

GOVERNMENT COLLEGE BIROHAR (JHAJJAR)

Summary of Lesson Plans of College Faculty for Academic Session 2025-26

Name of Assistant Professor: Dr. Seely Singh

Class & Sem.: B.Sc. II Year III Sem. Subject: ^{DSC} Fundamental Chemistry III

Months	Topics/Chapters to be covered
Unit - I August 2025	Chemistry of Transition Series elements :- G.C. of transition metals brief discussion of diff. b/w the first, second and third - transition series stability of various oxidat ⁿ states magnetic and spectral properties Binary comp. and complex illust relative stability of their oxidation states. Chem of Ti, V, Cr ^{III} , Fe, Co, Mo and W in various oxidat ⁿ states, some imp. comp as laboratory reagents Potassium dichromate potassium permanganate Potassium ferrioxalate, potassium ferrioxalate Sodium nitroprusside and Sodium cobaltinitrite
September 2025 Unit II -	Thermodynamics - II :- Third law of therm. Nernst heat theorem concept of residual entropy, evaluation of absolute entropy from heat capacity data. Gibbs & Helmholtz funct ⁿ Gibbs function (G) and Helmholtz funct ⁿ (H) as therm. quantities, ΔG as criteria for spontaneity, therm. eq. and their advantage over entropy change Variat ⁿ of G and A with P, V and T, partial molar quantities.
Unit - III October 2025	Electrochemistry :- Arrhenius theory of ionization Ostwald's Dilution Law. Debye - Hückel - Onsager's eq. for strong electrolytes, transport number definition and determination by Hittorf's method Electro cond. Factors aff. elec. cond. Appl. of cond. measure deter. of dissociation const. (K _a) and degree of dissociation deter. of sol. prod. of sparingly soluble salts, cond. tit. Defin. of pH and pK _a buffer solut, buffer action Hender Has. eq. buff. mec. of buff. action. Reversible electrodes :- Metal-M. ion gas ele., met-M insol Salt anion elec. & redox electrode. Alkyl and Aryl Halide :- Alkyl halide: Nomenclature and classes of alkyl halide general methods of preparat ⁿ , physical prop. & Chem. rxn. mech. (S _N 1 S _N 2 E1 E2 & E1cB) and stereochem. of nucle. sub. rxn. of alkyl halide with energy prof. diag. elem. vs Sub rxn. Aryl halide :- M.O. of preparat ⁿ rxn. Aromatic nucle. subst. and eff. of sub. on react ⁿ Benzene mechanism. $\text{KNO}_2 / \text{HNO}_2$ reagent and relative strength of halogen bond in alkyl allyl benzyl vinyl and aryl halides.
November 2025 Unit - IV	

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Name of Assistant Professor: Dr. Seelu Singh

Class & Sem.: B.Sc II Year III Sem Subject: SEI Paper - III Batteries

Months	Topics/Chapters to be covered
August 2025	<u>Basic Concept :- Unit - I</u> Components of Cells and batteries, classification of Cells and batteries, operation of Cells, theoretical Cell voltage, capacity, energy, Specific energy and energy density of practical batteries
September 2025	<u>Battery Design and factors Affecting Performance :- Unit - II</u> General introduction, designing to eliminate potential safety problems, battery safeguard when using discrete batteries, battery construction, design of rechargeable batteries, factors affecting battery performance
October 2025	<u>Primary Batteries :- Unit - III</u> General characteristics and applications of primary batteries, types and charat of primary batteries, comparison of the performance of characteristics of primary battery system, recharge primary batteries (A) Zinc Carbon Batteries General charat, Cell Chemistry, type of Cells and batteries, Construction, Cell components (B) Magnesium and Aluminum Batteries - General Char. Construction of Mg/MnO ₂ batteries, Size & types of Mg/MnO ₂
November 2025	<u>Secondary Batteries :- Unit IV</u> General charat and application of Secondary batteries, type and characteristic of secondary batteries, comparison of performance charat for secondary battery syst and intro. chemistry, construction, performance charat. charging charat of following batteries Lead batteries, Lithium ion batteries, Iron electrode batteries, Nickel - Cadmium, Nickel Metal hydride, Nickel - Zinc batteries.

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Name of Assistant Professor: Dr. Seethu Singh

Class & Sem.: B.Sc. III Year V Sem Subject: Chemistry Physical

Months	Topics/Chapters to be covered
Unit - I August 2025	B. Radiation, Planck's law, Photoelectric effect, heat capacity of Solids Compton effect, wave funct ⁿ and its sign, Postulates of quat. Mec., quant. Mec. operator, Commut ⁿ relat ⁿ , Hermitian operator, Hermitian ope. average values of Square of Hermitian as a positive quantity Role of ope. in quantum M. To show quat. Mec. that posit ⁿ and momentum cannot be predicated Simultaneously, Determination of wave funct ⁿ & energy of particle in one dimensional box, pictorial represent ⁿ and its significance.
Unit - II September 2025	Physical Properties and Molecular Structure :- Optics & active polariz ⁿ Orientation of dipoles in an electric field dipole moment included dipole moment meas. of dipole moment - temp method and refractivity method, dipole moment and str. of mole, Magnetic permeability, Magnetic susceptibility and its determinat ⁿ Appli ⁿ of magnetic susceptibility, Magnetic properties Paramagnetism, diamagnetism and Ferromagnetism. Test - I
Unit - III October 2025	Spectroscopy - I Electromagnetic radiat ⁿ , regions of spectrum, basic features of Spect. statement of Born Oppenheimer approximat ⁿ , Degree of freedom Rotational Spectrum :- Diatomic mole., Energy level of rigid rotator, selection rules, spectral intensity distribution using populat ⁿ distribut ⁿ determinat ⁿ of bond length, qualitative description of non-rigid rotor, isotope effect.
Unit - IV November 2025	Vibrational Spectrum :- In. Spectrum Energy level of simple harmonic oscillator, selection rules, pure vibrat ⁿ spectrum, intensity determination of force constant and qualitative relat ⁿ of force constant and bond energies. effects of anharmonic motion and isotopic effect on the spectra idea of vibrational frequencies of diff. At ⁿ gp. Raman Spe. & Concept of polarizability pure rotat ⁿ and pure vib ⁿ R. Sp. of diatomic mole. Sele. rule Q. the of R. Sp.

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Name of Assistant Professor: Dr. Seetu Singh

Class & Sem.: B.A I Year I Sem Subject: Basics of Chemistry - MC

Months	Topics/Chapters to be covered
Unit - I August 2025	<u>Basic Concepts of Chemistry :-</u> Introduction, Dalton atomic theory Concept of atom, element and mole. Matter and its classification chemical and empirical and molecular formula atomic mass, molecular mass, mole concepts, ways of expressing concentration of solution.
Unit - II September 2025	<u>Atomic Structure :-</u> Thomson's model, Rutherford's model, Bohr's model electron, Proton, Neutron and their characteristics atomic number, atomic mass, isotopes, Isobars and Isotones dual nature of matter and light, de Broglie's relationship Heisenberg Uncertainty principle, concept of orbital and spin, Quantum numbers, shapes of s, p and d orbitals, rules for filling electrons in the orbitals, electronic configuration of atoms, extra stability of half-filled and completely filled orbitals. - (Text - I)
Unit - III October 2025	<u>States of Matter :-</u> Introduction to the three states of Matter and intermolecular interaction. Gaseous State: Boyle's law, Charles' law, Gay Lussac's law and Avogadro's law with practical implication. Elementary idea of Kinetic energy, mole speeds, ideal gas equation and deviation from ideal behavior. Liquid State: Melting & boiling points, Vapor pressure, viscosity and Surface tension. Solid State: Gen. characte of Solid state, crystalline and amorphous Solids, classifi. of Crystalline Solids.
November 2025 Unit IV	<u>Chemistry in Everyday Life :-</u> Drugs and their classification with suitable example food adulterants and preservatives artificial sweetening agents, antioxidants, soaps and detergents and their cleansing action. - (Text - II)

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