DEPARTMENT OF CHEMISTRY

PROGRAMME: THREE-YEAR B.Sc (CHEMISTRY)

REVISED SYLLABUS UNDER CBCS FRAMEWORK WITH EFFECT FROM 2020-2021

(With Learning Outcomes, Unit-wise Syllabus, References, Co -curricular Activities & Model Q.P)

Dr. V. S. Krishna Govt. Degree & PG College (A)

(NAAC Reaccredited A Grade Institution & District Identified College)

CENTRE FOR RESEARCH STUDIES

Visakhapatnam- 530 013, Andhra Pradesh, INDIA

Board Of Studies January- 2021

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Board Of Studies October- 2020

B.Sc. Chemistry Revised Syllabus under CBCS

w.e.f. 2020-21

Structure of Chemistry Core Syllabus under CBCS

YEAR	SEMESTER	COURSE	TITLE	MARKS	CREDITS
I	I	I	Inorganic and Physical Chemistry	100	03
			Practical-I Analysis of SALT MIXTURE	50	02
	II	II	Organic and General Chemistry	100	03
			Practical-II Volumetric Analysis	50	02
II	III	III	Organic Chemistry and Spectroscopy	100	03
			Practical-III Organic preparations and IR Spectral Analysis	50	02
	IV	IV	Inorganic, Organic and Physical Chemistry	100	03
			Practical – IV Organic Qualitative analysis	50	02
		V	Inorganic and Physical Chemistry	100	02
			Practical-V Course Conductometric and Potentiometric Titrimetry	50	02

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Visakhapatnam- 530 013, Andhra Pradesh, INDIA

Resolutions/ Minutes of the 6th Board of Studies, Jan-2021

Subject: CHEMISTRY Department: CHEMISTRY

In pursuance of conferment of Autonomous status to Dr. V. S. Krishna Govt. Degree College(A), Visakhapatnam by the UGC vide letter No.F22-1/2011(AC) dated 20.07.2011 from Dr. Manju Singh, Joint Secretary, UGC, New Delhi and proceedings No. C-II (CDC)/Dr. V S K. Govt. College/BOS/2020 dt.19.03.2020 of the Vice-Chancellor, Andhra University Visakhapatnam, the 6th Board of Studies in **Chemistry** Subject is conducted on **28.01.2021** at 11.30 AM will the following members. The changes will be implemented from 2020-21 academic year onwards

MEMBER	NAME & DESIGNATION	SIGNATURE
Head of the Department (Chairman)	Dr. K. Bharath Kumar Naik HOD, Chemistry	
Faculty members	Smt. J L Mangamma Lecturer in Chemistry	
	Sri A. Ramesh Lecturer in Chemistry-CF	
	Smt. R. Sailaja Lecturer in Chemistry-CF	
	Dr. B. Sudhamsha Lecturer in Chemistry-CF	
Subject Expert (University Nominee)	Dr. K. Basavaiah Professor, School of Chemistry-AU	
Subjects Experts (From outside the parent University)	Dr. S. Ramakrishna Dept. of Chemistry GDC(M), Srikakulam	
	Dr. N. Vijay Kumar HOD, Chemistry DNR College, Bhimavaram West Godavari-AP	
Representative member from Industry/Corporate/Allied area relating to placement	Dr. N. Rambabu Senior Manager QC, HPCL-Vizag	
Member from Alumni	Dr. Ch.V.M. K. Hari HOD, Copt. Sc.,	
Coordinator, IQAC	Dr. Ch. Lalitha HOD, Micro. Biol.	
Coordinator, Academic Council	Dr. S. Sravan Kumar HOD, Physics	
Chairperson, Academic Council	Dr. V. Chandrasekhar Principal	

SEMESTER -I

Course I (Inorganic &Physical Chemistry) 60 hrs. (4h/w)

Learning objectives:

On completion of this course, the students will be able to understand:

1. Elements in periodic table; physical and chemical characteristics, periodicity.
2. Familiarization with various states of matter.
3. Theories of bonding metals.
4. Physical properties of each state of matter and laws related to describe the states.
5. Calculation of lattice parameters.
6. Electrolytes and electrolytic dissociation, salt hydrolysis and acid-base equilibria.

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 intermolecular interactions.
3. Apply the concepts of gas equations, pH and electrolytes while studying other chemistry courses.

INORGANIC CHEMISTRY 24 h UNIT –I

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 $\{(PNCl_2)_n$ where n=3, 4

Group 16: Oxides and Oxoacids of Sulphur (structures only)

Group 17: Pseudohalogens, 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_2O system and ethanol-water system. Partially miscible liquids-phenol- water system. Critical solution temperature (CST), Effect of impurity on consulate 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 boing point and depression in freezing point. Abnormal colligative properties. Van't Hoff factor.

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.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 analyzed) 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.

Guidelines to the Paper Setter: The syllabus I Semester consists of **Inorganic & physical chemistry.** The I Semester question paper consists of 2 sections.

In PART- A: Consists of EIGHT short answer questions carries 5 marks out of which 5 are to be answered. The examiner has to choose 4 questions from Inorganic & 4 questions from organic part.

In PART- B: Consists of FIVE internal choice essay questions are to be set, each question carries 10 marks .The examiner has to choose 2 question from each unit from Inorganic & physical part

The examiner is requested to set question in such a way that the entire syllabus is reflected in the question paper set by him.

B. Sc Chemistry, Course-I, Semester-I
BLUE PRINT
(Inorganic &Physical Chemistry)

Sl. No	UNITS	Name of the chapter	10 Marks	5 Marks
		INORGANIC CHEMISTRY		
1	UNIT-I	Chemistry of p block elements	2	2
2	UNIT-II	Chemistry of d & f block elements Theory of bonding in metals	2	2
		PHYSICAL CHEMISTRY		
3	UNIT-III	Solid state	2	1
4	UNIT-IV	Gaseous state	1	1
		Liquid state	1	1
5	UNIT-V	Solutions, Ionic equilibrium& dilute solutions	2	1

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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
ఏవైనా ఐదు ప్రశ్నలకు సమాధానములు వ్రాయుము.ప్రతి ప్రశ్న కు 5 మార్కులు

1. Explain the preparation & structures of Phosphonitrilic compounds.
ఫాస్ఫోనిట్రోలిక్ సమ్మేళనాల తయారీ మరియు నిర్మాణాన్ని వివరింపుము.
2. Explain in brief, catalytic properties & stability of various oxidation states of d- block elements.
d బ్లాక్ మూలకాల ఉత్ప్రేరక మరియు వివిధ రకాల ఆక్షీకరణ స్థితుల యొక్క స్థిరత్వాన్ని వివరింపుము.
3. Write short note on Bravais lattices and crystal systems.
బ్రావైస్ జాలకాలు మరియు స్ఫటిక వ్యవస్తలు గురించి లఘు వ్యాఖ్య వ్రాయుము.
4. What are Smectic&Nematic liquid Crystals? Explain.
స్మెక్టిక్ మరియు నెమటిక్ ద్రవ స్ఫటికాలు అంటే ఏమిటి? వివరింపుము.
5. Write account on Common ion effect & Solubility product.
ఉమ్మడి అయాన్ ప్రభావము మరియు ద్రావణీయత లబ్ధం ను గూర్చి వ్రాయుము.
6. Describe Andrew's isotherms of carbon dioxide.
కార్బన్ డయాక్సైడ్ యొక్కఆండ్రూస్ సమ ఉష్ణోగ్రత రేఖ లను వివరింపుము.
7. Explain Actinide Conntraction.
ఆక్టినడ్ సంకోచం ను వివరింపుము
8. Explain the structure of Borazine.
బోరజిన్ నిర్మాణాన్ని వివరింపుము.

PART- B 5X 10 = 50 Marks

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

ఈ క్రిందీ అన్ని ప్రశ్నలకు సమాధానములు వ్రాయుము.ప్రతి ప్రశ్న కు 10 మార్కులు.

9 (a). Explain Classification, Preparations & uses of Silicones

సిలికోన్ ల వర్గీకరణ,తయారీ మరియు అనువర్తనాలను వివరింపుము.

(or)

(b). (i) What are Pseudohalogens. సుడో హలోజను లు అనగానేమి?

(ii) Explain the Structures of any one AX_3& AX_5interhalogen compounds.

AX_3& AX_5 అంతర హాలోజన్ సమ్మేళనాల నిర్మాణాన్ని వివరింపుము.

10 (a). What is Lanthanide Contraction? Explain the Consequences of Lanthanide Contraction.

లాంథన్ైడ్ సంకోచం అనగానేమి? లాంథన్ైడ్ సంకోచం యొక్క పర్యవసానాలను వివరింపుము.

(or)

(b). (i) Explain the magnetic properties of d- block elements.

d బ్లాక్ మూలకాల యొక్క అయస్కాంత ధర్మాలను వివరింపుము.

(ii) Explain about Conductors, Semi-Conductors& Insulators using Band Theory.

వాహకాలు,అర్ధ వాహకాలు మరియు నిరోధకాలను పట్టీ సిద్ధాంతమును ఉపయోగించి వివరింపుము.

11.(a). Write an essay on Crystal defects.

స్ఫటిక లోపాలను గూర్చి వివరింపుము.

(or)

(b). What is Bragg's Law. Explain the determination of structure of a crystal by powder method.

బ్రాగ్ సమీకరణం ను వివరించి,వాడర్ వద్ధతి ద్వారా స్ఫటికము యొక్క నిర్మాణాన్ని ఏ విధాముగా నిర్ణయిస్తారు?

12. (a). Derive the relationship between Critical constants &Vanderwaal constants

వాండర్ వాల్ స్థిరాంకాలకు,సందిగ్ధ స్థిరాంకాలకు మధ్య సంబంధము ను ఉత్పాదించుము.

(or)

(b).(i) Write any 5 differences between liquid crystals & liquids, solids

ద్రవ స్ఫటికాలు మరియు ద్రవ,ఘన పదార్థాల మధ్య ఏవైనా 5 బేధాలను వివరింపుము.

(ii) Write the applications of Liquid crystals.

ద్రవ స్ఫటికాల అనువర్తనాలను వివరింపుము.

13.(a). Explain Nernst distribution Law. Explain its applications

నార్నస్ట్ వితరణ నియమమును వ్రాయుము.అనువర్తనాలను వివరింపుము

(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.

కణధార ధర్మాలను నిర్వచించుము? ఘనీభవన స్థాన నిమ్నత మరియు భాస్ఫీభవన స్థాన ఉన్నతి ని ఉపయోగించి ఒక అభాస్పశీలి ద్రావిత పదార్థ మోలార్ ద్రవ్యరాశిని ప్రాయోగికముగా నిర్ణయిస్తారు?

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SEMESTER – II

Course II – (Organic & General Chemistry) 60 hrs (4h/w)

Learning objective:

On completion of this course, the students will be able to understand:

1. Preparations and chemical reactions of alkanes , alkenes, alkynes and cycloalkanes
2. The importance of aromaticity
3. Colloids ,concept of adsorption,physical and chemical adsorption, Langmuir adsorption isotherm
4. Various projection formulae, stereo isomerism.
5. Pearson,s concept, HSAB principle.

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. Correlateanddescribethestereochemicalpropertiesoforganiccompoundsand 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 WurtzFittig 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. Conformations of monosubstituted cyclohexane.

UNIT-II

Carbon-Carbon pi Bonds (AlkenesandAlkynes) **12h**

General methods of preparation, physical and chemical properties. Mechanism of E1, E2, E1 reactions, Saytzeff and Hoffmann eliminations, Electrophilic Additions, mechanism (Markownikoff/Antimarkownikoff addition) with suitable examples,, *syn*and*anti*-addition; addition of H_2, X_2, HX. Oxymercuration- demercuration, hydroboration-oxidation,ozonolysis,hydroxylation, Diels Alderreaction,1,2- and1,4-addition reactions in conjugated dienes. Reactions of alkynes; acidity, electrophilic and nucleophilic additions, hydration to form carbonyl compounds, Alkylation of terminal alkynes.

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). 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

1. Surface chemistry and chemical bonding

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 toClF_3,$Ni(CO)_4$, 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**

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

List of Reference Books Theory:

Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (PearsonEducation).

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

30hrs (2 h / w)

Practical-II Volumetric Analysis

(At the end of Semester-II)

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. Understandandexplainthevolumetric analysisbasedonfundamental conceptslearnt in ionic equilibria
3. Learnandidentifythe 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 $Na_2S_2O_3$ with $K_2Cr_2O_7$ as primary standard.
4. Estimation of water of crystallization in Mohr's salt by titrating with $KMnO_4$

Guidelines to the Paper Setter: The syllabus II Semester consists of **Organic & General Chemistry.** The II Semester question paper consists of 2 sections.

In PART- A: consists of EIGHT short answer questions carries 5 marks out of which 5 are to be answered. The examiner has to choose 4 questions from organic & 4 questions from General Chemistry part.

In PART- B: consists of FIVE internal choice essay questions are to be set, each question carries 10 marks .The examiner has to choose 2 question from each unit from organic & General Chemistry part.

The examiner is requested to set question in such a way that the entire syllabus is reflected in the question paper set by him.

B. Sc Chemistry, course-II, Semester-II
BLUE PRINT
(Organic & General Chemistry)

Sl. No	Units	Name of the chapter	10 Marks	5 Marks
		ORGANIC CHEMISTRY		
1	UNIT-I	Recapitulation of Basics of Organic Chemistry (Alkanes and Cycloalkanes)	2	1
2	UNIT-II	Carbon-Carbon pi Bonds (AlkenesandAlkynes)	2 -	1 1
3	UNIT-III	Benzene and its reactivity	2	1
		GENERAL CHEMISTRY		
4	UNIT-IV	Surface chemistry Chemical Bonding & HSAB	1 1	1 1
5	UNIT-V	Stereochemistry of carbon compounds	2	2

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CENTRE FOR RESEARCH STUDIES
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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 5 = 25 Marks

Answer any **FIVE** of the following questions. Each carries **FIVE** marks
ఏవైనా ఐదు ప్రశ్నలకు సమాధానములు వ్రాయుము.ప్రతి ప్రశ్న కు 5 మార్కులు

1. Write different conformations of n-butane. Explain their relative stability.
   n బ్యూటేన్ వివిధ అనురూపకాలను వ్రాయుము. వాటి స్థిరత్వం ను వివరింపుము.
2. Explain 1,2- & 1,4- addition reactions of conjugated dienes.
   సంయుగ్మ డైన్ ల 1,2 &1,4- సంకలన చర్యలను వివరింపుము.
3. Explain the orientation effect of halogens on mono substituted benzene.
   ఏకప్రతిక్షేపక బెంజీన్ లో హాలోజన్ ల స్థాన నిర్దేశకత ను వివరింపుము.
4. Explain the mechanism of $E1^{CB}$ elimination reaction.
   $E1^{CB}$ వాలోపన చర్య యొక్క చర్య విధానాన్ని వివరింపుము.
5. Explain the structure of ClF_3 by Valency Bond theory.
   ClF_3 అణుమ నిర్మాణాన్ని వేలన్సీ బంధ సిద్ధాంతము ద్వారా వివరింపుము.
6. What are Hard & soft acids & bases? Explain with examples.
   కఠిన , మృదు ఆమ్లాలు మరియు క్షారాలు అనగానేమి?ఉదాహరణ లతో వివరింపుము.
7. Draw the Wedge, Fischer, Newmann& saw-Horse representations for Tartaric acid.
   టార్టారిక్ ఆమ్లం యొక్క వెడ్జ్ ,ఫిషర్, న్యూమన్ మరియు సాహోర్స్ నిర్మాణాలను వ్రాయుము.
8. Define Enantiomers and Diastereomers and give two examples for each.
   ఎనాన్సయోమార్స్ మరియు డయాస్టీరియోమార్స్ నిర్వచించుము మరియు రెండు ఉదాహరణలిమ్ము.

PART- B | 5 X 10 = 50 Marks

Answer **ALL** the questions. Each carries **TEN** marks
ఈ క్రింది అన్ని ప్రశ్నలకు సమాధానములు వ్రాయుము.ప్రతి వ్రశ్న కు 10 మార్కులు.

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

మర్ట్జ్ మరియు కోర్ హాస్ చర్యల నుండి అల్కేన్ తయారీ నివర్ణయము.

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

అల్కేన్ హలోజినేషన్ ను వివరింపుము.స్వేచ్ఛా వ్రాతిపదికల వ్రతిక్షేపన చర్యల చర్యాశీలత మరియు సేలెక్టివిటి ను వివరింపుము.

(or)

(b). (i) Explain Baeyer Strain Theory

బేయర్ వ్రయాస సిద్ధాంతమును వివరించుము.

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

స్కెల్హాక్జేన్ అనురూపకాలను గీయుము మరియు వాటి స్థిరత్వమును శక్తిసోపాన చిత్రం ద్వారా వివరింపుము.

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

ఆల్కేన్ ల ఏవైనా రెండు తయారు చేయు పద్ధతులు ను వ్రాయుము.

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

ఆల్కేన్ తో HBr సంకలన చర్య యొక్క మార్కోనికాఫ్ మరియు ఆంటి మార్కోనికాఫ్ చర్య విధానమును వివరింపుము.

(or)

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

1- అల్కైన్ యొక్క ఆమ్లత్వాన్ని వివరింపుము.

(ii) How will you prepare acetaldehyde and acetone from alkynes?

అల్కైన్ ల ను అసిటాల్డిహైడ్ మరియు అసిటోన్ నుండి ఎలా తయారు చేస్తారు?

(iii) Write alkylation reaction of terminal alkne.

టెర్మినల్ అల్కైన్ ల ఆల్కైలేషన్ చర్య ను వ్రాయుము.

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

ఆరోమాటిక్ సమ్మేళనాల హుకెల్ నియమమును నిర్వచించుము.బెంజనాయిడ్ మరియు నాన్ బెంజనాయిడ్ ఆరోమాటిక్ సమ్మేళనాల ను ఉదాహరణ ల తో వివరింపుము.

(or)

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

బెంజీన్ యొక్క నైట్రేషన్ మరియు ఫ్రిడెల్ క్రాఫ్ట్స్ ఆల్కైలేషన్ చర్య ల చర్య విధానంతో వివరింపుము.

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

గోల్డ్ సంఖ్య మరియు హార్డీ షూల్జి నియమమును నిర్వచించుము.

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

భౌతిక అధిశోషణము,రసాయన అధిశోషణము భేదాలు ను వ్రాయుము.లాంగ్ మ్యూర్ అధిశోషణ సమ ఉష్ణోగ్రత సిద్ధాంతమును వివరింపుము.

(or)

(b). Construct the Molecular Orbital diagram for O_2 and NO and explain their bond order and magnetic property.

O_2 మరియు NO అణుమల బంధ క్రమమును మరియు అయస్కాంత ధర్మాలను వ్రాయుము.

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

రాసిమిక్ మిశ్రమము ను నిరవచించుము. రాసిమిక్ మిశ్రమము యొక్క పృధక్కరణ ను రెండు పద్ధతులను తెలుపుము.

(or)

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

ధ్రువణశీలత మరియు విశిష్ట భ్రమణం ను నిర్వచించుము.

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

అలనైన్, గ్లిసరాల్దిహైడ్ యొక్కR, S నిర్మాణాలను గీయుము.

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

2- బ్యూటిన్ E మరియు Z నిర్మాణాలను వ్రాయుము.

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SEMESTER - III

Course III (ORGANICCHEMISTRY&SPECTROSCOPY) 60hrs (4 h / w)

Learning objective:

On completion of this course, the students will be able to understand:

1. Substitution nucleophilic unimolecular and bimolecular reactions.
2. rection mechanisms such as Aldol, Benzoin, Cannizzaro,haloform,etc., reactions
3. Typical reactions of dicarboxylic acids, hydroxy acids and unsaturated acids: succinic, lactic, malic, tartaric, citric, maleic and fumaric acids:
4. Preparation and reactions of acid chlorides, anhydrides, esters and amides; -Mechanism of acidic and alkaline hydrolysis of esters, Claisen condensation, Dieckmann and Reformatsky reactions
5. Lambert-Beer's law and its limitations
6. Vibrational Raman spectra, Stokes and anti-Stokes lines.
7.
8. NMR spectroscopy Application of visible, ultraviolet and Infrared spectroscopy in organic molecules

Course outcomes:

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

1. Understand preparation, properties and reactions of haloalkanes, haloarenes and oxygen containing functional groups.
2. Use the synthetic chemistry learning this course to do functional group transformations.
3. To propose plausible mechanisms for any relevant reaction

ORGANIC CHEMISTRY **34h**

UNIT – I

1. Chemistry of Halogenated Hydrocarbons: **6h**

Alkyl halides: Methods of preparation and properties, nucleophilic substitution reactions– N1, SN2 and SNi mechanisms with stereo-chemical aspects and effect of solvent etc.; nucleophilics ubstitutionvs. Elimination, Williamson's synthesis.

Arylhalides:Preparation(includingpreparationfromdiazoniumsalts)andproperties,nucleophilic aromatic substitution; SNAr, Benzyne mechanism. Relative reactivity of alkyl, allyl, benzyl, vinyl and arylhalides towards nucleophilic substitute ion reactions.

2. Alcohols &Phenols **6h**

Alcohols: preparation, properties and relative reactivity of 1°, 2°, 3° alcohols. Bouvaelt Blanc Reduction; Oxidation of diols byper iodicacid and leadtetra acetate, Pinacol- Pinacolone

rearrangement; Phenols: Preparation and properties; Acidity and factors effecting it. Rings substitution reactions, Reimer–Tiemann and Kolbe's–Schmidt Reactions, Fries and Claisen rearrangements with mechanism;

UNIT-II

Carbonyl Compounds **10h**

Structure, reactivity, preparation and properties; Nucleophilic additions, Nucleophilic addition-elimination reactions with ammonia derivatives. Mechanisms of Aldol and Benzoin condensation, Claisan-Schmidt, Perkin, Cannizzaro and Wittig reaction, Beckmann halo form reaction and Baeyer Villigeroxidation,α-substitution reactions, oxidations and reductions (Clemmensen, wolf – kishner, with LiAlH4 &NaBH4). Addition reactions of α, β-unsaturated carbonyl compounds: Michael addition. Active methylene compounds: Keto- Enol tautomerism. Preparation and synthetic applications of diethyl malonate and ethyl acetoacetate.

UNIT-III

CarboxylicAcidsand their Derivatives **12h**

General methods of preparation, physical properties and reactions of monocarboxylic acids, effect of

Substituentson acidic strength. Typical reactions of dicarboxylic acids, hydroxyl acids and unsaturated acids. Preparation and reactions of acidchlorides, anhydrides, estersandamides; Comparative study of nucleophilic substitution atacylgroup-Mechanism of acidic and alkaline hydrolysis of esters, Claisen condensation, Reformatsky 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, decarboxylation by Schimdt reaction, Arndt- Eistert synthesis, halogenation by Hell- Volhard- Zelinsky reaction.

SPECTROSCOPY **26 h**

UNIT-IV

MolecularSpectroscopy: **18h**

Interactionofelectromagneticradiationwithmoleculesandvarioustypesof spectra;

Rotation spectroscopy: Selection rules, intensities of spectral lines, determination of bond lengths of diatomic and linear triatomic molecules, isotopic substitution.

Vibrationalspectroscopy: Classicalequationofvibration, computationofforceconstant, Harmonic and anharmonic oscillator, Morsepotential curve,vibrational degreesoffreedom forpolyatomic molecules, modesofvibration. Selection rules for

vibrational transitions, Fundamentalfrequencies, overtones and hotbands.

Electronic spectroscopy: Energy levels of molecular orbitals (σ, π, n). 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.

Nuclear Magnetic Resonance (NMR) spectroscopy: 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

Application of visible, ultraviolet and Infrared spectroscopy in organic molecules. Application of electronic spectroscopy and Woodward 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 intramolecular 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 FinarVol 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)

LABORATORY COURSE -III 30hrs (2 h / w)

Practical Course-IIIOrganic preparations and IR Spectral Analysis

(At the end of Semester- III)

Course outcomes:

On the completion of the course,the student willbe able to do the following:

1. how to use glassware, equipment and chemicals and follow experimental procedures in the laboratory
2. how to calculate limiting reagent, theoretical yield, and percent yield
3. how to engage in safe laboratory practices by handling laboratory glassware, equipment, and chemical reagents appropriately
4. how to dispose of chemicals in a safe and responsible manner
5. how to perform common laboratory techniques including reflux, distillation, recrystallization, vacuum filtration.
6. how to create and carry out work up and separation procedures
7. 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

Organic preparations: **40M**

i. Acetylation of one of the following compounds:

amines (aniline, o-, m-, ptoluidines 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. Benzolyation 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 **10M**

IR Spectral Analysis of the following functional groups with examples

a) Hydroxyl groups

b) Carbonyl groups

c) Amino groups

d) Aromatic groups

Guidelines to the Paper Setter: The syllabus III Semester consists of organicchemistry&spectroscopy. The III Semester question paper consists of 2 sections.

In PART- A: consists of EIGHT short answer questions carries 5 marks out of which 5 are to be answered.

In PART- B: consists of FIVE internal choice essay questions are to be set, each question carries 10 marks .The examiner has to choose 2 question from each unit from Inorganic & organic part

The examiner is requested to set question in such a way that the entire syllabus is reflected in the question paper set by him.

B.Sc, Chemistry, COURSE III,III Semester

BLUE PRINT

(ORGANICCHEMISTRY&SPECTROSCOPY)

Sl. No	Units	Name of the chapter	10 Marks	5 Marks
		ORGANICCHEMISTRY		
1	UNIT-I	Chemistry of Halogenated Hydrocarbons:	1	1
		Alcohols &Phenols	1	1
2	UNIT-II	Carbonyl Compounds	2	1
		SPECTROSCOPY		
3	UNIT-III	Carboxylic Acidsand their Derivatives	2	2
4	UNIT-IV	Molecular Spectroscopy	2	3
5	UNIT-V	Application of Spectroscopy to Simple Organic Molecules	1	
		Application of visible, ultraviolet and Infrared spectroscopy in organic molecules.	1	

Dr. V. S. Krishna Govt. Degree & PG College (A)

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MODEL PAPER

SECOND YEAR B.Sc., DEGREE EXAMINATION

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
ఏవైనా ఐదు ప్రశ్నలకు సమాధానములు వ్రాయుము.ప్రతి ప్రశ్న కు 5 మార్కులు

1. Discuss two methods for preparation of aryl halides.
ఎర్నైల్ హేల్నైడ్ ల రెండు తయారు చేయువద్ధతులు వ్రాయుము.
2. Explain the mechanism for Pinacol-Pinacolone rearrangement.
పినకోల్-పినకలోన్ మనరమరిక చర్యను చర్య విధానం తో వివరింపుము.
3. Discuss the mechanism for Bayer-villiger oxidation reaction.
బేయర్ వాలిగర్ ఆక్షీకరణ చర్య ను చర్య విధానం తో వివరింపుము.
4. Explain the effect of substituents on acidic strength of mono-carboxylic acids.
మోనో కార్బక్సలిక్ ఆమ్లాల ఆమ్ల బలం పై ప్రతిక్షేపకాలు వ్రభావం ను వివరింపుము.
5. Write the mechanism for Claisen Condensation reaction.
క్లైజన్ సంఘనన చర్య ను చర్య విధానం తో వివరింపుము.
6. Write the selection rules in rotational spectroscopy.
భ్రమణ అణు వర్ణ పట శాస్త్రం యొక్క ఎంపిక నియమాలను వ్రాయుము.
7. Explain Spin – Spin coupling and Coupling Constant.
స్పిన్-స్పిన్ కపులింగ్ మరియు కపులింగ్ స్థిరాంకం ను వివరింపుము.
8. Explain types of electronic transitions in UV spectroscopy.
UV అణు వర్ణ పట శాస్త్ర వివిధ ఎలక్ట్రానిక్ పరివర్తనలను వివరింపుము.

PART- B 5 X 10 = 50 Marks

Answer **ALL** the questions. Each carries **TEN** marks
ఈ క్రిందీ అన్ని వ్రశ్నలకు సమాధానములు వ్రాయుము.ప్రతి ప్రశ్న కు 10 మార్కులు.

9 (a). Give the mechanism & stereochemistry of SN^1& SN^2 reactions of alkyl halides with suitable example.

అల్క్హైల్ హాల్హైడ్ ల SN^1 మరియు SN^2 చర్య విధానమును మరియు వ్రాదశీక విన్యాసంతో వివరింపుము.

(or)

(b). Explain the following reactions with mechanism.

ఈ క్రింది చర్యలను చర్య విధానము తో వివరింపుము.

(i) Reimer-Tiemann reaction రీమర్ -టీమ్ న్ చర్య(ii) Fries rearrangement.ఫ్ర్రైస్ మనరమరిక

10 (a). Discuss the mechanism for following reactions.

ఈ క్రింది చర్యలను చర్య విధానము తో వివరింపుము.

(i) Perkin reaction. వార్కిన్ చర్య (ii) Cannizaro reaction కాన్నిజారో చర్య

(or)

(b). Write the preparation and any three synthetic applications of diethyl malonate.

డ్రైఈథ్రైల్ మాలోనేట్ తయారీ మరియు సంశ్లేషణ అనువర్తనాలను వ్రాయుము.

11.(a). Explain acid and base hydrolysis reaction of esters with mechanism.

ఎస్టర్ ఆమ్ల మరియు క్షార జలవిశ్లేషణ చర్య ను చర్య విధానము తో వివరింపుము.

(or)

(b). Explain the mechanisms of Curtius rearrangement & Arndt –Eastern reaction.

కార్ట్ స్ మరియు ఆర్నట్-ఈస్ట్రర్న్ చర్యలను చర్య విధానము తో వివరింపుము.

12.(a). (i) Write a note on vibrational degrees of freedom for polyatomic molecules.

బహు పరమాణుక అణుముల కంపన స్వతంత్ర పరిమితుల సంఖ్య ను వ్రాయుము.

(ii) Explain different modes of vibrations & selection rules in IR spectroscopy.

IR అణు వర్ణ పట శాస్త్ర కంపన మరియు ఎంపిక నియమాలను వ్రాయుము

(or)

(b).(i) Define Bathochromic shift. Explain the effect of conjugation in U.V. spectroscopy.

బాత్ో క్రోమిక్ షిఫ్ట్ నిర్వచించుము. UV అణు వర్ణ పట శాస్త్ర సంయుగ్మ ప్రభావమును వివరింపుము.

(iii) Discuss the principle of NMR spectroscopy.

NMR వర్ణపట శాస్త్ర సూత్రమును వ్రాయుము.

13.(a). Write Woodward-Fieser rules for calculating λmax for conjugated dienes and α,β – unsaturated carbonyl compounds , and apply them for one example each.

మడ్ వార్డ్ -ఫిషర్ సూత్రాలను ఉపయోగించి సంయుగ్మ డ్రైన్ ,α,β --అసంతృప్త కార్బోన్రైల్ సమ్మేళనాల యొక్క λmax విలువ లెక్కకగట్టండి.

(or)

(b).(i) What is Fingerprint region. Explain its signigicance with an example.(ii) Write IR spectral data for any one alcohol, aldehyde and ketone

వేలిముద్ర వర్ణాంతమును ఉదాహరణ లతో గూర్చి వ్రాయుము.ఆల్కహాల్ ,ఆల్దహ్రైడ్ మరియు కీటోన్ ల

IR వర్ణ పట శాస్త్రము ను వివరింపుము,

SEMESTER - IV

Course IV (INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY) 60hrs (4 h / w)

Learning objective:

On completion of this course, the students will be able to understand:

1. Classification , Preparations and chemical reactions of organometallic compounds.
2. Classification of carbo hydrates and structures of reducible and non reducible sugars,.
3. Preparation of amino acids and structure of protein.five and six member heterocyclic compounds.
4. Preparation and properties of nitro compounds, amines and diazonium salts
5. he laws of thermodynamics, Concepts of internal energy,entropy. Gibb's Helmholtz equqtion and Maxwell relations Concept of Fugacity

Course outcomes:

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

1. To learn about organo metallic compounds and different types carbohaydrates
2. To learn about the laws of absorption of light energy by molecules and the subsequent photo chemical reactions.
3. To understand the concept of quantum efficiency and mechanisms of photochemical reactions.

UNIT - I

Organometallic Compounds **8h**

Definition and classification of organometallic compounds on the basis of bond type. Concept of captivity of organic ligands. Metal carbonyls: 18electronrule, electron count of mononuclear, poly-nuclear and substituted metal carbonyls of 3d series. General methods of preparation of mono and binuclear carbonyls of3d 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).

UNIT – II

Carbohydrates **8h**

Occurrence, classification and their biological importance, Monosaccharide's: Constitution and absolute configuration of glucose and fructose, epimers and anomers, muta-rotation, determination of ring size of glucose and fructose, Haworth projections and conformational structures; Inter conversions of aldoses and ketoses; Killiani-Fischer synthesis and Ruff degradation;

Disaccharides– Elementary treatment of maltose, lactose and sucrose. Polysaccharides– Elementary treatment of starch.

UNIT- III

Amino acids and proteins **6h**

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) Gabriel Phthalimide 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.

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 - electrophillic 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

Nitrogen Containing Functional Groups

Preparation, properties and important reactions of nitro compounds, amines and diazonium salts.

1. 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.

2.Amines: **11h**

Introduction, classification, chirality inamines (pyramidal inversion), importance and general methods of preparation. Properties: Physical properties, Basicity of amines: Effect of substituent, solvent and steric effects. Distinction between Primary, secondary and tertiary amines using Hinsberg's method and nitrous acid. Discussion of the following reactions with emphasis on the mechanistic pathway: Gabriel Phthalimide synthesis, Hoffmann-Bromamide reaction, Carbylamine reaction, Mannich reaction, Hoffmann's exhaustive methylation, Hofmann-elimination reaction and Cope elimination.

Diazonium Salts:
Preparation and synthetic applications of diazonium salts including preparation of arenes, halo arenes, phenols, cyano and nitro compounds. Coupling reactions of diazonium salts (preparation of azo dyes).

UNIT- V

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 and hydrogen- bromine reaction. Qualitative description of fluorescence, phosphorescence, Jablonski diagram, Photosensitized reactions- energy transfer processes (simple example).

Thermodynamics **12 h**

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.

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
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 Arunbahl

9. A Text Book of Organic chemistry by I L FinarVol I
10. A Text Book of Organic chemistry by I L FinarVol II
11. Advanced physical chemistry by Gurudeep Raj

LABORATORY COURSE -IV **30hrs(2 h / w)**

Practical Course-IV Organic Qualitative analysis **50 M**

(At the end of Semester- IV)

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 g 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

Guidelines to the Paper Setter: The syllabus IV Semester consists of inorganic, organic and physical chemistry. The IV Semester question paper consists of 2 sections.

.**In PART - A**: consists of EIGHT short answer questions carries 5 marks out of which 5 are to be answered.

In PART- B: consists of FIVE internal choice essay questions are to be set, each question carries 10 marks .The examiner has to choose 2 question from each unit from Spectroscopy & Physical chemistry part

The examiner is requested to set question in such a way that the entire syllabus is reflected in the question paper set by him.

SEMESTER- IV
B.Sc, Chemistry COURSE IV
BLUE PRINT
(INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY)

Sl. No	Units	Name of the chapter	10 Marks	5 Marks
1	UNIT-I	Organometallic Compounds	2	1
2	UNIT-II	Carbohydrates	2	1
3	UNIT-III	Amino acids and proteins Heterocyclic compounds	2	2
4	UNIT-IV	Nitrogen Containing Functional Groups	2	2
5	UNIT-V	Photochemistry	1	1
		Thermodynamics	1	1

Dr. V. S. Krishna Govt. Degree & PG College (A)

(NAAC Reaccredited A Grade Institution & District Identified College)
CENTRE FOR RESEARCH STUDIES
Visakhapatnam- 530 013, Andhra Pradesh, INDIA

MODEL PAPER

SECOND YEAR B.Sc., DEGREE EXAMINATION

SEMESTER-IV

CHEMISTRY COURSE -IV: INORGANIC, ORGANIC & 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
ఏవైనా ఐదు ప్రశ్నలకు సమాధానములు వ్రాయుము.ప్రతి ప్రశ్న కు 5 మార్కులు

1. Describe the 18 electron rule of mono nuclear and polynuclear metal carbonyls with suitable examples.
ఏక అణుక మరియు ద్వి అణుక లోహకార్బోన్యిల్ ల 18 ఎలక్ట్రాన్ నియమమును ఉదాహరణ లతో వివరింపుము.
2. What are epimers and anomers. Give examples.
ఎపిమార్స్ మరియు ఎనోమార్స్ అంటే ఏమిటి?ఉదాహరణలిమ్ము.
3. Discuss about iso electric point and zwitter ion.
సమ విద్యుత్ స్థానము మరియు జ్విట్టర్ ఆయాన్ గూర్చి వివరింపుము.
4. Discuss the Paul-Knorr synthesis of five membered heterocyclic compounds.
5 వలయ విజాతీయ వలయ సమ్మేళనాల పాల్- నూర్ సంశ్లేషణ ను వ్రాయుము.
5. Explain Tautomerism shown by nitro alkanes
నైట్రోఅల్కేన్ ల టాటోమెరిజం ను వివరింపుము.
6. Discuss the basic nature of amines.
ఎమీన్స్ ల క్షారత్వం ను వ్రాయుము.
7. Write the differences between thermal and photochemical reactions.
ఉష్ణ మరియు కాంతి రసాయన చర్యల మధ్య భేదాలను వ్రాయుము
8. Derive heat capacities and derive $C_p - C_v = R$
ఉష్ణ సామర్ద్యము మరియు $C_p - C_v = R$ ను ఉత్పాదించుము.

PART- B | 5 X 10 = 50 Marks

Answer **ALL** the questions. Each carries **TEN** marks
ఈ క్రిందీ అన్ని ప్రశ్నలకు సమాధానములు వ్రాయుము.ప్రతి ప్రశ్న కు 10 మార్కులు.

9 (a). What are organometallic compounds? Discuss their Classification on the basis of type of bonds with examples.
కర్బన లోహసమ్మేళనాలను అనగా నేమి? కర్బన లోహసమ్మేళనాలను బంధ ఆధారముగా ఏ విధముగా వర్గీకరిస్తారు?

(or)

(b). Discuss the general methods of preparations of mono & bi-nuclear carbonyls of 3d series.
3 d శ్రేణి మోనో మరియు బై న్యూక్లియర్ కార్బోనైల్ సమ్మేళనాలను తయారీ చేయు పద్ధతులు ను వివరింపుము.

10 (a). Discuss the constitution, configuration and ring size of glucose. Draw the Haworth and Conformational structure of glucose.
గ్లూకోస్ వలయ నిర్మాణానను వివరించండి.హోవర్త్ మరియు అనురూపక నిర్మాణానను వివరించండి.

(or)

(b). (i) Explain Ruff's degradation.
రఫ్ఫ్స్ డిగ్రడేషన్ ను వివరింపుము.
(ii) Explain Kiliani- Fischer synthesis.
కిలియాని ఫిషర్ సంశ్లేషణ ను వివరింపుము.

11.(a). What are amino acids? Write any three general methods of preparation of amino acids.
ఎమినో ఆమ్లాలు అంటేమిటి?ఏవైనా మూడు ఎమినో ఆమ్లాల తయారు చేయు పద్ధతులు ను వ్రాయుము.

(or)

(b). Discuss the aromatic character of Furan, Thiophene and Pyrrole.

ఫోర్రోల్,ఫ్యూరన్ మరియు థయోఫిన్ ఆరోమాటిక్ స్వభావమును ను వివరింపుము.

12.(a). Write the mechanism for the following.

ఈ క్రిందిచర్య ల చర్య విధానమును వివరించుము.
(i) Nef reaction నెఫ్ చర్య (ii) Mannich reaction మానిచ్ చర్య

(or)

(b).(i) Explain Hinsberg separation of amines.

హిన్స్ బర్గ్ విధానము ద్వారా ఏమిన్స్ వేరు చేయుటను వివరింపుము.
(ii) Discuss any three synthetic applications of diazonium salts.
డయోజోనియం లవణాల సంశ్లేషణ అనువర్తనాలను వివరింపుము.

13.(a). What is quantum yield? Explain the photochemical combination of Hydrogen-Chlorine and Hydrogen - Bromine.

క్వాంటమ్ దక్షత అనగానేమి?హైడ్రోజన్- క్లోరిన్ మరియు హైడ్రోజన్-బ్రోమిన్ కాంతిరసాయనచర్యలదక్షతను వివరింపుము.

or

(b). Define entropy. Describe entropy changes in the reversible and irreversible process.

ఎంట్రోపి నిర్వచించుము.ఉత్ర్కమణీయ మరియు అను ఉత్ర్కమణీయ ప్రక్రియల లో ఎంట్రోపి మార్పు ను వివరింపుము.

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SEMESTER - IV

Course V (INORGANIC &PHYSICAL CHEMISTRY) **60 hrs (4 h / w)**

Learning objective:

On completion of this course, the students will be able to understand:

1. Nomenclature and structural isomerism of coordination complexes, VBT, CFSE theories of coordination complexes
2. labile and inert complexes,ligand substitution reactions.
3. Metal ions present in biological systems, classification of elements according to their action in biological system
4. Concept of phases, components and degrees of freedom.some phase system diagrams.
5. Concept of Conductance,weak and strong electrolytes, electro chemical cells,cell constant, Nernst distribution law, fuel cells.
6. The concept of reaction rates, first ,second order rate reaction,effect of tempratureon reaction rates, Enzyme catalysis.

Course outcomes:

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

1. Understand the coordination compounds and inorganic reaction mechanism.
2. To know about bioinorganic chemistry..
3. Understand the concept of phase and phase diagrams of sinhle and double component system.
4. Understand the concept of reaction rates.

INORGANIC CHEMISTRY **26 h**

UNIT –I

Coordination Chemistry **12 h**

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, Spectrochemical series, Comparison of CFSE for Octahedral and Tetrahedral complexes, Tetragonal distortion of octahedral geometry, Jahn-Teller distortion, square planar coordination.

UNIT –II

1. Inorganic Reaction Mechanism: **4h**

Introduction to inorganic reaction mechanisms. Concept of reaction pathways, transition state, intermediate and activated complex. Labile and inert complexes, ligand substitution reactions - SN^1 and SN^2, Substitution reactions insquare planar complexes, Trans-effect, theories of Tran's effect and its applications

2. Stability of metal complexes: 2h

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.

3. Bioinorganic Chemistry: 8h

Metal ions present in biological systems, classification of elements according to their action in biological system. Geochemical effect on the distribution of metals, Sodium/K- pump, carbon ican hydrase and carboxy peptidase. Excess and deficiency of some tracemetals.Toxicityofmetalions (Hg,Pb,CdandAs), easonsf or toxicity, Use of chelating agent sinmedicine, Cis-platinasananti-cancerdrug. Iron and its application in bio-systems, Haemoglobin, Myoglobin Storage and transfer of iron.

PHYSICAL CHEMISTRY 34 h

UNIT-III

1 .Phase rule 6h

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, de-silverisation of lead ii) NaCl-Water system, Congruent and incongruent melting point- Definition and examples for systems having congruent and incongruent melting point , freezing mixtures.

UNIT-IV

Electrochemistry 14h

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

UNIT-V

Chemical Kinetics: **14 h**

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. 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 & key model. Michaels- Menten equation- derivation, significance of Michaelis-Menten constant.

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.PhysicalChemistry4thEd.Narosa(2004).
12. Mortimer,R. G.PhysicalChemistry3rdEd. Elsevier:NOIDA,UP(2009).
13. Barrow,G.M.PhysicalChemistry

SEMESTER - IV

Course V **LABORATORY COURSE** **30hrs (2 h / w)**

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 conceptsof electrochemistry in experiments
3. Be familiar with electroanalytical 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_3COOH Solution using standard NaOH solution.
3. **Conductometric titration-** Determination of concentration of CH_3COOH and HCl in a mixture using standard NaOH solution.
4. **Potentiometric titration-** Determination of Fe (II) using standard $K_2Cr_2O_7$ solution.
5. Determination of rate constant for acid catalyzed ester hydrolysis.

Guidelines to the Paper Setter: The syllabus V Semester consists of inorganic &physical chemistry . The V Semester question paper consists of 2 sections.

In PART- A: consists of EIGHT short answer questions carries 5 marks out of which 5 are to be answered..

In PART- B: consists of FIVE internal choice essay questions are to be set, each question carries 10 marks from Inorganic & Physical Chemistry part.

The examiner is requested to set question in such a way that the entire syllabus is reflected in the question paper set by him.

BLUE PRINT
B.Sc, Chemistry, V Semester
(INORGANIC &PHYSICAL CHEMISTRY)

Sl. No	Units	Name of the chapter	10 Marks	5 Marks
1	UNIT-I	Coordination Chemistry	2	1
2	UNIT-II	Inorganic Reaction Mechanism	2	1
		Stability of metal complexes		1
		Bioinorganic Chemistry		
3	UNIT-III	Phase rule	2	1
4	UNIT-IV	Electrochemistry	2	2
5	UNIT-V	Chemical Kinetics	2	2

Dr. V. S. Krishna Govt. Degree & PG College (A)

(NAAC Reaccredited A Grade Institution & District Identified College)
CENTRE FOR RESEARCH STUDIES
Visakhapatnam- 530 013, Andhra Pradesh, INDIA

MODEL PAPER

SECOND YEAR B.Sc., DEGREE EXAMINATION

SEMESTER-IV

CHEMISTRY COURSE V: 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
ఏవైనా ఐదు ప్రశ్నలకు సమాధానములు వ్రాయుము.ప్రతి ప్రశ్న కు 5 మార్కులు.

1. Write note on Jahn-Teller distortion.
   జాన్ టెల్లర్ విభాజనను వ్రాయుము.
2. Explain Labile & inert complexes.
   క్రియాశీల మరియు జడ సమ్మేళనాల ను వివరింపుము.
3. Explain Job's method for determination of composition of complex.
   సంశ్లిష్ట సమ్మేళనాల నిర్ధారణ్వన్ని వివరించు జాబ్స్ పద్ధతి వివరింపుము.
4. Explain Thermodynamic derivation of Gibb's phase rule.
   గిబ్స్ ఫేజ్ సమీకరణం నుఉత్పదించుము.
5. Explain any two conductometric titrations.
   ఏవైనా రెండు వాహకత అంశమాపనాలు ను వివరింపుము.
6. Write note on Fuel Cells with examples and applications.
   ఇంధన బ్యాటరీ ఉదాహరణలు మరియు అనువర్తనాలను వ్రాయుము.
7. What is enzyme catalysis? Write any three factors effecting enzyme catalysis.
   ఎంజైమ్ ఉత్ప్రేరణ అనగా నేమి? ఎంజైమ్ ఉత్ప్రేరణ మీద ఏవైనా మూడు ప్రభావాలను వ్రాయుము
8. Derive Michaels- Menten equation.
   మైఖలీస్- మెంటన్ సమీకరణం ఉత్పదించుము.

PART- B 5 X 10 = 50 Marks

Answer **ALL** the questions. Each carries **TEN** marks
ఈ క్రింది అన్ని ప్రశ్నలకు సమాధానములు వ్రాయుము.ప్రతి ప్రశ్న కు 10 మార్కులు.

9 (a). Explain Valence Bond theory with Inner and Outer orbital complexes. Write

limitations of VBT.

వేలన్సీ బంధ సిద్ధాంతం వివరించి,బాహ్య మరియు అంతర సంశ్లిష్ట సమ్మేళనాలను వ్రాయుము. వేలన్సీ బంధ సిద్ధాంతం యొక్క అవధులు వ్రాయుము.

(or)

(b). Define CFSE. Explain the factors affecting the magnitude of crystal field splitting energy.

CFSE అనగా నేమి? స్ఫటిక క్షేత్ర విభజన శక్తి మీద ప్రభావితం చేయు అంశాలను వివరించుము.

10 (a). Explain Trans effect. Explain the theories of trans effect and write any two applications of trans effect.

ట్రాన్స్ ప్రభావమును వివరింపుము.ట్రాన్స్ ప్రభావమును వివరించు సిద్ధాంతాలను మరియు ఏవైనా రెండు అనువర్తనాలను వ్రాయుము.

(or)

(b). (i) Write the biological functions of Hemoglobin and Myoglobin.

హీమోగ్లోబిన్ మరియు మయోగ్లోబిన్ జీవ ప్రక్రియలు గూర్చి వ్రాయుము.

(ii) Write note on use of chelating agents in medicines.

ఔషధాలలో కీలటింగ్ ఏజెంట్స్ ఉపయోగమును వ్రాయుము.

11.(a). Define Phase rule and terms involved in it. Explain phase diagram of Pb-Ag system.

ప్రావస్థ నియమమును వ్రాసి అందులో అంశాలను వివరింపుము.pb-Ag వ్యవస్థ ను వివరింపుము.

(or)

(b). (i) Explain phase diagram for NaCl-water system.

Nacl-నీరు ప్రావస్థ చిత్రమును వివరింపుము.

(ii) Explain briefly about freezing mixtures.

ఘనీభవన మిశ్రమాలను వివరింపుము.

12.(a). Define Transport number. Write experimental method for the determination of transport number by Hittorf method.

అభిగమన సంఖ్య ను నిర్వచించుము. అభిగమన సంఖ్య ను హిట్టర్ఫ్ పద్ధతి ద్వారా ఏ విధముగా నిర్ణయిస్తారు?

(or)

(b).(i) Define single electrode potential.

ఏకఎలక్ట్రోడ్ పొటన్షియల్ ను నిర్వచింపుము.

(ii) Explain four types of electrodes with examples.

నాలుగు రకాల ఎలక్ట్రోడ్స్ ను ఉదాహరణ లతో వివరింపుము.

13.(a). Explain general methods for determination of order of a reaction.

చర్య రేటు ను నిర్ధారించు సాధారణ పద్ధతుల ను వివరింపుము.

(or)

(b). Explain Collision theory and Activated complex theory of bimolecular reactions.
తాడన సిద్ధాంతాన్ని వివరించుము మరియు ద్వి అణుక చర్యల యొక్క ఉత్తేజిత సంశ్లిష్ట సిద్ధాంతాన్ని వివరింపుము.

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SUBJECT EXPERTS

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Dr. M. Mahaboob Pacha Lecturer in Chemistry Government Degree College Ramachandrapuram – 533255

SYLLABUS VETTED BY

Prof. N.V.S. Naidu, Professor, Department of Chemistry
S.V. University Tirupati.

DEPARTMENT OF CHEMISTRY

Inter Disciplinary Add On Course
CLINICAL LAB TECHNOLOGY

Model Curriculum- Inter Disciplinary Add on Course
Syllabus & Model Question Papers

WITH EFFECT FROM 2020-21

Dr. V. S. Krishna Govt. Degree & PG College (A)
(NAAC Reaccredited *A Grade* Institution & District Identified College)
CENTRE FOR RESEARCH STUDIES
Visakhapatnam- 530 013, Andhra Pradesh, INDIA

Board Of Studies October- 2020

Dr. V. S. Krishna Govt. Degree & PG College (A)

(NAAC Reaccredited A Grade Institution & District Identified College)

CENTRE FOR RESEARCH STUDIES

Visakhapatnam- 530 013, Andhra Pradesh, INDIA

Dept of Chemistry Inter Disciplinary Add On Course

Clinical Lab Technology-Syllabus

(w.e.f 2019-20 revised on October-2018)

MODULE- I (Clinical Lab Technology) 18 hrs

1. Solutions: 2 hrs

Definition, different concentration methods

2. Carbohydrates and Lipids 4 hrs

(a) Carbohydrates: Definition, biological importance, classification, qualitative tests

(b)Lipids: Definition, biological importance, classification and clinical importance.

3. Amino acids Proteins 4 hrs

Definition, biological importance, classification, qualitative tests.

4. Vitamins and Minerals 4 hrs

(a) Vitamins: Classification, source, deficiency diseases

(b) **Minerals:** source, importance, deficiency diseases and clinical tests

5. Blood composition 4 hrs

Blood composition functions tests

6. Practical 12hrs

(a) Blood tests, group identification, hemoglobin, other tests

(b) Blood sugar test

(c) Lipid profile test

(d) Liver function test

(e) Kidney function test

(f) Serum calcium, Sodium, Potassium test

Guidelines to the Paper Setter:

The syllabus Inter Disciplinary Add on Course consists of Clinical Lab Technology. The question paper consists of 3 sections.

In Section-A: consists of 6 very short answers questions in which 5 are to be answered each question carries 2 marks.

In Section-B: consists of 8 short answer questions carries 5 marks out of which 5 are to be answered.

In section-C: 6 essay questions are to be set each question carrying 10 marks out of which 4 questions are to be answered.

The examiner is requested to set question in such a way that the entire syllabus is reflected in the question paper set by him.

Inter Disciplinary Add on Course
Clinical Lab Technology
BLUE PRINT

Sl. No	Name of the chapter	2 marks	5 marks	10 marks
Module-I (Clinical Lab Technology)				
1.	Solutions	1	1	--
2.	Carbohydrates and Lipids	2	2	2
3.	Amino acids Proteins	1	1	1
4.	Vitamins and Minerals	1	--	2
5.	Blood composition	1	2	1
6.	Practical	--	2	--

Dr. V. S. Krishna Govt. Degree & PG College (A)

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CENTRE FOR RESEARCH STUDIES
Visakhapatnam- 530 013, Andhra Pradesh, INDIA
Dept of Chemistry Inter Disciplinary Add On Course
Clinical Lab Technology-Syllabus
(w.e.f 2020-21 revised on October-2020)

Time: 3 Hours ***Model Paper*** ***Max. Mark: 75***

SECTION – A

Answer any FIVE questions. Each question carries 2 Marks (5 X 2 = 10 Marks)

1. Define Molarity?
2. Write Molisch test?
3. What is a lipid?
4. What are amino acids?
5. Write the deficiency disease of vitamin A?
6. What is Plasma?

SECTION – B

Write any FIVE questions. Each question carries 5 Marks. (5 X 5 = 25 Marks)

7. Explain about Lipid profile test?
8. Explain about Liver function test?
9. Explain various concentrations methods of solutions?
10. Explain about Blood sugar test?
11. What is Hemoglobin? Explain its functions?
12. Write about Blood clotting and role of vitamin in it?
13. What are amino acids? Explain their classification?
14. Explain about serum creatine and serum urea test?

SECTION – C

Answer any FOUR questions. Each question carries 10 Marks. (4 X 10 = 40 Marks)

15. What are carbohydrates? Explain their classifications and biological importance?
16. Explain the functions, biological importance and normal levels of Cholesterol?
17. What are Proteins? Explain their functions and tests to identify?
18. Explain the sources and deficiency diseases of vitamin A, B, C, D, E.
19. Explain the sources and biological importance of Na, K and Ca?
20. Explain the composition of Blood and its function?

DEPARTMENT OF CHEMISTRY

SKILL DEVELOPMENT COURSES UNDER CBCS FRAMEWORK WITH EFFECT FROM 2020-21

(With Learning Outcomes, Unit-wise Syllabus, References, Co -curricular Activities & Model Q.P)

Dr. V. S. Krishna Govt. Degree & PG College (A)

(NAAC Reaccredited A Grade Institution & District Identified College)

CENTRE FOR RESEARCH STUDIES

Visakhapatnam- 530 013, Andhra Pradesh, INDIA

Board Of Studies January- 2021

DEPARTMENT OF CHEMISTRY

SKILL DEVELOPMENT COURSES UNDER CBCS FRAMEWORK WITH EFFECT FROM 2020-21

(With Learning Outcomes, Unit-wise Syllabus, References, Co -curricular Activities & Model Q.P)

Dr. V. S. Krishna Govt. Degree & PG College (A)

(NAAC Reaccredited *A* Grade Institution & District Identified College)

CENTRE FOR RESEARCH STUDIES

Visakhapatnam- 530 013, Andhra Pradesh, INDIA

Board Of Studies October- 2020

SKILL DEVELOPMENT COURSES UNDER CBCS FRAMEWORK WITH EFFECT FROM 2020-21

YEAR	SEMESTER	HOURS PER WEEK	TITLE	MARKS	CREDITS
I	II	2	FOOD ADULTERATION	50	2
II	III	2	ENVIRONMENTAL AUDIT	50	2

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CENTRE FOR RESEARCH STUDIES

Visakhapatnam- 530 013, Andhra Pradesh, INDIA

Semester- II

Syllabus of

FOOD ADULTERATION

Total 30 hours (02hours/week) **02 Credits & Max Marks: 50**

Learning Outcomes:

After successful completion of the course, students will be able to:

1. Get basic knowledge onvarious foods and about adulteration.
2. Understand the adulteration of common foods and their adverse impact on health
3. Comprehend certain skills of detecting adulteration of common foods.
4. Extend their knowledge to other kinds of adulteration, detection and remedies.
5. Know the basic laws and procedures regarding food adulteration and consumer protection.

SYLLABUS:

UNIT-I – Common Foods and Adulteration: **7 hours**

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: **10hours**

Means of AdulterationMethods 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: **8hours**

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.Qualitycontrol laboratories of companies, Private testing laboratories,Quality control laboratories of consumerco-operatives. Consumer education,Consumer's problemsrightsandresponsibilities, COPRA 2019 - Offenses and Penalties – Procedures to Complain – Compensation to Victims.

Recommended Co-curricular Activities (including Hands on Exercises): (05hours)

1. Collection of information on adulteration of some common foods from local market
2. Demonstration of Adulteration detection methods for a minimum of 5 common foods (one method each)
3. Invited lecture/training by local expert
4. Visit to a related nearby laboratory
5. Assignments, Group discussion, Quiz etc.,

Reference e Books and Websites:

1. A firstcourseinFoodAnalysis–A.Y.Sathe,NewAgeInternational(P)Ltd.,1999
2. FoodSafetycasestudies–Ramesh.V.Bhat,NIN,1992
3. https://old.fssai.gov.in/Portals/0/Pdf/Draft_Manuals/Beverages and confectionary.pdf
4. https://cbseportal.com/project/Download-CBSE-XII-Chemistry-Project-FoodAdulteration#gsc.tab=0 (Downloadable e material on food adulteration)
5. https://www.fssai.gov.in/
6. https://indianlegalsolution.com/laws-on-food-adulteration/
7. https://fssai.gov.in/dart/
8. https://byjus.com/biology/food-adulteration/
9. Wikipedia
10. Vikaspedia

Guidelines to the Paper Setter:

The syllabus of Food adulteration paper of semester-IIconsists of **Adulteration of Common Foods and Methods of Detection,Present Laws and Procedures on Adulteration**The question paper consists of 2 sections.In which,

Section-Aconsists of eight short answer questions,out of which FOUR questions to be answered and each question carries five marks

Section-Bconsists of FIVE essay questions, out of which THREE questions to be answered and each question carries10marks.

The examiner has to choose at least one question from each unit and he/she is requested to set question paperin such a way that the entire syllabus should

reflect on the question paper.

FOOD ADULTERATION SEMESTER-II BLUE PRINT				
S.No	**UNIT**	**Name of the unit**	**5 marks**	**10 Marks**
1.	I	Common foods and Adulteration	3	2
2.	II	Adulteration of common foods and methods of detection	2	1
3.	III	Present laws and procedures on Adulteration	3	2

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CENTRE FOR RESEARCH STUDIES

Visakhapatnam- 530 013, Andhra Pradesh, INDIA

Semester- II

FOOD ADULTERATION

MODEL QUESTION PAPER

Max. Marks: 50 **Time: 1½ hours (90 Minutes)**

SECTION- A (4x5M=20 Marks)

Answer any FOUR questions. Each answer carries 5 marks
(At least 1 question should be given from each Unit)

1. Define food adulteration?
2. Explain the adulteration through Food Additives
3. Name few cheap substitutes used in food adulteration
4. Give examples for food additives and sweetening agents
5. Write a short notes on processed food
6. Explain the procedures to complain about the food adulteration
7. Name the laws that governs the food adulteration
8. Explain the procedure to get compensation to the victims of food adulteration

SECTION B (3x10M = 30 Marks)

Answer any THREE questions. Each answer carries 10 marks
(At least 1 question should be given from each Unit)

9. Write an essay on the common Foods which are subjected to Adulteration and explain the types poisonous substances added for food adulteration
10. Describe the highlights of Food Safety and Standards Act 2006 (FSSAI)
11. Explain the food testing and standardized testing methods and protocols
12. Write in detail about the general Impact of food adulteration on Human Health
13. Write an essay on different types of offenses of food adulteration and the penalties imposed.

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CENTRE FOR RESEARCH STUDIES
Visakhapatnam- 530 013, Andhra Pradesh, INDIA
Semester- III
Syllabus of
ENVIRONMENTAL AUDIT

Total 30 hours (02hours/week) **02 Credits &Max.marks: 50**

Learning Outcomes:
By successful completion of the course, students will be able to:
1. Understand the basic concepts Environmental health
2. Learn and identify the industrial pollution
3. Explain the highlights in the regulatory aspects of Environmental law and policy
4. Understand the various phases of Environmental Audit

UNIT – I Industrial Pollution and its effects **06hours**

Climate – Weather and Air Pollution – Classification of water and water bodies – Water Quality Parameters – Water Pollution – Sources – Classification, nature and Toxicology of water pollutants. - Soil parameters –Soil pollution and impacts – Soil conservation

UNIT - II Environmental Law & Policy **09 hours**

Highlights of the Acts, Institutional arrangements for: (1) The Water (Prevention & Control of Pollution) Act, 1974 amended in 1988; (2) The Air (Prevention and Control of Pollution) Act, 1981 amended in 1987; (3) The Water (Prevention and Control of Pollution) Cess Act, 1977 amended in 1991; (4) The Environment (Protection) Act, 1986; (5) The Public Liability Insurance Act, 1991; – Indian Policy Statement for abatement of Pollution, 1992.

UNIT – III Environmental Audit - Scope & Requisites **10hours**

Environmental Audit: Definition; Objectives; Scope, Coverage - GOI Notification on Environmental Audit - Benefits to Industry. Reporting Environmental Audit Findings - Importance of Environmental Audit Report to industry, public and the governments.

Co-curricular Activities Suggested: 05h

1. Visit to understand Institutional arrangements and functioning of Pollution Control Boards.
2. Visiting different Ecosystems
3. Soil analysis: Determination of soil type and texture, pH, Soil Moisture, Nitrogen, Potassium and Phosphorous.
4. Water analysis: Determination of pH, Dissolved solids and suspended solids, Dissolved Oxygen, COD, BOD.
5. Assignments, Group discussion, Quiz etc.

Reference books and websites:

1. Environmental Education in India by K.R. Gupta
2. Environmental Legislation in India by K.R. Gupta
3. https://parivesh.nic.in/
4. https://www.cpcb.nic.in/
5. https://www.free-ebooks.net/environmental-studies-academic

Guidelines to the Paper Setter:

The syllabus of Environmental audit paper of semester-III consists of **Industrial Pollution and its effects,Environmental Law & Policy,Environmental Audit - Scope & Requisites.** The question paper consists of 2 sections. In which,

Section-A consists of eight short answer questions, out of which FOUR questions to be answered and each question carries five marks

Section-B consists of FIVE essay questions, out of which THREE questions to be answered and each question carries10marks.

Theexaminerhastochoose at least one question from each unit and he/she is requested to set question paper in such a way that the entire syllabus should reflect on the question paper.

ENVIRONMENTAL AUDIT SEMESTER-III BLUE PRINT				
S.No	**UNIT**	**Name of the unit**	**5 marks**	**10 Marks**
1.	I	Industrial Pollution and its effects	3	2
2.	II	Environmental Law & Policy	3	2
3.	III	Environmental Audit - Scope & Requisites	2	1

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CENTRE FOR RESEARCH STUDIES

Visakhapatnam- 530 013, Andhra Pradesh, INDIA

Semester- III

ENVIRONMENTAL AUDIT

MODEL QUESTION PAPER

Max. Marks: 50 **Times: 1½ hrs (90 Minutes)**

SECTION- A (4x5M=20 Marks)

Answer any FOUR questions. Each answer carries 5 marks
(At least 1 question should be given from each Unit)

1. Write any three global environmental problems?
2. Write a short note on soil pollution and its impact?
3. What is BOD and explain its significance in determining the quality of water?
4. What are the objectives of the environmental Acts and the Institutional arrangements
5. Write a brief note on the environmental laws that governs the water pollution
6. Write a brief note on the functioning of central and state pollution control boards?
7. What are the objectives of environmental audit.
8. What is GOI notification on environmental audit?

SECTION B (3x10M = 30 Marks)

Answer any THREE questions. Each answer carries 10 marks
(At least 1 question should be given from each Unit)

1. What is water pollution and explain in detail about the water pollutants?
2. What is air pollution and explain in detail about the air pollutants?
3. Write an essay on the Water (Prevention & Control of Pollution) Act, 1974 Amended in 1988
4. Write an essay on the Air (Prevention and Control of Pollution) Act, 1981 amended in 1987
5. What is environmental audit and explain the various stages involved in it and the benefits of environmental audit to the industry?

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Dr. V. S. Krishna Govt. Degree & PG College (A)

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CENTRE FOR RESEARCH STUDIES

Visakhapatnam- 530 013, Andhra Pradesh, INDIA

Department of Chemistry, External Examination List

Sl. No.	Name of the Faculty	Place of working	Contact number with email ID
01	Dr. S. Raju	Govt. Degree College Chodavaram-Visakha	9440306372
02	Smt. Ch. S. Anuradha	Govt. Degree College(W) Visakhapatnam	9885501503
03	Dr. A. Ramgopal	Govt. Degree College Paderu-Visakhapatnam	9441247706
04	Dr. A V Ramesh	SGA Govt. Degree College Yellamanchili-Visakhapatnam	8985646309
05	Dr. D. Laxman Rao	Govt. Degree College Saluru-VZM	9492451990
06	Sri. P. Kiran Kumar	SGA Govt. Degree College Yellamanchili-Visakhapatnam	9000251552
07	Smt. S. Durgabhavani	Govt. Degree College(W) Visakhapatnam	9441956233
08	Dr. VVJ Gopalakrishna	Mrs. AVN Degree College Visakhapatnam	9848312918
09	Smt. D. Suneetha	Govt. Degree College Yeleswaram. E.G	9492260511
10	Sri. V. Sambasivarao	Govt. Degree College TUNI, East Godavari	9440473002
11	Smt. Tejeswani	Govt. Degree College Nidadavole.W.G	
12	Smt. D. Prasanna	Govt. Degree College V.Madugula-Visakha	8332887645
13	Dr. Mamidi Gopi	Govt. Degree College Baruva. Srikakulam	7396927964
14	Dr. S. Ramakrishna	Govt. Degree College(Men), Srikakulam	9030768474
15	Smt. K. Vidyakalpana	SGA Govt. Degree College Yellamanchili-Visakhapatnam	6301682015
16	Dr. Saikrishna	Govt. Degree College(Men), Srikakulam	9542148008
17	Sri. T. Apparao	Govt. Degree College Chodavaram-Visakha	
18	Dr. G V Rao	Mrs. AVN Degree College Visakhapatnam	9440543909