S.D. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)

KAKINADA – 533 002, EAST GODAVARI, A.P.

B.Sc. CHEMISTRY COURSE STRUCTURE (w.e.f. 2020-21)

Semester	Course code	Course Title	Hrs./ Week	Credits	Max. Marks		
					Int	Ext	Total
FIRST YEAR							
I	CHE 1303	INORGANIC & PHYSICAL CHEMISTRY - I	4	3	25	75	100
	CHE 1303P	Practical – I Analysis of SALT MIXTURE	2	2	0	50	50
II	CHE 2303	ORGANIC AND GENERAL CHEMISTRY - II	4	3	25	75	100
	CHE 2303P	Practical – II Volumetric Analysis	2	2	0	50	50

Signatures of the members who attended the Board of studies in Chemistry:

1. Dr. D. Chenna Rao Chairman & Lecturer in Charge
2. Dr. D. Rama Rao University representative
P.R. Govt. College (A)
Kakinada.
3. Sri N.V.Sudhakar Subject Expert
Lecturer in Chemistry,
Govt. Degree College,
Tuni.
4. Sri V.Sanjeeva Kumar Subject Expert
Lecturer in Chemistry,
Govt. Degree College, Mandapeta.
5. Dr. B. Ramesh Babu, Founder & CMD,
BogaR laboratories, Peddapuram.
6. Kum. S. Vijaya Lakshmi Alumnus
7. Smt. V.Anantha Lakshmi Member
8. Sri V.Badari Narayana Rao Member
9. Dr. S. Priya Darshini Member
10. Smt. M.Subba Lakshmi Member

ACTION PLAN BOS MEETING -CHEMISTRY HELD ON 30.06.2020.

1. Department activities for 2020-2021 academic year. Annexure I (Tentative)

Month	Activity proposed	Faculty member in charge
July-20	Departmental staff meeting to review results and class work allotment	Dr. D. Chenna Rao
	Preparation of curricular plans, time-tables etc.,	
	Remedial coaching classes for II & III year	
Aug-20		
	Bridge classes for I year students	
	Student awareness programmes on ragging & eve teasing - consequences , self-discipline, career guidance, higher education opportunities etc.,	Smt. V.Anantha Lakshmi
Sep-20	Extension activity	Smt. M.Subba Lakshmi
Oct-20	Invited lecture by Industrial Expert	Sri V.Badari Narayana Rao
Nov-20	National Education Day – Outreach Programme to nearby school	Dr. S. Priya Darsini
Dec-20	World AIDS Day	D.Chennarao
Dec-20	National Chemistry Day	
Jan-21	10 days coaching for PG entrance examinations in chemistry Study tour / Field trips	Dr. S. Priya Darshini

2. Organizing National/ State level Webinars/Seminars/Workshops/ Conferences/ Training programmes etc., with topics and other details.

(Mandatory for each Department)

- i) Awareness on OZONE protection
- ii) National Chemistry day
- iii) National Science day
- iv) Guest lectures
- v) National Webinar in Chemistry
- vi) Project in Soil analysis
- vii) Training in water analysis

3. Plan for utilization of funds for Autonomous/CPE/other grants available for arranging guest lectures, faculty improvement programmes, study tours, equipping laboratories, reference books & other necessary teaching-learning material with ICT enabled teaching.

Study visits to:

1. Dr. Reddy's Laboratories, Yanam.
 2. National Institute of Hydrology, Kakinada.
 3. SAR Chandra Environ Solutions, Kakinada.
 4. Soil analysis laboratory, Samalkot.
 5. Soap Industries, Kakinada.
 6. Venky parenterals, Yanam
 7. Manufacturing of pet bottles at Industrial Park, Kakinada
4. Introduction of new programmes–PG/UG/Diploma and certificate courses.

PHYSICAL CHEMISTRY**36h****UNIT-III****SOLIDSTATE****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. Powder method. Defects in crystals. Stoichiometric and non-stoichiometric defects.

Additional Input: Miller indices.

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- ethanol-water system. Partially miscible liquids-phenol water system. Critical solution temperature (CST). Immiscible liquids and steam distillation. Nernst distribution law. Calculation of the partition coefficient.

Additional Input: Azeotropes-HCl-H₂O system, Effect of impurity on consolute temperature, 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, 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.deAtkin'sPhysicalChemistryEd.,OxfordUniversityPress, 10thEd(2014).
10. Castellán,G.W.PhysicalChemistry4th Ed. Narosa (2004).
- 11 . Mortimer,R. G.PhysicalChemistry3rdEd. Elsevier: NOIDA,UP(2009).
12. Barrow,G.M. PhysicalChemistry

LABORATORY COURSE -I

30hrs (2 h / w)

Practical-I Analysis of SALT MIXTURE

(At the end of Semester-I)

Qualitative inorganic analysis (Minimum of Six mixtures should be analysed) 50 M

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.

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 10 = 50 Marks

Answer **ALL** the questions. Each carry **TEN** marks

1. (a). Explain Classification, Preparations & uses of Silicones.
సిలికోనుల వర్గీకరణ, తయారీ మరియు ఉపయోగాలను వివరించండి.
(or)
(b). What are Pseudo halogens? Explain with examples.
మిథ్యా హాలోజనులు అనగానేమి? ఉదాహరణలతో వివరించండి.
2. (a). What is Lanthanide Contraction? Explain the Consequences of Lanthanide Contraction.
లాంథనైడ్ సంకోచం అనగా నేమి? లాంథనైడ్ సంకోచం వల్ల కలిగే పరిణామాలను వివరించండి.
(or)
(b). (i) Explain the magnetic properties of d- block elements.
డి-బ్లాక్ మూలకాల అయస్కాంత ధర్మాలను వివరించండి.
(ii) Explain about Conductors, Semi-Conductors & Insulators using Band Theory.
పట్టి సిద్ధాంతం ఆధారంగా వాహకాలు, అర్ధ వాహకాలు, బంధకాలను గూర్చి వివరించండి.
3. (a). Write an essay on Crystal defects.
స్పటిక లోపాలపై ఒక వ్యాసం రాయండి.
(or)
(b). What is Bragg's Law? Explain the determination of structure of a crystal by powder method.
బ్రాగ్ నియమం ఏమిటి? స్పటిక నిర్మాణాన్ని కనుగొను చూర్ణ పద్ధతిని గూర్చి వివరించండి.
4. (a). Derive the relationship between Critical constants & Vander Waal constants
వాండర్ వాల్ స్థిరాంకాలకు, సందిగ్ధ స్థిరాంకాలకు మధ్యగల సంబంధాన్ని రాబట్టండి.
(or)
(b). (i) Explain the classification of liquid crystals.
ద్రవ స్పటికాల వర్గీకరణను వివరించండి.
(ii) Write the applications of Liquid crystals.
ద్రవ స్పటికాల అనువర్తనాలను రాయండి.
5. (a). Explain Nernst distribution Law. Explain its applications
నెర్స్ట్ వితరణ నియమాన్ని వివరించండి. ఈ నియమ అనువర్తనాలను వివరించండి.

(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.

కణాధార ధర్మాలు అనగానేమి? భాష్పీభవన స్థాన ఉన్నతినీ ప్రయోగాత్మకంగా నిర్ణయించు ఏదేని ఒక పద్ధతినీ వివరించండి.

PART- B

5 X 5 = 25 Marks

Answer any FIVE of the following questions. Each carry FIVE marks.

6. Explain the preparation & structures of Phosphonitrilic compounds.
ఫోస్ఫోనైట్రైలిక్ సమ్మేళనాల తయారీ, నిర్మాణాలను వివరించండి.
7. Explain in brief, catalytic properties & stability of various oxidation states of d-block elements.
డి-బ్లాక్ మూలకాల ఉత్పేరక, ఆక్సీకరణ స్థితుల స్థిరత్వాలను గూర్చి క్లుప్తంగా వివరించండి.
8. Write short note on Bravais lattices and crystal systems.
బ్రేవైస్ తలాలు మరియు స్పటిక వ్యవస్థలను గూర్చి లఘుటీక రాయండి.
9. Write the differences between solid, liquid and liquid crystals.
ఘన, ద్రవ మరియు ద్రవస్పటికాల మధ్యగల భేదాలను గూర్చి రాయండి.
10. Write account on Common ion effect & Solubility product.
ఉమ్మడి అయాన్ ప్రభావం, ద్రావణీయతా లబ్ధం లను గూర్చి రాయండి.
11. Describe Andrew's isotherms of carbon dioxide.
ఆన్ డ్రూస్ కార్బన్ డైయాక్సైడ్ వాయువు సమోష్టోగ్రాఫ్ రేఖలను వివరించండి.
12. Explain Actinide Contraction.
ఆక్టినైడ్ సంకోచం ను వివరించండి.
13. Explain the structure of diborane.
డైబోరేన్ నిర్మాణాన్ని వివరించండి.

SEMESTER – II

Course II – (Organic & General Chemistry)

60 hrs (4h/w)

Course outcomes:

At the end of the course, the student will be able to;

1. Understand and explain the differential behavior of organic compounds based on fundamental concepts learnt.
2. Formulate the mechanism of organic reactions by recalling and correlating the fundamental properties of the reactants involved.
3. Learn and identify many organic reaction mechanisms including Free Radical Substitution, Electrophilic Addition and Electrophilic Aromatic Substitution.
4. Correlate and describe the stereochemical properties of organic compounds and reactions.

ORGANIC CHEMISTRY

36h

UNIT-I

RECAPITULATION OF BASICS OF ORGANIC CHEMISTRY

Carbon-Carbon sigma bonds (Alkanes and Cycloalkanes)

12h

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, Free radical substitutions; Halogenation, concept of relative reactivity v/s selectivity. Conformational analysis of alkanes (Conformations, relative stability and energy diagrams of Ethane, Propane and butane). General molecular formulae of cycloalkanes and relative stability, Baeyer strain theory, Cyclohexane conformations with energy diagram.

Additional Input: Conformations of monosubstituted cyclohexane.

UNIT-II

Carbon-Carbon pi Bonds (Alkenes and Alkynes)

12h

General methods of preparation, physical and chemical properties. Mechanism of E1, E2, Saytzeff, Electrophilic Additions, mechanism (Markownikoff / Antimarkownikoff addition) with suitable examples, syn and anti-addition; Diels Alder reaction, 1,2- and 1,4-addition reactions in conjugated dienes. Reactions of alkynes, acidity, Alkylation of terminal alkynes.

Additional Input: E1cb reactions, Hoffmann eliminations, addition of H₂, X₂, HX. oxymercuration-demercuration, hydroboration-oxidation, ozonolysis, hydroxylation, electrophilic and nucleophilic additions, hydration to form carbonyl compounds.

UNIT-III

Benzene and its reactivity

12h

Concept of aromaticity, Huckel's rule - application to Benzenoid (Benzene, Naphthalene) and Non - Benzenoid compounds (cyclopropenylcation, cyclopentadienyl anion and tropyliumcation) Reactions - General mechanism of electrophilic aromatic substitution, mechanism of nitration, Friedel- Craft's

alkylation and acylation. Orientation of aromatic substitution - ortho, para and meta directing groups. Ring activating and deactivating groups with examples (Electronic interpretation of various groups like NO_2 and Phenolic).

Additional Input: 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

24 h

UNIT-IV

Surface chemistry and chemical bonding

1. Surface chemistry

6h

Colloids- Coagulation of colloids- Hardy-Schulze rule. Stability of colloids, Protection of Colloids, Gold number.

Adsorption-Physical and chemical adsorption, Langmuir adsorption isotherm, applications of adsorption.

2. Chemical Bonding

6h

Valence bond theory, hybridization, VB theory as applied to ClF_3 , $\text{Ni}(\text{CO})_4$, Molecular orbital theory -LCAO method, construction of M.O. diagrams for homo-nuclear and hetero-nuclear diatomic molecules (N_2 , O_2 , CO and NO).

3. HSAB

2h

Additional Input: Pearson's concept, HSAB principle & its importance, bonding in Hard-Hard and Soft-Soft combinations.

UNIT-V

Stereochemistry of carbon compounds

10h

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, Alanine, Tartaric acid. D, L, R, S and E, Z- configuration with examples. Definition of Racemic mixture – Resolution of racemic mixtures (any 3 techniques)

Additional Input: optical isomerism of Lactic acid, 2,3-dibromopentane.

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 development.

Semester-end Examination: critical indicator of student's learning and teaching methods adopted by Teachers throughout the semester.

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:

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, NewAge International.

Gunstone, F. D. Guidebook to Stereochemistry, Prentice Hall Press, 1975.

LABORATORY COURSE-II
Practical-II Volumetric Analysis
(At the end of Semester-II)

30hrs (2 h / w)

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 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 KMnO_4

MODEL PAPER
FIRST YEAR B.Sc., DEGREE EXAMINATION
SEMESTER-II
CHEMISTRY COURSE -II: ORGANIC & GENERAL CHEMISTRY

Time: 3 hours

Maximum Marks: 75

PART- A

5 X 10 = 50 Marks

Answer **ALL** the questions. Each carry **TEN** marks

1 (a). (i) Write the preparation of alkanes by Wurtz and Corey-House reaction.

ఉర్ట్ మరియు కోరే-హౌస్ చర్య పద్ధతుల ద్వారా ఆల్కేనులను ఎలా తయారు చేస్తారు?

(ii) Explain Halogenation of alkanes. Explain the reactivity and selectivity in free radical substitutions.

ఆల్కేనుల హాలోజేషన్ చర్యను వివరించండి. స్వేచ్ఛా ప్రాతిపదిక ప్రతిక్షేపణ చర్యల యొక్క చర్యాశీలత మరియు వరణాత్మకతను గూర్చి వివరించండి.

(or)

(b). (i) Explain Baeyer Strain Theory

బేయర్ ప్రయాస సిద్ధాంతాన్ని గూర్చి వివరించండి.

(ii) Draw the conformations of Cyclohexane and explain their stability by drawing energy profile diagram.

సైక్లోహెక్సేన్ అనురూపకాలను రాసి, వాటి స్థిరత్వాలను శక్తిపటాల ద్వారా వివరించండి.

2 (a). (i) Write any two methods of preparation of alkenes.

ఆల్కేనులను తయారుచేయు ఏవేని రెండు పద్ధతులను రాయండి.

(ii) Explain the mechanism of Markownikoff and Anti-Markownikoff addition of HBr to alkene.

HBr ఆల్కీన్ సంకలనము లోని మార్కోనికాఫ్ మరియు వ్యతిరేక-మార్కోనికాఫ్ చర్యవిధానాన్ని గూర్చి వివరించండి.

(or)

(b). (i) Explain the acidity of 1-alkynes.

1-ఆల్కైనుల ఆమ్ల స్వభావాన్ని గూర్చి వివరించండి.

(ii) Write alkylation reaction of terminal alkyne with an example.

అంత్య ఆల్కైను యొక్క ఆల్కైలేషన్ చర్యను ఒక ఉదాహరణతో వివరించండి.

3 (a). Define Huckel's rule of aromatic compounds. What are benzenoid and non-benzenoid aromatic compounds? Give examples.

ఎరోమాటిక్ సమ్మేళనాల హుకెల్ నియమాన్ని వివరించండి. బెంజినాయిడ్ మరియు నాన్-బెంజినాయిడ్ సమ్మేళనాలంటే ఏమిటి? ఉదాహరణలను ఇవ్వండి.

(or)

(b). Explain the mechanisms of Nitration and Friedel-Craft's alkylation of Benzene.

బెంజీన్ పై జరిగే నైట్రేషన్ మరియు ఫ్రీడల్-క్రాఫ్ట్ ఆల్కైలేషన్ ల చర్యా విధానాలను వివరించండి.

4. (a). (i) Define Hardy-Schulze rule & Gold number.

హార్డి-షుల్ట్ నియమం మరియు గోల్డ్ సంఖ్య లను నిర్వచించండి.

(ii) Differentiate Physisorption & Chemisorption. Explain Langmuir adsorption isotherm.

భౌతిక, రసాయన అధిశోషణల మధ్యగల భేదాన్ని రాయండి. లాంగ్మూర్ అధిశోషణ సమోష్టరేఖను వివరించండి.

(or)

(b). Construct the Molecular Orbital diagram for O₂ and NO and explain their bond order and magnetic property.

O₂, NO ల అణు ఆర్బిటాల్ పటాన్ని నిర్మించి వాటి బంధక్రమాన్ని మరియు అయస్కాంత ధర్మాన్ని వివరించండి.

5. (a). Define racemic mixture. Explain any two techniques for resolution of racemic mixture.

రెసిమిక్ మిశ్రమం ను నిర్వచించండి. రెసిమిక్ మిశ్రమాన్ని పృథక్కరణ చేయు ఏవేని రెండు పద్ధతులను వివరించండి.

(or)

(b). (i) Define Optical activity and Specific rotation.

దృవణ భ్రమణత మరియు విశిష్ట భ్రమణత లను నిర్వచించండి.

(ii) Draw the R- & S- isomers of Alanine, Glyceraldehyde.

అలనిన్, గ్లిసరాల్డిహైడ్ ల R- మరియు S- సాదృశ్యాలను లను రాయండి.

(iii) Write the E- & Z- isomers of 2-butene.

2-బ్యూటీన్ యొక్క E- మరియు Z- సాదృశ్యాలను లను రాయండి.

PART- B

5 X 5 = 25 Marks

Answer any **FIVE** of the following questions. Each carry **FIVE** marks

6. Write different conformations of n-butane. Explain their relative stability.

n-బ్యూటేన్ యొక్క వివిధ రకాల అనురూపకాలను రాసి వాటి సాపేక్ష స్థిరత్వాన్ని వివరించండి.

7. Explain 1,2- & 1,4- addition reactions of conjugated dienes.

సంయుగ్మ డైఈనుల 1,2- మరియు 1,4- సంకలన చర్యలను వివరించండి.

8. What is ring activating and deactivating groups? Give examples.

- వలయ ఉత్తేజ మరియు అనుత్తేజ సమూహాలు అనగానేమీ? ఉదాహరణల నిమ్ము.
9. Explain the mechanism of E1 elimination reaction.
E1 విలోపన చర్యావిధానాన్ని వివరించండి.
10. Explain the structure of ClF_3 by Valency Bond theory.
సంయోజకతా బంధ సిద్ధాంతం ఆధారంగా ClF_3 నిర్మాణాన్ని వివరించండి.
11. Explain the aromaticity of benzene.
బెంజీన్ ఎరోమాటిక్ స్వభావాన్ని వివరించండి.
12. Draw the Wedge, Fischer, Newman & saw-Horse representations for Tartaric acid.
టార్టారిక్ ఆమ్ల వెడ్జ్, ఫిషర్ మరియు సా-హోర్స్ నిర్మాణాలను రాయండి.
13. Define Enantiomers and Diastereomers and give two examples for each.
ఎనాన్సియోమర్లు, డయాస్టీరియోమర్లను నిర్వచించి ఉదాహరణల నివ్వండి.

WEIGHTAGE TO THE COURSE CONTENT
First Year Semester - II
ORGANIC AND GENERAL CHEMISTRY - II

Sl. No.	COURSE CONTENT	ESSAY	SA
1	UNIT - I	2	1
2	UNIT - II	2	2
3	UNIT - III	2	2
4	UNIT - IV	2	1
5	UNIT - V	2	2
Total		10	8

N.B: INTERNAL EVALUATION OF THEORY IN EACH SEMESTER: MAX. MARKS: 25

- Average of Two unit tests: 15 M
 - Seminar/Quiz 05 M
 - Assignment 05 M
- Total = 25 M**

A.S.D. GOVT. DEGREE COLLEGE FOR WOMEN (A)

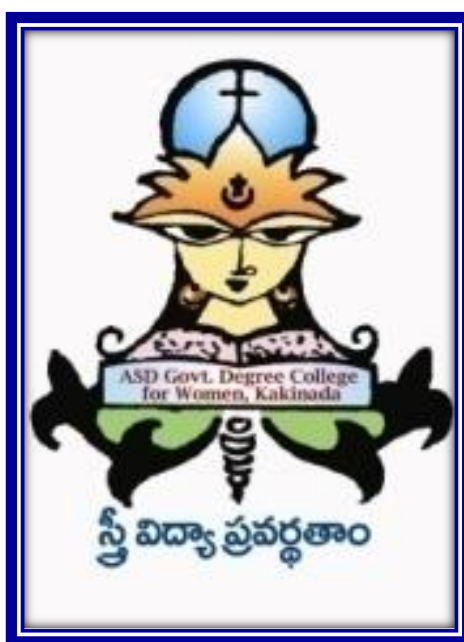
(Accredited by NAAC with 'B' Grade, Cycle 3)

KAKINADA – 533 002, EAST GODAVARI, A.P.

BOARD OF STUDIES OF CHEMISTRY

SYLLABUS & MODEL PAPERS

2020-2021



Convened on 30th June 2020

DEPARTMENT OF CHEMISTRY

A.S.D. GOVT. DEGREE COLLEGE FOR WOMEN (A)

KAKINADA, EAST GODAVARI, A.P.

A.S.D GOVT.DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)
KAKINADA
DEPARTMENT OF CHEMISTRY

AGENDA FOR THE BOARD OF STUDIES MEETING 2020-2021

1. To discuss the semester System and Choice Based Credit System (CBCS) being implemented for the past 06 years.
2. To discuss the continuation/Upgradation of the syllabus for the odd and even Semesters of II and III Years for 2020-21.
3. Minor modification in Question paper Model in view of COVID-19 and to approve the blue print of each paper.
4. Possibilities to follow Teaching-Learning-Evaluation by 70:30 (Offline: Online) ratio.
5. Panel of paper setters and examiners.
6. To discuss the weightage to be given to continuous internal assessment (CIA) and external assessment.
7. Introduction of New Courses of Study – Possibilities.
8. Admission criteria for programmes offered by the Departments.
9. Proposals for Community Services / Extension Activities / Projects for the benefit of the Society.
10. To follow B.Sc. First year instruction as per APSCHE/University Syllabus.
11. To discuss and resolve the minor modifications/refinement if any, in the Cluster electives A1, A2 and A3 as majority of the students opting this Cluster as their choice.
12. Any other matter of academic interest.

A.S.D. GOVT.DEGREE COLLEGE FOR WOMEN (A), KAKINADA

COMPOSITION OF THE BOARD OF STUDIES OF CHEMISTRY

I Composition

1. Head of the Department concerned (Chairman):

Dr. D. Chenna Rao, M.Sc, NET, Ph.D.

2. The entire faculty of each specialization:

1. Smt. V Anantha Lakshmi M.Sc,M.Phil,B.Ed.
2. Sri. V. Badari Narayana Rao, M.Sc, B.Ed.
3. Dr.S. Priya Darshini, M.Sc, Ph.D.
4. Smt.M.Subba Lakshmi, M.Sc.

3. Two experts in the subject from outside the college to be nominated by the Academic Council:

1. Sri.N.V. Sudhakar, M.Sc, M.Phil, Lecturer in Chemistry, Govt.Degree College(A), Tuni.Ph:9642238976.Mail Id: vijayasudha19@gmail.com
2. Sri. V.Sanjeeva Kumar, M.Sc,NET, Lecturer in Chemistry, Govt. Degree College, Mandapeta, Ph:9849324966, Mail Id:skvudi1972@gmail.com

5.One expert to be nominated by the Vice-Chancellor from a panel of six recommended by the College Principal:

Dr. D. Rama Rao, M.Sc,Ph.D., Lecturer in Chemistry, P.R. Govt. College (A), Kakinada. Ph: 9949308203.

6. One representative from industry/ Corporate Sector/ allied area relating to placement.

Dr.B. Ramesh Babu, BogaR laboratories, Peddapuram. Ph: 9701712028.

7. One postgraduate meritorious alumnus to be nominated by the Principal.

The chairman, Board of Studies, may with the approval of the Principal of the College, Co-opt

Kum. S. Vijaya Lakshmi, M.Sc. (Organic Chemistry)

II. Term:

The term of the nominated members shall be two years.

III Meeting:

The Principal to the College shall draw the schedule for meeting of the Board of Studies for different Departments. The meeting may be scheduled as and when necessary but at least once a year.

IV Functions:

The Board of Studies of a Department in the College shall:

- a) Prepare syllabus and various courses keeping in view the objectives of the interest of the College stakeholders and national requirement for consideration and approval of the Academic Council.
- b) Suggest methodologies for innovative teaching and evaluation techniques.
- c) Suggest panel of names to the Academic Council for appointment of examiners
- d) Coordinate research, Teaching, Extension and other academic activities in the Department/College.

**A.S.D GOVT .DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)
KAKINADA**

Course Structure and Scheme of Examination Pattern

As per the orders of the Commissioner of Collegiate Education (CCE), Hyderabad, A.S.D. Govt. Degree College for Women (Autonomous), Kakinada has resolved to adopt the “Choice Based Credit System” (CBCS) from the academic year 2015 – 16 after detailed discussion in the staff meeting on 02-06-2015 and 10-07-2015. This new system i.e. CBCS would be applicable to 2015 – 16 onwards, i.e. come into force from the Academic year 2015 – 16 onwards. The entire B.Sc.Program consists of M.P.C, CBZ, CBMB & CZAqTgroups. The courses, number of credits and total number of credits have shown in the table form (see table).

Therefore, the Department of Chemistry A.S.D. Govt. Degree College (Autonomous), Kakinada, has resolved to adopt the Choice Based Credit System, from the Academic Year i.e. 2015 – 2016 onwards. This system applicable to the 2016-17,2017-18,2018-19, 2019-20& 2020-2021admitted batch students. The semesters, course code, course title, allocated hours, total marks and allocated credits have shown in the table (see table).

**A.S.D. GOVT. DEGREE COLLEGE FOR WOMEN
(AUTONOMOUS)KAKINADA – 533 002, EAST GODAVARI, A.P.**

B.Sc. CHEMISTRY COURSE STRUCTURE (w.e.f. 2017-18)

Semester	Course code	Course Title	Hrs./ Week	Credits	Max. Marks			
					Int	Ext	Total	
FIRST YEAR								
I	CHE 1303	INORGANIC AND ORGANIC CHEMISTRY	4	3	25	75	100	
	CHE 1303P	LABORATORY COURSE - I	3	2	0	50	50	
II	CHE 2303	PHYSICAL AND GENERAL CHEMISTRY - II	4	3	25	75	100	
	CHE 2303P	LABORATORY COURSE - II	3	2	0	50	50	
SECOND YEAR								
III	CHE 3303	INORGANIC & ORGANIC CHEMISTRY - III	4	3	25	75	100	
	CHE 3303P	LABORATORY COURSE - III	3	2	0	50	50	
IV	CHE 4303	SPECTROSCOPY & PHYSICAL CHEMISTRY - IV	4	3	25	75	100	
	CHE 4303P	LABORATORY COURSE - IV	3	2	0	50	50	
THIRD YEAR								
V	CHE 5301	INORGANIC, ORGANIC & PHYSICAL CHEMISTRY-V	3	3	25	75	100	
	CHE 5301P	Laboratory Course - V	3	2	0	50	50	
	CHE 5302	INORGANIC, ORGANIC & PHYSICAL CHEMISTRY-VI	3	3	25	75	100	
	CHE 5302P	Laboratory Course - VI	3	2	0	50	50	
VI * Any one Paper from VII A, B and C	VII (A)*	Elective	3	3	25	75	100	
		Practical - VII A	3	2	0	50	50	
	VII (B)*	Elective	3	3	25	75	100	
		Practical - VII B	3	2	0	50	50	
	VII (C)*	Elective	3	3	25	75	100	
		Practical - VII C	3	2	0	50	50	
** Any one cluster from VIII, A, B and C	VIII (A)**	Cluster Electives - I :						
		VIII-A-1	3	3	25	75	100	
		VIII-A-2	3	3	25	75	100	
		VIII-A-3	3	3	25	75	100	
			3	2	0	50	50	
			3	2	0	50	50	
	VIII (B)**	Cluster Electives - II ::						
		VIII-B-1	3	3	25	75	100	
		VIII- B-2	3	3	25	75	100	
		VIII-B-3	3	3	25	75	100	
			3	2	0	50	50	
			3	2	0	50	50	
	VIII (C)**	Cluster Electives - III ::						
		VIII-C-1	3	3	25	75	100	
		VIII-C-2	3	3	25	75	100	
		VIII-C-3	3	3	25	75	100	
			3	2	0	50	50	
			3	2	0	50	50	
	TOTAL			73	50	250	1250	1500

A.S.D.GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), KAKINADA
DEPARTMENT OF CHEMISTRY
BOARD OF STUDIES: 2020-21
SECOND YEAR, SEMESTER– III
Paper III (INORGANIC & ORGANIC CHEMISTRY) 60 h (4 h / w)

Dt:

INORGANIC CHEMISTRY 30 h (2h / w)

UNIT – I

1. Chemistry of d-block elements: 9h

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:6h

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:7h

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: 8h

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 30 h (2h/w)

UNIT – III

1. Halogen compounds 5 h

Nomenclature and classification of alkyl (into primary, secondary, tertiary), 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 5 h

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 KMnO_4 , Ceric ammonium nitrate, Lucas reagent and phenols by reaction with FeCl_3 .

Chemical properties:

- a) Dehydration of alcohols.
- b) Oxidation of alcohols by CrO_3 , KMnO_4 .
- c) Special reaction of phenols: Bromination, Kolbe-Schmidt reaction, Reimer-Tiemann reaction, Fries rearrangement, azocoupling, Pinacol-Pinacolone rearrangement.

UNIT-IV

Carbonyl compounds 10 h

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_3 , b) HCN , c) RMgX , d) NH_2OH , e) PhNHNH_2 , f) 2,4-DNP, 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_4 and NaBH_4 .

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

UNIT-V

1. Carboxylic acids and derivatives 6 h

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.

A.S.D.GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS) KAKINADA
CHEMISTRY II YEAR SEMESTER – III MODEL PAPER (2020-21)
INORGANIC AND ORGANIC CHEMISTRY - II

Time: 3 Hrs.

Max. Marks: 75

SECTION – A (Essay Questions)

Answer **Any Five** of the following questions (5x10 = 50M)

1. Explain Variable Oxidation states and magnetic properties of d-block elements
2. Give a detailed account of band theory of metals. How could you explain the properties of conductors, insulators and semi conductors basing on this theory
3. Give the classification of metal carbonyls and write the structure and shapes of metal carbonyls of V, Co and Ni
4. What is lanthanide contraction? What are its consequences
5. Discuss the mechanism of stereochemistry of SN1 and SN2 reaction taking suitable examples
6. Write notes on the following reactions with mechanisms
(i) Kolbe Schmidt reaction (ii) Pinacol-Pinacolone rearrangement
7. Give the mechanisms of (i) Aldol Condensation (ii) Cannizaros reaction
8. Write the methods used for the synthesis of aldehydes and ketones explain the reactivity of carbonyl group in aldehydes.
9. Write the Nomenclature preparation and write degradation of carboxylic acids by Huns-diecker reaction, decarboxylation by Schmidt reaction, Arndt Eister synthesis, Halogenation by Hell-Volhard-Zelinsky reaction
10. How do you prepare malonic ester from acetic acid. How do you prepare the following from malonic ester (a) barbituric acid (b) Succinic acid (c) Crotonic acid

SECTION – B (Short Answer Questions)

Answer any **FIVE** from the following questions: (5x5 = 25M)

11. Write short note on Valence bond theory
12. What is EAN rule and explain with one example
13. What is Riemer Tiemann reaction
14. How do you prepare primary, secondary and tertiary alcohols
15. Write the mechanism of perkins reaction
16. What is Haloform reaction
17. Write note on keto-enol tautomerism
18. What is claisen condensation give its mechanism

WEIGHTAGE TO THE COURSE CONTENT
Second Year Semester - III
INORGANIC AND ORGANIC CHEMISTRY - III

Sl. No.	COURSE CONTENT	ESSAY	SA
1	UNIT - I	2	1
2	UNIT - II	2	1
3	UNIT - III	2	2
4	UNIT - IV	2	2
5	UNIT - V	2	2
Total		10	8

N.B:INTERNAL EVALUATION OF THEORY IN EACH SEMESTER: **MAX. MARKS: 25**

• Average of Two-unit tests:	15 M		
• Seminar/Quiz	05 M		
• Assignment	<u>05 M</u>		
	Total	=	<u>25 M</u>

A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), KAKINADA
DEPARTMENT OF CHEMISTRY
BOARD OF STUDIES: 2020-21
THIRD YEAR, SEMESTER - V

Paper - V (INORGANIC, PHYSICAL & ORGANIC CHEMISTRY)
45 hrs (3 h / w)
INORGANIC CHEMISTRY

UNIT – I

Coordination Chemistry:

8h

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. Hard and Soft acids and bases: 4h

Classification, Pearson's concept of hardness and softness- HSAB Principle and applications of HSAB Principle-stability of complexes, predicting the feasibility of a reaction.

2. Stability of metal complexes:

3h

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:

3h

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:

12h

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

15h

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. 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.

LABORATORY COURSE – V **Practical Paper –VOrganic Chemistry**

(at the end of semester V) 30 hrs (2 h / W)

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 with suitable derivatives.

Alcohols, Phenols, Aldehydes, Ketones, Carboxylic acids, Aromatic Primary Amines, Amides and Simple sugars.

A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), KAKINADA
III YEAR SEMESTER-V EXAMINATION
PAPER-V; INORGANIC, ORGANIC & PHYSICAL CHEMISTRY

Time: 3 hours

Max.Marks: 75

SECTION-A

Answer Any Five of the questions. Each question carries TEN marks 5 x 10 = 50 Marks

1. Write postulates of Werner's co-ordination theory
2. Explain the formation of $[Fe(CN)_6]^{4-}$ and $[Fe(CN)_6]^{3-}$ on the basis of valence bond theory.
3. How do you determine the magnetic susceptibility of metal complexes using Guoy balance method?
4. Explain the factors that effect the stability of complexes.
5. Write the methods of preparation of nitroalkanes.
6. Explain about the Mannich reaction and Micheal addition reaction.
7. How amines are prepared from Gabriel synthesis and Hoffmann bromamide method?
8. Write any four electrophilic substitution reactions of aromatic reactions.
9. Derive Kirkoff's equation.
10. Describe the Carnot Cycle.

SECTION – B

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

11. Explain the EAN rule. Give any two complexes which don't obey this rule.
12. Briefly explain the crystal field theory.
13. Differentiate the thermodynamic stability and kinetic stability of complexes.
14. Nef reaction.
15. Explain the basicity of Amines.
16. Write notes on Diazotization.
17. State and explain Joule-Thomson effect.
18. Write about Entropy

WEIGHTAGE TO THE COURSE CONTENT
Third Year Semester - V
INORGANIC, PHYSICAL & ORGANIC CHEMISTRY -V

Sl. No.	COURSE CONTENT	ESSAY	SA
1	UNIT - I	2	2
2	UNIT - II	2	1
3	UNIT - III	2	1
4	UNIT - IV	2	2
5	UNIT - V	2	2
Total		10	8

N.B:INTERNAL EVALUATION OF THEORY IN EACH SEMESTER: MAX. MARKS: 25

- | | | |
|------------------------------|--------------------|--------------------|
| • Average of Two unit tests: | 15 M | |
| • Seminar/Quiz | 05 M | |
| • Assignment | <u>05 M</u> | |
| | Total = | <u>25 M</u> |

A.S.D.GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), KAKINADA

DEPARTMENT OF CHEMISTRY

BOARD OF STUDIES: 2020-21

THIRD YEAR, SEMESTER - V

Paper - VI (INORGANIC, ORGANIC & PHYSICAL CHEMISTRY)

45 hrs (3 h / w)

INORGANIC CHEMISTRY

UNIT-I

1. Reactivity of metal complexes: 4h

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: 4h

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.

PHYSICAL CHEMISTRY

UNIT-II

1. Chemical kinetics 8h

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 5h

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)

ORGANIC CHEMISTRY

UNIT- III

Heterocyclic Compounds 7h

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-IV

Carbohydrates

8h

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 (keto hexose) - Evidence of 2 - keto hexose 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 Keto hexose

[(+) Glucose to (-) Fructose] and Keto hexose to Aldohexose (Fructose to Glucose)

UNIT- V

Amino acids and proteins

7h

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.

LABORATORY COURSE – VI
Practical Paper – VI Physical Chemistry
(at the end of semester V) 30 hrs (2 h/W)

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 acetic acid on animal charcoal, verification of Freundlich isotherm.

A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), KAKINADA
III YEAR SEMESTER-V EXAMINATION
PAPER-VI; INORGANIC, ORGANIC & PHYSICAL CHEMISTRY

Time: 3 hours

Max.Marks: 75

SECTION-A

Answer Any Five of the questions. Each question carries TEN marks (5 x 10 = 50 Marks)

1. Describe the substitution reactions of metal complexes.
2. Write the structure and functions of haemoglobin.
3. Give in detail the various methods of determining the order of a chemical reaction.
4. Explain the photochemical reaction mechanisms of hydrogen-chlorine and hydrogen-bromine reactions.
5. What are heterocyclic compounds? Discuss the aromatic character of pyrrole, furan and thiophene.
6. Illustrate the substitution reactions of Pyridine
7. Discuss the cyclic structure of glucose.
8. i) What are epimers? Give example.
ii) Write about the formation of glucosazone.
9. Give any three methods of preparation of alanine.
10. Describe the structure of proteins

SECTION-B

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

11. Define labile and inert complexes with suitable examples.
12. Explain the biological significance of sodium and potassium
13. Discuss about zero order reactions.
14. Write effect of temperature on the rate of a reaction.
15. What are photosensitized reactions? Give one example.
16. Explain the nature of pyrrole and pyridine.
17. Kiliani – Fischer method.
18. Write notes on Zwitter ion.

