Pt. Ravishankar Shukla University,

Raipur (C.G.), India 492010

Syllabus

All Subject

Entrance Test – 2025

For University Teaching Departments Admission-2025

Index

Syllabus and Pattern of Entrance Examination 2025-26
M.Sc. Physics and M.Sc. Electronics

Question Pattern

- There will be 50 Multiple Choice Questions.
- Each question will carry 01 mark.
- There is no negative marking.
- The paper will be bilingual (Hindi & English).
- Duration of examination will be one hour.

Syllabus

1. MECHANICS, OSCILLATIONS AND PROPERTIES OF MATTER

Cartesian, Cylindrical and Spherical coordinate system, Inertial and non-inertial frames of reference, uniformly rotating frame, Coriolis force and its applications. Motion under a central force, Kepler's laws. Effect of Centrifugal and Coriolis forces due to earth's rotation, Center of mass (C.M.), Lab and C.M. frame of reference, motion of C.M. of system of particles subject to external forces, elastic, and inelastic collisions in one and two dimensions, Scattering angle in the laboratory frame of reference, Conservation of linear and angular momentum, Conservation of energy.

Rigid body motion, rotational motion, moments of inertia and their products, principal moments & axes, introductory idea of Euler's equations. Potential well and Periodic Oscillations, case of harmonic small oscillations, differential equation and its solution, kinetic and potential energy, examples of simple harmonic oscillations: spring and mass system, simple and compound pendulum, torsional pendulum.

Bifilar oscillations, Helmholtz resonator, LC circuit, vibrations of a magnet, oscillations of two masses connected by a spring. Superposition of two simple harmonic motions of the same frequency, Lissajous figures, damped harmonic oscillator, case of different frequencies. Power dissipation, quality factor, examples, driven (forced) harmonic oscillator, transient and steady states, power absorption, resonance.

Effect of E and B on charge particles, E as an accelerating field, electron gun, case of discharge tube, linear accelerator, Transverse B field, mass spectrograph, principle of a cyclotron. Mutually perpendicular E and B fields, Parallel E and B fields, principle of magnetic focusing lens.

Elasticity: Strain and stress, elastic limit, Hooke's law, Modulus of rigidity, Poisson's ratio, Bulk modulus, relation connecting different elastic- constants, twisting couple of a cylinder (solid and hallow), Bending moment, Cantilever, Young modulus by bending of beam.

Viscosity: Poiseulle's equation of liquid flow through a narrow tube, equations of continuity. Euler's equation, Bernoulli's theorem, viscous fluids, streamline and turbulent flow. Poiseulle's law, Coefficient of viscosity, Stoke's law, Surface tension.

2. ELECTRICITY, MAGNETISM AND ELECTROMAGNETIC THEORY

Gradient of a scalar field and its geometrical interpretation, divergence and curl of a vector field, and their geometrical interpretation, line, surface and volume integrals, flux of a vector field. Gauss's divergence theorem, Green's theorem and Stoke's theorem and their physical significance. Kirchoff's law.

Coulomb's law, Work done on a charge in a electrostatic field expressed as a line integral, conservative nature of the electrostatic field. Relation between Electric potential and Electric field, torque on a dipole in a uniform electric field and its energy, flux of the electric field. Gauss's law and its applications.

Dielectric constant, Polar and Non Polar dielectrics, Dielectrics and Gauss's Law, Dielectric Polarization, Electric Polarization vector P, Electric displacement vector D. Dielectric susceptibility and permittivity, Polarizability and mechanism of Polarization, Lorentz local field, Clausius Mossotti equation, Debye equation.

1

Ferroelectric and Paraelectric dielectrics, Steady current, current density J, non-steady currents and continuity equation, rise and decay of current in LR, CR and LCR circuits, decay constants, AC circuits, complex numbers and their applications in solving AC circuit problems, complex impedance and reactance, series and parallel resonance, Q factor, power consumed by an a AC circuit, power factor.

Magnetization Current and magnetization vector M, three magnetic vectors and their relationship, Magnetic permeability and susceptibility, Diamagnetic, paramagnetic and ferromagnetic substances. B.H. Curve, cycle of magnetization and hysteresis, Hysteresis loss, Biot-Savart's Law and its applications, Ampere's law.

Electromagnetic induction, Faraday's law, electromotive force, Mutual and self inductance, Transformers, energy in a static magnetic field. Maxwell's displacement current, Maxwell's equations, electromagnetic field energy density. The wave equation satisfied by E and B, plane electromagnetic waves in vacuum, Poynting's vector.

3. KINETIC THEORY AND STATISTICAL PHYSICS

The laws of thermodynamics : The Zeroth law, first law of thermodynamics, internal energy as a state function, reversible and irreversible change, Carnot's cycle, carnot theorem, second law of thermodynamics. Claussius theorem inequality, Entropy, The thermodynamic scale of temperature, Third law of thermodynamics, Concept of negative temperature.

Thermodynamic functions, Internal energy, Enthalpy, Helmholtz function and Gibb's free energy, Maxwell's thermodynamical equations, Application of Maxwell's equation, Joule-Thomson cooling, adiabatic cooling of a system, Van der Waals gas, Clausius-Clapeyron heat equation. Blackbody spectrum, Stefan-Boltzmann law, Wien's displacement law, Rayleigh-Jean's law, Planck's quantum theory of radiation.

Maxwellian distribution of speeds in an ideal gas: Distribution of speeds and velocities, experimental verification, distinction between mean, rms and most probable speed values. Doppler broadening of spectral lines. Transport phenomena in gases: Molecular collisions mean free path and collision cross sections. Estimates of molecular diameter and mean free path. Transport of mass, momentum and energy and interrelationship, dependence on temperature and pressure. Behaviour of Real Gases.

Probability and thermodynamic probability, principle of equal a priori probabilities, statistical postulates. Concept of Gibb's ensemble, accessible and inaccessible states. Concept of phase space, Equilibrium before two systems in thermal contact, probability and entropy, Boltzmann entropy relation. Boltzmann canonical distribution law and its applications, law of equipartition of energy.

Bose-Einstein & Fermi-Dirac conditions. Concept of partition function, Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac Statistics and their applications.

4. WAVES, ACOUSTICS AND OPTICS

Waves, Speed of transverse waves on uniform string, speed of longitudinal waves in a fluid, energy density and energy transmission in waves. Waves over liquid surface: gravity waves and ripples. Group velocity and phase velocity, Ultrasonic and infrasonic waves, Reflection, refraction and diffraction of sound, transducers, principle of a sonar system, sound ranging.

Fermat's Principle of extremum path, the aplanatic points of a sphere and other applications. Cardinal points of an optical system, thick lens and lens combinations. Lagrange equation of magnification, telescopic combinations, telephoto lenses. Monochromatic aberrations and their reductions; aspherical mirrors and Schmidt corrector plates.
Interference of light, Thin films. Newton's rings and Michelson interferometer and their applications, Fabry-Perot interferometer.

Diffraction, Types of Diffraction, Fresnel's diffraction, half-period zones, phasor diagram and integral calculus methods, the intensity distribution, Zone plates, diffraction due to straight edge, Fraunhofer

diffraction due to a single slit and double slit. Diffraction at N-Parallel slit. Plane Diffraction grating, Rayleigh criterion, resolving power of grating . Prism, telescope.

Polarization of light, Production of polarized light by reflection, refraction and scattering. Polarization by double refraction and Huygen's theory, Nicol prism, Retardation plates, Production and analysis of circularly and elliptically polarized light.
Basic properties of Lasers, coherence length and coherence time, spatial coherence of a source, Einstein's A and B coefficients, Spontaneous and induced emissions, conditions for laser action, population inversion, Types of Laser : Ruby and, He-Ne laser and. Applications of laser : Application in communication, Holography and Basics of non linear optics and Generation of Harmonic.

5. RELATIVITY, QUANTUM MECHANICS, ATOMIC MOLECULAR AND NUCLEAR PHYSICS

Reference systems, inertial frames, Galilean invariance propagation of light, Michelson-Morley experiment, Ether, Postulates for the special theory of relativity, Lorentz transformations, length contraction, time dilation, velocity addition, variation of mass with velocity, mass-energy equivalence, particle with zero rest mass.

Origin of the quantum theory : Failure of classical physics to explain the phenomena such as black-body spectrum, photoelectric effect, Compton effect, Wave-particle duality, uncertainty principle, de Broglie's hypothesis for matter waves, the concept of Phase and group velocities, Davisson and Germer's experiment. Consequence of de Broglie's concepts, Bohr's atomic model, energies of a particle in a box, wave packets, Uncertainty relation.

Schrodinger's equation, Statistical interpretation of wave function, Orthogonality and normalization of wave function, Probability current density. Operators, expectation values, Ehrenfest's theorem, transition probabilities, applications to particle in a one and three dimensional boxes, harmonic oscillator in one dimension, reflection at a step potential, transmission across a potential barrier.

Spectra of hydrogen, deuteron and alkali atoms spectral terms, doublet fine structure, selection rules. Discrete set of electronic energies of moleculers, quantisation of vibrational and rotational energies, determination of inter-nuclear distance. rotational, vibrational and rotational-vibrational spectra, Transition rules, Dissociation limit for the ground and other electronic state, Raman effect, Stokes and anti-Stokes lines.

Interaction of charged particles and neutrons with mater, working of nuclear detectors, G-M counter, proportional counter and scintillation counter, cloud chambers, spark chamber, emulsions, Structure of nuclei, deuteron binding energy, p-p and n-p scattering and general concepts of nuclear forces, Beta decay, alpha decay and continuous and discrete spectra. Nuclear reactions.

6. SOLID STATE PHYSICS, SOLID STATE DEVICES AND ELECTRONICS

Amorphous and crystalline solids, Elements of symmetry, seven crystal system, Cubic lattices, Crystal planes, Miller indices, Laue's equation for X-ray diffraction, Bragg's Law, Bonding in solids, classification. Cohesive energy of solid, Madelung constant, evaluation of Parameters, Specific heat of solids, classical theory (Dulong-Petit's law), Einstein and Debye theories, Vibrational modes of one dimensional monoatomic lattice, Dispersion relation, Brillouin Zone.

Free electron model of a metal, Solution of one dimensional Schrödinger equation in a constant potential, Density of states, Fermi Energy, Energy bands in a solid (Kronig- Penny model without mathematical details), Difference between Metals, Insulator and Semiconductors, Hall effect, Dia, Para and Ferromagnetism, Langevin's theory of dia and para-magnetism, Curie- Weiss's Law, Qualitative description of Ferromagnetism (Magnetic domains), B-H curve and Hysteresis loss.

Intrinsic and extrinsic semi conductors, Concept of Fermi level, Generation and recombination of electron hole pairs in semiconductors, Mobility of electrons and holes, drift and diffusion currents, p-n junction diode, depletion width and potential barrier, junction capacitance, I-V characteristics, Tunnel diode, Zener

diode, Light emitting diode, solar cell, Bipolar transistors, pnp and npn transistors, characteristics of transistors, different configurations, current amplification factor, FET and MOSFET Characteristics.

Half and full wave rectifier, rectifier efficiency ripple factor, Bridge rectifier, Filters, Inductor filter, L and π section filters, Zener diode, regulated power supply using zener diode, Applications of transistors, Bipolar Transistor as amplifier, h-parameter, h-parameter equivalent circuit, Transistor as power amplifier, Transistor as oscillator, principle of an oscillator and Bark Hausen's condition, requirements of an oscillator, Wein-Bridge oscillator and Hartley oscillator.

Digital Circuits: Difference between Analog and Digital Circuits, Binary Numbers, Decimal to Binary and Binary to Decimal Conversion, AND, OR and NOT Gates (Realization using Diodes and Transistor), NAND and NOR Gates as Universal Gates, XOR and XNOR Gate, De Morgan's Theorems, Boolean Laws, Simplification of Logic Circuit using Boolean Algebra, Digital to Analog Converter, Analog to Digital Converter.

SOS IN ELECTRONICS & PHOTONICS

PT. RAVISHANKAR SHUKLA UNIVERSITY RAIPUR(C.G.)

M TECH IN OPTOELECTRONICS & LASER TECHNOLOGY

SYLLABUS/COURSE CONTENTS FOR M TECH ENTRANCE TEST 2025:

Engineering Mathematics
Linear Algebra, Calculus: vector algebra and vector calculus, Linear differentialEquations, Elementary complex analysis, Fourier Analysis.

Electromagnetics
Electrostatics, Magnetostatics, Electromagnetic waves: reflection and refraction, dispersion, interference, coherence, diffraction, polarization. Waveguides: modesin rectangular waveguides, dispersion relations.

Thermodynamics and Statistical Physics
Laws of Thermodynamics, Thermodynamic potentials and Maxwell's relations. Phase space, Microstates and Macrostates. Black Body radiation & Plank'sdistribution law, Bose-Eienstein condensation.

Optoelectronics
Maxwell's Equations, The planar slab waveguide, Dispersion in waveguides,Graded index waveguides, Dispersion and Graded Index fibers, Attenuation,Nonlinear effects in waveguides, Rectangular Dielectric waveguides, The beampropagation Method for analyzing optical waveguides, Coupling and Numericanalysis, Coupled Mode Theory and Application, Coupling between opticalsources and waveguides, Noise in optical detectors, Optical radiation.

Optics and Lasers
Fermat's Principle and its applications, Refraction and reflection by SphericalSurfaces, Matrix Method in Paraxial Optics, Aberrations, General concepts ofInterference, Diffraction, Polarization, Holography, Lasers : Optical resonators,spontaneous and stimulated emission, Optical pumping, population inversion,Coherence, Simple description of Ruby Laser and He-Ne Laser. Defects andcolor center lasers, Elementary idea of Nano optics, Magnetic Resonance Imaging (MRI), Computer Tomography.

24.3.2025

5

Electronics :
Physics of p-n junction, Diode as a circuit element, clipping, clamping,Rectification, Zener regulated power supply; Transistor as a circuit element: CC,CB and CE configuration. Transistor as a switch, OR, AND, NOT gates. Feedback in Amplifiers.
Operational amplifier and its applications: inverting, non-inverting amplifier, adder,integrator, differentiator, wave form generator, comparator & Schmidt trigger.Digital integrated circuits-NAND & NOR gates as building blocks, X-Or Gate,simple combinational circuits. Half & Full adder, Flip-flop, shift register, counters.Basic principles of A/D & D/A converters; Simple applications of A/D & D/Aconverters.

Electronics Devices
Energy bands in silicon, intrinsic and extrinsic silicon, Carrier transport in silicon:diffusion current, drift current, mobility and resistivity. Generation andrecombination of carriers, p-n junction diode, Zener diode, Tunnel diode, BJT,JFET, MOS capacitor, MOSFET, LED, p-i-n and avalanche photo diode. Devicetechnology: integrated circuits fabrication process, oxidation, diffusion, ionimplanation, photolithograpohy, n-tub , p-tub and twin-tub CMOS process.

Applied Optics
Applied Optics, Holography, Fourier-Transform Optics, Spatial Filtering, SpeckleInterferometry, Birefringence, Electro-optics, Magneto-optics and Acousto-optics,Kerr Effect, Optical Integrated Circuits. Fiber Optics, The optical fiber,comparison of optical fiber with other interconnectors, concept of an opticalwaveguide, rays and modes, principle of light guidance in optical wave guides,Application of fiber optics. nonlinear optics, nonlinear optical susceptibility,second and third order optical susceptibilities, harmonic generation, phasematching, optical mixing, parametric generation of light, self-focusing of light,optical bistability, optical phase conjugation.

REFRENCES Books :
1. Optical Electronics: A. Ghatak & K. Thyagarajan
2. Quantum Electronics: A. Yariv

M. Sc. CHEMISTRY and ENVIRONMENTAL SCIENCE

ENTRANCE EXAMINATION – 2025

Pt. RAVISHANKAR SHUKLA UNIVERSITY, RAIPUR

COURSE CONTENTS

(Based on B. Sc. I, II, III years Chemistry (Inorganic, Organic & Physical) Syllabi of Pt. R.S.U. Raipur)

(Only 50 Multiple Choice Questions will be asked from the following syllabus)

INORGANIC CHEMISTRY
(B.Sc. - I)

UNIT-1
A. ATOMIC STRUCTURE

Idea of de-Broglie matter-waves, Heisenberg Uncertainty principle, Schrodinger wave equation, significance of Ψ and Ψ_2, radial & angular wave functions and probability distribution curves, Atomic orbital and shapes of s, p, d orbital's, Aufbau and Pauliexclusion principles, Hund's Multiplicity rule, electronic configuration of the elements, effective nuclear charges.

B. PERIODIC PROPERTIES
Ionization energy, electron gain enthalpy and electro negativity, trend in periodic table and applications in predicting and explaining the chemical behavior.

UNIT-2 CHEMICAL BONDING

Covalent Bond: Valence bond theory and its limitations, directional characteristics of covalent bond, various types of hybridization & shapes of simple inorganic molecules and ions. Valence shell electron pair repulsion (VSEPR) theory to NH_3, H_3O^+, SF_4, ClF_3, Cl_2 and H_2O I − . M.O. Theory, homonuclear & heteronuclear bond strength & bond energy, percentage ionic character

from dipole moment & electronegativity difference.

UNIT-3 CHEMICAL BONDING

Ionic Solids- Ionic structures, radius ratio & co-ordination number, limitation of radius, ratio rule, lattice defects, semiconductors, lattice energy Born- Haber cycle, Solvation energy and solubility of ionic solids, polarising power & polarisability of ions, Fajans rule, Metallic bond-free electron, Valence bond & band theories.

UNIT-4 A. s-BLOCK ELEMENTS

Comparative study, salient features of hydrides, solvation & complexation tendencies including their function in biosystems and introduction to alkyl & aryls, Derivatives of alkali and alkaline earth metals.

B. CHEMISTRY OF NOBLE GASES

Chemical properties of the noble gases, chemistry of xenon, structure binding in xenon compounds.

UNIT-5 A. p-BLOCK ELEMENTS

Halides hydrides, oxides and oxyacids of Boron, Aluminum, Nitrogen and Phosphorus, boranes, borazines, fullerenes and silicates, interhalogens and pseudohalogens.

B. INORGANIC CHEMICAL ANALYSIS

Chemical principles involved in the detection of acids and basic radicals including interfering radicals

INORGANIC CHEMISTRY
(B.Sc. – II)

UNIT-I CHEMISTRY OF ELEMENTS OF FIRST TRANSITION SERIES

Characteristic properties of d-block elements. Properties of the elements of the first transition series, their binary compounds and complexes illustrating relative stability of their oxidation states, coordination number and geometry.

UNIT-II CHEMISTRY OF ELEMENTS OF SECOND & THIRD TRANSITION SERIES

General characteristics, comparative treatment with their 3d-analogues in respect of ionic radii, oxidation states, magnetic behaviour, spectral properties and stereochemistry.

UNIT-III A. OXIDATION AND REDUCTION
Use of redox potential data analysis of redox cycle, redox stability in water- Frost, Latimert & Pourbaix diagrams. Principles involved in the extraction of the elements.

B. COORDINATION COMPOUNDS
Werner's coordination theory and its experimental verification, effective atomic number concept, chelates, nomenclature of coordination compounds, isomerism in coordination compounds, valencey bond theory of transition metal complexes.

UNIT-IV A. CHEMISTRY OF LANTHANIDE ELEMENTS

Electronic structure, oxidation states and ionic radii and lanthanide contraction, complex formation, occurrence and isolation, lanthanide compounds.

B. CHEMISTRY OF ACTINIDES
General features and chemistry of actinides, chemistry of separation of Np, Pu and Am from uranium, similarities between the later actinides and the later lanthanides.

UNIT-V

A. ACID AND BASES

Arrhenius, Bronsted-Lowry, the Lux-flood, solvent system and Lewis concepts of acids and bases.

B. NON-AQUEOUS SOLVENTS
Physical properties of a solvent, types of solvents and their general characteristics, reaction in non-aqueous solvents with reference to liquid ammonia and liquid sulphur dioxide.

INORGANIC CHEMISTRY
(B.Sc. – III)

UNIT-I
METAL-LIGAND BONDING IN TRANSITION METAL COMPLEXES

Limitations of valence bond theory, an elementary idea of crystal field theory, crystal field splitting in octahedral, tetrahedral and square planar complexes, factors affecting the crystal field parameters. Thermodynamic and kirietic aspects of metal complexes. A brief outline of thermodynamic stability of metal complexes and factors affecting the stability, subsitution reactions of square planar complexes.

UNIT-II MAGNETIC PROPERTIES OF TRANSITION METAL COMPLEXES

Types of magnetic behaviour, methods of determining magnetic susceptibility, spin only formula, L-S coupling, correlation of μ s and μ eff. values, orbital contribution to magnetic moments, application of magnetic moment data for 3d metal complexes. Electronic spectra of Transition Metal Complexes. Types of electronic transitions, selection rules for d-d transitions, spectroscopic ground states, spectro-chemical series. Orgel-energy level diagram for d^1 and d^2 states, discussion of the electronic spectrum of $[Ti(H_2O)_6]^{3+}$ complex ion.

UNIT-III ORGANOMETALLIC CHEMISTRY
Definition, nomenclature and classification of organo metallic compounds. Preparation, properties, bonding and applications of alkyls and aryls of Li, Al, Hg, Sn, & Ti, A brief account of metal-ethylenic complexes and homogeneous hydrogenation, monouclear carbonyls and nature of bodning in metal carbonyls.

UNIT-IV BIOINORGANIC CHEMISTRY
Essential and trace elements in biological processes, metalloporphyrins with special reference to hemoglobin and myoglobin. Biological role of alkali and alkaline earth metals with special reference to Ca21, nitrogen fixation.

UNIT-V HARD AND SOFT ACIDS AND BASES (HSAB)

Classification of acids and bases as hard and soft. Perason's HSAB concept, acidbase strength and hardness and softness. Symbiosis Silicones and Phosphazenes Silicons and phosphazenes as examples of inorganic polymers, nature of bonding in triphosphazenes.

ORGANIC CHEMISTRY
(B.Sc. – I)

UNIT-I ELECTONIC STRUCTURE & BONDING

A. Resonance, Hyperconjugation, Inductive and other field effects, Aromaticity, hydrogen bonding.

B. MECHANISM OF ORGANIC REACTIONS

Homolytic & heterolytic bond breaking, types of reagents-electrhpiles & nucleophiles. Structure and reactivity of reaction intermediates-Carbocation, carbanions free radicals, carbenes and niterenes.

UNIT-2 STEREOCHEMISTRY OF ORGANIC COMPOUNDS

A. Optical Isomerism - enantiomers, diastereomers, threo and erythro meso compound, resolution of enantiomers, inversion, retention and recemization, Relative and absolute configuration, Sequence rules, D and L and R & S systems of nomenclature.

B. Geometrical isomerism - Syn and anti forms, E & Z system of nomenclature, properties of cis-trans isomers.

UNIT-3 ALIPHATIC AND AROMATIC RING COMPOUNDS

A. Cycloalkanes- Nomenclature, methods of formation, chemical reactions, Baeyer's strain theory and its limitations. Ring strain in small rings (cyclopropane and cyclobutane), theory of strainless rigns. The case of cyclopropane ring: banana bonds.

B. Mono-nuclear and polynuclear aromatic ring. Structure of benzene & naphthalene. Molecular formula and Kekule structure. Aromatic electrophilic substitution. General pattern of the mechanism, role of σ and π complexes. Electrophilic substitution in naphthalene.

UNIT-4 ALKENES, DIENES AND ALKYNES
A. Mechanism of dehydration of alcohols.
B. Chemical reactions of alkenes- Mechanisms involved in electrophilic and free radical additions, hydroboration-oxidation, oxymercuration- reduction. epoxidation. Substitution at the allylic and vinylic positions of alkenes. Structure of allenes and butadiene, chemical reaction- 1,2 and 1,4 addition, Diel-Alder reaction. Chemical reactions of alkynes and acidity of alkynes. Electrophilic and nucleophilic addition reactions, hydroboration and oxidation with ozone and $KMnO_4$.

UNIT-5 ARENES AND AROMATICITY

A. Alkyl halides and Aryl Halides
Mechanism and stereochemistry of nucleophilic substitution reactions and alkyl halides and aryl halides with energy profile diagrams. SN1, SN2, SNi mechanisms.
B. Mechanisms and stereochemistry of elimination reaction and alkyl halides.Elimination Vs Substitution.

ORGANIC CHEMISTRY
(B.Sc. – II)

UNIT-I ALCOHOLS

A. Dihydric alcohols - nomenclature, methods of formation, chemical reactions of vicinal glycols, oxidative cleavage [Pb(OAc)4 and HIO4] and pinacol – pinacolone rearrangement.

B. Trihydric alcohols - nomenclature and methods of formation, chemical reactions of glycerol.

PHENOLS

A. Structure and bonding, in phenols, physical properties and acidic character. Comparative acidic strength of alcohols and phenols, resonance stabilization of phenoxide Ion. Reactions of phenols, acylation and carboxylation.

B. Mechanisms of Fries rearrangement, Claisen rearrangement, Gatterman synthesis, Hauben - Hoesch reaction, Lederer - Manasse reaction and Reimer- Tiemann reaction. EPOXIDES Synthesis of epoxides. Catalysed ring opening of epoxides, orientation of epoxide ring opening, reactions of Grignard and organolithium reagents with epoxides. Anti 1,2 dihydroxylation of alkenes via epoxides. Crown eithers.

UNIT-II ALDEHYDES AND KETONES

A. Nomenclature and Structure of the carbonyls group. Synthesis of aldehydes and ketones using 1,3 - dithianes, synthesis of ketones from nitriles. Mechanism of nucleophilic additions to carbonyls group Benzoin, Aldol, Perkin and Knoevenagel condensations. Condensations with ammonia and its derivateves, Wittig reaction, Mannich reaction.

B. Use of acetate as protecting group, Oxidation of aldehydes, Baeyer – Villiger oxidation of ketones, Cannizzaro reaction, MPV, Clemmensen Condensation, Wolff-Kishner reaction, LiAIH4 and NaBH4 reduction. Halogenation of enolizable ketones. An introduction to α,β unsaturated aldehydes and ketones.

UNIT-III A. CARBOXYLIC ACIDS

Structure and bonding, Physical properties, acidity of carboxylic acids, effects of substituents on acid strength. Hell-Volhard Zeilinsky reaction. Reduction of carboxylic acids. Mechanism of Decarboxylation. Methods of formation and chemical reactions of unsaturated mono carboxylic acids. Di carboxylic acids : methods of formation and effect of heat and dehydrating agents.

B. SUBSTITUTED CARBOXYLIC ACIDS

Hydroxy and Halo-substituted Acids.

C. CARBOXYLIC ACID DERIVATIVES

Structure of acid chloredes, esters, amides and acid anhydrides. Relative stability of acyl derivatives. Physical properties, interconversion of acid derivatives by nucleophilic acyl substitution. Mechanisms of acid and base catalyzed esterification and hydrolysis.

UNIT-IV ORGANIC COMPOUNDS OF NITROGEN

A. Preparation of nitroalkanes and nitroarenes. Chemical reactions of nitroalkanes. Mechanisms of nucleophilic substitution in nitroarenes and their reduction in acidic, neutral and alkaline medium.

B. Reactivity, Structure and nomenclature of amines, physical properties. Stereochemistry of amines. Separation of mixture of primary, secondary and tertiary amines. Structural features affecting basicity of amines. Prepatation of alkyl and aryl amines (reduction of nitro compounds, nitriles), reductive amination of aldehydic and ketonic compounds. Gabriel - phthalimide reaction, Hofmann bromamide reaction, Reactions of amines, electrophilic aromatic substitution in aryl amines, reactions of amines with nitrous acid. Synthetic transformations of aryl diazonium salts, azo coupling.

UNIT-V HETEROCYCLIC COMPOUNDS

A. Introduction

Molecular orbitl picture and aromatic character of pyrrole, furan, thiophene and pyridine, methods of synthesis and chemical reactions with emphasis on the mechanism of electrophilic substitution. Mechanism and nucleophilic substitution reaction in pyridine derivatives. Comparison of basicity of pyridine. Piperidine and pyrrole.

B. Preparation and reaction of Indole, quinoline and isoquinoline and with special reference to Fisher Indole synthesis and skraup synthesis and Bisher- Napieralski synthesis, Mechanism of electrophilic substitution reactions of indole, quinoline and isoquinoline. Amino acids and Peptides : A. Classification, Structure and stereochemistry of amino acids. Acid-base behaviour, isoelectric point and electrophoresis. Preparation and reaction of α- amino acids.

B. Structure and nomenclature of peptides. Peptide synthesis, solid - phase peptide synthesis.

ORGANIC CHEMISTRY
(B.Sc. – III)

UNIT-I A. ORGANICMETALLIC COMPOUNDS

Organomegenesium compounds : Grignard reagents-formation, structure and chemical reactions. Organozinc compounds : formation and chemical reactions. Organolithium compounds : formation and chemical reactions.

B. Organosulphur Compounds

Nomenclature, structural features, methods of formation and chemical reactions of thiols, thioethers, sulphonic acids, sulphonamides and sulphaguanidine. Organic Synthesis via Enolates Active methylene groupalkylation of diethylmalonate and ethyl acetoacetate. Synthesis of ethyl acetoacetate : the Claisen condensation. Keto-enol tautomerism of ethyl acetoacetate.

13

UNIT-II BIOMOLECULES

A. Carbohydrates :
Configration of monosaccharides, threo and erytho diastereomers. Formation of glycosides ethers and esters Determination of ring size of monosaccharides. Cyclic structure of D(+) glucose. Structure of ribose and deoxyribose. An introduction to disaccharides (maltose, sucrose and lactose) and polysaccharides (starch and cellulose) without involving structure determination.

B. Proteins and Nucleic acids
Classification and structure of protein levels of protein structure, protein denaturation / renaturation, Constituents of amino acids Ribonucleicsids and ribouncleotieds, double helical structure of DNA.

UNIT-III A. Synthetic Polymers

Addition or chain growth polymerization. Free radical vinyl polymerization, Ziegler- Natta polymerization, Condensation or Step growth polymerization, Polyesters, polyamides, phenols-formaldehyde resins, urea- formaldehyde resins, epoxy resins and polyurethanes, natural and synthetic rubbers.

B. Synthetic Dyes
Colour and constitution (Electronic Concept). Classification of Dyes. Chemistry of dyes. Chemistry and synthesis of Methyl Orange, Congo Red, Malachite Green, Crystal Violet, Phenolphthalein, fluorescein, Alizarine and Indigo.

UNIT-IV SPECTROSCOPY

A. Mass spectroscopy : mass spectrum fragmentation of functional groups

B. InfraRed Spectroscopy : IR absorption Band their position and intensity,
Identification of IR spectra.
C. UV-Visible Spectroscopy : Beer Lambert's law, effect of Conjugation λ max Visible spectrum and colour.
D. Anthocyanin as natural colouring matter (Introduction only)
E. Application of Mass, IR, UV-Visible Spectroscopy to organic molecules.

UNIT-V
A. NMR Spectroscopy : Introduction to NMR. Shielding and Number of signal in PMR, Chemical shift and characteristic values, spiltting of Signals and Coupling constant. Application to organic molcules.

B. 13CMR Spectroscopy : Principal & Application

C. Magnetic Resonance Imaging (MRI)- Introductory idea.

PHYSICAL CHEMISTRY
(B.Sc. – I)

UNIT-1 MATHEMATICAL CONCEPTS FOR CHEMIST AND COMPUTER

A. Logarithmic relations, curve sketching linear graphs, Properties of straight line, sloped and intercept, Differentiation of functions, Partial differentiation, Integration of some useful and relavant functions, Maxima and minima, Permutation and combination, Probability.

B. General introduction to computers, components of computer, hardware and software, input and output devices; binary numbers, Introduction to computer languages, Programming, Operation systems.

UNIT-2 A. MOLECULAR VELOCITIES :

Root mean square velocity average and most probable velocities, Maxwell's law of distribution of molecular velocites of gases, (Graphical interpretation), effect of temperature on distribution of molecular velocities, collision frequency, mean free path, Joule- Thompson effect, Liquification of gases.

B. Deviation from ideal behavior, Real gases, Vander Waal equation of state, Relationship, Vander waal constant and critical constants, Law of corresponding state.

UNIT-3 A. LIQUID STATE
Inter molecular forces, magnitude of intermolecular force, structure of liquids, Properties of liquids, viscosity and surface tension. B. Ideal and non ideal solutions, modes of representing concentration of solutions, activity and activity coefficient. Dilute solution : Colligative Properties, Lowering of vapor pressure of solvent, Roults law, Osmosis, Vant Hoff Theory of dilute solutions, measurements of Osmotic pressure, relationship between lowering of vapour pressure and osmotic pressure. Elevation of boiling point, Depression in freezing point, abnormal molar masses, Depress of dissociation and association of solutes, Vant Hoff factor.

UNIT-4 A. LIQUID CRYSTALS :

Defference between liquid Crystal, solids and liquids, Classification, Structure of nematic and cholestic phases, Thermography, Seven segment cell, applications of liquid Cristals.

B. COLLOIDAL STATE :

Classification, Optical, Kinetic, and Electrical Properties of colloid, Coagulation, Handy Schulze law, flocculation value, Protection, Gold number, Emulsion, micelle. Gel, Syneresis and thixotrophy, Application of colloid.

C. SOLID STATE

Space lattices, unit cells, Elements of Symmetry in crystallize solids, X-rays diffraction, Mills indices, identification of unit cell by Broggs Spectrometer, Powder method, Neutron and electron diffraction (Elementry idea only)

UNIT-5 A. CHEMICAL KINETICS

Rate of reaction, Factors influencing rate of reaction, rate constant, Order and molecularity of reactions, Zero, first and second order reaction, methods of determining order of reaction, Complex reactions : Consecutive, opposing and side reactions, Chain reactions. Temperature dependence of raction rate, Arrhenius theory, Physical significance of Activation energy, collision theory, demerits of collision theory, non mathematical concept of transition state theory.

B. CATALYSIS :

Homogeneous and Heterogeneous Catalysis, types of catalyst, characteristic of Catalyst, Enzyme Catalysed reactions, Micellor catalysed reactions, Industrial applications of Catalysis.

PHYSICAL CHEMISTRY
(B.Sc. – II)

UNIT-I A. Thermodynamics - I

Fundamental of thermodynamics system, surroundings etc. Types of systems, intensive and extensive properties, state and path functions themodynamic operations Internal energy, enthalpy, Heat capacity of gases at constant volume and at constant pressure and their relationship. First Law of Thermodynamics limitation of first law. Joule-Thompson expansion, inversion temperature of gases. Calculation of w,q, dU & dH for the liquification expansion of ideal gases under isothermal and adiabatic conditions.

B. Thermo chemistry

Standard state,- Hess's law of heat summation. Enthalpy of reaction at constant pressure and constant volume. Enthalpy of neutralizations. Enthalpy ofcombustion, Enthalpy of formation, Calculation of Bond enthalpy. Elirchhoff's equation.

UNIT-II A. Thermodynamics-II

Second Law of Thermodynamics : Spontaseous process need of second law, statements of Carnot cycle and effciency of heat engine, Carnot theorem. Thermodynamic state of temperature. Concept of entropy : entropy change in a reversible and irreversible process, Entropy change in insothermal reversible expansion of an ideal gas, Entropy change in isothermal mixing of ideal gases, physical signification of entropy.

B. Gibbs and Helmholtz free energy variation of G and A with pressure, volume temperature, Gibbs Helmholtz equation.

UNIT-III PHASE EQUILIBRIUM

A. Gibbs Phase rule, Phase components and degree of freedom, Limitation of phase rule. Applications of phase rule to one component system - water system, suplhur system. Application of phase rule to two component systems : pb-Ag system, Zn, Mg system, ferric chloride-water system, desilverization of congruent and incongruent, melting point, eutectic point. Three component systems : solid solution liquid pairs. Liquid liquid mixture : (Partially miscible liquids) : phenol-water, trimethylaminewater nicotine systems, constant temperature, azeotrops.

B. Nerst distribution law, Henry's law, application, solvent extraction.

UNIT-IV ELECTROCHEMISTRY-I

A. Electrolytic Conductance : Specific and equivalent conductance, measurement of equivalent conductance, effect of dilution on conductance, kohlrausch's law; application of kohlrausch's law in determination of dissociation constant of weak electrolyte, solubility of sparingly soluble electrolyte, absolute velocity of ions, ionic product of water, conductometric titration.

B. Theories of strong electrolytes : limitations of ostwald dilution law, weak and strong electrolyte, Debye-Huckel- Onsagar (DHO) equation for strong electrolyte, relaxation and electrophoretic effect.

C. Migration of ions : Transport number, definition and determination by Hittorf method and moving boundary method.

UNIT-V ELECTROCHEMISTRY-II

A. Electrochemical cell or Galvanic cell : reversible and irreversible cells conventional representation of electrochemical cells, EMF of the cell, the effect of temperature on EMF of the cell, Nernst equation, calculation of G, Δ H and Δ S for cell reaction.

B. Single electrode potential: standard hydrogen electrode, calomel electrode quinhydrone electrode, redox electrodes, electrochemical series.
C. Concentration cells with & without transport, liquid junction potential, application of concentration cell in determining valency of ions, solubility product, activity coefficient.

D. Determination of pH and pKa using hydrogen and quinhydrone electrode potentiometric titrations, buffer solutions; Henderson-Hazel Equation, Hydrolysis of salts, Corrosion: type theories and prevention.

PHYSICAL CHEMISTRY
(B.Sc. – III)

UNIT-I QUANTUM MECHANICS

Black body radiation, Plank's radiation law, photoelectric effect, Compton effect. DeBroglie's idea of matter waves, experimental verification Heisenberg's uncertainty principle, Sinosoidal wave equation, Operators : Hamiltonian operator, angular momentum operator, laplacian operators postulate of quantum mechanics Eigen values, Eigen function. Schrodinger time independed wave equation physical significance of Ψ and $\Psi2$. Applications of schrodinger wave equation : particle in one dimensional box Hydrogenation (separation into three equation's) radial wave function and angular wave function.

UNIT-II QUANTUM MECHANICS-II

Quantum mechanical approach of molecular orbit theory; basic idea criteria for forming M.O and A.O, LCAO approximation, formation of H2+ ion, calculation of energy levels from wave functions bonding and antibonding wave functions concept of σ, σ^*, π and orbitals and their characteristics, Hybrid orbital : SP, SP2, SP3, Calculation of coefficients Ads used in these hybrid orbitals. Introduction to valence bond model of H2, Comparison of M.O. and V.B. model, Huckle theory, application of huckel theory to ethane propene etc.

UNIT-III SPECTROSCOPY-I

A. Introduction, characterization of electromagenetic radiation, regions of the spectrum, representation of spectra width and intensity of spectral transition, rotational spectra of calculated diatomic molecules, energy level of rigid rotator, selection rule, determination of bond length qualitative description of non – rigid rotator isotopic effect.

B. Vibrational spectra - Fundamental vibrational and their symmetry, vibrating diatomic molecules, enegy levels of simple harmonic oscillator. Selection Rule, Pure vibrational Spectrum, determination of force constant, diatomic vibrating operator. Anhormonic Oscillator.

C. Raman Spectra : Concept of polarizability, quantum theory of Raman spectra stokes and anti stokes lines pure rotational and vibrational Raman spectra, Application of Raman spectra stokes and anti stokes lines, pure rotational and vibrational Raman apectra, Applications of Raman spectra.

UNIT-IV SPECTROSCOPY-II

A. Electronic Spectra : Electronic Spectra of diatonic molecule, Frank London principle, types of electronic transitions. Applications of electronic spectra. B. Photo-chemistry : Interaction of radiation with matter, difference between thermal and photochemical processes. Laws of photochemistry. Grothus-Drapper law, Stark-Elinstein law, Jablonski diagram depicting various process occurring in the excited state, qualitative description of fluorescence, occurring in the excited state, qualitative descripiton of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing), quantum yield photosensitized reactions energy transfer processes (simple examples).

UNIT-V A. Thermodynamics

Energy refered to absolute zero, third law of therodynamics Test of III law of thermodynamics Nerst heat theorem application and limitation of Nerst heat theorem.

B. Physical properties and molecular structure : polarization of molecules, {Classius-Mosotti equation. orientation of dipoles in an electric field. Dipole moment, induced dipole moment, measurement of dipole moment. Temperature methods and refractivity methods. Dipole moment and molecular structure.

C. Magnetic Properties : Parmagenetism diamagnetism, ferromagnetism. Determination of magnetic susceptibility, elucidation of molecular structure.

Head
School Of Studies In Chemistry
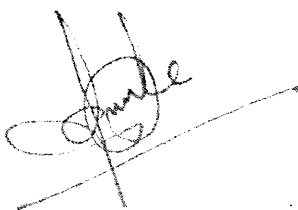Pt. Ravishankar Shukla University
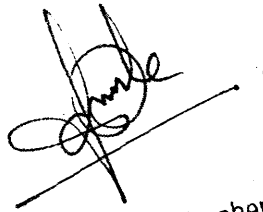RAIPUR (C.G.)

Syllabus of M.Ed. Entrance Test 2024-25
Institute of Teachers Education
Pt. Ravishankar Shukla University, Raipur, C.G.

- Education: Nature and Meaning, its objectives.

- Philosophy and Education: Relationship and Implications.

- Western Philosophy and Thinkers: Idealism, Realism, Naturalism, Pragmatism and Humanism, Plato, Aristotle, Rousseau, Dewey, Gramsci and Friere.

- Indian Philosophy and Thinkers: Advaita, Jainism, Buddhist, Gandhi, Tagore, Gijju Bhai, Vivekanand, Aurobindo and J.Krishna Murthy.

- Critical and Comparative study of the period and Socio- political perspective of the western and Indian Thinkers.

- Concept, Aims, Objectives and scope of Nai-Talim.

- Main Principle of Basic Education.

- Diversity in Indian society, especially in Chhattisgarh.

- Social stratification.

- Social discrimination, exclusion and exploitation.

- Psychology: Its meaning, nature, methods and scope; functions of educational psychology.

Institute of Teachers Education
Pt. Ravishankar Shukla University
Raipur (C.G.)

20

- Curriculum, syllabi and textbooks.

- Types of curriculum: Liberal curriculum, Vocational curriculum.

- Gender, sex, sexuality, patriarchy, masculinity and feminism.

- Gender bias, gender role and stereotyping and its consequences.

- Distinction between 'Assessment of Learning' and 'Assessment for Learning.

- Dimensions and levels of learning.

- Teaching Methods.

- Micro teaching.

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Pt. Ravishankar Shukla University, Raipur (C.G.)

Syllabus for M. Com Entrance Exam 2025-26

UNIT I: Financial Accounting

Development, Definition, Needs, Objectives, Basic Accounting Principle, Concept and Conventions, Accounting Standard: National & International, Concept of Single and Double Entry System, Books of Original Records, Journals, Ledger, Sub Division of Journal Cash Book (including GST Transaction) and Trial Balance, Manufacturing Accounts, Trading Accounts, Profit and Loss Accounts, Balance sheet, Adjustment Entries, Rectification of Errors, Computerized Accounting System.

UNIT – II: Corporate Accounting

Issue, Forfeiture and reissue of shares, Issue and Redemption of Debentures, Financial Statements and Final Accounts (as per Company Act 2013), Liquidation of Company, Accounting of Amalgamation and Internal Reconstruction of Company, Consolidated Balance sheet of Holding Company with one Subsidiary only.

UNIT – III: Cost & Management Accounting

Concept and Nature of Cost Accounting, Elements of Cost, Unit Output Costing, Contract Costing, Service Costing, Emerging Trends in Cost Accounting,

Concept of Management Accounting, Ratio Analysis, Fund Flow Statement, Cash Flow Statement (as per AS-3), Absorption & Marginal Costing (including Break-even analysis), Responsibility Accounting.

UNIT – IV: Direct and Indirect Tax

General Introduction of Income Tax, Basic Concepts: Important Definitions, Residential Status, Computation of Total Taxable Income & Tax Liability of Individual, Concept of Advance Tax, Concept of Indirect Tax including GST.

UNIT – V: Auditing:

Meaning, Objectives & Types of Audit, Internal Check System, Vouching – Verification of Assets and Liabilities, Auditor's Report, Recent Trends in Auditing, Company Auditors, Special Audit of various Institutes.

UNIT VI: Business Law

Law of Contract (1872) – Nature of Contract Classification, Offer and Acceptance, Capacity of parties to Contract, Free Consent, Considerations, Agreement Declared Void, Performance of Contract, and Discharge of Contract.

Negotiable Instrument Act (1881), Sale of Goods Act (1930), The Consumer Protection Act (2019)

UNIT – VII: Company Law and Secretarial Practice

Introduction: Definition of Company, Characteristic and Limitations, Memorandum of Association, Article of Association, Kinds of Company, Social Responsibility of Corporate, Prospectus.

Company Secretary – Appointment, Legal position and Qualification, Rights, Duties and Liabilities

Company Meetings – Kinds, Notice, Quorum, Agenda, Voting Rights, Proxy, Resolutions, Minutes, Role of Company Secretary in Company's Meeting.

UNIT – VIII: Principle of Business Management

Concept of Management, Development of Management Thought, Function of Management – Planning, Organizing, Staffing, Directing and Controlling, Scientific Management and Management by Objectives.

UNIT – IX: Business Statistics

Introduction to Statistics: Meaning, Scope, Importance and Limitation,

Collection of data: Primary and Secondary Data, Editing of Data, Classification of Data, Frequency Distribution and Statistical Series.

Measures of Central Tendency, Dispersion and Skewness, Correlation and Regression Analysis.

UNIT – X: Business Environment:

Meaning, Definition, Components, Business Scope, Economic Problem of Growth- Inflation, Parallel Economy, Industrial Sickness

Foreign Direct Investment (FDI) and Portfolio Investment (PFI), General Agreement of Trade and Tariff, World Trade Organisation, Foreign Exchange Management Act (FEMA) 2000.

SYLLABUS FOR ENTRANCE EXAM 2025-26
BACHELOR OF VOCATION IN RENEWABLE ENERGY TECHNOLOGY & MANAGEMENT
PT. RAVISHANKAR SHUKLA UNIVERSITY
RAIPUR, CHHATTISGARH

The question paper for entrance test will comprise of 50 questions from General Science, Environment & Climate Change, Current Affairs & General Aptitude, Govt sensitization schemes for Youth as Swacchh Bharat Mission, Digital India, Make in India and other, Proficiency in English, Analytical reasoning, Quantitative ability.

WORK ENERGY AND POWER

Work done by force, energy, power, Elastic collisions, Potential energy, Gravitational potential energy and its angular conversion to kinetic energy, Potential energy of a spring.

CURRENT ELECTRICITY

Electric current, Ohm's law, Kirchoff's laws, resistances in series and parallel, temperature dependence of resistance, wheat stone bridge, and potentiometer. Measurement of voltages and currents.

ELECTROMAGNETIC INDUCTION AND ALTERNATING CURRENT

Magnetic flux, Electromagnetic induction induced emf Faraday's law, Lenz's law, self and mutual inductance, Alternating currents impedance and reactance growth and decay of current in L-R circuit, elementary idea of dynamo and transformer.

SEMICONDUCTOR

Elementary ideas of conductor, semiconductor and insulator, intrinsic and extrinsic semiconductors, Diode, transistor, oscillator, digital circuit and logic gates.

BASICS OF RENEWABLE ENERGY

Introduction to Energy, Types of renewable sources, effect of renewable on environment, Photoelectric effect, PV technologies, Solar Spectrum, History & Basics of the Technologies, Renewable energy in Indian & world Context, Government Plans related to renewable energy sources, Biomass , Green House effect

COORDINATOR
Institute of Renewable Energy Technology & Management
Pt. Ravishankar Shukla University, Raipur (C.G.)- 492010

(24)

SYLLABUS FOR ENTRANCE EXAM 2025-26
MASTER OF SCIENCE IN RENEWABLE ENERGY TECHNOLOGY
PT. RAVISHANKAR SHUKLA UNIVERSITY
RAIPUR, CHHATTISGARH

The question paper for entrance test will comprise of 50 questions from General Science, Environment & Climate Change, Current Affairs & General Aptitude, Govt sensitization schemes for Youth as Swacchh Bharat Mission, Digital India, Make in India and other, Proficiency in English, Analytical reasoning, Quantitative ability.

BASICS OF RENEWABLE ENERGY

Introduction to Energy, Types of renewable sources, effect of renewable on environment, Photoelectric effect, PV technologies, Solar Spectrum, History & Basics of the Technologies, Renewable energy in Indian & world Context, Government Plans related to renewable energy sources, Biomass, Green House effect, Climate Change.

ElECTRONICS

Intrinsic and Extrinsic semiconductors, concept of Fermi level, Generation and recombination of electron hole pairs in semiconductors, Mobility of electrons and holes, drift and diffusion currents, p-n junction diode, Depletion width and potential barrier, junction capacitance, I-V characteristics, Tunnel diode, Zener diode, Light emitting diode, solar cell, Half and full wave rectifier, rectifier efficiency ripple factor, bridge rectifier, filters, L and π section filters. Bipolar transistors, pnp and npn transistors, characteristics of transistors, different configurations, Applications of transistors current amplification factor, FET and MOSFET Characteristics.

Digital Circuits: Difference between analog and digital circuits, Binary Numbers, Decimal to Binary and Binary to Decimal conversion, AND OR and NOT Gates, NAND nad NOR Gates as Universal Gates, XOR and XNOR Gate, De Morgan's theorems, Boolean Laws, Simplification of logic circuit using Boolean Algebra, Digital to Analog and Analog to Digital Converter.

CURRENT ELECTRICITY

Electric current, Ohm's law, Kirchoff's laws, resistances in series and parallel, temperature dependence of resistance, wheat stone bridge, and potentiometer. Measurement of voltages and currents.

ELECTROMAGNETIC INDUCTION AND ALTERNATING CURRENT

Magnetic flux, Electromagnetic induction induced emf Faraday's law, Lenz's law, self and mutual inductance, Alternating currents impedance and reactance growth and decay of current in L-R circuit, elementary idea of dynamo and transformer.

ENVIRONMENTAL STUDIES

Definition and composition- Lithosphere, Hydrosphere, Biosphere, Hydrological cycle. Resources and wealth : Meaning Types of resources, Use of Technology and its impact on Natural Environment Man made industrial waste.

Environmental Management: Meaning development and environmental linkages, Environmental concerns in India. Action for environmental protection- National and International initiatives, Emerging environment management strategies, Indian initiatives, Environmental protection Movements and NGOs in India.

(26)

Syllabus of Entrance Exam for M.Sc.(IT)

Data Representation

Data types, number systems, fixed point representation, 1's and 2's complements, Binary fixed point representation, arithmetic operation on binary operation, overflow and underflow, codes, ASCII, EBCDIC codes, Grey codes, Excess-3, BCD codes, Error detection and correcting codes. Logic gates AND, OR, NOT, gates and their truth tables, MOR, NAND and XOR gates, Boolean algebra, basic Boolean Law, demorgan's theorem, Map Simplification, Minimizing technique, K-Map, Sum of product, Product of sum. Combinational and sequential circuits, binary adder, substractor, Flip flop, shift register, encoder, decoder, comparator, Multiplexer, Demultiplexer.

Computer Fundamentals

Computers – Introduction, Development of Computers, Types of Computers, Generations of Computers; Input Device; Output Devices; Central Processing Unit; Storage Devices; Computer Softwares. Operating System – Introduction, Uses of OS, Functions of OS, Booting process, Types of Reboot, Booting from different OS, Types of OS, DOS, Windows, Linux.

Programming language C & C++

Overview of C, Data Types, Constants and Variables, Operators and Expressions, Control Structures and Loops, functions, Storage class, Arrays & Pointes, Structures and Unions. Introduction to OOPS, Data Structure - Stack, queues, link lists, tree, sorting and searching.

Communication, Networks and Internet

Communication – Introduction, Communication process, Communication Types, Communication Protocols, Communication Channels/Media. Introduction to Network and Types; Topology. Brief overview of the OSI and TCP/IP model, switching, IP Addressing. Internet –Introduction, Internet Service Provider, ARPANET and Internet, Services Available on Internet - File Transfer Protocol, HTTP, E-mail, WWW, Website, Webpage, Applications of Internet.

Office Automation

Word : Creating and Formatting, Advanced Features, Mail Merge, Table & Charts. *Excel* : Worksheet Basics, Working with Formula & Cell referencing, Graphs & Charts, Function and Macros. *Power Point* : Creating a presentation, Modifying visual Elements, Adding objects, Applying Transitions, animations and linking, Preparing handouts, presenting a slide show.

Data Base Management System

Purpose of database systems, views of data, Database Languages, Database Administrator and User, Database System Structure, Data Models, concept of Keys, Relational Algebra, Normalization, SQL.

27

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Raipur 492 010, Chhattisgarh

Syllabus

Entrance Test
for
M.Sc. in Biotechnology

Session
2025-2026

Syllabus for M.Sc. Entrance Test in Biotechnology

The cell (Prokaryotic & Eukaryotic):
The cell envelope: Plasma membrane; bilayer lipid structure; functions; the cell wall. Ultra structure and function of nucleus: nuclear membrane; nucleolus and other organelles: Golgi bodies, ER, peroxisomes, Vacuoles. Cell divisions (Mitosis & Meiosis)

Chromosome organization:
Morphology; centromere and telomere; chromosome alterations; deletions, duplications, translocations, inversions; variations in chromosome number aneuploidy, polyploidy; sex chromosomes

DNA the genetic material:
DNA structure; replication; DNA- protein interaction; the nucleosome model; genetic code; satellite and repetitive DNA. Extranuclear genome: Presence and function of mitochondrial and plastid DNA; plasmids.

Gene expression:
Structure of gene; transfer of genetic information; transcription, translation, protein synthesis; tRNA; ribosomes; regulation of gene expression in prokaryotes and eukaryotes; proteins, 1D, 2D and 3D structure.

Genetic variations:
Mutations, spontaneous and induced; transposable genetic elements; DNA damage and repair: Genetic inheritance: Mendelism; laws of segregation and independent assortment: linkage analysis; allelic and non-allelic interactions.

Genetic engineering:
Tools and techniques of recombinant DNA technology; cloning vectors; genomic and cDNA library; transposable elements; techniques of gene mapping and chromosome walking

Plant biotechnology:
Functional definition; basic aspects of plant tissue culture; cellular totipotency, differentiation and morphogenesis; biology of *Agrobacterium*; vectors for gene delivery and marker genes; salient achievements in crop biotechnology
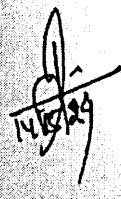
Microbiology:
General and Applied microbiology; Microbiology of Domestic water and sewage; Microbiology of milk and milk products; Industrial microbiology
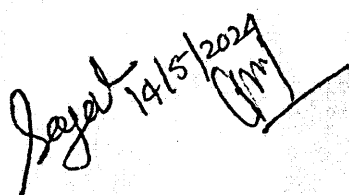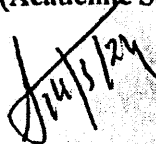
Biochemistry:
Amino acids and Peptides - Basic structure and biological function, Carbohydrate and its metabolism - Glycogenesis; Gluconeogenesis; glycolysis, Glycogenolysis Lipids - Basic structure and biological function.
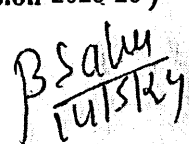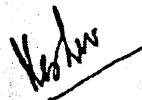
Techniques in Biotechnology:
Principles and techniques about the following pH meter; Colorimeter; Microscopy- Light microscopes, Phase contrast and Electron microscopes; Centrifugation; Separation of bio-molecules by chromatography and Electrophoresis.
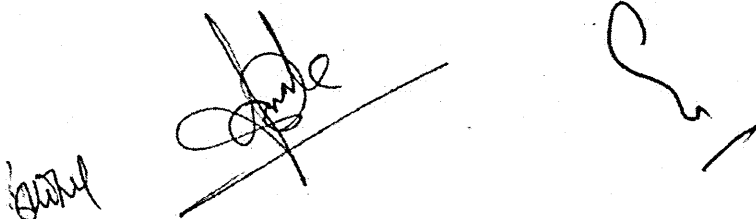
Syllabus

For

B.P.Ed. Entrance Examination 2024-25

a.   Current affairs on physical education, sports, games and yoga.

b.   Field / Court dimensions, rules and regulations of different sports events.

c.   Sports terminology and technical words used in competitive sports.

d.   Olympic games, Asian games, Commonwealth games, Paraolympic, National and International tournaments for various sports - Sports history and records etc.

e.   Sports Awards - International, national and state, famous sports personalities, Federation, Association (National and International) : History, Headquarters and working

f.   National and international stadium, national and international trophies, autobiographies, books, sports media - print and electronics

g.   Sports in Chhattisgarh

Syllabus for M. P. Ed. Entrance examination for session 2024-25

NOTE: Maximum marks. 50. No negative marking.

1. Meaning of the terms physical culture. physical training. physical education_ drill. sports. gymnastic and athletics. Objectives and aim of physical education.

2. Philosophy of physical education. Idealism and Physical Education. Pragmatism and Physical Education, Naturalism and Physical Education, Existentialism and Physical Education.

3. Ancient Greece, the origin and development of ancient Olympic Games. Ancient Rome. Physical education in Germany. Sweden and Denmark, Physical education in Great Britain. U.S.A.

4. Modern Olympic Games.

5. Physical education in modern India.

6. Biological- Growth and development, Effect of heredity and environment. Difference between males and females, Body types.

7. Skeletal system -- bones of the skeleton structure and types, spine-structure and function. joints and joint movements. Posture — good posture, postural defects, etc.

8. Muscular system — properties and development, effect of exercise on muscles. trunks. arm's and leg's muscles and their action. Physical conditioning, fatigue, muscle pull and spasm.

9. Circulatory system — structure of— heart, blood vessels, arteries, veins and capillaries. Blood circulation. Blood constituents and their function. Effect of exercise on the circulatory system. Blood clotting; immunities. Lymphatic systems.

10. Respiratory system -- organs of respiration — structure and functions. Physiology of respiration. Control of respiration. Vital capacity. Effect of exercise on respiratory system. Oxygen debt. second wind.

11. Nervous system -- organs location and functions. Brain and its parts. Centers of localization. Spinal cord. Reflex action. Autonomous nervous system. Neuro muscular co-ordination.

12. Digestive system — organs of digestion - structure and functions, enzymes. Digestion in the stomach and in the intestine. Absorption and assimilation of food. Metabolism. Effect of exercise on digestion.

13. Excretory system — structure and function. Composition of normal urine — fluid balance. Acid-base balance. Skin-structure and functions. Sweat glands. Temperature regulations. Effect of exercise on excretory system.

14. Reproductive system — male, female, structure and function.

15. Health Problems, Communicable diseases, Health & Health education, Dietetics - constituents of food. Principles of nutrition. Caloric values of food. Balanced diet, special diets for children & athlete. Underweight / overweigh.

(31)

16. Psychological physical unit of human organism. Reflex action condition reflex etc. Law of learning their application to situation on playgrounds. Transfer of training and its importance in learning physical skill. Theory of play. Sociological foundation of physical education.

17. Social nature and learning of man Traditions and their influence on behaviour pattern (social Inheritance), social values and development of different traits and ideas. Insurance of the group on the individual and vice versa competition and co-operation social recognize session physical education as a socializing Agencies. Leadership and its importance.

18. General Innate tendencies: Motives, Needs, Drives, Sympathy, Imitation, Suggestion, Play, Play Theories. Play. Way in education and sublimation of innate tendencies.

19. Growth and development: The nature of growth and development. Characteristics of various stages of development, Heredity and Environment: its Impact on sports, The Learning Process: The nature. Laws of Learning, Motivation in Learning, Attention, Interest, Learning Curves, Transfer of training, Personality: Its meaning, development of personality, personality theories, adjustment through physical education and sports. Competition, Anxiety and Aggression.

20. Programmer Planning — Meaning, Importance, Principles. Factors influencing the programmer planning, Characteristics of a good Physical Education Programmer. Intramural Activities, Extra-mural Competition, Co- Curricular Activities N.C.C., N.F.C.

21. Budgets and Finance — Preparation of Budget, Administration, Importance of Budget, Principles Qualities of a good Budget, Rules for expenditure forms and routine for payments and entries, Accounting and auditing.

22. Organization of Games - Meaning, Advantages of Games, Advantages of Competitive games and Tournament Disadvantages of Competitive games, Principles.

23. Facilities of Physical Education — Construction and care of Gymnasium, swimming pool, playing field, Track marking, play grounds, Construction and marking of play fields.

24. Tests and measurements: qualities of good test, types and formation, Teaching, coaching and training - definition and purpose of the teacher, coach and trainer. Qualities, knowledge and responsibilities of each, Improving the standards of officiating - rules study. Practice, clinics, apprenticeships, ratings etc.

25. Methods of teaching — orientation, verbal explanation, demonstrations, explanations, practice, discussion, part & whole method, Classification — importance, methods and types, Teaching aids — models, films, black board.

26. Scientific principles applied to coaching: balance, motion, force and levers, injuries, its prevention, management of injuries on field.

27. Rehabilitation of injuries, Official rules, signals, positional play.

28. Evaluation — Meaning, Definitions, Principles, Importance, Procedure of Evaluation.

(32)

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School of Studies in Geology & WRM

Syllabus for MSc (Geology) Entrance Test

2025 – 26

(33)

School of Studies in Geology & WRM
Pt. Ravishankar Shukla University, Raipur, C.G

Syllabus for MSc (Geology) Entrance Test
Year of Examination 2025 – 26

Geodynamics & Geomorphology

Introduction to Geology: Introduction to Geology and its branches and importance, Origin of Earth, Internal structure of Earth, Crust, Mantle and Core. **Age of Earth:** Various methods of determination of age of the Earth. **Dynamic Earth:** Theories of continental-drift, Sea-floor spreading and evidences, Concept of Plate Tectonics, Tectonic Plates: types, and plate boundaries, Introduction to paleomagnetism and polar wandering, Mid-oceanic ridges, trenches and island arcs. **Earthquakes:** Causes and effects, Earthquake Belts, measurement of earthquakes. Seismic zones of India, **Volcanoes:** Types & distribution, **Geomorphology:** Geomorphical agents and processes of rock weathering, Soil formation, soil profile and types of soil. Geological work of rivers ; fluvial landforms, Drainage system, Geological work of ground water and karst topography, Geological work of wind ; Aeolian landforms, Geological work of Glaciers ; glacial land forms. Geological work of oceans; coastal landforms, Volcanic landforms, Earth's heat budget, Climate change, global warming, greenhouse effect, Physiographic and tectonic divisions of India.

Mineralogy and Crystallography

Introduction to Crystallography: Definition of Mineral and Crystal: Rock forming and ore minerals, Crystal structures, Unit cells, Elements of crystal. Crystal forms, Crystallographic axes and axial angles, Weiss's Parameters and Miller's Indices systems of crystal notations. **Crystallography:** Interfacial angle and its measurement, Laws of Crystallography, **Crystal symmetry:** Plane, axis and center of symmetry, Classification of crystals into systems and classes, Symmetry and forms of normal classes, Twinning in crystals. Mineralogy: Silicate structures and classification of silicates, Bonding in Minerals, Isomorphism and Solid solution, Polymorphism and Pseudomorphism, Physical properties of minerals. **Optical Mineralogy:** Nature of light, reflection and refraction of light, Refractive index, Critical angle. Total internal reflection and Becke effect, Double refraction. Nicol prism - it's construction and working, Polarizing Microscope- its parts & functions, Optical properties of minerals. **Minerals and lithosphere:** Study of Composition, Classification, physical and optical properties of the following Mineral groups - Olivine, Garnet and Mica groups, Pyroxenes and Amphiboles, Feldspars and Feldspathoids, Silica, Composition of lithosphere, Industrial and other uses of various minerals.

Petrology

Igneous Petrology: Magma: definition, origin & composition, Bowen's reaction series, magmatic differentiation & assimilation, Introduction to crystallisation of Uni-component (silica), Bicomponent (albite-anorthite and diposide-anorthite) and tricomponent magma (diopside-albite-anorthite), Texture, structures & forms of igneous rocks, **Classification of igneous rocks:** Mineralogical, Chemical & Tabular classification. Brief idea of the formation of igneous rocks in relation to Plate Tectonics. Petrology of Acid igneous rocks, Alkaline igneous rocks, Basic igneous rock, Ultrabasic igneous rocks. **Sedimentary petrology:** Origin, transportation & deposition of sediments, Sedimentary depositional environments - Aeolian, fluvial, coastal and abyssal environment, Introduction to sedimentary facies. Lithification & Diagenesis, Textures & structures of sedimentary rocks, Brief idea of the formation of

sedimentary rocks in relation to Plate Tectonics. **Classification of sedimentary rocks:** Clastic, non-clastic and biogenic rocks, Petrographic description of Breccia, Conglomerate, sandstone, shale, siltstone and limestone. **Metamorphic Petrology:** Definition, agents, facies & grades, Textures, structures & classification of metamorphic rocks, Phase rule in metamorphism. Elementary idea about Paragenetic diagrams & projective analysis.   A.C.F & A.K.F. diagrams, Progressive metamorphism of Argillaceous rocks and thermal metamorphism of impure limestone, Progressive metamorphism of basic igneous rocks, Petrographic description of slate, phyllite, schist, gneiss, marble, quartzite, amphibolite, Khondalite, Gondite, Kodurite & Charnockite, Introduction to Paired Metamorphic Belts.

Structural Geology

Dip and Strike:definition & measurement. Rule of 'Vs', Clinometer and Brunton compass, **Unconformity:** Definition & types, Outlier and inlier. Overlap & offlap. Recogntion of unconformity. **Fold:** Definition and morphology, Geometric and genetic classification of folds, Recognition of folds in the field and on geological maps, Effect of folds on outcrops, Mechanics of folding. **Fault:** Definition and morphology, Geometric and genetic classification of faults, Recognition of faults in the field and on geological maps, Effect of faults on outcrops, Mechanics of faulting. **Joint, Foliation & Lineation:** Definition, geometric & genetic classification of joints. **Foliation:** terminology, kinds, origin and relation to major structures, **Lineation:** terminology, Kinds, origin and relation to major structures, **Plutons:** tectonics & emplacement. Tectonic framework of India.

Palaeontology

Modes of fossilization. Uses of fossils, Derived fossils, Index fossils & their significance, Use of Palaeontology in Stratigraphy, Palaeoecology & Palaeogeography, Gondwana plant fossils. Morphology, Geological distribution and important species of   Foraminifera & Anthozoa fossils, Gastropoda and Lamellibranchia fossils, Cephalopoda, Echinoidea & Brachiopoda fossils, Trilobite and Graptolite fossils.

Stratigraphy

Principles of Stratigraphy, Various divisions of Geological Time Scale, their nomenclature and type area. Basic concepts of Lithostratigraphic, Chronostratigraphic & Biostratigraphic Units. Tectonic   & Physical Subdivisions of Indian subcontinent. **Geological distribution, stratigraphic classification and economic importance of:** Archaeozic rocks of India, Archaeozic rocks of Bastar (Chhattisgarh), Vindhyan & Chhattisgarh supergroup of rocks, Gondwana Supergroup, Deccan-traps, inter trappean and infra trappean (Bagh & Lameta) Beds, Palaeozoic rocks of Salt Range, Palaeozoic rocks of Spiti Valley, Cretaceous rocks of Trichonopoly, Jurassic rocks of Kutchh-Region, Tertiary rocks of Assam-Region, and Siwalik group of rocks.

Earth Resources & Applied Geology

Processes of mineral deposit formation: Concept of distribution of mineral deposits in time & space

in Indian context. Classification of mineral deposits. **Igneous processes of mineralization:** (a) Magmatic process and its Indian examples. (b)Hydrothermal processes and its Indian examples, **Sedimentary processes of mineral formation:** (a) Mechanical and residual concentration (b) Precipitation (c) Evaporites, Oxidation & supergene sulphide enrichment processes. **Metallic and non-metallic mineral deposits:** Geological, Geographical distribution, mode of occurrence, mineralogy & economic importance of following metallic & nonmetallic deposits of India, Iron, Manganese, Chromium, Copper, Lead, Zinc, Gold, Aluminium, Refractory and Fertilizer minerals, Minerals used in cement & chemical industries. **Economic Geology:** Ore, ore mineral, gangue mineral, tenor, grade, assay. **Coal deposit:** Origin, & stratigraphy. **Types of coal:** Peat, Lignite, Bituminous & Anthracite. Coal deposits of Chhattisgarh. **Oil reserves:** Origin of Natural-hydrocarbon, its migration & accumulation. **Types of oil traps:** Structural, stratigraphic and composite. Offshore & onshore oil fields of India, **Radioactive minerals:** Mineralogy, Geological & Geographical distribution in India.

Applied Geology

Engineering properties of rocks, Geological consideration for site selection of Dam and Tunnels, Elementary study of Photogeology and use of Aerial photographs in geological studies, Hydrologic cycle. Mode of occurrence of ground water, Hydrologic properties of rocks. Porosity and permeability. Brief idea about aquifer, aquiclude, aquitard and aquifuge. Introduction to mineral exploration. Principles and instruments of Gravity and Electrical methods of geophysical exploration, Principles and instruments of Magnetic and Seismic methods of geophysical exploration, Elementary idea about Remote Sensing & GIS and its applications.

M.Sc. Entrance Examination – 2025
Subject: Bioscience/ Microbiology/ Biochemistry
School of Studies in Life Science
Pt. Ravishankar Shukla University, Raipur

Syllabus

1. General Biology
- Cell Biology: Structure and function of cell organelles, cell cycle, and cell division
- Genetics: Mendelian genetics, linkage and recombination, molecular basis of inheritance

2. Ecology and Environment
- Evolution and Ecology: Theories of evolution, ecosystems: Food chain, food web, pyramids, productivity
- Pollution, Biodiversity and conservation, Natural disaster, Climate change, sustainable development

3. Plant Biology
- Plant Biology: General characteristics of Angiosperm (Dicot and Monocot), Gymnosperm (Cycas, Pinus and Ephedra) and Pteridophyta (Marsilea, Azolla and Equisetum).
- Photosynthesis, respiration, plant hormones, water and mineral nutrition

4. Animal Biology
- Animal Biology: Classification of Invertebrates (Protozoa, Porifera, Platyhelminthes, Nematoda, Annelida, Arthropoda, Mollusca, Echinodermata) and Chordates (Pisces, Amphibia, Reptilia, Aves, Mammalia).
- Animal physiology: Nervous, endocrine, cardiovascular, respiratory, excretory, and reproductive systems

5. Microbiology and Immunology
- Microbial classification, occurrence, distribution, structure, and economic importance of Algae, Bacteria, Fungi, Virus
- Pathogenic microorganisms and infectious diseases
- Immune system: Innate and adaptive immunity, antigen-antibody interactions, vaccines

6. Biochemistry
- Biomolecules: Carbohydrates, proteins, lipids, nucleic acids
- Enzymes: Classification, Structure, Function, and Kinetics
- Vitamins and hormones

7. Instrumentation and Techniques
- Microscopy (principle and staining methods), Chromatography (Paper, Thin layer, Gas, and HPLC)
- Principle, techniques, and applications of Centrifugation and Spectrophotometry

8. Molecular Biology and Biotechnology
- DNA replication, transcription, and translation
- Gene regulation and expression
- Recombinant DNA technology, cloning, PCR
- Applications of biotechnology in agriculture, medicine, and industry

9. Biostatistics
- Basic statistical methods: Mean, median, mode, standard deviation

(37)

B.Lib.I.Sc. Entrance Examination 2025-26
Syllabus

Time : 1 hour

1. सामान्य हिन्दी

1. पर्यायवाची एवं विलोम शब्द
2. समोच्चरित शब्दों के अर्थभेद
3. वाक्यांश के लिए एक सार्थक शब्द
4. संधि एवं संधि विच्छेद
5. सामायिक पद रचना एवं समास–विग्रह
6. तत्सम एवं तत्भव शब्द
7. शब्द– शुद्धि
8. वाक्य शुद्धि
9. उपसर्ग एवं प्रत्यय
10. मुहावरे एवं लोकोक्ति (अर्थ एवं प्रयोग)
11. पारिभाषिक शब्दावली (अंग्रेजी शब्दों के समानार्थी हिन्दी शब्द)

2. GENERAL ENGLISH

The Test in language proficiency (of XII Standard) will have the following components:

(I) Grammar
   a. Verb, Auxiliary and Modal Verbs, Main Verbs
   b. Negatives and Interrogatives
   c. Tenses Time 'Tense relationship'
(II) Correction of Sentences
   a. Related to articles, Prepositions, Adjectives adverbs, etc.
(III) Vocabulary

3. समसामयिक घटनायें

1. राष्ट्रीय घटनाए
2. भारतीय अर्थव्यवस्था
3. भारत एवंविश्व
4. अन्तर्राष्ट्रीय घटनाए
5. विज्ञान एवं प्रौद्योगिकी
6. पुरस्कार एवंसम्मान
7. चर्चित एवंसम्मान
8. चर्चितव्यक्ति
9. चर्चितस्थान
10. पुस्तकें एवंलेखन
11. खेलकुद

4. छत्तीसगढ़

1. छत्तीसगढ़ का इतिहास, भौगोलिक स्थिति एवं विस्तार तथा संस्कृति ।

(38)

M.Lib. & ISc. Entrance Examination Syllabus
2025 – 26

UNIT – I LIBRARY ORGANISATION AND MANAGEMENT

Library Organization : Meaning , importance, principles and types. Library Committee : Definition , types and functions. Different Library systems- their salient feature and functions. National Libraries of India, UK and USA., Role of libraries as Academic and social institution. Ranganathan's five laws of library science and their applications. Library legislation in India, Library movement in India, UK and USA. NKC, Library association / Professional organizations: their objectives and functions: UNESCO, IFLA, ALA, IASLIC,ILA, Management : Definition, Components, features and principles of management, Administration versus Organization, Library rules and regulations., Scientific management, Personnel management, Physical Environment : Basic, consideration in planning of library building, furniture, fittings and equipments, Routine procedures: Acquisition, circulation , serials control, stock verification Vs stock rectification, Public relation and extension activities., Financial Management, Budgeting : its concepts , types and methods, Collection Development : Different types of selection tools and their importance, Maintenance of library record and statistics, Annual report, Resource sharing

UNIT -II LIBRARY CATALOGUING AND BIBLIOGRAPHY

Library Catalogue: Objectives , purpose and functions, Different between bibliography, catalogue and documentation list, Canons and normative principles of cataloguing, Physical and inner forms of library catalogue, Selective and simplified cataloguing, Descriptive cataloguing including, Entries-their types and functions, Filling of entries, Cooperative and centralized cataloguing, Cataloguing in source and cataloguing in publication, Comparative study of CCC and AACR-2, Organization and management of cataloguing department, Subject cataloguing – meaning , purpose and objectives, Subject Headings –Need and basic principles, Derivation of subject headings-LCSH, Sears list of subject headings, Chain procedures, Study of ISBN and ISNN, Bibliography -- definitions , aims, need ,functions and types, Subject bibliography, National bibliography-need, scope and coverage, Study of INB and BNB, Trade bibliography,Universal bibliography, Bibliography control, Bibliography and documentation activities in U.S.A. and U.K., Bibliographical organizations in India and their services.

UNIT -III REFERNCE SOURCES AND SERVICE

Reference service-concept , definition and importance, Theories and philosophy of reference service, Kinds and nature of reference service in different types of libraries, Short range and long range services, Orientation of a freshman, User education, Enquiry techniques and methods of answering reference questions, Classification of reference

(39)

sources and their evaluation, Organization and management of reference department, Non-Documentary Sources of Information, Digital Sources.

Dictionary –scope , purpose ,types, uses and alternative names,Glossary, Thesaurus, Lexicon, Concordance etc.Checklist for evaluation of dictionaries. Study of- (i) Random House Dictionary of English Language, (ii) Webster's Third New International Dictionary of English Language (iii) Oxford English Dictionary, (iv) Roget's International Thesaurus **Encyclopedias**-Scope, purpose, types and importance, criteria for evaluation Study of- (i) New Encyclopedias Britannica, (ii) Encyclopedia American, (iii) Encyclopedia of Library and Information Science, (iv) International Encyclopedia of Social Science and Technology (v) McGraw –Hill Encyclopedia of Science and Technology, (vi) Van Nostrand's Scientific Encyclopedia. **Years Books and Almanacs** – scope , definition and purpose, Study of- (i) Europa Yearbook, (ii) Stateman's Yearbook ,(iii) India: a Reference Annual, (iv) World Almanac and Book of Facts. **Directories** –Definition, scope and types Study of- (i) World of Learning, (ii) Study Abroad, (iii) Times of India Directory and Yearbook including Who's Who, (iv) Universities Handbook, India **Current reference sources**-(i) Asian recorder: a weekly digest of Asian events with index, (ii) Facts on file: weekly world news digests, (iii) Keesing's contemporary archives.**Geographical Sources** –scope and categories – Gazetteers , guide books , maps ,atlases and globes Study of- (i) Colombia lipncott gazetteer of the world, (ii) Gazetteer of India, (iii) Fodor's India. **Biographical sources** –scope , categories , characteristics Study of- (i) Dictionary of American biography, (ii) Dictionary of National biography , (iii) Dictionary of scientific biography,(iv) India who's who, Reference questions and their information sources with bibliographical description

UNIT -IV DOCUMENTATION AND INFORMATION SERVICE

Documentation : meaning and definition , its aim, scope and development, Documentation work and their scope, Documentation services and their scope, Documentation lists-their kinds and preparation, Reprographic and translation service, **Information science** –its definition , aims and scope , Changing concept of information science , Information users-their needs and information seeking behavior, Nature of information needs, Information services : CAS,SDI **Abstracting-** definition , aims and scope, Types of abstracts, Canons of abstracting, Characteristics and qualities of good abstracts, Methods and stages of abstracting

Study of - Chemical abstracts , Biological Abstracts, Physical Abstracts, Mathematical reviews, Psychological Abstracts, Sociological Abstracts, Library and information science abstracts, Indian science abstracts, Indian library science abstracts. **Indexing**-definition and functions, Pre-coordinate indexing, chain indexing, PRECIS,POPSI. Post coordinate indexing-Term entry system , peek-a-boo-system,edgenotched, Punch card system, Citation indexing, Key word indexing. **Documentation centers and systems**-FID,VINITI, NISCAIR, DESIDOC,NASSDOC,UNISIST AND NISSAT.

UNIT-V COMPUTER APPLICATION IN LIBRARIES

Computer Basics - Computer: Definition , Development and Computer Generation., Types of computers and their use, Basic components of a computer, Computer Peripherals, Electronic data processing . **Hardware and Software Components -**

Computer Hardware: Components and Functions, Computer Software: Types and Uses, Operating System, functions and their commands: Window and UNIX/LINUX, Flow Chart. **Software Packages** - Word Processing Packages, Desktop Publishing, Library Application Software: CDS/ISIS, Different types of Library Software. **Library Automation** - Library House Keeping Operations, Computerized Information Services, Selection of Library Software Packages, Use of INTERNET for various library activities, e-journals, e-books. **Networking** - Definition, Need, Client Server Architecture, Types of Network: LAN, WAN, MAN, Network Topologies: Bus, Star, Ring etc., Library Information Network: DELNET, INFLIBNET, CALLIBNET, UGC-Infonet

UNIT -VI LIBRARY CLASSIFICATION (THEORY)

Library classification: Its definition, aims & function ,Species of classification schemes- Enumerative & Faceted : their features, merits & demerits, Basic subject & their kinds, Comparative study of colon classification & Decimal classification, Knowledge classification & its canons, Hospitality in array & chain, Facet analysis, Five fundamental categories & their postulates, Principles for facet sequence,Types of isolates: common, special, Devices used in Classification (chronological, geographical, subject, alphabetical Enumeration, superimposition & phase devices), System & specials **Notation**: definition, need & functions, Types, structure & qualities of notation, **Mnemonics:** its types & canons, Indicator digits. **Book classification:** purpose & meaning, Canons for book classification, System of book number, Knowledge classification vs book classification, Rules for classifying books, Steps in practical classification

UNIT -VII LIBRARY CLASSIFICATION (PRACTICE)

Classification of documents by using latest available edition of DDC and colon classification (6 th ed. Reprint).

UNIT -VIII LIBRARY CATALOGUING (PRACTICE)

Cataloguing of documents and continuing resources according to AACR-II(R)
- Personal, Joint Author
- Works Produced under Editorial Direction
- Pseudonymous Author
- Continuing resources

Note:- 1. There will be only 50 objective type's questions in the question paper.
    2. Each question carries 2 Marks.
    3. Time: 1 hours.
    4. Exam will be in online mode.

1. प्रश्न पत्र में केवल 50 वस्तुनिष्ठ प्रकार के प्रश्न होंगें |

2. प्रत्येक प्रश्न के 2 अंक है|

3. समय : 1 घंटे |

4. परीक्षा ऑनलाइन मोड में होगा |

School of Regional Studies and Research

Pt.Ravishankar Shukla University Raipur

Syllabus for MA in Rural Development Entrance Test

Session: 2024-25 & onwards

Approved by:	Board of Studies	Academic Council
Date:	24/04/2024	

CFI 24\4\2024

42

School of Regional Studies and Research
Pt. Ravishankar Shukla University, Raipur (C.G.)

Syllabus for MA in Rural Development Entrance Test 2024-25 & onwards

(A) General aptitude: (10 marks)

1. Verbal Reasoning
2. Numerical Ability Test: Syllogism, Coding – Decoding, Miscellaneous.

(B) General knowledge of Chhattisgarh: (15 marks)

3. Overview of Chhattisgarh:

   Geography: Geographical Distribution, Soils, Transport.

   Population: Census of Chhattisgarh.

   Centuries and National Parks.

4. Mineral Resources: Types of Minerals, Industries.

   Water Resources: Rivers, Water Falls, Dams.

   Forest and Agricultural of Chhattisgarh: Forest Distribution, Crops.

(C) Rural Development: Overview (25 marks)

5. Rural Development & Programmes: Training Rural Youths for Self-Employment (TRYSEM), National Rural Employment Programme (NREP), Jawahar Rozgar Yojana (JRY), Antyodaya Yojana, Mahatma Gandhi National Rural Employment Guarantee Scheme (MNREGS), Narwa, Garwa, Ghurwa, Badi (NGGB) Programme

6. Administration, Local Government and Panchayati Raj: 73 Constitutional Amendment, Recommendation of Balwant Rai Mehta Committee & Ashok Mehta Committee, Role of Gram Sabha and Chhattisgarh Panchayati Raj Adhiniyam 1993. Panchayati Raj Amendment 2019.

Eligibility: Graduate degree in any subject with 45% marks is eligible to appear in the entrance test. Students appearing in the Final year examination of Graduate Degree may also eligible for appearing in the PG Entrance Test.

Note:

   Exam Time: 1 hour

   Total no. of questions will be 50 and Total Marks: 50

   All questions will be multiple choice questions (MCQ)

   There will be no provision of negative marking.

   Subject to change as per university rule.

Book Recommended:

1. Desai, Vasant. **Rural Development in India**. New Delhi: Himalaya, 2005.
2. IGNOU. **Rural Development: Indian Context.** New Delhi: IGNOU, 2005.
3. Narwani, G.S. **Training for Rural Development**, New Delhi: Rawat Publications, 2002.
4. Sisshodia, M.S., **Chhattisgarh Samanya Gyan,** Upkar Publication.2015.
5. Choudhry, N.C. **Chhattisgarh Samanya Gyan**, LUCENT Publication. Delhi: 2015.

44

School of Studies in Mathematics,
Pt.Ravishankar Shukla University Raipur

Syllabus

M.Sc. Mathematics Entrance Examination
(Semester System)

Admission Session: 2024-25 onwards

Approved by:	Board of Studies	Academic Council
Date:		

CALCULUS:

$\varepsilon - \delta$ definition of the limit of a function. Basic properties of limits. Continuous functions and classification of discontinuties. Differentiability. Successive differentiation. Leibnitz theorem. Maclaurin and Taylor series expansions. Integration of transcendental functions. Reduction formulae. Definite integrals. Quadrature. Rectification. Volumes and surfaces of solids of revolution.

Definition of a sequence. Theorems on limits of sequences. Bounded and monotonic sequences. Cauchy's convergence criterion. Series of non-negative terms. Comparison tests, Cauchy's integral test, Ratio tests, Raabe's, logarithmic, de Morgan and Bertrand's tests. Alternating series, Leibnitz's theorem. Absolute and conditional convergence. Continuity, Sequential continuity, Properties of continuous functions, Uniform continuity, Chain rule of differentiability, Mean value theorems and their geometrical interpretations. Darboux's intermediate value theorem for derivatives, Taylor's theorem with various forms of remainders. Limit and continuity of functions of two variables. Partial differentiation. Change of variables. Euler's theorem on homogeneous functions. Taylor's theorem for functions of two variables. Jacobians. Envelopes, evolutes. Maxima, minima and saddle points of functions of two variables. Lagrange's multiplier method.

ALGEBRA:

Elementary operations on matrices, Inverse of a matrix. Linear independence of row and column matrices, Row rank, column rank and rank of a matrix. Equivalence of column and row ranks. Eigenvalues, eigenvectors and the characteristic equations of a matrix. Cayley Hamilton theorem and its use in finding inverse of a matrix. Application of matrices to a system of linear (both homogeneous and nonhomogeneous) equations. Theorems on consistency of a system of linear equations.

(46)

Mappings, Equivalence relations and partitions. Congruence modulo n. Definition of a group with examples and simple properties. Subgroups, generation of groups, cyclic groups, coset decomposition, Lagrange's theorem and its consequences. Fermat's and Euler's theorems. Normal subgroups. Quotient group, Permutation groups. Even and odd permutations. The alternating groups An. Cayley's theorem. Homomorphism and Isomorphism the fundamental theorems of homomorphism. Automorphisms, inner automorphism. Automorphism groups and their computations, Conjugacy relation, Normaliser, Counting principle and the class equation of a finite group. Center for Group of prime-order, Abelianizing of a group and its universal property. Sylow's theorems, Sylow subgroup, Structure theorem for finite Abelian groups. Ring theory-Ring homomorphism. Ideals and quotient rings. Field of quotients of an integral domain, Euclidean rings, polynomial rings, Polynomials over the rational field. The Eisenstien criterion, polynomial rings over commutative rings, Unique factorization domain. R unique factorisation domain implies so is R[x1, x2 ..... xn]. Modules, Submodules, Quotient modules, Homomorphism and Isomorphism theorems. Definition and examples of vector spaces. Subspaces. Sum and direct sum of subspaces. Linear span, linear dependence, independence and their basic properties. Basis. Finite dimensional vector spaces. Existence theorem for bases. Invariance of the number of elements of a basis set. Dimension. Existence of complementary subspace of a subspace of a finite dimensional vector space. Dimension of sums of subspaces. Quotient space and its dimension.

Linear transformations and their representation as matrices. The Algebra of linear transformations. The rank nullity theorem. Change of basis. Dual space. Bidual space and natural isomorphism. Adjoint of a linear transformation. Eigenvalues and eigenvectors of a linear transformation. Diagonalisation. Annihilator of a subspace. Bilinear, Quadratic and Hermitian forms. Inner Product Spaces-Cauchy-Schwarz inequality. Orthogonal vectors. Orthogonal Complements. Orthonormal sets and bases. Bessel's inequality for finite dimensional spaces. Gram-Schmidt Orthogonalization process.

47

DIFFERENTIAL EQUATIONS:

Degree an order of a differential equation. Equations reducible to the linear form. Exact differential equations. First order higher degree equations solvable for x, y, p. Clairaut's form and singular solutions. Geometrical meaning of a differential equation. Orthogonal trajectories. Linear differential equations with constant coefficients. Homogeneous linear ordinary differential equations. Linear differential equations of second order. Transformation of the equation by changing the dependent variable/the independent variable. Method of variation of parameters. Ordinary simultaneous differential equations.

Laplace Transformation- Linearity of the Laplace transformation, Existence theorem for Laplace transforms, Laplace transforms of derivatives and integrals, Shifting theorems. Differentiation and integration of transforms. Convolution theorem. Solution of integral equations and systems of differential equations using the Laplace transformation. Partial differential equations of the first order. Lagrange's solution, some special types of equations which can be solved easily by methods other than the general method, Charpit's general method of solution. Partial differential equations of second and higher orders, Classification of linear partial differential equations of second order, Homogeneous and non-homogeneous equations with constant coefficients, Partial differential equations reducible to equations with constant coefficients, Monge's methods.

ANALYSIS:

Series of arbitrary terms. Convergence, divergence and oscillation. Abel's and Dirichlet's test. Multiplication of series. Double series. Partial derivation and differentiability of real-valued functions of two variables. Schwarz and Young's theorem. Implicit function theorem. Fourier series. Fourier expansion of piecewise monotonic functions. Riemann integral. Intergrability of continuous and monotonic functions. The fundamental theorem of integral calculus. Mean value theorems of integral calculus. Improper integrals and their convergence. Comparison tests. Abel's and Dirichlet' tests. Frullani's integral. Integral as a function of a parameter. Continuity, derivability and integrability of an integral of a function of a parameter.

48

Complex numbers as ordered pairs. Geometric representation of complex numbers. Stereographic projection. Continuity and differentiability of complex functions. Analytic functions. Cauchy-Riemann equations. Harmonic functions. Elementary functions. Mapping by elementary functions. Mobius transformations. Fixed points, Cross ratio. Inverse points and critical mappings. Conformal mappings.

METRIC SPACES:

Definition and examples of metric spaces. Neighbourhoods, limit points, interior points, open and closed sets, closure and interior. Boundary points, Sub-space of a metric space. Cauchy sequences, completeness, Cantor's intersection theorem. Contraction principle, construction of real numbers as the completion of the incomplete metric space of rationals. Real numbers as a complete ordered field. Dense subsets. Baire Category theorem. Separable, second countable and first countable spaces. Continuous functions. Extension theorem. Uniform continuity, isometry and homeomorphism. Equivalent metrics. Compactness, sequential compactness. Totally bounded spaces. Finite intersection property. Continuous functions and compact sets, connectedness, components, continuous functions and connected sets.

49

SYLLABUS FOR M.Sc. (STATISTICS) ENTRANCE EXAM, 2024-25

2025-2026

Permutation, Combination, Set theory, Arithmetic, Geometric and Harmonic progressions, Binomial expansion, Exponential and Logarithmic series, Matrices, Determinants, Simultaneous equations.

Differentiation and Integration, Tailor and Maclaurine series, Definite integral, Integration by parts, Maxima and Minima of function, Convergence and Divergence of series, Asymptotes.

Complex variable. Interpolation and Extrapolation, Fundamentals of Computer.

Measures of central tendency, dispersion, correlation, regression. Concept of Probability, Mathematical probability, Additive and multiplicative theorems of probability. Conditional probability, Bayes Theorem. Binomial distribution.

Eligibility: Students who have appeared/Passed B.Sc. with Mathematics. Minimum 50% Marks obtained in Mathematics Paper.

50

1

Unit:I Physical Geography

Origin of the Earth, Earth's Interior, Continental Drift Theory (Wegner), Plate Tectonics, Isostasy. Earth movements: Earthquakes and Volcanoes. Rocks, Weathering, Erosion and Normal cycle of erosion, Evolution of landscapes: Fluvial, Aeolian (Arid and Semi Arid), Glacial, Karst. Elements of Weather and Climate, Composition and Structure of the Atmosphere. World patterns of Atmospheric Temperature, Pressure, and Winds. Monsoon. Bottom relief of Ocean, Distribution of Temperature and Salinity of Oceans and Seas, Currents and Tides.

Unit:II Human Geography

Meaning, Definition, Nature and Scope of Human Geography, Man - environment relationship. Human Races: Formation and Evolution . Density and Distribution of World Population. Rural Settlements, Rural Houses in India, Urban Settlement- Types and Pattern. Environmental Issues: Global Warming, Air, Water and Soil Pollution.

Unit: III Economic and Resources Geography

Meaning, scope and concept of economic geography; Resources .Agricultural regions of the world (D. Whittlesey's); Theory of agricultural location (Von Thunen); Theory of industrial location (Weber). International trade: patterns and trends; Major trade blocks: SAARC, BRICKS, OPEC, LAFTA, EEC, ASEAN; Effect of globalization on developing countries

Unit: IV Geography of India

Physical Features & Climate . Natural Resources: Soils. Water Resources & Forests .Mineral and Power resources . Impact of Green Revolution, Agro-climatic region & Industrial region.

Unit: V Geography of Chhattisgarh

Physical Features: Geological Structure, Relief and Physiographic Regions, Drainage system, Climate. Natural Resources: Soils, Water & Forests; Distribution,and Conservation . Mineral Resources: Iron-ore, Coal, Lime stone, Bauxite . Agriculture and Populations. Industries - Iron and Steel, Cement, Sugar, Aluminum.Industrial Regions of Chhattisgarh Trade and Transport, Tourism &Socio-Economic Development of Chhattisgarh.

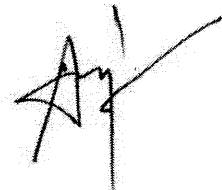## Unit: VI Remote Sensing and GIS

Basics of Remote Sensing: definition, history, and Scope. Electro-magnetic Radiation. Types of Remote Sensing, Aerial photos: Types and Characteristics. Platforms and sensors, Visual and Digital image processing techniques, application of remote sensing development and Growth in India. Introduction of GIS:, History, development, Components and Functions of GIS. Data types: Spatial and Non Spatial. Raster data and Vector data and their characteristic.

Unit: VII Practical

Basic concept of Cartography. Maps, Scales, Graphs, Diagram & Surveying. Chain and Tape survey. Statistical Technique: Mean Median, Mode.

SYLLABUS
OF
MA/M.Sc. ANTHROPOLOGY
ENTRANCE EXAM

UNDER

FACULTY OF LIFE SCIENCE

1. Introduction to Chhattisgarh
- 1.1 History of Chhattisgarh
- 1.2 Demography of Chhattisgarh
- 1.3 Geography of Chhattisgarh
- 1.4 Tribal Community of Chhattisgarh
- 1.5 Culture of Chhattisgarh

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2. General Anthropology
- 2.1 Meaning, Definition and Branches of Anthropology
- 2.2 Physical Anthropology: Human Evolution, Darwinism, Lamarkmism, Blood Groups.
- 2.3 Archaeology: Terminology, Exvation and Exploration.
- 2.4 Social-cultural Anthropology: Culture, Society and Community.
- 2.5 Basics of Bio-statistics

Recommended Readings:

1. Barnouw, V. 1979. Anthropology: A General Introduction, The Dorsey Press, Illinois.
2. Holmes, L. D. Anthropology: An Introduction, The Ronald Press Company, New York.
3. Sharma and Sharma. 1997. Anthropology, Atlantic Publishers and Distributors, New Delhi.
4. Hunter & Whitten. The Study of Cultural Anthropology, Harper & Row Publishers, New York.
5. Moore, A. 1978. Cultural Anthropology, Harper & Row Publishers, New York. Barnouw,
6. V. 1979. Anthropology: A General Introduction, The Dorsey Press, Illinois.
7. Holmes, L. D. Anthropology: An Introduction, The Ronald Press Company, New York.
8. Sharma and Sharma. 1997. Anthropology, Atlantic Publishers and Distributors, New Delhi.
9. Hunter & Whitten. The Study of Cultural Anthropology, Harper & Row Publishers, New York.
10. Moore, A. 1978. Cultural Anthropology, Harper & Row Publishers, New York.
11. Kaplan, D. & Manners, R. A. Culture Theory, Prentice Hall of India Private Ltd., New Delhi.
12. Comas, J. 1960. Manual of Physical Anthropology, Springfield, Charles C. Thomas.
13. Sarkar, R. M. 1976. Fundamentals of Physical Anthropology. Blackie (India).
14. Das, B. M. 1985. Outlines of Physical Anthropology, Kitab Mahal, New Delhi.

(52)

15. Shrivastav, A. R. N. 1994. Sharirik Manav Vigyan (in Hindi), Gyandeep Prakashan, Allahabad.
16. A grawal, D.P. & M.G. Yadava. 1995. Dating the human past.
17. Bhattacharya, D.K. 1977. Palaeolithic Europe.
18. Bordes,F. 1968. The Old Stone age. Weidenfeld and Nicolson.
19. Burkitt, M.C. 1969. Old Stone Age: Study of Palaeolithic Times.
20. Campbell, B. C. 1979. Humankind emerging, II edition.
21. Goode & Hatt. Methods in Social Research.
22. Young, P. V. Scientific Social Surveys and Research.
23. Danda, Ajit. Research Methodology in Anthropology, Inter- India. New Delhi.
24. Gupta, S. P. Statistics Methods.
25. Elhance. D. N. Practical Problems in Statistics, Kitab Mahal, Allahabad.
26. Levin, J. Elementary Statistics in Social Research.

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(53)

School of Studies in Forensic Science

Pt. Ravishankar Shukla University
Raipur (C.G.)

Syllabus For Entrance Examination in M.Sc.
Forensic Science

2025-26

(54)

Unit -I

Chhattisgarh -Demography, Culture, Geography and Tribes.

Unit -II

Physical Properties- Temperature, Weight and Mass, Density, Refractive Index, Diffraction, Polarization.

Laws of Motion- Motion in a Uniform Field, Centripetal Acceleration, Motion under a Central Force.

Basic Optics- Light as an Electromagnetic wave, Interference of Light, Principle of Superposition, Two-Slit Interference, Michelson Interferometer and its Application.

Microscopy- Numerical Aperture and Resolving Power of Microscopic Systems, How the Microscope Forms Images; Simple, Compound, Stereoscopic, Polarizing, Comparison, Fluorescence and Electron Microscopes.

Photochemistry- Interaction of Radiation with Matter, Difference between Thermal and Photochemical Processes, Laws of Photochemistry, Grothus-Drapper Law, Stark-Einstein Law. Jablonski Diagram, Description of Fluorescence, Phosphorescence, Non-radiative Processes, Quantum Yield, Photosensitized Reactions, Energy Transfer Processes, etc.

Organic Chemistry- Structure and Bonding: Hybridization, Bond Length and Bond Angles, Bond Energy, Localized and Delocalized Chemical Bond. Structure and Characteristics of Alkane, Alkene, Cycloalkane, Alcohol, Phenol, Ethers, Aldehyde, Ketone, Carboxylic Acid, etc.

Inorganic Chemistry- Trends in Periodic Table and Applications in Predicting and Explaining the Physical and Chemical Behaviors. Definitions of Acid and Base, Classification of Acids and Bases, Essential and Trace Elements in Biological Process, Metallo Porphyrins with Special Reference to Haemoglobin, Types of Magnetic Behaviors, Method of Determining Magnetic Susceptibility, Spin only Formula, L-S Coupling.

Unit -III

Forensic Science- Definition, History, Development and Scope of Forensic Science in India. Basic Principles of Forensic Science and its Significance, Organization, and Functioning of State and Central Forensic Science Laboratories.

Physical evidence- Definition, Types, Class, and Individual Characteristics; Different Searching Methods for Locating Physical Evidence at the Scene of Crime; Chain of Custody.

Unit -IV

Forensic Biology- Composition and Examination of biological fluids like - Blood and Bloodstains, Seminal stains, Saliva, Urine, Pus, Feces, etc.; Hair, Fiber, Pollen grains, and Diatoms.

Scene of crime - Types, Protection of Scene of Crime, Crime Scene Documentation- Note Taking, Videography, Photography and, Sketching Methods, Importance of Photography, General Guidelines, Admissibility in Court, Various forms such as Videography.

Unit- V

Fingerprints- History, Types of Fingerprints, Types of Finger Print Patterns, Different Classifications, Systems Location and Preservation of Fingerprints, Development of Latent

Prints by Physical, and Chemical Methods.

Questioned Documents- Definition, Types of Documents, Types of Writing Instruments their Characteristics and Examination, Paper and its Examination, Basic Tools needed for Forensic Document Examination.

(55)

PSYCHOLOGY

Entrance Exam syllabus for M.A. Psychology (2025-26)

1. **Psychopathology:** Models of Psychopathology- Psychodynamic, Behavioural, Cognitive.

2. **Biological Basis of Behaviour:** Central Nervous System, Autonomic Nervous System, Peripheral Nervous System.

3. **Social Psychology:** Nature, Goal, Scope and History of Social Psychology, Approaches to study Social Behaviour - Psychoanalytic, Cognitive, Learning, Motivational and Socio-cultural.

4. **Psychological Assessment:** Difference between Physical and Psychological Assessment, Levels of Assessment, Barriers to Psychological Assessment.

5. **Statistics:** Meaning and application in psychology, Central Tendencies- Mean, Median, Mode of grouped and ungrouped data, Frequency Distribution, Graphical Representation of Data.

(56)

PSYCHOLOGY

Entrance Exam Syllabus for

P. G. Diploma in Psychological Guidance and Counselling (2025-26)
&
P.G. Diploma in Rehabilitation Psychology (2025-26)

1. **Psychological Assessment:** Nature of Psychological Assessment, Scaling, Construction of Psychological Test, Reliability, Validity, Norms, Types of Tests: Projective and Psychometric, Tests of Intelligence, Aptitude, Interest, Values, Stress and Anxiety.

2. **Personality:** Theories of Personality- Psychoanalytic, Behaviouristic, Humanistic, Trait and Type theory of Personality, Assessment of Personality,

3. **Development across the Life Span:** Nature Vs. Nurture in human development, Physical, Cognitive and Psychosocial development in Infancy, childhood, adolescence and Adulthood, Moral development.

4. **Clinical and Abnormal Psychology:** Psychological disorders- Concepts of mental disorder, Assessment and Diagnosis, DSM, ICD. Psychotherapies- Psychodynamic, Behaviouristic, Humanistic and Cognitive.

5. **Educational Psychology:** Factors in Educational achievement, Counselling and Guidance in School, 21 Types of disabilities.

Professor & Head
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RAIPUR (C.G.)
8-4-25

57

स्वामी विवेकानंद स्मृति तुलनात्मक धर्म दर्शन एवं योग

पं. रविशंकर शुक्ल विश्वविद्यालय रायपुर छ.ग.

एम.ए.अनुप्रयुक्त दर्शन एवं योग

प्रवेश परीक्षा पाठयक्रम 2025—26

अ.

1 भारतीय दर्शन का अर्थ एव विशेषताएं, क्या भारतीय दर्शन निराशावादी है ?

2.आस्तिक एवं नास्तिक दर्शन,षडदर्शन।

3. वेद और उपनिषद आत्म तत्व, ब्रह्म तत्व।

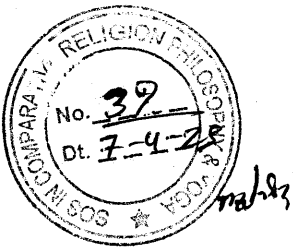4. श्रीमद भगवद् ज्ञान, भक्ति,कर्म योगों का समन्वय निष्काम कर्मयोग।

ब.

1.योग दर्शन—व्युत्पत्ति एवं परिभाषाएं :—

पतंजलि योगसूत्र, भगवद् गीता एवं अद्वैत वेदांत के अनुसार

योग एवं स्वास्थ्य।

2.चित्त एवं उसकी वृत्तियॉ, भूमियॉ।

3.अष्टांग योग, आसन एवं प्राणायाम, आसन एवं व्यायाम में अंतर।

4. यौगिक आहार, हठयोग., नेति,नौली, कुजंल, शंख प्रक्षालन ।

27-4-2025

विभागाध्यक्ष
स्वामी विवेकानंद स्मृति
तुलनात्मक धर्म दर्शन एवं योग अध्ययन शाला .... (छ.ग.)

58

पं.रविशंकर शुक्ल विश्वविद्यालय, रायपुर (छ.ग)
पाठ्यक्रम
एम.ए.प्रवेश परीक्षा, इतिहास,
सत्र 2024–25

अंक – 100,

(अ)

1. भारत की भौगोलिक संरचना
2. प्रागैतिहासिक काल एवं सिन्धु घाटी की सभ्यता
3. वैदिक कालीन सभ्यता और संस्कृति
4. छठी शताब्दी ई.पू. में भारत की राजनीतिक स्थिति
5. जैन धर्म एवं बौद्ध धर्म
6. सिकंदर का आक्रमण और उसका प्रभाव
7. मौर्यकाल तथा मौर्यकालीन प्रशासन, सामाजिक आर्थिक एवं सांस्कृतिक दशा
9. हिन्द–यूनानी, शक एवं कुषाण
10. गुप्तकाल तथा गुप्तकालीन प्रशासन, सामाजिक आर्थिक एवं सांस्कृतिक दशा
12. वर्धन साम्राज्य
13. दक्षिण भारत के प्रमुख राजवंश
14. राजपूत युग

(ब)

1. भारत में अरबों तथा तुर्कों के आक्रमण
2. दिल्ली सल्तनत – गुलाम वंश, खिलजी वंश, तुगलक वंश, सैयद एवं लोदी वंश
3. सल्तनत कालीन – प्रशासन, सामाजिक, आर्थिक एवं धार्मिक दशा, कला एवं संस्कृति
4. विजय नगर एवं बहमनी राज्य
5. मुगल काल – बाबर, हुमायूँ, शेरशाह, अकबर, जहांगीर, शाहजहां तथा औरंगजेब
6. मुगलकालीन – प्रशासन, सामाजिक, आर्थिक, धार्मिक दशा, कला एवं संस्कृति
7. शेरशाह सूरी एवं उनका प्रशासन
8. मराठों का उत्थान – शिवाजी की विजयें तथा प्रशासन, पेशवाओं के अधीन मराठा
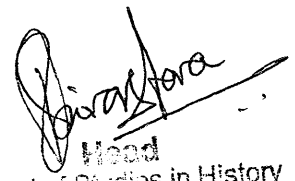9. भक्ति आंदोलन एवं सूफी आंदोलन
10. सिक्ख धर्म

(स)

1. भारत में यूरोपीय व्यापारिक कंपनियों का आगमन
2. बंगाल में अंग्रेजी राज्य की स्थापना – प्लासी एवं बक्सर का युद्ध, घटनाएँ एवं परिणाम
3. ईस्ट इंडिया कंपनी के अधीन केंद्रीय तथा प्रांतीय ढांचे का विकास (1773 ई.–1857ई.)
4. भारत में ब्रिटिश आर्थिक, सामाजिक एवं सांस्कृतिक नीतियाँ (1757ई.–1857ई.)
5. 1857 की क्रांति – स्वरुप, कारण, घटनाएँ, परिणाम एवं महत्व

(59)

6. 1858 के पश्चात् प्रशासनिक परिवर्तन, संवैधानिक विकास एवं भारत पर प्रभाव
7. 19 वीं शताब्दी के पूर्वार्द्ध में सामाजिक एवं धार्मिक सुधार
8. भारत में राष्ट्रीय जागरण का उदय एवं विकास – कांग्रेस की स्थापना, उदारवाद एवं उग्रवाद
9. गांधी युग का राष्ट्रीय आंदोलन (1920ई.–1947ई.)
10. राष्ट्रीय आंदोलन में अन्य धाराएँ– क्रांतिकारी आंदोलन, वामपंथी आंदोलन, आजाद हिन्द फौज,
11. साम्प्रदायिकता का उदय और विकास
12. भारत का संवैधानिक विकास 1919 से 1935 ई. तक
13. 1858 से 1947ई. तक ब्रिटिश युगीन भारत की सामाजिक, आर्थिक एवं सांस्कृतिक स्थिति
14. भारत स्वतंत्रता से 1964 ई. तक

<div align="center">(द)</div>

1. छत्तीसगढ़ का भौगोलिक परिचय–सीमाएं, नामकरण
2. प्राचीन कालीन छत्तीसगढ – प्रागैतिहासिक काल से पूर्व मौर्यकाल तक
3. प्राचीन कालीन छत्तीसगढ – मौर्य, गुप्त, वाकाटक, नल, राजर्षितुल्य ,शरभपुरीय, पांडु , छिन्दकनाग, सोमवंश
4. छत्तीसगढ़ में कल्चुरीकाल एवं कल्चुरी युगीन सामाजिक, आर्थिक एवं सांस्कृतिक दशा
5. छत्तीसगढ़ में मराठा शासन एवं मराठा युगीन सामाजिक, आर्थिक एवं सांस्कृतिक दशा
6. छत्तीसगढ़ में ब्रिटिश शासन एवं ब्रिटिश युगीन सामाजिक, आर्थिक एवं सांस्कृतिक दशा
7. छत्तीसगढ़ की जमींदारियां एवं करद राज्य तथा भारतीय संघ में विलय
8. 1857 ई. का विद्रोह एवं छत्तीसगढ़
9. छत्तीसगढ़ में स्वाधीनता आंदोलन एवं क्रांतिकारी आंदोलन 1947 ई. तक
10. छत्तीसगढ़ में किसान, मजदूर एवं जनजातीय आंदोलन
11. छत्तीसगढ़ में शैव, शाक्त, जैन, बौद्ध मत, कबीर पंथ एवं सतनाम पंथ
12. छत्तीसगढ़ की लोक कला, साहित्य एवं संस्कृति
13. छत्तीसगढ़ राज्य निर्माण की पृष्ठभूमि
14. छत्तीसगढ़ के प्रमुख ऐतिहासिक स्थल एवं महान विभूतियां

Head
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(60)

S. O. S. IN ECONOMICS
Pt. R. S. U., RAIPUR
Syllabus for Entrance Examination
M. A. Economics

Microeconomics- Introduction, Definitions, Nature and scope of Economics, Utility- Cardinal and Ordinal approaches, Indifference curve, Consumer's equilibrium, Demand- Law of Demand, Elasticity of demand, Consumer's surplus, Theory of production and cost, concepts of cost and revenue, Law of variable proportions, Returns to scale, Market structure, Equilibrium of a firm - Perfect competition, Monopoly and Monopolistic competition.

Macroeconomics- National Income: Concept and measurement of national income, Circular flow of income, National income accounting, Basic concepts : Money - meaning and functions, Value of Money, Inflation and deflation - types, causes and effects on different sectors of the economy; Demand pull and cost push inflation; Measures to control inflation.

Economics of Growth and development - Economic Growth and Development : Factors affecting of economic growth (Labour, Capital and Technology), Developed and under developed Economy, The Planning commission and NITI Aayog, Planning in India through different five Year Plans, New Economic Reforms: Liberalization, Privatization and Globalization.

International Trade - Trade - Inter-regional and International trade, Role of foreign trade, Trends in exports and imports, Composition and direction of India's foreign trade, Tariffs & import quotas, Concept & components of Balance of Payments, Functions and objectives of international monetary fund, World Bank and World Trade Organization.

Indian Economy - Agriculture: Nature and importance, Trends in agriculture production and productivity, factors determining productivity, Land reforms, green revolution, Rural credit.
Industry: Growth and productivity, Industrial policy and reforms, Growth and problems of small scale and cottage industries, Role of public sector enterprises in India's industrialization.
Service Sector: Trends and performance in services, Commercial banking- meaning and types and functions of commercial banks, Evolution of commercial banking in India after independence, Functions of a central bank, Concept of demonetization, MUDRA yojana.
Trends in poverty, inequality and unemployment, Demographic features of India and Chhattisgarh, Population and environment.

Public Economics - Meaning and scope of public finance, Public expenditure - Meaning, classification, principles and trends of public expenditure in India, Sources of Public revenue; Taxation - meaning, canons and classification of taxes; Impact and incidence of taxes; Major trends in tax revenue of the central and State Governments in India, Public debt and financial administration; Sources of public borrowing, Effects of public debt. The Budget: Kinds of budget, Economic and functional classification of the budget, Preparation and passing of Budget in India.

Statistics - Definition of Statistics, Importance and limitations of Statistics, Measurements of central tendency (Mean, Median, Mode), Statistical investigation, Census and sampling methods of data investigation, Statistical data Collections of Data, Primary & Secondary data.

Pt.RavishankarShuklaUniversity,Raipur(C.G.)
Faculty of Social Sciences
SoS in AIHCA
Syllabus for M.A. Entrance Test 2025

In this entrance examination there will be one paper of 01hourduration.The question paper will have 50 objective type multiple choice questions carrying one mark each. There will be four choices of answers for each question out of which one is to be selected. There will be no negative marking for wrong answer.

PART-'1'- GENERAL KNOWLEDGE OF CHHATTISGARH

1. History of Chhattisgarhand Contribution of Chhattisgarh in Freedom Movement.

2. Geography, Climate, Physical status, Census, Archeological and Tourist Centers of Chhattisgarh.

3. Tribes, Special Traditions, and Festivals of Chhattisgarh.

4. Economy, Forest and Agriculture of Chhattisgarh.

5. Administrative Structure, Local Government andPanchayatiraj of Chhattisgarh.

6. Industry in Chhattisgarh, Energy, Water and Mineral Resource of Chhattisgarh.

8. Current Affairs of Chhattisgarh

PART-'2'- GENERAL KNOWLEDGE OF INDIA

1. History of India and Indian National Movement.

2. Physical, Social & Economic Geography of India.

3. Indian Economy.

4. Indian Philosophy, Art, Literature &Culture.

5. Current Affairs

Syllabus of M.A. Sociology Entrance Examination - 2023-2024

Subject : Sociology

Conceptual framework of Sociology : Definition, Origin and nature of Sociology.
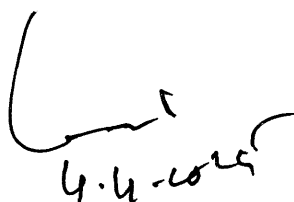
Basic concepts : Society, Community, Institution , Association, Social Group, Status and Role.

Institution of Indian Society: Caste System, Marriage, Family, Religion, Kinship, Norms and Tribal Economy.

Social Structure : Definition of Social Structure, Status, Role ets.

Basic Thinkers : August Comte, Emile Durkheim, Max Weber, Karl Marks

Social Research : Definition of Social Research, Interview-schedule, Questionnaire, Observation, Sampling, Hypothesis, Survey and Case Study.

Head,
S.O.S. In Sociology & Social Work,
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Raipur (C.G.)

(63)

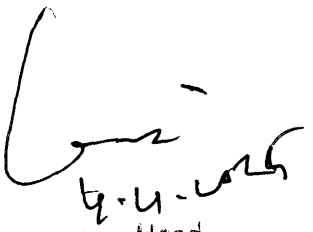# Syllabus of PG Entrance Examination -2023-2024

Subject –Master of Social Work

Basic Concept of Social Work: Meaning,Definition and concept of Social work, origin of Social work. And Social work Profession, Importance of social work, Non Governmental organization and voluntary Organization. Indian Constitution Ideology of Social Work, Fundamental rights and Human rights.

Major Social Issues:-Untouchability, Casteism, Corruption, Communalism, Gender issues, Crime against women and Children.

Social Policy and Social Welfare: Social Development, Social Policy and Planning, Social Welfare and Social change, leadership, Social Group work.

Social Work Research: Tool and technique of social work research, Interview-schedule, Interview guide, Questionnaire and Observation.

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(64)

SCHOOL OF STUDIES IN LITERATURE & LANGUAGES
PT. RAVISHANKAR SHUKLA UNIVERSITY, RAIPUR (C.G.)
SYLLABUS OF P.G. ENTRANCE EXAM (2023-24) 2025
SUBJECT - M.A. CHHATTISGARHI

इकाई - 1

छत्तीसगढ़ी भाषा का उद्भव, विकास और स्वरूप, छत्तीसगढ़ी की बोलियां।

इकाई-2

छत्तीसगढ़ी में शब्दभेद, और व्याकारणिक कोटियां।

इकाई-3
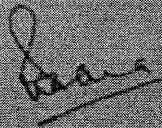
छत्तीसगढ़ी के उपसर्ग, प्रत्यय, समास, ध्वन्यात्मकता, मुहावरे एवं लोकोक्तिया, पर्यायवाची,

विलोम, अनेकार्थी शब्द, अनेक शब्दों के लिए एक शब्द।

इकाई-4

छत्तीसगढ़ी के प्रमुख साहित्यकार एवं उनकी रचनाएं - सुंदरलाल शर्मा, मुकुटधार पाण्डेय,

हरिठाकुर, पवन दीवान, लक्ष्मण मस्तुरिहा।

संदर्भित पुस्तकें-

1. छत्तीसगढ़ी भाषा का उदविकास- डॉ. नरेंद्र देव वर्मा।

2. छत्तीसगढ़ी लोक साहित्य का अध्ययन- डॉ. सत्यभामा आडिल।

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(65)

इकाई 1   1. हिंदी भाषा का उद्भव विकास और स्वरूप

2. मानक हिंदी भाषा : स्वरूप और लक्षण, हिंदी की बोलियाँ

इकाई 2   1. हिंदी भाषा संबंधी अशुद्धियाँ : वर्तनी एवं व्याकरण संबंधी ।

इकाई 3   हिंदी साहित्य का इतिहास

1. काल विभाजन, नामकरण

इकाई 4   मध्यकालीन कवियों का सामान्य परिचय

1. कबीर, जायसी, सूरदास, तुलसीदास

2. केशव, बिहारी, घनानंद

इकाई 5   छत्तीसगढ़ के प्रमुख हिंदी साहित्यकारों का सामान्य परिचय

1. पदुमलाल पुन्नालाल बख्शी

2. माधव राव सप्रे

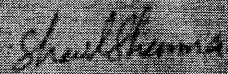3. गजानन माधव मुक्तिबोध

4. हबीब तनवीर

5. विनोद कुमार शुक्ल

निर्धारित पुस्तकें

1. हिंदी साहित्य का इतिहास- आचार्य रामचंद्र शुक्ल

2. हिंदी व्याकरण - कामता प्रसाद गुरु

3. आधुनिक हिंदी व्याकरण और रचना - वासुदेवनंदन प्रसाद

66

SCHOOL OF STUDIES IN LITERATURE & LANGUAGES PT. RAVISHANKAR SHUKLA UNIVERSITY, RAIPUR SYLLABUS OF PG. GENTRANCE EXAM 2023-24

SUBJECT-M.A. ENGLISH

Unit-I General Introduction of History, Culture, Dialects, Grammar, Literature, Folk art, Tribes of Chhattisgarh

Unit-II Parts of Speech - Noun, Pronoun, Adjective, Verb, Adverb, Preposition, Conjunction, Interjection

Unit-III Tenses, Active & Passive Voice, Direct & Indirect Speech, Types of Sentences (Simple,Compound, Complex)

Unit-IV Articles and Modals
Vocabulary-Synonyms & Antonyms.

Unit-V History of English Literature

Books Recommended -

1. A Remedial English Grammar - F.T. Wood
2. An Intermediate Grammar and composition - M. L. Tikkoo and Subramanyam

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1

SCHOOL OF STUDIES IN LITERATURE & LANGUAGES
PT. RAVISHANKAR SHUKLA UNIVERSITY, RAIPUR (C.G.)
SYLLABUS OF PG ENTRANCE EXAM 2023-24 2025
SUBJECT- M.A. LINGUISTICS

इकाई-1 भाषा: परिभाषा, प्रकृति एवं विशेषताएँ भाषा के अवयव ध्वनि, रूप, शब्द, पदबंध, उपवाक्य वाक्य अर्थ । मानवभाषा एवं मानवेतर भाषा, मौखिक एवं लिखित भाषा, भाषा और बोली बोली के भाषा बनने के कारण।

Language: Definition, NatureCharacteristics & Features Constituents of Language Sound, Morph, Word, Phrase, Clause Sentence, Meaning Human Language and Non-human Language, Oral and Written language, Language and Dialect, Factors causing a dialect to be a Language.

इकाई-2 भाषा के विविध रूप मूल भाषा, व्यक्ति बोली, स्थानीय भाषा, बोली, उपभाषा, परिनिष्ठित भाषा, राजभाषा, राष्ट्रभाषा, संपर्क भाषा, सामान्य भाषा और साहित्यिक भाषा।

Different Forms of anguage, Original Language, Individual, dialect, Nasne dialect, Dialect, Sub-dialect, Standard Language, State Language, National Language, Communicative language, State Language and Literary Language.

इकाई-3 अर्थ- प्रकार, समानार्थी, विलोम, अनेकार्थी, मुहावरे एवं लोकोक्तियाँ ।

Semantic-Synonyms Antonyms Polysemy, Idioms and Proverbs

इकाई-4 शब्द भेद-

संज्ञा, सर्वनाम विशेषण क्रिया क्रियाविशेषण अव्यय ।

Parts of Speech.

Noun, Pronoun, Adjective, Verb, Adverb, Preposition

इकाई-5 भाषा के विविध रूप कार्यालयी जनसंचार, साहित्य, विधि आदि

Different forms of langiunge Official Media, Literature, Law

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Pt. ...Raipur (C.G.)

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(68)

निर्धारित पुस्तकें-

1. ध्वनि विज्ञान: गोलोक बिहारी धल

2. हिंदी भाषा की ध्वनि संरचना: भोलानाथ तिवारी

3. हिंदी का रूपग्रामिका अध्ययन: महावीर सरन जैन

4. The phonemic its Naturand. Use . Cambridge University press Cambridge.

Londar- newyork- Melbourne 1-1 dition. 1976

69

School of Studies in Literature & Languages
Pt. Ravishankar Shukla University, Raipur (C. G.)
Syllabus Of PG Entrance Exam 2024-2025
Subject – M. A. Sindhi

इकाई 1. (i) सिंधी भाषा की उत्पत्ति एवं विकास

(ii) सिंधी भाषा के स्वरूप एवं लक्षण

इकाई 2. (i) सिंधी साहित्य का संक्षिप्त इतिहास

(ii) सिंधी साहित्य के प्रमुख साहित्यकार

इकाई 3. (i) सिंधी साहित्य जो इतिहास (1853 खां अजु तांई)

(ii) 1853 खां पोई सिंधी शाइरी (कविता)

इकाई 4. (i) सिंधी साहित्यकारों का इतिहास

1 शाह अब्दुल लतीफ

2 वेंदाती कवि सामी

3. महाकवि किशन चंद बेवस

इकाई 5. (i) सिंधी संस्कृति सोरहां संस्कार

(ii) संत शदाराम साहिब का परिचय

निर्धारित पुस्तकें–

1. सामीअ जा सलोक : प्रो. लक्ष्मण हर्दवाणी
2. सूफीज आफ सिंध : डॉ. मोतीलाल जोतवाणी
3. शाह जो रसालो : डॉ. होतचंद मूलचंद गुरबख्शाणी
4. शदाणी प्रकाश : प्रो. कन्हैया लाल एम. तलरेजा

Sunil Sharma
28/03/2025
अध्यक्ष
साहित्य एवं भाषा अध्ययन शाला
पं. रविशंकर शुक्ल विश्वविद्यालय
रायपुर (छत्तीसगढ़)

SYLLABUS FOR CBS-EST 2025

Center for Basic Sciences

Pt. Ravishankar Shukla University, Raipur

Biology

Cell Biology

Cell theory and cells as unit of life. Basic concepts of biomolecules – Proteins, Carbohydrates, Lipids, Nucleic acids. Tools and techniques of cell studies - use of microscope and calibration (microscopy), elements of microscope. Biomembranes - transport mechanism, cellular respiration. Cell organelles - structure and functions. Discovery and structure of DNA, processes of replication, transcription, genetic code and translation. Principles of the basic techniques in molecular biology. Enzymes- catalysis, kinetics, activation energy, competitive and non-competitive inhibition.

Genetics and Evolution

Fundamentals of genetics and evolution. Evidences and theories of organic evolution. Organization of the heredity material in chromosomes. Equational division. Reduction division. Mitosis and meiosis compared and contrasted. Significance of meiosis. Mendel's laws of inheritance. Discovery of linkage, sex-linked inheritance. Crossing-over, stage at which crossing-over occurs. Neurospora genetics. Mutation - discovery, types of Mutation and Mutations in diploids. Role of mutations in evolution. Elaboration of Mendel's laws of inheritance. Monohybrid or Dihybrid crosses. Human genetics - human chromosomes, sex-determination, sex-linked inheritance.

Ecology

Physical and biological factors influencing organisms. Food chains, pyramids of numbers and biomass. Biological equilibrium. Interspecific associations. Bio-diversity. Flora and fauna. Basics of microbial systems, Ecosystems.

Humans and Environment

Soil, rainfall and temperature with reference to natural resources. Our natural resources - their uses and abuses. Environmental pollution and preventive measures. Biodiversity and conservation.

Biotechnology

Principles of recombinant DNA technology. Applications of biotechnology.

71

Biology of Animal systems

Digestive System - Modes of nutrition. Different vitamin compounds and their deficiencies. Structure of alimentary canal and associated glands, digestive enzymes and gastrointestinal hormones. Absorption of products of digestion, peristalsis, balanced diet.

Respiratory System - Gaseous exchange in animals. Structure of respiratory organs, mechanism of breathing, gaseous transport, tissue respiration.

Circulatory System - Open and closed systems. Functions of blood and lymph. Microscopic structure of blood and blood vessels. Structures and working of heart. Distribution of arteries and veins. Circulation of blood coagulation. Blood groups.

Excretory System - Elimination of nitrogenous waste. Osmoconformers and osmoregulators. Structure and function of kidney tubules. Arrangement of excretory organs.

Nervous System - General account of brain, spinal cord and nerves. Reflex actions (simple and conditioned). Sense organs (eye and ear).

Reproductive System - Sexual and asexual reproduction. General arrangement and functions of reproductive organs.

Developmental Biology - Basic features of development in animals. Types of eggs, fertilization, cleavage, blastula. Stem cells- definition, types, uses, advantages and disadvantages, induced pluripotent stem cells. Different hormones and their roles.

Diversity of Animal Life — Principles of classification, binomial nomenclature. General classification of animal phyla up to classes (invertebrates) and upto sub-classes / order (vertebrates), General characters of fishes, amphibians, reptiles, birds and mammals.

Immunology - Basics of immune mechanisms and diseases- active and passive immunity, T and B cell responses, antigen presentation, principles of vaccination, monoclonal antibodies and their uses, immunology of AIDS.

Biology of Plant systems

Anatomy and Physiology of Plants - Meristems. Plant growth and development. Internal and external regulators of growth and development in plant. Plant reproduction. Internal structure of root, stem, secondary growth and leaves. Xylem and Phloem - their cell elements and functions. Internal structure of dicot and monocot leaves. Photosynthesis - history, importance, factors and mechanism, stomatal mechanism, transpiration and respiration. Comparative study of dicot and monocot anatomy. Absorption and cellwater relations, transport of water and minerals, tropic and turgor movements. Significance of life-cycles with special reference to alternation of generations as exemplified in Funaria, Selaginella and Pinus (no structural details). Plant hormones.

Systematics - Principles of classical and new systematics. Binomial nomenclature. Familiarity with taxa. Plant breeding and tissue culture.

Chemistry

Physical Chemistry

Measurements in chemistry: SI units for fundamental quantities, significant figures in calculations.

Mole concept: Avogadro number and mole concept, molar masses, mole fraction, molarity, molality, percent composition, stoichiometry. Equivalent weight and normality. Calculations based on mole concept and stoichiometry of different reactions. Oxidation-reduction reactions.

Gaseous and liquid states: Absolute scale of temperature. Gas laws, ideal gas equation, real gases and deviation from ideality, liquefaction of gases, van der Waals equation. Kinetic theory of gases; average, root mean square and most probable velocities and their relation with temperature. Law of partial pressures. Vapour pressure. Diffusion of gases.

Atomic structure and chemical bonding: Bohr model, spectrum of hydrogen atom, quantum numbers. Wave particle duality, de Broglie hypothesis. Uncertainty principle. Orbitals and quantum numbers; shapes and energy of s, p and d orbitals. Electronic configurations of elements (up to atomic number 36), filling of orbitals - Aufbau principle. Pauli's exclusion principle and Hund's rule. Hybridization involving s, p and d orbitals. Atomic orbital overlap and chemical bonds; ionic, covalent and coordinate bonds; bond parameters. Orbital energy diagrams for homo-nuclear diatomic species. Lewis structures. Hydrogen bond. Polarity in molecules, dipole moment (qualitative aspects). VSEPR theory and shapes of molecules. Valence Bond Theory. Molecular orbital theory of homo-nuclear diatomic molecules (qualitative idea).

Thermodynamics: Thermodynamic states. First law of thermodynamics. Internal energy, work and heat, pressure-volume work. Enthalpy and enthalpy change, Hess's law, heat of - reaction, fusion and vapourization. Second law of thermodynamics, entropy, free energy, criterion of spontaneity.

Chemical equilibrium: Laws of chemical Equilibrium, law of mass action. Equilibrium constant — factors affecting equilibrium constant and its applications. Le Chatelier's principle - effect of concentration, temperature and pressure. Significance of ΔG and ΔG^o · in chemical equilibrium. Relationship of K and ΔG. Ionic equilibrium. Acids and bases (Bronsted and Lewis concepts), salts. Ka, Kb, Kw, degree of dissociation, pH and their relationships. Solubility product, common ion effect. Hydrolysis of salts. Buffer solutions.

Electrochemistry: Redox reactions and electrode potential, Electrochemical cells, Galvanic cells and cell reactions. Standard electrode potential. Nernst equation and its relation to ΔG and K. Electrochemical series, emf of galvanic cells. Electrolysis and Faraday's laws of electrolysis. Electrolytic conductance, specific, equivalent and molar conductivity, Kohlrausch's law. Concentration cells. Batteries (primary and secondary), fuel cells, corrosion.

Chemical kinetics: Rates of chemical reactions. Order of reaction, rate constant. First order and pseudo first order reactions. Factors affecting rate of reaction – concentration, temperature (Arrhenius equation), catalyst.

Solid state: Classification of solids, amorphous and crystalline solids, crystalline state, crystal lattice and unit cells; seven crystal systems (cell parameters a, b, c, α, β, γ), close packed structure of solids (cubic), packing in fcc, bcc and hcp lattices. Packing efficiency, nearest neighbours, ionic radii. Simple ionic

compounds, Imperfection in solids, point defects. Electrical and magnetic properties, band theory of metals.

Solutions: Solution of solid and gas in liquid. Concentration of solution. Ideal and nonideal solutions. Colligative properties. Vapour pressure of solution, Raoult's law. Molecular weight determination from lowering of vapour pressure, elevation of boiling point and depression of freezing point. Abnormal molecular mass, vant Hoff factor. Osmosis – Osmotic pressure, reverse osmosis.

Surface chemistry:
(a) Adsorption – Physisorption and chemisorptions. Factors affecting adsorption of gases on solids. Adsorption isotherm. Catalysis – homogeneous and heterogeneous, Activity and selectivity. Enzyme catalysis.
(b) Colloidal state – Types, preparation and properties of colloids. Tyndall effect, 13 Brownian movement, electrophoresis, coagulation. Application of colloids. Micelles.

Inorganic Chemistry

Classification of elements and periodicity in properties: Modern periodic table, classification of elements, periodic trends in properties of elements – valence, oxidation state, atomic/ionic radius, ionization energy, electron gain energy, electronegativity, valency, chemical reactivity. Diagonal relationship. Anomalous behaviours of Li, Be, B, C.

Hydrogen: Isotopes, preparation, isolation, properties and uses. Hydrides – ionic, covalent and interstitial. Properties of water and heavy water. Hydrogen peroxide – Preparation, structure, reactions, uses. Hydrogen as fuel cell.

s- Block elements (Alkali and alkaline earth elements) – General characteristics and trends in properties.
(a) Group 1: Preparation, properties and reactions of alkali metals with emphasis on chemistry of Na and K and their compounds - oxides, peroxides, hydroxides, carbonates, bicarbonates, chlorides and sulphates. Uses.
(b) Group 2: Preparation, properties and reactions alkaline earth metals with emphasis on the chemistry of Mg and Ca and their compounds - oxides, peroxides, hydroxides, carbonates, bicarbonates, chlorides and sulphates. Uses.

p- Block elements: General characteristics and trends in properties.
(a) Group 13: Chemistry of Boron and its compounds - borax, boric acid and diborane.
(b) Group 14, 15 and 16: Chemistry of carbon, sulphur, nitrogen and phosphorus. Allotropy. Chemistry of oxides and oxyacids of these elements. Phosphines, phosphorus chlorides, ammonia, peroxide and ozone; silicones, silicon tetrachloride and silicates.
(c) Group 17: Chemistry of halogens, chemistry of chlorine in detail. Interhalogen compounds. HX and oxyacids of halogens.
(d) Group 18: Isolation, properties and reactions of inert gases with emphasis on chemistry of Xenon.

d-Block elements: (Mainly 3d elements) General characteristics and trends in properties. Variable oxidation states and their stabilities, colour (excluding the details of electronic transitions) and calculation of spin-only magnetic moment. Catalytic properties. Interstitial compounds, alloy formation. Preparation and properties of potassium dichromate and permanganate.

f- Block elements: (mainly lanthanides) General characteristics and trends in properties. Variable oxidation states. Lanthanide contraction and its consequences. Coordination compounds: Nomenclature of

mononuclear coordination compounds. Isomerism. Hybridization and geometries of mononuclear coordination compounds. Magnetic properties. Werner's theory, VBT, CFT.

Metals and metallurgy: Occurrence of metals. General methods of extraction involving chemical principles – thermodynamic, electrochemical and redox principles. General operation stages involved in metallurgical operation. Metallurgy of p-block element (emphasis on Al). Metallurgy of Fe-triad (more emphasis on Fe metallurgy). Metallurgy of coinage metals (Cu, Ag with more emphasis on Cu). Refining.

Organic Chemistry

Basic concepts: Representation of organic compounds. Hybridisations of carbon. Sigma and pi-bonds. Shapes of simple organic molecules. Inductive effect, electromeric effect, resonance effect, hyperconjugation. Keto-enol tautomerism. Determination of empirical and molecular formulae (only combustion method). Hydrogen bond - definition and effect on physical properties of alcohols and carboxylic acids. Acidity and basicity of 14 organic acids and bases. Methods of purification of compounds.

Reactive intermediates: Homolytic and heterolytic bond cleavages. Formation, structure and stability of - carbocation, carbanion and free radical.

Isomerism: Structural and stereoisomerism. Geometrical isomerism. Chirality. Enatiomers. Optical isomerism of compounds containing up to two asymmetric centres, (R, S and E, Z nomenclature excluded). Racemic mixture. Conformations of ethane and butane (Newman projections).

Nomenclature: IUPAC nomenclature of simple organic compounds (only hydrocarbons, mono-functional and bi-functional compounds), including benzene derivatives. . Alkanes: Preparation, properties and reactions. Idea of homologous series Combustion and halogenation of alkanes. Mechanism of photohalogenation. Wurtz reaction.

Alkenes and Alkynes: Preparation, properties and reactions of alkenes and alkynes. Isomerization. Acidity of alkynes. Acid catalysed hydration of alkenes and alkynes (excluding the stereochemistry), Reactions of alkenes with $KMnO_4$, sulphuric acid. Reduction of alkenes and alkynes. Preparation of alkenes and alkynes by elimination reactions (excluding stereochemistry). Electrophilic addition reactions of alkenes with X2, HX, HOX and H_2O (X=halogen). Makownikoff rule. Peroxide effect. Polymerization of alkenes. Addition reactions of alkynes. Metal acetylides. Ozonolysis

Aromatic compounds: Aromaticity. Huckel theory of aromaticity. Structure of benzene. Isomerism in substituted benzenes. Electrophilic substitution reaction on benzeneGeneral mechanism. Orientating influence of substituents in electrophilic substitution reaction of monosubstituted benzenes. Electrophilic substitution reactions of benzene and substituted benzenes - halogenation, nitration, sulphonation, Friedel-Crafts alkylation and acylation (No mechanism).

Haloalkanes (Alkyl halides): Preparation from alkanes, alcohols, olefins. Grignard reagents and their reaction with aldehydes/ketones/esters/nitriles. Nucleophilic substitution reactions of alkyl halides with different nucleophilic species. SN1 and SN2 reactions with mechanism. Halogen exchange reaction. Polyhalogen compounds.

Haloarenes: Nucleophilic aromatic substitution in haloarenes and substituted haloarenes (excluding Benzyne mechanism and Cine substitution).

(75)

Alcohols: Preparation from – olefins, alkyl halides, carboxylic acids, aldehydes/ketones. Hydroboration reaction. Dehydration, oxidation to aldehydes and ketones. Reaction with sodium, phosphorus halides, $ZnCl_2/$ HX, H_2SO_4. Identification of p-, sec- and tertalcohols. Uses of methanol and ethanol. Phenols: Preparation of phenol from halobenzene, cumene and benzene sulphonic acid. Acidity. Reactions of phenols - halogenation, nitration, sulphonation, with Zn. Reimer-Tieman reaction, Kolbe reaction.

Ethers: Preparation by Williamson's Synthesis, dehydration of alcohols. Reaction with H_2O, HX.

Aldehydes and Ketones - Preparation of aldehydes and ketones from – Alcohols, olefins, acid chlorides, arylalkanes, nitriles, esters, Friedel-Crafts reaction. Reactions with – Alcohols, HCN, NaHSO3. Reactions- oxidation, reduction, oxime and hydrazone formation. Aldol condensation, Perkin reaction. Cannizzaro reaction. Haloform reaction. Tests to distinguish aldehydes and ketones.

Carboxylic acids - Acidity and structure-acidity relationship. Preparation of acids. Preparation of amides, acid chlorides, esters and anhydrides. ester hydrolysis. Reactions of acids with - thionyl chloride, P-halides, ammonia, alkalis, metals, halogens, reducing agents. Decarboxylation. Halogenation.

Amines - Basicity and structure-basicity relationship. Identification of p-, sec- and tertamines. Preparation of amines from - nitro compounds, nitriles, amides, haloalkanes/aromatic compounds. Reaction with – Acids, alkylating agents, acylating agents, nitrous acid. Diazotization of aromatic primary amines - Reactions of aromatic diazonium salts - azo coupling reaction, Sandmeyer and related reactions. Carbylamine reaction of p-amines.

Carbohydrate: Classification of carbohydrates. mono- and di- saccharides (glucose and sucrose). Characteristic tests. Structure of glucose. Reactions of glucose- Oxidation, reduction, hydroxylamine, HI, acetic anhydride. Cyclic structure of glucose. Structures of - Sucrose, maltose, starch and cellulose . Glycoside formation and hydrolysis of sucrose.

Amino acids and proteins: α-amino acids. General structure of peptides and proteins. Peptide bond. Characteristic tests. Separation of amino acids using physical properties. Denaturation of proteins. Enzymes.

Polymers: Classification. Homo and co-polymers, Addition and condensation polymerizations. Polythene, nylons, polyetsres, Bakelite, melamine-formaldehyde, rubber – natural and synthetic.

Mathematics

Algebra

Algebra of complex numbers, addition, multiplication, conjugation, polar representation, properties of modulus and principal argument, triangle inequality, cube roots of unity, geometric interpretations. Quadratic equations with real coefficients, relations between roots and coefficients, formation of quadratic equations with given roots, symmetric functions of roots.

Arithmetic, geometric and harmonic progressions, arithmetic, geometric and harmonic means, sums of finite arithmetic and geometric progressions, infinite geometric series, sums of squares and cubes of the first n natural numbers.

Logarithms and their properties.

Permutations and combinations, Binomial theorem for positive integral index, properties of binomial coefficients. Matrices as a rectangular array of real numbers, equality of matrices, addition, multiplication by a scalar and product of matrices, transpose of a matrix, determinant of a square matrix of order up to three, inverse of a square matrix of order up to three, properties of these matrix operations, diagonal, symmetric and skewsymmetric matrices and their properties, solutions of simultaneous linear equations in two or three variables.

Addition and multiplication rules of probability, conditional probability, Bayes Theorem, independence of events, computation of probability of events using permutations and combinations.

Trigonometry

Trigonometric functions, their periodicity and graphs, addition and subtraction formulae, formulae involving multiple and sub-multiple angles, general solution of trigonometric equations.

Relations between sides and angles of a triangle, sine rule, cosine rule, half-angle formula and the area of a triangle, inverse trigonometric functions (principal value only).

Analytical geometry

Two dimensions - Cartesian coordinates, distance between two points, section formulae, shift of origin. Equation of a straight line in various forms, angle between two lines, distance of a point from a line. Lines through the point of intersection of two given lines, equation of the bisector of the angle between two lines, concurrency of lines. Centroid, orthocentre, incentre and circumcentre of a triangle.

Equation of a circle in various forms, equations of tangent, normal and chord. Parametric equations of a circle, intersection of a circle with a straight line or a circle, equation of a circle through the points of intersection of two circles and those of a circle and a straight line.

Equations of a parabola, ellipse and hyperbola in standard form, their foci, directrices and eccentricity, parametric equations, equations of tangent and normal. Locus Problems.

Three dimensions - Direction cosines and direction ratios, equation of a straight line in space, equation of a plane, distance of a point from a plane.

Differential calculus

Real valued functions of a real variable, into, onto and one-to-one functions, sum, difference, product and quotient of two functions, composite functions, absolute value, polynomial, rational, trigonometric, exponential and logarithmic functions.

Limit and continuity of a function, limit and continuity of the sum, difference, product and quotient of two functions, L'Hospital rule for evaluation of limits of functions.

Even and odd functions, inverse of a function, continuity of composite functions, intermediate value property of continuous functions. Derivative of a function, derivative of the sum, difference, product and quotient of two functions, chain rule, derivatives of polynomial, rational, trigonometric, inverse trigonometric, exponential and logarithmic functions.

Derivatives of implicit functions, derivatives up to order two, geometrical interpretation of the derivative, tangents and normals, increasing and decreasing functions, maximum and minimum values of a function, Rolle's Theorem and Lagrange's Mean Value Theorem.

Integral calculus

Integration as the inverse process of differentiation, indefinite integrals of standard functions, definite integrals and their properties, Fundamental Theorem of Integral Calculus.

Integration by parts, integration by the methods of substitution and partial fractions, application of definite integrals to the determination of areas involving simple curves.

Formation of ordinary differential equations, solution of homogeneous differential equations, separation of variables method, linear first order differential equations.

Vectors

Addition of vectors, scalar multiplication, dot and cross products, scalar triple products and their geometrical interpretations.

Physics

General: Units and dimensions, dimensional analysis. least count, significant figures. Methods of measurement (Direct, Indirect, Null) and measurement of length, time, mass, temperature, potential difference, current and resistance.

Design of some simple experiments, such as: i) Searle's method to determine Young's modulus, ii) determination of 'g' by simple pendulum, iii) speed of sound using resonance tube, iv) coefficient of friction using angle of repose, v) determination of focal length of a convex lens by plotting a graph between 'u' and 'v', vi) refractive index of material of prism using the method of minimum deviation, vii) verification of Ohm's law, viii) resistance of galvanometer using half deflection method, ix) specific heat of a liquid using calorimeter, x) I-V characteristic curve for p-n junction in forward and reverse bias.

Graphical representation and interpretation of data. Errors in the measurements and error analysis.

Mechanics: Kinematics in one and two dimensions (Cartesian coordinates only), projectiles. Uniform circular motion. Relative velocity. Newton's laws of motion. Inertial and uniformly accelerated (linear only) frames of reference. Static and dynamic friction. Kinetic and potential energy. Linear and circular simple harmonic motion. Work and power. Conservation of linear momentum and mechanical energy.

Systems of particles. Centre of mass and its motion. Centre of gravity. Impulse. Elastic and inelastic collisions.

Law of gravitation. Centripetal acceleration and centrifugal force. Gravitational potential and field. Acceleration due to gravity. Motion of planets and satellites in circular orbits. Escape velocity.

Rigid body, moment of inertia, parallel and perpendicular axes theorems, moment of inertia of uniform bodies with simple geometrical shapes. Angular momentum, Torque. Conservation of angular momentum. Dynamics of rigid bodies with fixed axis of rotation. Rolling without slipping of rings, cylinders and spheres. Equilibrium of rigid bodies. Collision of point masses with rigid bodies.

Hooke's law and stress – strain relations. Elastic limit, plastic deformation. Young's modulus, bulk and shear moduli.

Pressure in a fluid. Pascal's law. Buoyancy. Surface energy and surface tension, capillary rise. Viscosity – Stoke's and Poiseuille's law, Terminal velocity. Qualitative understanding of turbulence. Reynolds number. Streamline flow, equation of continuity. Bernoulli's theorem.

Sound and mechanical waves: Plane wave motion, longitudinal and transverse waves, superposition of waves. Progressive and stationary waves. Vibration of strings and air columns. Resonance (qualitative understanding). Beats. Speed of sound in gases. Doppler Effect.

Thermal physics: Thermal expansion of solids, liquids and gases. Calorimetry, latent heat. Heat conduction in one dimension. Elementary concepts of convection and radiation. Newton's law of cooling. Ideal gas laws. Specific heats (C_V and C_P for monoatomic and diatomic gases). Isothermal and adiabatic processes, bulk modulus of gases. Equivalence of heat and work. First and second law of thermodynamics and its applications (only for ideal gases). Entropy. Blackbody radiation - absorptive and emissive powers. Kirchhoff's law. Wien's displacement law, Stefan's law.

(79)

Electricity and magnetism: Coulomb's law. Electric field and potential. Electrical potential energy of a system of point charges and of electrical dipoles in a uniform electrostatic field; Electric field lines. Flux of electric field. Gauss's law and its application in simple cases, such as to find field due to infinitely long straight wire. Uniformly charged infinite plane sheet and uniformly charged thin spherical shell.

Capacitance - Calculation of capacitance with and without dielectrics. Capacitors in series and parallel. Energy stored in a capacitor.

Electric current. Ohm's law. Series and parallel arrangements of resistances and cells. Kirchhoff's laws and simple applications; Heating effect of current.

Biot-Savart's law and Ampere's law. Magnetic field near a current carrying straight wire, along the axis of a circular coil and inside a long straight solenoid. Force on a moving charge and on a current carrying wire in a uniform magnetic field.

Magnetic moment of a current loop. Effect of a uniform magnetic field on a current loop. Moving coil galvanometer, voltmeter, ammeter and their conversions.

Electromagnetic induction - Faraday's law, Lenz's law. Self and mutual inductance. RC, LR and LC circuits with and A.C. Sources.

Optics: Rectilinear propagation of light. Reflection and refraction at plane and spherical surfaces, Deviation and dispersion of light by a prism. Thin lenses. Combination of mirrors and thin lenses. Magnification. Wave nature of light - Huygen's principle, interference limited to Young's double slit experiment. Elementary idea of diffraction – Rayleigh criterion. Elementary idea of polarization – Brewster's law and the law of Malus.

Modern physics: Atomic nucleus. Alpha, beta and gamma radiations. Law of radioactive decay. Decay constant. Half-life and mean life. Binding energy and its calculation. Fission and fusion processes. Energy calculation in these processes.

Photoelectric effect. Bohr's theory of hydrogen like atoms. Characteristic and continuous X-rays, Moseley's law. de Broglie wavelength of matter waves. Heisenberg's uncertainty principle.

80