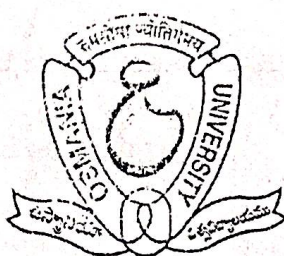




ANDHRA MAHILA SABHA
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Scheme of Instruction, Evaluation And
Syllabus of B.Sc (BZC,BtZC)
With effect from Academic Year 2025-2026

Department of Chemistry



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DEPARTMENT OF CHEMISTRY
BSc (BZC/BtZC) I year I Semester

SCHEME OF EVALUATION (2025-2026)

Subject	Subject Code	Subject	Hours / Week		Exam Duration	Marks			No Of Credits
			Theory	Practical		Sem	Internal	Total	
English	Eng 101	General English	5Hrs		3 Hrs	80	20	100	5
Telugu / Hindi/Sanskrit	Tel/Hin /San 101	Telugu /Hindi/Sanskrit	5Hrs		3 Hrs	80	20	100	5
Botany /Bio Technology	Bot/Bio 101	DSC 1 A	4 Hrs		3 Hrs	80	20	100	4
Zoology	Zoo 101	DSC 2 A	4 Hrs		3 Hrs	80	20	100	4
Chemistry	Che101	DSC 3 A	4 Hrs		3 Hrs	80	20	100	4
Practicals									
Botany /Bio Technology	Bot/Bio 131	DSC 1 A (Pra)	-	2 Hrs	3 Hrs	50	Nil	50	1
Zoology	Zoo 131	DSC 2A Pra)	-	2 Hrs	3 Hrs	50	Nil	50	1
Chemistry	Che131	DSC 3A (Pra)	-	2 Hrs	3 Hrs	30	20	50	1
									Total: 25

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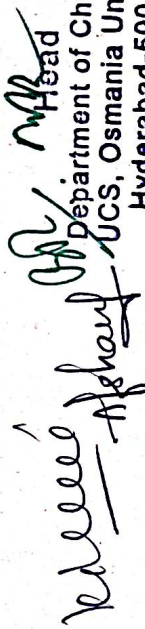
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DEPARTMENT OF CHEMISTRY BSc (BZC/BtZC) I Year II Semester SCHEME OF EVALUATION(2025-2026)

Subject	Subject Code	Subject	Hours / Week		Exam Duration	Marks			No Of Credits
			Theory	Practical		Sem	Internal	Total	
English	Eng 151	General English	5Hrs		3 Hrs	80	20	100	5
Telugu / Hindi/Sanskrit	Tel/Hin /San 151	Telugu /Hindi/Sanskrit	5Hrs		3 Hrs	80	20	100	5
Botany /Bio Technology	Bot/Bio 151	DSC 1B	4 Hrs		3 Hrs	80	20	100	4
Zoology	Zoo 151	DSC 2B	4 Hrs		3 Hrs	80	20	100	4
Chemistry	Che151	DSC 3B	4 Hrs		3 Hrs	80	20	100	4
Practicals									
Botany /Bio Technology	Bot/Bio 181	DSC 1B(Pra)		2 Hrs	3 Hrs	50	Nil	50	1
Zoology	Zoo 181	DSC 2B(Pra)		2 Hrs	3 Hrs	50	Nil	50	1
Chemistry	Che181	DSC 3B (Pra)		2 Hrs	3 Hrs	50	20	50	1
Total :									25

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**DEPARTMENT OF CHEMISTRY
I YEAR- I SEMESTER**

**Syllabi, Model Papers
2025-2026**

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**Syllabus for B.Sc I Yr
Chemistry – Semester -I Paper-I**

CHE 101

Instruction

Duration of Semester Examination

4 Hrs/Week

Duration of Sessional Examination

3.00 Hrs

Semester Examination

1 Hrs

Sessional Examination

80 Marks

Assignment

15 Marks

05 Marks

Unit-I (Inorganic Chemistry)

15h (1 h/week)

S1-I-1: Chemistry of P-Block Elements

15h

Structure and bonding in diborane (B_2H_6), Boron nitrogen compounds ($B_3N_3H_6$ and BN), Lewis acid nature of BX_3 .

Carbides- Classification -ionic, covalent, interstitial-Structures and reactivity. Industrial applications. **Silicones-**Classification-straight chain, cyclic and cross-linked and applications.

Nitrides-Classification -ionic, covalent and interstitial- Reactivity – hydrolysis.

Oxides and Oxyacids: Definition and Types of oxides (a) Normal- acidic, basic amphoteric and neutral (b) Mixed oxide (c) sub oxide (d) peroxide (e) superoxide. Structure of oxides and oxyacids of B, C, N, P, S and Cl - reactivity, thermal stability, hydrolysis.

Interhalogens- Classification- general preparation- structures of AB , AB_3 , AB_5 and AB_7 type and reactivity.

Poly halide: Definition and structure of ICl_2^- , ICl_4^- and I_3^- .

Pseudohalogens: Comparison with halogens.

Structure, bonding and reactivity of Xenon Compounds-Oxides, Halides and Oxy-halides.

Unit - II (Organic Chemistry)

15h (1 h/week)

S1-O-1: Structural Theory in Organic Chemistry

5h

Bond polarization: Factors influencing the polarization of covalent bonds, electro negativity – inductive effect. Application of inductive effect (a) Basicity of amines (b) Acidity of carboxylic acids (c) Stability of carbonium ions. Resonance - Mesomeric effect, application to (a) acidity of phenol. (b) acidity of carboxylic acids and basicity of anilines. Stability of carbo cations, carbanions and free radicals. Hyper conjugation and its application to stability of carbonium ions, free radicals and alkenes.

S1-O-2: Acyclic Hydrocarbons

5h

Alkanes– Methods of preparation: Preparation of Alkanes from Grignard reagent. Chemical

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reactivity- inert nature, free radical substitution, Halogenation example.

Alkenes - Preparation of alkenes (with mechanism) (a) by dehydration of alcohols (b) dehydrohalogenation of alkyl halides (c) by dehalogenation of 1,2 dihalides, Zaitsev's rule. **Properties:** Anti-addition of halogen and its mechanism. Addition of HX, Markovnikov's rule, addition of H_2O , HOX with mechanism and addition of HBr in the presence of peroxide (anti-Markovnikov's addition). Oxidation (cis-additions) hydroxylation by $KMnO_4$, OsO_4 , anti-addition-peracids (via epoxidation), ozonolysis – location of double bond.

Alkynes– Preparation by dehydrohalogenation of vicinal dihalides, dehalogenation of tetrahalides. **Physical Properties:** Chemical reactivity – electrophilic addition of X_2 , HX, H_2O (tautomerism), Oxidation (formation of enediol) and reduction (catalytic hydrogenation).

S1-O-3: Aromatic Hydrocarbons

5h

Introduction to aromaticity: Huckel's rule – Benzene, Naphthalene and Anthracene. Reactions - General mechanism of electrophilic substitution, mechanism of nitration, sulphonation and halogenation, Friedel Crafts alkylation and acylation. Orientation of aromatic substitution - Definition of ortho, para and meta directing groups. Ring activating and deactivating groups with examples. Orientation – (i) activating groups: Amino, methoxy and alkyl groups. (ii) Deactivating groups - nitro, nitrile, carbonyl, carboxylic acid, sulphonic acid and halo groups.

Unit – III (Physical Chemistry)

15h (1h/week)

S1-P-1: Elementary quantum mechanics

3h

Limitations of classical mechanics and Origin of quantum mechanics-Black body radiation, Rayleigh Jeans law; Planck's radiation law, photoelectric effect, Compton effect, de Broglie's hypothesis. Heisenberg's uncertainty principle. Schrödinger wave equation (derivation not required) – significance of ψ and ψ^2 .

S1-P-2: Chemical Kinetics

8h

Introduction to chemical kinetics, rate of reaction, rate laws and rate constant. Molecularity and Order of a reaction. Factors influencing the reaction rates. First order reaction, derivation of equation for rate constant. Characteristics of first order reaction. Units for rate constant. Half- life period, graph of first order reaction, Example - Decomposition of H_2O_2 . Problems. Pseudo first order reaction, Hydrolysis of methyl acetate, inversion of cane sugar, problems. Second order reaction, derivation of expression for second order rate constant, example-Saponification of ester. Characteristics of second order reaction, units for rate constants, half- life period and second order plots. Problems. Methods for determining the order of a reaction. Arrhenius equation – activation energy -problems.

S1-P-3: Photochemistry

4h

Introduction to photochemistry – differences between dark and photo reactions. Laws of photochemistry; Quantum Yield – problems; Examples of photo chemical reactions with different quantum yields. Photo chemical combinations of H_2-Cl_2 and H_2-Br_2 reactions. Abnormal quantum yield – high and low-examples with reasons. Singlet and triplet states. Jablonski diagram – non-

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radiative processes – Internal conversion and Intersystem crossing; radiative processes- Fluorescence and phosphorescence.

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Unit - IV (General Chemistry)

15h (1h/week)

S1-G-1. General Principles of Inorganic quantitative Analysis:

5h

Volumetric Analysis: Introduction, standard solutions, indicators, end point, titration curves, Types of titrations: i) neutralization titration- principle, theory of acid base indicators, titration curves and selection of indicators- strong acid - strong base, strong acid -weak base, weak acid- strong base and weak acid -weak base. Theory of redox titrations – internal (KMnO_4) and external indicators – use of diphenylamine and ferroin indicators. Theory of complexometric titrations – use of EBT, Murexide and Fast sulphone black indicators. Role of pH in complexometric titrations. Precipitation titrations – theory of adsorption indicators.

S1-G-2. Isomerism

5h

Isomerism: Definition of isomers. Classification of isomers: Constitutional and Stereoisomers - definition and examples. Constitutional isomers: chain, functional and positional isomers. Stereoisomers: enantiomers and diastereomers – definitions and examples. Representation of stereoisomers – Wedge, Fischer, Sawhorse, Newmann projection formulae.

Conformational analysis: Classification of stereoisomers based on energy. Definition and examples Conformational and configurational isomers. Conformational analysis of ethane, n- butane, 1,2-dichloroethane, 2-chloroethanol. Cis-trans isomerism: E-Z-Nomenclature.

S1-G-3 Colloids & Surface Chemistry

5h

Colloids: Definition of colloids-classification of colloids-examples. Solid in liquid (sol)-Preparation, kinetic and electrical properties, stability and protection of colloids - Hardy-Schulze rule and Gold number. Liquid in liquid (emulsion)-types of emulsions and emulsifier. Liquid in solid (gel)-types and properties. Applications of colloids.

Adsorption: Types of adsorptions; Factors influencing adsorption; Freundlich adsorption isotherm and Langmuir adsorption isotherm. Applications.

References

General reference: B.Sc I Year Chemistry : Semester I, Telugu Academy publication, Hyd.

Unit- I

1. Puri, B. R., Sharma, L. R., & Kalia, M. S. (1996). Principles of inorganic chemistry. Vishal Publications.
2. Lee, J. D. (1981). Concise inorganic chemistry (3rd ed.). Oxford University Press.
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5. Greenwood, N. N., & Earnshaw, A. (1989). Chemistry of the elements. Pergamon Press.
6. Shriver, D. F., & Atkins, P. W. (1999). Inorganic chemistry (3rd ed.). Oxford University Press.
7. Gopalan, R. (2009). Textbook of inorganic chemistry. Universities Press.

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Unit- II

1. Morrison, R. T., & Boyd, R. N. (2011). Organic chemistry. Pearson Education (Prentice Hall).
2. Solomons, T. W. G., & Fryhle, C. B. (2016). Organic chemistry. Wiley (John Wiley & Sons).
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4. Wade, L. G., Jr. (2013). Organic chemistry. Pearson Education.
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Unit III

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6. Laidler, K. J. (1987). Chemical kinetics (3rd ed.). McGraw Hill.
7. Rajaraman, J., & Kuriacose, J. (1993). Kinetics and mechanism of chemical transformations. Macmillan India.
8. Turro, N. J. (1978). Molecular photochemistry. W. A. Benjamin, Inc.
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Unit IV

1. Jeffery, G. H., Bassett, J., Mendham, J., & Denney, R. C. (1999). Vogel's textbook of quantitative chemical analysis (5th ed.). Addison Wesley Longman Inc.
2. Day, R. A., & Underwood, A. L. (2004). Quantitative analysis (6th ed.). Prentice Hall of India.
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12. Satake, M., Hayashi, Y., Mido, Y., Iqbal, S. A., & Sethi, M. S. (2014). Colloidal and surface chemistry. Discovery Publishing Pvt. Ltd.

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Syllabus for B.Sc I Yr Chemistry – Semester –I
Paper I – Quantitative Analysis**

CHE 131

30hrs (2 h /week)

Paper I- Quantitative Analysis

Acid-Base Titrations

1. Estimation of Carbonate in Washing Soda.
2. Estimation of Bicarbonate in Baking Soda.
3. Estimation of Carbonate and Bicarbonate in the Mixture.
4. Estimation of Alkali content in Antacid using HCl.

Redox Titrations

1. Determination of Fe(II) using $K_2Cr_2O_7$
2. Determination of Fe(II) using $KMnO_4$ with sodium oxalate as primary standard.
3. Determination of Cu(II) using $Na_2S_2O_3$ with $K_2Cr_2O_7$ as primary standard

Complexometric Titrations

1. Estimation of Mg^{2+} by EDTA
2. Estimation of Cu^{2+} by EDTA

References

1. Jeffery, G. H., Bassett, J., Mendham, J., & Denney, R. C. (1999). Vogel's textbook of quantitative chemical analysis (5th ed.). Addison Wesley Longman Inc.
2. Vogel, A. I. Vogel's Textbook of Quantitative Chemical Analysis, 6th Edition, Pearson Education, 2000. ISBN: 9780582226289
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**DEPARTMENT OF CHEMISTRY
I YEAR- II SEMESTER**

**Syllabi, Model Papers
2025-2026**

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**Syllabus for B.Sc I Yr
Chemistry – Semester -II Paper-II**

CHE 151

Instruction	4 Hrs/Week
Duration of Semester Examination	3.00 Hrs
Duration of Sessional Examination	1 Hrs
Semester Examination	80 Marks
Sessional Examination	15 Marks
Assignment	05 Marks

Unit-I (Inorganic Chemistry)

15h (1h/week)

S2-I-1 Chemistry of d-block elements

7h

Characteristics of d-block elements with special reference to electronic configuration, variable oxidation states, color properties, d-d spectral transitions, ability to form complexes, magnetic properties, calculation of magnetic moment-spin only formula & catalytic properties. Comparative treatment of second and third transition series with their 3d analogues.

S2-I-2: Chemistry of f-block elements

8h

Chemistry of Lanthanides: Position in periodic table, electronic structure, oxidation state, ionic and atomic radii/ionic radii- lanthanide contraction- cause and consequences, anomalous behavior of post lanthanides-complexation-type of donor ligands preferred. Magnetic properties- paramagnetism, color and spectra, f-f transitions-occurrence and separation-ion exchange method, solvent extraction.

Chemistry of actinides: General features-electronic configuration, oxidation state, actinide contraction, color and complex formation. Comparison with lanthanides.

Unit - II (Organic Chemistry)
(1h/week)

15h

S2-O-1: Halogen compounds

4h

Classification: alkyl (primary, secondary, tertiary), aryl, aralkyl,. Chemical reactivity - reduction, formation of RMgX , Nucleophilic substitution reactions – classification into S_N^1 and S_N^2 . Mechanism and energy profile diagrams of S_N^1 and S_N^2 reactions. Stereochemistry of S_N^2 (Walden Inversion) 2-bromobutane, S_N^1 (Racemization) 1- bromo-1-phenylpropane.

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S2-O-2: Hydroxy compounds and ethers

5h

Alcohols: Preparation: 1°, 2° and 3° alcohols using Grignard reagent, Reduction of Carbonyl compounds, carboxylic acids and esters. Physical properties: H-bonding, Boiling point and Solubility. Reactions with Sodium, HX/ZnCl₂ (Lucas reagent), oxidation with conc. HNO₃ and Oppenauer oxidation (Mechanism).

Phenols: Preparation: (i) from diazonium salts of anilines and (ii) from benzene sulphonic acids. Properties: Acidic nature, formation of phenoxide and reaction with R-X, electrophilic substitution; halogenations, Riemeier-Tiemann reaction (Mechanism), Gattermann-Koch reaction, Schotten-Baumann reaction.

Ethers: Nomenclature, preparation by Williamson synthesis. Chemical properties – inert nature, action of conc. H₂SO₄.

S2-O-3 Carbonyl compounds

6h

Preparation of aldehydes & ketones from acid chlorides, nitriles and carboxylic acids. Special methods of preparing aromatic aldehydes and ketones by Oxidation of arenes. Physical properties – absence of Hydrogen bonding. Reactivity of the carbonyl groups in aldehydes and ketones. Chemical reactivity: Addition of (a) NaHSO₃ (b) HCN (c) RMgX (d) 2,4-DNP (Schiff base). Addition of H₂O to form hydrate, addition of alcohols - hemi acetal and acetal formation. Cannizzaro reaction. Oxidation reactions – KMnO₄ oxidation, reduction – catalytic hydrogenation, mechanism of Clemmensen reduction, Meerwein-Ponndorf-Verley reduction.

Unit - III (Physical Chemistry)

15h (1h/week)

S2-P-1: Electrochemistry

15h

Revision of conductance, specific conductance, equivalent conductance and factors influencing conductance of electrolytes. Ionic mobility, definition and significance of transport number. Kohlrausch's law – its applications: determination of degree of dissociation and acid dissociation constant (K_a) of weak acids, solubility product determination and conductometric titrations. Ostwald's dilution law - its uses and limitations. Debye-Hückel-Onsager's equation for strong electrolytes (elementary treatment only).

Types of electrodes with examples - Types of reversible electrodes - the gas electrode, metal-metal ion, metal-insoluble salt, redox electrodes and ion-selective electrode. Reversible and irreversible cells; Nernst equation – EMF of a cell; representation of a cell-problems; electrode potentials-electrochemical series and its significance. Determination of pH – using quinhydrone and glass electrodes. Potentiometric titrations.

Unit – IV (General Chemistry)

(1h/week)

15h

S2-G-1: Chemical Bonding

5h

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Molecular orbital theory: Shapes and sign convention of atomic orbitals. Modes of bonds. Criteria for orbital overlap. LCAO concept. π and σ overlapping. Concept of Types of molecular orbitals: bonding, antibonding and non-bonding. MOED of homonuclear diatomic molecules - H_2 , N_2 , O_2 , O_2^- , O_2^{2-} , F_2 (unhybridized diagrams only) and heteronuclear diatomics - CO , CN^- , NO , NO^+ and HF , their bond order, stability and magnetic properties.

S2-G-2: Stereoisomerism

5h

Optical activity: Definition, wave nature of light, plane polarized light, optical rotation and specific rotation, chiral centers. Chiral molecules: definition and criteria - absence of plane, center and S_n axis of symmetry - asymmetric and dissymmetric molecules. Examples of asymmetric molecules (Glyceraldehyde, Lactic acid, Alanine) and dissymmetric molecules (trans-1,2-dichlorocyclopropane). Molecules with constitutionally symmetrical chiral carbons (Tartaric acid) Molecules with constitutionally unsymmetrical chiral carbons (2,3-dibromopentane). D, L configuration - examples. R, S - configuration: Cahn-Ingold-Prelog (CIP) rules.

S2-G-3: Colligative Properties

5h

Definition of colligative properties- relative lowering of vapour pressure-Raoult's law; Osmotic pressure; elevation of boiling point and depression of freezing point; thermodynamic relation between molecular weight and colligative property (derivations not required) -Problems.

References

General reference: B.Sc. I Year Chemistry : Semester II, Telugu Academy publication, Hyd.
Unit I

1. Puri, B. R., Sharma, L. R., & Kalia, M. S. (1996). Principles of inorganic chemistry. Vishal Publications.
2. Lee, J. D. (1981). Concise inorganic chemistry (3rd ed.). Oxford University Press.
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1. Glasstone, S., & Lewis, D. (1966). Elements of physical chemistry. Macmillan.
2. Maron, S. H., & Lando, J. B. (1966). Fundamentals of physical chemistry. Macmillan Limited.
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8. Sangaranarayanan, M. V. & Mahadevan, V. (2011). Text Book of Physical chemistry. Univ. Press.

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1. Day, R. A., & Underwood, A. L. (2004). Quantitative analysis (6th ed.). Prentice Hall of India.
2. Atkins, P. W. (2001). Physical chemistry (7th ed.). Oxford University Press.
3. Kapoor, K. L. (2004). Physical chemistry (Vols. 3 & 5). Macmillan Publishers.
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5. Raj, G. (2009). Advanced physical chemistry (35th ed.). Goel Publishing House.

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Syllabus for B.Sc I Yr Chemistry – Semester –II
Paper II – Qualitative Analysis

CHE 181

30hrs (2 h /week)

Paper II- Qualitative Analysis: Semi micro analysis of mixtures
Analysis of two anions (one simple, one interfering) and two cations in the given mixture.

Anions: CO_3^{2-} , SO_3^{2-} , S^{2-} , Cl^- , Br^- , I^- , CH_3COO^- , NO_3^- , PO_4^{3-} , BO_3^{3-} , SO_4^{2-}

Cations: Hg_2^{2+} , Ag^+ , Pb^{2+} ,

Hg^{2+} , Bi^{3+} , Cd^{2+} , Cu^{2+} , $\text{As}^{3+} / \text{As}^{5+}$, $\text{Sb}^{3+} / \text{Sb}^{5+}$, $\text{Sn}^{2+} / \text{Sn}^{4+}$,

Al^{3+} , Cr^{3+} , Fe^{3+}

Mn^{2+} , Co^{2+} , Ni^{2+} , Zn^{2+}

Ca^{2+} , Ba^{2+} , Sr^{2+}

Mg^{2+} , NH_4^+

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