

# Syllabus of Examination of all Teaching and Non-teaching posts to be filled through Direct Recruitment for Tier II

## Tier II : Detailed syllabus for the post of Assistant Commissioner

### I Prospective on Education and Leadership:

<b>A</b>	<b>Understanding the Learner</b>
	<ul style="list-style-type: none"> <li>▪ Concept of growth, maturation and development, principles and debates of development,</li> <li>▪ Development tasks and challenges with special reference to the Foundational, preparatory, middle and secondary stage school children.</li> <li>▪ Domains of Development: Physical, Cognitive, Socio-emotional, Moral etc., deviations in development and its implications.</li> <li>▪ Role of Primary and Secondary Socialization agencies. Steps to ensure Home school continuity.</li> <li>▪ Mental Health and Well Being.</li> </ul>
<b>B</b>	<b>Understanding Teaching Learning</b>
I	<p>Theoretical perspectives on Learning -Behaviorism, Cognitivism and Constructivism with special reference to their implications for:</p> <ul style="list-style-type: none"> <li>• The role of Principal</li> <li>• Role of Vice-Principal and HM</li> <li>• The role of teacher</li> <li>• The role of learner</li> <li>• Nature of teacher-student relationship</li> <li>• Innovative Pedagogical Practices</li> <li>• Productive Classroom environment</li> <li>• Understanding of discipline, power etc.</li> </ul>
II	<p>Factors affecting learning and their implications for:</p> <ul style="list-style-type: none"> <li>• Designing classroom instructions,</li> <li>• Planning student activities and,</li> <li>• Creating learning spaces in school</li> </ul>
<b>C</b>	<b>Planning and Organization of Teaching-Learning</b>
	<ul style="list-style-type: none"> <li>• Concept of Syllabus and Curriculum, Overt and Hidden Curriculum</li> <li>• Preparation of School Time-table</li> <li>• Foundational Literacy and Numeracy, Early Childhood Care and Education</li> <li>• Competency Based Lesson Planning.</li> <li>• Competency Based Assessment</li> <li>• Instructional Material and Resources</li> <li>• Digital Technology in Teaching Learning</li> <li>• Classroom Observation, Feedback and Follow-up, Reflections and Dialogues as a means of constructivist teaching</li> </ul>
<b>D</b>	<b>Creating Conducive Learning Environment</b>
	<ul style="list-style-type: none"> <li>• Inclusive Education: The concepts of Diversity, disability and Inclusion, implications of disability as social construct, types of disabilities-their identification and interventions</li> <li>• Concept of School Mental Health &amp; Well Being. Addressing the curative, preventive and promotive dimensions of mental health for all students and staff. Provisioning for guidance and counselling.</li> <li>• Developing School and community as a learning resource.</li> <li>• Right of Person with Disability Act-2016 as amended from time to time.</li> </ul>

<b>E</b>	<b>School Organization and Leadership</b>
	<ul style="list-style-type: none"> <li>• Leader as reflective practitioner, team builder, initiator, coach and mentor.</li> <li>• Perspectives on School Leadership: instructional, distributed and transformative</li> <li>• Vision building, goal setting and creating a School development Plan</li> <li>• Using School Processes and forums for strengthening teaching learning-Annual Calendar, time-tabling, parent teacher forums, school assembly, teacher development forums, using achievement data for improving teaching –learning, School Self-Assessment and Improvement</li> <li>• Creating partnerships with community, industry and other neighboring schools and Higher Education Institutes – forming learning communities,</li> <li>• School Accreditation.</li> </ul>
<b>F</b>	<b>Perspectives in Education</b>
	<ul style="list-style-type: none"> <li>• Role of school in achieving aims of education.</li> <li>• Educational Policies of Govt of India</li> <li>• National Education Policy-2020</li> <li>• National Curriculum Framework for Foundational Stage-2022</li> <li>• National Curriculum Framework for School Education 2023</li> <li>• NIPUN Bharat Mission</li> <li>• Guiding Principles for Child Rights, Protecting and provisioning for rights of children to safe and secure school environment,</li> <li>• Right of Children to free and Compulsory Education Act, 2009 as amended from time to time.</li> <li>• Historically studying the National Policies in education with special reference to school education;</li> <li>• School Curriculum Principles: Perspective, Learning and Knowledge, Curricular Areas, School Stages – Pedagogy &amp; Assessment</li> </ul>

## **II Management, Supervision and Leadership**

Management: its nature and scope; The Management Processes; Planning, Organization, Staffing, Directing and Controlling; The Role of a Manager in an Organization. Leadership: The Tasks of a Leader, Leadership Styles; Leadership Theories; A successful Leader versus an effective Leader. Human Resource Development: Concept of HRD; Goals of HRD; Performance Appraisal — Potential appraisal and development — Feedback and Performance Counseling — Career Planning — Training and Development — Rewards — Employee Welfare. Motivation, Morale and Incentives: Theories of Motivation; How Managers Motivate; Concept of Morale; Factors determining morale; Role of Incentives in Building up Morale. Communication: Steps in the Communication Process; Communication Channels; Oral versus Written Communication; Verbal versus non-verbal Communication; upward, downward and lateral Communication; Barriers to Communication, Role of Information Technology. Class Observation and School Supervision. Ethics in School Management. Emotional Intelligence.

### **III Administration and Finance**

- Office Procedure & Office Management
- CCS (CCA) Rules 1965
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- TA Rules
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### TIER II : Syllabus - PGT (Mathematics)

#### **Sets:**

Sets and their representations, Empty set, Finite and Infinite sets, Equal sets, Subsets. Subsets of a set of real numbers especially intervals (with notations). Universal set. Venn diagrams. Union and Intersection of sets. Difference of sets. Complement of a set. Properties of Complement.

#### **Relations & Functions:**

Ordered pairs. Cartesian product of sets. Number of elements in the Cartesian product of two finite sets. Cartesian product of the set of reals with itself (upto  $R \times R \times R$ ). Definition of relation, pictorial diagrams, domain, co-domain and range of a relation. Function as a special type of relation. Pictorial representation of a function, domain, co-domain and range of a function. Real valued functions, domain and range of these functions, constant, identity, polynomial, rational, modulus, signum, exponential, logarithmic and greatest integer functions, with their graphs. Sum, difference, product and quotients of functions.

#### **Trigonometric Functions**

Positive and negative angles. Measuring angles in radians and in degrees and conversion from one measure to another. Definition of trigonometric functions with the help of unit circle. Truth of the identity  $\sin^2x + \cos^2x = 1$ , for all  $x$ . Signs of trigonometric functions. Domain and range of trigonometric functions and their graphs. Expressing  $\sin(x \pm y)$  and  $\cos(x \pm y)$  in terms of  $\sin x$ ,  $\sin y$ ,  $\cos x$  &  $\cos y$  and their simple applications. Identities related to  $\sin 2x$ ,  $\cos 2x$ ,  $\tan 2x$ ,  $\sin 3x$ ,  $\cos 3x$  and  $\tan 3x$ .

#### **Complex Numbers and Quadratic Equations**

Need for complex numbers, especially  $\sqrt{-1}$ , to be motivated by inability to solve some of the quadratic equations. Algebraic properties of complex numbers. Argand plane

#### **Linear Inequalities**



Linear inequalities. Algebraic solutions of linear inequalities in one variable and their representation on the number line.

### **Permutations and Combinations**

Fundamental principle of counting. Factorial  $n$ .  $(n!)$  Permutations and combinations, derivation of Formulae for  $nPr$  and  $nCr$  and their connections, simple applications.

### **Binomial Theorem**

Historical perspective, statement and proof of the binomial theorem for positive integral indices.

Pascal's triangle, simple applications.

### **Sequence and Series**

Sequence and Series. Arithmetic Progression (A. P.). Arithmetic Mean (A.M.) Geometric Progression (G.P.), general term of a G.P., sum of  $n$  terms of a G.P., infinite G.P. and its sum, geometric mean (G.M.), relation between A.M. and G.M.

### **Straight Lines**

Slope of a line and angle between two lines. Various forms of equations of a line: parallel to axis, point -slope form, slope-intercept form. Distance of a point from a line.

### **Conic Sections**

Sections of a cone: circles, ellipse, parabola, hyperbola, a point, a straight line and a pair of intersecting lines as a degenerated case of a conic section. Standard equations and simple properties of parabola, ellipse and hyperbola. Standard equation of a circle.

### **Introduction to Three-dimensional Geometry**

Coordinate axes and coordinate planes in three dimensions. Coordinates of a point. Distance between two points.

### **Limits and Derivatives**

Derivative introduced as rate of change both as that of distance function and geometrically. Intuitive idea of limit. Limits of polynomials and rational functions trigonometric, exponential and logarithmic functions. Definition of derivative relate it to slope of tangent of the curve, derivative of sum, difference, product and quotient of functions. Derivatives of polynomial and trigonometric functions.

### **Statistics**

Measures of Dispersion: Range, Mean deviation, variance and standard deviation of ungrouped/grouped data.

### **Probability**

Random experiments; outcomes, sample spaces (set representation). Events; occurrence of events, 'not', 'and' and 'or' events, exhaustive events, mutually exclusive events, Axiomatic (set theoretic) probability, connections with other theories of earlier classes. Probability of an event, probability of 'not', 'and' and 'or' events.

### **Relations and Functions**

Types of relations: reflexive, symmetric, transitive and equivalence relations. One to one and onto functions.

### **Inverse Trigonometric Functions**

Definition, range, domain, principal value branch. Graphs of inverse trigonometric functions.

### **Matrices**

Concept, notation, order, equality, types of matrices, zero and identity matrix, transpose of a

matrix, symmetric and skew symmetric matrices. Operation on matrices: Addition and multiplication and multiplication with a scalar. Simple properties of addition, multiplication and scalar multiplication. On commutativity of multiplication of matrices and existence of non-zero matrices whose product is the zero matrix (restrict to square matrices of order 2). Invertible matrices and proof of the uniqueness of inverse, if it exists; (Here all matrices will have real entries).

### Determinants

Determinant of a square matrix (up to 3 x 3 matrices), minors, co-factors and applications of determinants in finding the area of a triangle. Adjoint and inverse of a square matrix. Consistency, inconsistency and number of solutions of system of linear equations by examples, solving system of linear equations in two or three variables (having unique solution) using inverse of a matrix.

### Continuity and Differentiability

Continuity and differentiability, derivative of composite functions, chain rule, derivative of inverse trigonometric functions, derivative of implicit functions. Concept of exponential and logarithmic functions. Derivatives of logarithmic and exponential functions. Logarithmic differentiation, derivative of functions expressed in parametric forms. Second order derivatives.

### Applications of Derivatives

Applications of derivatives: rate of change of bodies, increasing/decreasing functions, maxima and minima (first derivative test motivated geometrically and second derivative test given as a provable tool). Simple problems (that illustrate basic principles and understanding of the subject as well as real-life situations).

### Integrals

Integration as inverse process of differentiation. Integration of a variety of functions by substitution, by partial fractions and by parts, Evaluation of simple integrals of the following types and problems based on them.

$$\int \frac{dx}{x^2 \pm a^2}, \int \frac{dx}{\sqrt{x^2 \pm a^2}}, \int \frac{dx}{\sqrt{a^2 - x^2}}, \int \frac{dx}{ax^2 + bx + c}, \int \frac{dx}{\sqrt{ax^2 + bx + c}}$$

$$\int \frac{px + q}{ax^2 + bx + c} dx, \int \frac{px + q}{\sqrt{ax^2 + bx + c}} dx, \int \sqrt{a^2 \pm x^2} dx, \int \sqrt{x^2 - a^2} dx$$

$$\int \sqrt{ax^2 + bx + c} dx,$$

Fundamental Theorem of Calculus. Basic Properties of definite integrals and evaluation of definite integrals;

### Applications of the Integrals

Applications in finding the area under simple curves, especially lines, circles/ parabolas/ellipses (in standard form only)

### Differential Equations

Definition, order and degree, general and particular solutions of a differential equation. Solution of differential equations by method of separation of variables, solutions of homogeneous differential equations of first order and first degree. Solutions of linear differential equation of the type:  $dy/dx + py = q$ , where p and q are functions of x or constants.  $dx/dy + px = q$ , where p and q are functions of y or constants.

### Vectors

Vectors and scalars, magnitude and direction of a vector. Direction cosines and direction ratios

of a vector. Types of vectors (equal, unit, zero, parallel and collinear vectors), position vector of a point, negative of a vector, components of a vector, addition of vectors, multiplication of a vector by a scalar, position vector of a point dividing a line segment in a given ratio. Definition, Geometrical Interpretation, properties and application of scalar (dot) product of vectors, vector (cross) product of vectors.

### **Three - dimensional Geometry**

Direction cosines and direction ratios of a line joining two points. Cartesian equation and vector equation of a line, skew lines, shortest distance between two lines. Angle between two lines.

### **Linear Programming**

Introduction, related terminology such as constraints, objective function, optimization, graphical method of solution for problems in two variables, feasible and infeasible regions (bounded or unbounded), feasible and infeasible solutions, optimal feasible solutions (up to three non-trivial constraints).

### **Probability**

Conditional probability, multiplication theorem on probability, independent events, total probability, Bayes' theorem, Random variable and its probability distribution, mean of random variable.

## TIER II: Syllabus -PGT (Physics)

### **Units and Measurements**

Need for measurement: Units of measurement; systems of units; SI units, fundamental and derived units, significant figures. Dimensions of physical quantities, dimensional analysis and its applications.

### **Motion in a Straight Line**

Frame of reference, Motion in a straight line, Elementary concepts of differentiation and integration for describing motion, uniform and non- uniform motion, and instantaneous velocity, uniformly accelerated motion, velocity - time and position-time graphs, Relations for uniformly accelerated motion .

### **Motion in a Plane**

Scalar and vector quantities; position and displacement vectors, general vectors and their notations; equality of vectors, multiplication of vectors by a real number; addition and subtraction of vectors, Unit vector; resolution of a vector in a plane, rectangular components, Scalar and Vector product of vectors. Motion in a plane, cases of uniform velocity and uniform acceleration, projectile motion, uniform circular motion.

### **Laws of Motion:**

Intuitive concept of force, Inertia, Newton's first law of motion; momentum and Newton's second law of motion; impulse; Newton's third law of motion. Law of conservation of linear momentum and its applications. Equilibrium of concurrent forces, Static and kinetic friction, laws of friction, rolling friction, lubrication. Dynamics of uniform circular motion: Centripetal force, examples of circular motion- vehicle on a level circular road, vehicle on a banked road.

### **Work, Energy and Power:**

Work done by a constant force and a variable force; kinetic energy, work-energy theorem, power, Notion of potential energy, potential energy of a spring, conservative forces: non-conservative forces, motion in a vertical circle; elastic and inelastic collisions in one and two dimensions.

### **Motion of System of Particles and Rigid Body & System of Particles and Rotational Motion**

Centre of mass of a two-particle system, momentum conservation and Centre of mass motion, Centre of mass of a rigid body; centre of mass of a uniform rod, Moment of a force, torque, angular momentum, law of conservation of angular momentum and its applications, Equilibrium of rigid bodies, rigid body rotation and equations of rotational motion, comparison of linear and rotational motions. Moment of inertia, radius of gyration, values of moments of inertia for simple geometrical objects.

### **Gravitation:**

Kepler's laws of planetary motion, universal law of gravitation, Acceleration due to gravity and its variation with altitude and depth. Gravitational potential energy and gravitational potential, escape velocity, orbital velocity of a satellite.

### **Mechanical Properties of Solids**

Elasticity, Stress-strain relationship, Hooke's law, Young's modulus, bulk modulus, shear modulus of rigidity, Poisson's ratio; elastic energy.

### **Mechanical Properties of Fluids**

Pressure due to a fluid column; Pascal's law and its applications -hydraulic lift and hydraulic brakes, effect of gravity on fluid pressure, Viscosity, Stokes' law, terminal velocity, streamline and turbulent flow, critical velocity, Bernoulli's theorem and its simple applications, Surface energy and surface tension, angle of contact, excess of pressure across a curved surface, application of surface tension ideas to drops, bubbles and capillary rise.

## **Thermal Properties of Matter**

Heat, temperature, thermal expansion; thermal expansion of solids, liquids and gases, anomalous expansion of water; specific heat capacity;  $C_p$ ,  $C_v$  - calorimetry; change of state - latent heat capacity. Heat transfer-conduction, convection and radiation, thermal conductivity, qualitative ideas of Blackbody radiation, Wein's displacement Law, Stefan's law.

## **Thermodynamics**

Thermal equilibrium and definition of temperature, zeroth law of thermodynamics, heat, work and internal energy, First law of thermodynamics, Second law of thermodynamics: gaseous state of matter, change of condition of gaseous state -isothermal, adiabatic, reversible, irreversible, and cyclic processes.

## **Behavior of Perfect Gases and Kinetic Theory of Gases :**

Equation of state of a perfect gas, work done in compressing a gas, Kinetic theory of gases - assumptions, concept of pressure. Kinetic interpretation of temperature; rms speed of gas molecules; degrees of freedom, law of equi-partition of energy and application to specific heat capacities of gases; concept of mean free path, Avogadro's number.

## **Oscillations and Waves:**

Periodic motion - time period, frequency, displacement as a function of time, periodic functions and their application, Simple harmonic motion (S.H.M) and its equations of motion; phase; oscillations of a loaded spring- restoring force and force constant; energy in S.H.M. Kinetic and potential energies; simple pendulum -its time period. Transverse and longitudinal waves, speed of travelling wave, displacement relation for a progressive wave, principle of superposition of waves, reflection of waves, standing waves in strings and organ pipes, fundamental mode and harmonics, Beats.

## **Electric Charges and Fields:**

Electric charges, Conservation of charge, Coulomb's law-force between two point charges, forces between multiple charges; superposition principle and continuous charge distribution, Electric field, electric field due to a point charge, electric field lines, electric dipole, electric field due to a dipole, torque on a dipole in uniform electric field. Electric flux, statement of Gauss's theorem and its applications to find field due to infinitely long straight wire, uniformly charged infinite plane sheet and uniformly charged thin spherical shell-field inside and outside.

## **Magnetism and Matter**

Bar magnet, bar magnet as an equivalent solenoid (qualitative treatment only), magnetic field intensity due to a magnetic dipole (bar magnet) along its axis and perpendicular to its axis (qualitative treatment only), torque on a magnetic dipole (bar magnet) in a uniform magnetic field (qualitative treatment only), magnetic field lines. Magnetic properties of materials- Para-, dia- and ferro - magnetic substances with examples, Magnetization of materials, effect of temperature on magnetic properties.

## **Electromagnetic Induction and Alternating Currents**

Electromagnetic induction; Faraday's laws, induced EMF and current; Lenz's Law, Self and mutual induction, Alternating Current Alternating currents, peak and RMS value of alternating current/voltage; reactance and impedance; LCR series circuit, resonance, power in AC circuits, power factor, wattless current, AC generator, Transformer.

## **Electromagnetic Waves**

Basic idea of displacement current, Electromagnetic waves, their characteristics, their transverse nature (qualitative idea only). Electromagnetic spectrum (radio waves, microwaves, infrared, visible, ultraviolet, X-rays, gamma rays) including elementary facts about their uses.

**Ray Optics and Optical Instruments Ray Optics:**

Reflection of light, spherical mirrors, mirror formula, refraction of light, total internal reflection and optical fibers, refraction at spherical surfaces, lenses, thin lens formula, lens maker's formula, magnification, power of a lens, combination of thin lenses in contact, refraction of light through a prism. Optical instruments: Microscopes and astronomical telescopes (reflecting and refracting) and their magnifying powers.

**Wave optics:**

Wave front and Huygen's principle, reflection and refraction of plane wave at a plane surface using wave fronts, Proof of laws of reflection and refraction using Huygen's principle. Interference, Young's double slit experiment and expression for fringe width, coherent sources and sustained interference of light, diffraction due to a single slit, width of central maxima.

**Dual Nature of Radiation and Matter:**

Dual nature of radiation, Photoelectric effect, Hertz and Lenard's observations; Einstein's photoelectric equation-particle nature of light, Experimental study of photoelectric effect Matter waves-wave nature of particles, de-Broglie relation.

**Atoms & Nuclei:**

Alpha-particle scattering experiment; Rutherford's model of atom; Bohr model of hydrogen atom, Expression for radius of nth possible orbit, velocity and energy of electron in its orbit, hydrogen line spectra, Composition and size of nucleus, nuclear force Mass-energy relation, mass defect; binding energy per nucleon and its variation with mass number; nuclear fission, nuclear fusion.

**Semiconductor Electronics:**

Energy bands in conductors, semiconductors and insulators, Intrinsic and extrinsic semiconductors- p and n type, p-n junction Semiconductor diode - I-V characteristics in forward and reverse bias, application of junction diode -diode as a rectifier.

## TIER II : Syllabus -PGT (Chemistry)

### **Basic Concepts of Chemistry**

General Introduction: Importance and scope of Chemistry. Nature of matter, laws of chemical combination, Dalton's atomic theory: concept of elements, atoms and molecules. Atomic and molecular masses, mole concept and molar mass, percentage composition, empirical and molecular formula, chemical reactions, stoichiometry and calculations based on stoichiometry.

### **Structure of Atom**

Discovery of Electron, Proton and Neutron, atomic number, isotopes and isobars. Thomson's model and its limitations. Rutherford's model and its limitations, Bohr's model and its limitations, concept of shells and subshells, dual nature of matter and light, de Broglie's relationship, Heisenberg uncertainty principle, concept of orbitals, quantum numbers, shapes of s, p and d orbitals, rules for filling electrons in orbitals - Aufbau principle, Pauli's exclusion principle and Hund's rule, electronic configuration of atoms, stability of half-filled and completely filled orbitals.

### **Classification of Elements and Periodicity in Properties**

Significance of classification, brief history of the development of periodic table, modern periodic law and the present form of periodic table, periodic trends in properties of elements -atomic radii, ionic radii, inert gas radii, Ionization enthalpy, electron gain enthalpy, electronegativity, valency. Nomenclature of elements with atomic number greater than 100.

### **Chemical Bonding and Molecular Structure**

Valence electrons, ionic bond, covalent bond, bond parameters, Lewis structure, polar character of covalent bond, covalent character of ionic bond, valence bond theory, resonance, geometry of covalent molecules, VSEPR theory, concept of hybridization, involving s, p and d orbitals and shapes of some simple molecules, molecular orbital theory of homonuclear diatomic molecules (qualitative idea only), Hydrogen bond.

### **Chemical Thermodynamics**

Concepts of System and types of systems, surroundings, work, heat, energy, extensive and intensive properties, state functions. First law of thermodynamics -internal energy and enthalpy, heat capacity and specific heat, measurement of  $\Delta U$  &  $\Delta H$ , Hess's law of constant heat summation, enthalpy of bond of dissociation, combustion, formation, atomization, sublimation, phase transition, ionization, solution and dilution. Second law of Thermodynamics, Introduction of entropy as a state function, Gibb's energy change for spontaneous and nonspontaneous processes, criteria for equilibrium. Third law of thermodynamics.

### **Equilibrium**

Equilibrium in physical and chemical processes, dynamic nature of equilibrium, law of mass action, equilibrium constant, factors affecting equilibrium - Le Chatelier's principle, ionic equilibrium- ionization of acids and bases, strong and weak electrolytes, degree of ionization, ionization of poly basic acids, acid strength, concept of pH, hydrolysis of salts (elementary idea), buffer solution, Henderson Equation, solubility product, common ion effect (with illustrative examples).

### **Redox Reactions**

Concept of oxidation and reduction, redox reactions, oxidation number, balancing redox reactions, in terms of loss and gain of electrons and change in oxidation number, applications of redox reactions.

### **Organic Chemistry -Some Basic Principles and Techniques**

General introduction, methods of purification, qualitative and quantitative analysis, classification and IUPAC nomenclature of organic compounds. Electronic displacements in a

covalent bond: inductive effect, electromeric effect, resonance and hyper conjugation.

Homolytic and heterolytic fission of a covalent bond: free radicals, carbocations, carbanions, electrophiles and nucleophiles, types of organic reactions.

## Classification of Hydrocarbons

### Aliphatic Hydrocarbons:

Alkanes - Nomenclature, isomerism, conformation (ethane only), physical properties, chemical reactions including free radical mechanism of halogenation, combustion and pyrolysis. Alkenes - Nomenclature, structure of double bond (ethene), geometrical isomerism, physical properties, methods of preparation, chemical reactions: addition of hydrogen, halogen, water, hydrogen halides (Markovnikov's addition and peroxide effect), ozonolysis, oxidation, mechanism of electrophilic addition. Alkynes - Nomenclature, structure of triple bond (ethyne), physical properties, methods of preparation, chemical reactions: acidic character of alkynes, addition reaction of - hydrogen, halogens, hydrogen halides and water.

Aromatic Hydrocarbons: Introduction, IUPAC nomenclature, benzene: resonance, aromaticity, chemical properties: mechanism of electrophilic substitution. Nitration, sulphonation, halogenation, Friedel Craft's alkylation and acylation, directive influence of functional group in monosubstituted benzene. Carcinogenicity and toxicity.

### Solutions

Types of solutions, expression of concentration of solutions of solids in liquids, solubility of gases in liquids, solid solutions, Raoult's law, colligative properties - relative lowering of vapour pressure, elevation of boiling point, depression of freezing point, osmotic pressure, determination of molecular masses using colligative properties, abnormal molecular mass, Van't Hoff factor.

### Electrochemistry

Redox reactions, EMF of a cell, standard electrode potential, Nernst equation and its application to chemical cells, Relation between Gibbs energy change and EMF of a cell, conductance in electrolytic solutions, specific and molar conductivity, variations of conductivity with concentration, Kohlrausch's Law, electrolysis and law of electrolysis (elementary idea), dry cell-electrolytic cells and Galvanic cells, lead accumulator, fuel cells, corrosion.

### Chemical Kinetics

Rate of a reaction (Average and instantaneous), factors affecting rate of reaction: concentration, temperature, catalyst; order and molecularity of a reaction, rate law and specific rate constant, integrated rate equations and half-life (only for zero and first order reactions), concept of collision theory (elementary idea, no mathematical treatment), activation energy, Arrhenius equation.

### d and f Block Elements

General introduction, electronic configuration, occurrence and characteristics of transition metals, general trends in properties of the first-row transition metals - metallic character, ionization enthalpy, oxidation states, ionic radii, colour, catalytic property, magnetic properties, interstitial compounds, alloy formation, preparation and properties of  $K_2Cr_2O_7$  and  $KMnO_4$ . **Lanthanoids** - Electronic configuration, oxidation states, chemical reactivity and lanthanoid contraction and its consequences. **Actinoids** - Electronic configuration, oxidation states and comparison with lanthanoids.

### Coordination Compounds

Coordination compounds - Introduction, ligands, coordination number, colour, magnetic properties and shapes, IUPAC nomenclature of mononuclear coordination compounds. Bonding, Werner's theory, VBT, and CFT; structure and stereoisomerism, importance of coordination compounds (in qualitative analysis, extraction of metals and biological system).

### Haloalkanes and Haloarenes.

Haloalkanes: Nomenclature, nature of C-X bond, physical and chemical properties, optical rotation



mechanism of substitution reactions. **Haloarenes:** Nature of C-X bond, substitution reactions (Directive influence of halogen in monosubstituted compounds only). Uses and environmental effects of - dichloromethane, trichloromethane, tetrachloromethane, iodoform, freons, DDT.

### **Alcohols, Phenols and Ethers**

Alcohols: Nomenclature, methods of preparation, physical and chemical properties (of primary alcohols only), identification of primary, secondary and tertiary alcohols, mechanism of dehydration, uses with special reference to methanol and ethanol. **Phenols:** Nomenclature, methods of preparation, physical and chemical properties, acidic nature of phenol, electrophilic substitution reactions, uses of phenols. **Ethers:** Nomenclature, methods of preparation, physical and chemical properties, uses.

### **Aldehydes, Ketones and Carboxylic Acids**

**Aldehydes and Ketones:** Nomenclature, nature of carbonyl group, methods of preparation, physical and chemical properties, mechanism of nucleophilic addition, reactivity of alpha hydrogen in aldehydes, uses. **Carboxylic Acids:** Nomenclature, acidic nature, methods of preparation, physical and chemical properties; uses.

### **Amines**

**Amines:** Nomenclature, classification, structure, methods of preparation, physical and chemical properties, uses, identification of primary, secondary and tertiary amines. Diazonium salts: Preparation, chemical reactions and importance in synthetic organic chemistry.

### **Biomolecules**

**Carbohydrates** - Classification (aldoses and ketoses), monosaccharides (glucose and fructose), D-L configuration oligosaccharides (sucrose, lactose, maltose), polysaccharides (starch, cellulose, glycogen); Importance of carbohydrates. **Proteins** -Elementary idea of - amino acids, peptide bond, polypeptides, proteins, structure of proteins - primary, secondary, tertiary structure and quaternary structures (qualitative idea only), denaturation of proteins; enzymes. Hormones - Elementary idea excluding structure. **Vitamins** - Classification and functions. Nucleic Acids: DNA and RNA.

## TIER II: Syllabus -PGT (Biology)

### **The Living World**

Biodiversity; Need for classification; three domains of life; taxonomy and systematics; concept of species and taxonomical hierarchy; binomial nomenclature

### **Biological Classification**

Five kingdom classification; Salient features and classification of Monera, Protista and Fungi into major groups; Lichens, Viruses and Viroids.

### **Plant Kingdom**

Classification of plants into major groups; Salient and distinguishing features and a few examples of Algae, Bryophyta, Pteridophyta, Gymnospermae (Topics excluded – Angiosperms, Plant Life Cycle and Alternation of Generations)

### **Animal Kingdom**

Salient features and classification of animals, non-chordates up to phyla level and chordates up to class level (salient features and at a few examples of each category).

### **Morphology of Flowering Plants**

Morphology of different parts of flowering plants: root, stem, leaf, inflorescence, flower, fruit and seed. Description of families: Solanaceae

### **Anatomy of Flowering Plants**

Anatomy and functions of tissue systems in dicots and monocots.

### **Structural Organisation in Animals**

Morphology, Anatomy and functions of different systems (digestive, circulatory, respiratory, nervous and reproductive) of frog.

### **Cell-The Unit of Life**

Cell theory and cell as the basic unit of life, structure of prokaryotic and eukaryotic cells; Plant cell and animal cell; cell envelope; cell membrane, cell wall; cell organelles - structure and function; endomembrane system- endoplasmic reticulum, ribosomes, golgi bodies, lysosomes, vacuoles; mitochondria, plastids, microbodies; cytoskeleton, cilia, flagella, centrioles (ultrastructure and function); nucleus.

### **Biomolecules**

Chemical constituents of living cells: biomolecules, structure and function of proteins, carbohydrates, lipids, nucleic acids; Enzymes - properties, enzyme action.

### **Cell Cycle and Cell Division**

Cell cycle, mitosis, meiosis and their significance

### **Photosynthesis in Higher Plants**

Photosynthesis as a means of autotrophic nutrition; site of photosynthesis, pigments involved in photosynthesis (elementary idea); photochemical and biosynthetic phases of photosynthesis; cyclic and non-cyclic photophosphorylation; chemiosmotic hypothesis; photorespiration; C<sub>3</sub> and C<sub>4</sub> pathways; factors affecting photosynthesis.

### **Respiration in Plants**

Exchange of gases; cellular respiration - glycolysis, fermentation (anaerobic), TCA cycle and electron transport system (aerobic); energy relations - number of ATP molecules generated; amphibolic pathways; respiratory quotient.

### **Plant - Growth and Development**

Seed germination; phases of plant growth and plant growth rate; conditions for growth;

differentiation, dedifferentiation and redifferentiation; sequence of developmental processes in a plant cell; growth regulators - auxin, gibberellin, cytokinin, ethylene, ABA.

### **Breathing and Exchange of Gases**

Introduction to respiratory organs in animals; Respiratory system in humans; mechanism of breathing and its regulation in humans - exchange of gases, transport of gases and regulation of respiration, respiratory volumes; disorders related to respiration - asthma, emphysema, occupational respiratory disorders.

### **Body Fluids and Circulation**

Composition of blood, blood groups, coagulation of blood; composition of lymph and its function; human circulatory system - Structure of human heart and blood vessels; cardiac cycle, cardiac output, ECG; double circulation; regulation of cardiac activity; disorders of circulatory system - hypertension, coronary artery disease, angina pectoris, heart failure.

### **Excretory Products and their Elimination**

Modes of excretion - ammonotelism, ureotelism, uricotelism; human excretory system - structure and function; urine formation, osmoregulation; regulation of kidney function - renin - angiotensin, atrial natriuretic factor, ADH, diabetes insipidus; micturition; role of other organs in excretion; disorders - uremia, renal failure, renal calculi, nephritis; dialysis and artificial kidney, kidney transplant.

### **Locomotion and Movement**

Types of movement - amoeboid, ciliary, flagellar, muscular; skeletal muscle, contractile proteins and muscle contraction; skeletal system and its functions; joints; disorders of muscular and skeletal systems - myasthenia gravis, tetany, muscular dystrophy, arthritis, osteoporosis, gout.

Neuron and nerves; Nervous system in humans - central nervous system and peripheral nervous system; generation and conduction of nerve impulse; visceral nervous system.

### **Chemical Coordination and Integration**

Endocrine glands and hormones; human endocrine system - hypothalamus, pituitary, pineal, thyroid, parathyroid, thymus, adrenal, pancreas, gonads; hormones of heart, kidney and gastrointestinal tract; mechanism of hormone action (elementary idea); role of hormones as messengers and regulators, hypo - and hyperactivity and related disorders; dwarfism, acromegaly, cretinism, goiter, exophthalmic goiter, diabetes, Addison's disease.

### **Neural Control and Coordination**

#### **Sexual Reproduction in Flowering Plants**

Flower structure; development of male and female gametophytes; pollination - types, agencies and examples; outbreeding devices; pollen-pistil interaction; double fertilization; post fertilization events - development of endosperm and embryo, development of seed and formation of fruit; special modes- apomixis, parthenocarpy, polyembryony; Significance of seed dispersal and fruit formation.

#### **Human Reproduction**

Male and female reproductive systems; microscopic anatomy of testis and ovary; gametogenesis - spermatogenesis and oogenesis; menstrual cycle; fertilisation, embryo development upto blastocyst formation, implantation; pregnancy and placenta formation ; parturition ; lactation .

#### **Reproductive Health**

Need for reproductive health and prevention of Sexually Transmitted Diseases (STDs); birth control - need and methods; medical termination of pregnancy (MTP); amniocentesis; infertility and assisted reproductive technologies - IVF, ZIFT, GIFT

#### **Principles of Inheritance and Variation**

Heredity and variation, Mendelian inheritance; deviations from Mendelism - incomplete dominance, co-dominance, multiple alleles and inheritance of blood groups, pleiotropy; elementary idea of polygenic inheritance; chromosome theory of inheritance; chromosomes and

genes; linkage and crossing over; Sex determination - in human being, birds and honey bee; sex linked inheritance - haemophilia, colour blindness; Mendelian disorders in humans - thalassemia; chromosomal disorders in humans; Down's syndrome, Turner's and Klinefelter's syndromes.

### **Molecular Basis of Inheritance**

Structure of DNA and RNA; DNA packaging; Search for genetic material and DNA as genetic material; DNA replication; Central Dogma; transcription, genetic code, translation; gene expression and regulation - lac operon; Human genome project; DNA fingerprinting.

### **Evolution**

Origin of life; biological evolution and evidences for biological evolution (paleontology, comparative anatomy, embryology and molecular evidences); adaptive radiation; Darwin's theory of evolution; mechanism of evolution - variation (mutation and recombination) and natural selection with examples, types of natural selection; Gene flow and genetic drift; Hardy - Weinberg's principle; human evolution

### **Human Health and Diseases**

Pathogens; parasites causing human diseases (malaria, dengue, chikungunya, filariasis, ascariasis, typhoid, pneumonia, common cold, amoebiasis, ring worm) and their control; Basic concepts of immunology - vaccines; cancer, HIV and AIDS; Adolescence - drug and alcohol abuse.

### **Biotechnology - Principles and Processes**

Genetic Engineering (Recombinant DNA Technology).

### **Biotechnology and its Application**

Application of biotechnology in health and agriculture: genetically modified organisms - Bt crops; Human insulin, gene therapy; molecular diagnosis; transgenic animals; biosafety issues, biopiracy and patents.

### **Organisms and Populations**

Population interactions - mutualism, competition, predation, parasitism, commensalism; population attributes - growth, birth rate and death rate, age distribution.

### **Ecosystem**

Ecosystem, productivity and decomposition; energy flow; pyramids of number, biomass, energy.

### **Biodiversity and Conservation**

Biodiversity - Concept, levels, patterns, importance; loss of biodiversity; biodiversity conservation; hotspots, endangered organisms, extinction, Red Data Book, Sacred Groves, biosphere reserves, national parks, wildlife, sanctuaries and Ramsar sites.

## TIER II : Syllabus –PGT (Computer Science)

### **Computer Systems and Organisation**

- Basic Computer Organisation : Introduction to computer system, hardware, software, input device, output device, CPU, memory (primary, cache and secondary), units of memory (Bit, Byte, KB, MB, GB, TB, PB)
- Types of software: system software (operating systems, system utilities, device drivers), programming tools and language translators (assembler, compiler & interpreter), application software
- Operating system (OS): functions of operating system, OS user interface
- Boolean logic: NOT, AND, OR, NAND, NOR, XOR, truth table, De Morgan's laws and logic circuits
- Number system: Binary, Octal, Decimal and Hexadecimal number system; conversion between number systems.
- Encoding schemes: ASCII, ISCII and UNICODE (UTF8, UTF32)

### **Computational Thinking and Programming**

- Introduction to problem solving: Steps for problem solving (analysing the problem, developing an algorithm, coding, testing and debugging). representation of algorithms using flow chart and pseudo code, decomposition
- Familiarization with the basics of Python programming: Introduction to Python, features of Python, executing a simple "hello world" program, execution modes: interactive mode and script mode, Python character set, Python tokens (keyword, identifier, literal, operator, punctuator), variables, concept of l-value and r-value, use of comments
- Knowledge of data types: number (integer, floating point, complex), boolean, sequence (string, list, tuple), none, mapping (dictionary), mutable and immutable data types
- Operators: arithmetic operators, relational operators, logical operators, assignment operator, augmented assignment operators, identity operators (is, is not), membership operators (in, not in)
- Expressions, statement, type conversion & input/output: precedence of operators, expression, evaluation of expression, python statement, type conversion (explicit & implicit conversion), accepting data as input from the console and displaying output
- Errors: syntax errors, logical errors, runtime errors
- Flow of control: introduction, use of indentation, sequential flow, conditional and iterative flow control
- Conditional statements: if, if-else, if-elif-else, flowcharts, simple programs: e.g.: absolute value, sort 3 numbers and divisibility of a number
- Iterative statements: for loop, range function, while loop, flowcharts, break and continue statements, nested loops, suggested programs: generating pattern, summation of series, finding the factorial of a positive number etc
- Strings: introduction, indexing, string operations (concatenation, repetition, membership & slicing), traversing a string using loops, built-in functions: len(), capitalize(), title(), lower(), upper(), count(), find(), index(), endswith(), startswith(), isalnum(), isalpha(), isdigit(), islower(), isupper(), isspace(), lstrip(),rstrip(), strip(), replace(), join(), partition(), split()
- Lists: introduction, indexing, list operations (concatenation, repetition, membership & slicing), traversing a list using loops, built-in functions: len(), list(), append(), extend(), insert(), count(), index(), remove(), pop(), reverse(), sort(), sorted(), min(), max(), sum(); nested lists, suggested programs: finding the maximum, minimum, mean of numeric values stored in a list; linear search on list of numbers and counting the frequency of elements in a list
- Tuples: introduction, indexing, tuple operations (concatenation, repetition, membership & slicing), built-in functions: len(), tuple(), count(), index(), sorted(), min(), max(), sum(); tuple assignment, nested tuple, suggested programs: finding the minimum, maximum, mean of values stored in a tuple; linear search on a tuple of numbers, counting the frequency of

elements in a tuple

- Dictionary: introduction, accessing items in a dictionary using keys, mutability of dictionary (adding a new item, modifying an existing item), traversing a dictionary, built-in functions: len(), dict(), keys(), values(), items(), get(), update(), del(), clear(), fromkeys(), copy(), pop(), popitem(), setdefault(), max(), min(), count(), sorted(), copy(); suggested programs : count the number of times a character appears in a given string using a dictionary, create a dictionary with names of employees, their salary and access them
- Introduction to Python modules: Importing module using 'import ' and using from statement, Importing math module (pi, e, sqrt, ceil, floor, pow, fabs, sin, cos, tan); random module (random, randint, randrange), statistics module (mean, median, mode)

### **Society, Law and Ethics**

- Digital Footprints
- Digital society and Netizen: net etiquettes, communication etiquettes, social media etiquettes
- Data protection: Intellectual Property Right (copyright, patent, trademark), violation of IPR (plagiarism, copyright infringement, trademark infringement), open source softwares and licensing (Creative Commons, GPL and Apache)
- Cyber-crime: definition, hacking, eavesdropping, phishing and fraud emails, ransomware, preventing cyber crime
- Cyber safety: safely browsing the web, identity protection, confidentiality, cyber trolls and bullying.
- Safely accessing web sites: malware, viruses, trojans, adware
- E-waste management: proper disposal of used electronic gadgets
- Indian Information Technology Act (IT Act)
- Technology & Society: Gender and disability issues while teaching and using computers

### **Computational Thinking and Programming – 2**

- Functions: types of function (built-in functions, functions defined in module, user defined functions), creating user defined function, arguments and parameters, default parameters, positional parameters, function returning value(s), flow of execution, scope of a variable (global scope, local scope)
- Introduction to files, types of files (Text file, Binary file, CSV file), relative and absolute paths
- Text file: opening a text file, text file open modes (r, r+, w, w+, a, a+), closing a text file, opening a file using with clause, writing/appending data to a text file using write() and writelines(), reading from a text file using read(), readline() and readlines(), seek and tell methods, manipulation of data in a text file
- Binary file: basic operations on a binary file: open using file open modes (rb, rb+, wb, wb+, ab, ab+), close a binary file, import pickle module, dump() and load() method, read, write/create, search, append and update operations in a binary file
- CSV file: import csv module, open / close csv file, write into a csv file using csv.writerow() and read from a csv file using csv.reader( )

### **Computer Networks**

- Evolution of networking: introduction to computer networks, evolution of networking (ARPANET, NSFNET, INTERNET)
- Data communication terminologies: concept of communication, components of data communication (sender, receiver, message, communication media, protocols), measuring capacity of communication media (bandwidth, data transfer rate), IP address, switching techniques (Circuit switching, Packet switching)
- Transmission media: Wired communication media (Twisted pair cable, Co-axial cable, Fiber-optic cable), Wireless media (Radio waves, Micro waves, Infrared waves)
- Network devices (Modem, Ethernet card, RJ45, Repeater, Hub, Switch, Router, Gateway, WIFI card)
- Network topologies and Network types: types of networks (PAN, LAN, MAN, WAN),

networking topologies (Bus, Star, Tree)

- Network protocol: HTTP, FTP, PPP, SMTP, TCP/IP, POP3, HTTPS, TELNET, VoIP, wireless/mobile communication protocol such as GSM, GPRS and WLL
- Introduction to web services: WWW, Hyper Text Markup Language (HTML), Extensible Markup Language (XML), domain names, URL, website, web browser, web servers, web hosting

### **Database Management**

- Database concepts: introduction to database concepts and its need
- Relational data model: relation, attribute, tuple, domain, degree, cardinality, keys (candidate key, primary key, alternate key, foreign key)
- Structured Query Language: introduction, Data Definition Language and Data Manipulation Language, data type (char(n), varchar(n), int, float, date), constraints (not null, unique, primary key), create database, use database, show databases, drop database, show tables, create table, describe table, alter table (add and remove an attribute, add and remove primary key), drop table, insert, delete, select, operators (mathematical, relational and logical), aliasing, distinct clause, where clause, in, between, order by, meaning of null, is null, is not null, like, update command, delete command, aggregate functions (max, min, avg, sum, count), group by, having clause, joins: cartesian product on two tables, equi-join and natural join
- Interface of python with an SQL database: connecting SQL with Python, performing insert, update, delete queries using cursor, display data by using fetchone(), fetchall(), rowcount, creating database connectivity applications

### **Introduction to Computer System**

- Introduction to computers and computing: evolution of computing devices, components of a computer system and their interconnections, Input/Output devices.
  - Computer Memory: Units of memory, types of memory – primary and secondary, data deletion, its recovery and related security concerns. Software: purpose and types – system and application software, generic and specific purpose software.

### **Introduction to Python**

- Basics of Python programming, Python interpreter - interactive and script mode, the structure of a program, indentation, identifiers, keywords, constants, variables, types of operators, precedence of operators, data types, mutable and immutable data types, statements, expressions, evaluation of expressions, comments, input and output statements, data type conversion, debugging, control statements: if-else, for loop Lists: list operations - creating, initializing, traversing and manipulating lists, list methods and built-in functions.: len(), list(), append(), extend(), insert(), count(), find(), remove(), pop(), reverse(), sort(), sorted(), min(), max(), sum()
- Dictionary: concept of key-value pair, creating, initializing, traversing, updating and deleting elements, dictionary methods and built-in functions: len(), dict(), keys(), values(), items(), get(), update(), clear(), del()

### **Database concepts and the Structured Query Language**

- Database Concepts: Introduction to database concepts and its need, Database Management System. Relational data model: concept of attribute, domain, tuple, relation, candidate key, primary key, alternate key, foreign key.
- Advantages of using Structured Query Language, Data Definition Language, Data Query Language and Data Manipulation Language, Introduction to MySQL, creating a database using MySQL, Data Types
- Definition Commands: CREATE TABLE
- Data Query Commands: SELECT-FROM- WHERE
- Data Manipulation Commands: INSERT

## Emerging Trends

Artificial Intelligence, Machine Learning, Natural Language Processing, Immersive experience (AR, VR), Robotics, Big data and its characteristics, Internet of Things (IoT), Sensors, Smart cities, Cloud Computing and Cloud Services (SaaS, IaaS, PaaS); Grid Computing, Block chain technology.

### Data Handling using Pandas

- Introduction to Python libraries- Pandas, Matplotlib.
- Data structures in Pandas - Series and Data Frames.
- Series: Creation of Series from – ndarray, dictionary, scalar value; mathematical operations; Head and Tail functions; Selection, Indexing and Slicing.
- Data Frames: creation - from dictionary of Series, list of dictionaries, Text/CSV files; display; iteration; Operations on rows and columns: add, select, delete, rename; Head and Tail functions; Indexing using Labels, Boolean Indexing;
- Importing/Exporting Data between CSV files and Data Frames.
- Data Visualization Purpose of plotting; drawing and saving following types of plots using Matplotlib – line plot, bar graph, histogram Customizing plots: adding label, title, and legend in plots

### Database Query using SQL

- Math functions: POWER (), ROUND (), MOD ().
- Text functions: UCASE ()/UPPER (), LCASE ()/LOWER (), MID ()/SUBSTRING ()/SUBSTR (), LENGTH (), LEFT (), RIGHT (), INSTR (), LTRIM (), RTRIM (), TRIM ().
- Date Functions: NOW (), DATE (), MONTH (), MONTHNAME (), YEAR (), DAY (), DAYNAME ().
- Aggregate Functions: MAX (), MIN (), AVG (), SUM (), COUNT (); using COUNT (\*).
- Querying and manipulating data using Group by, Having, Order by.

### Introduction to Computer Networks

- Introduction to networks, Types of network: LAN, MAN, WAN.
- Network Devices: modem, hub, switch, repeater, router, gateway
- Network Topologies: Star, Bus, Tree, Mesh.
- Introduction to Internet, URL, WWW, and its applications- Web, email, Chat, VoIP.
- Website: Introduction, difference between a website and webpage, static vs dynamic web page, web server and hosting of a website.
- Web Browsers: Introduction, commonly used browsers, browser settings, add-ons and plug- ins, cookies.

### Societal Impacts

- Digital footprint, net and communication etiquettes, data protection, intellectual property rights (IPR), plagiarism, licensing and copyright, free and open source software (FOSS), cybercrime and cyber laws, hacking, phishing, cyber bullying, overview of Indian IT Act.
- E-waste: hazards and management.
- Awareness about health concerns related to the usage of technology.



## TIER II : Syllabus - PGT (Commerce)

### Accountancy

#### **Introduction to Accounting**

- Accounting- concept, meaning, as a source of information objectives, advantages and limitations, types of accounting information; users of accounting information and their needs. Qualitative Characteristics of Accounting Information. Role of Accounting in Business.
- Basic Accounting Terms- Business Transaction, entity, Capital, Drawings. Liabilities (Non Current and Current). Assets (Non Current, Current); Fixed assets (Tangible and Intangible), Expenditure (Capital and Revenue), Expense, Revenue, Income, Profit, Gain, Loss, Purchase, Sales, Goods, Stock, Debtor, Creditor, Voucher, Discount (Trade discount and Cash Discount)

#### **Theory Base of Accounting**

- Fundamental accounting assumptions: GAAP: Concept
- Business Entity, Money Measurement, Going Concern, Accounting Period, Cost Concept, Dual Aspect, Revenue Recognition, Matching, Full Disclosure, Consistency, Conservatism, Materiality and Objectivity System of Accounting. Basis of Accounting: cash basis and accrual basis
- Accounting Standards: Applicability of IndAS
- Goods and Services Tax (GST): Characteristics and Advantages.

#### **Recording of Business Transactions**

- Voucher and Transactions: Source documents and Vouchers, Preparation of Vouchers, Accounting Equation Approach: Meaning and Analysis, Rules of Debit and Credit.
- Recording of Transactions: Books of Original Entry- Journal
- Special Purpose books
- Cash Book: Simple, cash book with bank column and petty cashbook
- Purchases book
- Sales book
- Purchases return book
- Sales return book
- Journal Proper
- Ledger: Format, Posting from journal and subsidiary books, Balancing of accounts
- Bank Reconciliation Statement:
  - Need and preparation, Bank Reconciliation, Statement with Adjusted Cash Book
- Depreciation, Provisions and Reserves
  - Depreciation: Meaning, Features, Need, Causes, factors
  - Other similar terms: Depletion and Amortisation
  - Methods of Depreciation: i. Straight Line Method (SLM)  
ii. Written Down Value Method (WDV)
- Difference between SLM and WDV;
- Advantages of SLM and WDV Accounting treatment of depreciation
  - i. Charging to asset account
  - ii. Creating provision for depreciation/accumulated depreciation account
  - iii. Treatment for disposal of asset
- Provisions and Reserves: Difference
- Types of Reserves: i. Revenue reserve ii. Capital reserve iii. General reserve iv. Specific reserve v. Secret Reserve

- Difference between capital and revenue reserve

### **Trial balance and Rectification of Errors**

- Trial balance: objectives and meaning & preparation
- Errors: types-errors of omission, commission, principles, and compensating; their effect on Trial Balance. Detection and rectification of errors; preparation of suspense account.

### **Financial Accounting – II**

- Financial Statements Meaning, objectives, and importance; Revenue and Capital Receipts; Revenue and Capital Expenditure;
- Deferred Revenue expenditure.
- Trading and Profit and Loss Account: Gross Profit, Operating profit and Net profit. Preparation.
- Balance Sheet: need, grouping and marshalling of assets and liabilities. Preparation.
- Adjustments in preparation of financial statements with respect to closing stock, outstanding expenses, prepaid expenses, accrued income, income received in advance, depreciation, bad debts, provision for doubtful debts, provision for discount on debtors, Abnormal loss, Goods taken for personal use/staff welfare, interest on capital and managers commission.
- Preparation of Trading and Profit and Loss account and Balance Sheet of a sole proprietorship with adjustments.

### **Accounting for Partnership Firms**

- Partnership: features, Partnership Deed. Provisions of the Indian Partnership Act 1932 in the absence of partnership deed.
- Fixed v/s fluctuating capital accounts. Preparation of Profit and Loss Appropriation account- division of profit among partners, guarantee of profits.
- Past adjustments (relating to interest on capital, interest on drawing, salary and profit sharing ratio). Goodwill: meaning, nature, need, factors affecting and methods of valuation - average profit, super profit and capitalization.

### **Accounting for Partnership firms - Reconstitution and Dissolution.**

- Change in the Profit Sharing Ratio among the existing partners - sacrificing ratio, gaining ratio, accounting for revaluation of assets and reassessment of liabilities and treatment of reserves, accumulated profits and losses. Preparation of revaluation account and balance sheet.
- Admission of a partner - effect of admission of a partner on change in the profit sharing ratio, treatment of goodwill (as per AS 26), treatment for revaluation of assets and reassessment of liabilities, treatment of reserves, accumulated profits and losses, adjustment of capital accounts and preparation of capital, current account and balance sheet.

### **Retirement and death of a partner**

- effect of retirement / death of a partner on change in profit sharing ratio, treatment of goodwill (as per AS 26), treatment for revaluation of assets and reassessment of liabilities, adjustment of accumulated profits, losses and reserves, adjustment of capital accounts and preparation of capital, current account and balance sheet. Preparation of loan account of the retiring partner.
- Calculation of deceased partner's share of profit till the date of death. Preparation of deceased partner's capital account and his executor's account.

### **Dissolution of a partnership firm:**

- Meaning of dissolution of partnership and partnership firm, types of dissolution of a firm. Settlement of accounts - preparation of realization account, and other related accounts: capital accounts of partners and cash/bank a/c (excluding piecemeal distribution, sale to a company and insolvency of partner(s)).

### **Accounting for Share Capital**

- Features and types of companies
- Share and share capital: nature and types.
- Accounting for share capital: issue and allotment of equity and preferences shares. Public subscription of shares - over subscription and under subscription of shares; issue at par and at premium, calls in advance and arrears (excluding interest), issue of shares for consideration other than cash.
- Concept of Private Placement and Employee Stock Option Plan (ESOP), Sweat Equity.
- Accounting treatment of forfeiture and reissue of shares. Disclosure of share capital in the Balance Sheet of a company.

### **Accounting for Debentures**

- Debentures: Meaning, types, Issue of debentures at par, at a premium and at a discount. Issue of debentures for consideration other than cash; Issue of debentures with terms of redemption; debentures as collateral security-concept, interest on debentures. Writing off discount / loss on issue of debentures.

### **Financial statements of a Company:**

- Meaning, Nature, Uses and importance of financial Statement.
- Statement of Profit and Loss and Balance Sheet in prescribed form with major headings and sub headings (as per Schedule III to the Companies Act, 2013)
- Financial Statement Analysis: Meaning, Significance Objectives, importance and limitations.
- Tools for Financial Statement Analysis: Cash flow analysis, ratio analysis.
- Accounting Ratios: Meaning, Objectives, Advantages, classification and computation.
- Liquidity Ratios: Current ratio and Quick ratio.
- Solvency Ratios: Debt to Equity Ratio, Total Asset to Debt Ratio, Proprietary Ratio and Interest Coverage Ratio. Debt to Capital Employed Ratio.
- Activity Ratios: Inventory Turnover Ratio, Trade Receivables Turnover Ratio, Trade Payables Turnover Ratio, Fixed Asset Turnover Ratio, Net Asset Turnover Ratio and Working Capital Turnover Ratio.
- Profitability Ratios: Gross Profit Ratio, Operating Ratio, Operating Profit Ratio, Net Profit Ratio and Return on Investment.

### **Cash Flow Statement**

- Meaning, objectives Benefits, Cash and Cash Equivalents, Classification of Activities and preparation

## **Business Studies**

### **Foundation of Business**

- Meaning and features

### **Evolution and Fundamentals of Business**

History of Trade and Commerce in India: Indigenous Banking System, Rise of Intermediaries, Transport, Trading Communities: Merchant Corporations, Major Trade Centres, Major Imports and Exports, Position of Indian Sub-Continent in the World Economy. Business-meaning and Characteristics, Business- profession and employment-Concept, Objectives of business Classification of business activities - Industry and Commerce, Industry-types: primary, secondary, tertiary Meaning and subgroups, Commerce-trade: (types-internal, external; wholesale and retail) and auxiliaries to trade; (banking, insurance, transportation, warehousing, communication, and advertising) – meaning, Business risk-Concept

### **Forms of Business organizations**

Sole Proprietorship-Concept, merits and limitations, Partnership-Concept, types, merits and

limitation of partnership, registration of a partnership firm, partnership deed. Types of partners. Hindu Undivided Family Business: Concept. Cooperative Societies-Concept, merits, and limitations. Company - Concept, merits and limitations; Types: Private, Public and One Person Company – Concept. Formation of company - stages, important documents to be used in formation of a company. Choice of form of business organization

### **Public, Private and Global Enterprises**

Public sector and private sector enterprises – Concept. Forms of public sector enterprises: Departmental Undertakings, Statutory. Corporations and Government Company. Global Enterprises – Feature. Public private partnership – concept

### **Business Services**

Business services – meaning and types. Banking: Types of bank accounts - savings, current, recurring, fixed deposit and multiple option deposit account. Banking services with particular reference to Bank Draft, Bank Overdraft, Cash credit. E-Banking meaning, Types of digital payments. Insurance – Principles. Types – life, health, fire and marine insurance – concept. Postal Service-Mail, Registered Post, parcel, Speed Post, Courier-meaning

### **Emerging Modes of Business**

E-business: concept, scope and benefits

### **Social Responsibility of Business and Business Ethics**

Concept of social responsibility. Case of social responsibility. Responsibility towards owners, investors, consumers, employees, government and community. Role of business in environment protection. Business Ethics - Concept and Elements.

### **Finance and Trade-Sources of Business Finance**

Concept of business finance. Owners' funds- equity shares, preference share, retained earnings. Borrowed funds: debentures and bonds, loan from financial institution and commercial banks, public deposits, trade credit, Inter Corporate Deposits (ICD).

### **Small Business and Enterprises**

Entrepreneurship Development (ED): Concept, Characteristics and Need. Process of Entrepreneurship Development: Start-up India Scheme, ways to fund start-up. Intellectual Property Rights and Entrepreneurship. Small scale enterprise as defined by MSMED Act 2006 (Micro, Small and Medium Enterprise Development Act). Role of small business in India with special reference to rural areas. Government schemes and agencies for small scale industries: National Small Industries Corporation (NSIC) and District Industrial Centre (DIC) with special reference to rural, backward areas.

### **Internal Trade**

Internal trade - meaning and types services rendered by a wholesaler and a retailer. Types of retail-trade-Itinerant and small scale fixed shops retailers. Large scale retailers- Departmental stores, chain stores – concept. GST (Goods and Services Tax): Concept and key-features.

### **International trade:**

Concept and benefits. Export trade – Meaning and procedure. Import Trade - Meaning and procedure. Documents involved in International Trade; indent, letter of credit, shipping order, shipping bills, mate's receipt (DA/DP). World Trade Organization (WTO) meaning and objectives.

### **Nature and Significance of Management**

Management - concept, objectives, and importance. Management as Science, Art and Profession. Levels of Management. Management functions-planning, organizing, staffing, directing and controlling. Coordination- concept and importance.

### **Principles of Management**

Principles of Management- concept and significance. Fayol's principles of management. Taylor's Scientific management- principles and techniques.

### **Business Environment**

Business Environment- concept and importance Dimensions of Business Environment- Economic, Social, Technological, Political and Legal. Demonetization - concept and features.

### **Planning**

Concept, importance and limitation. Planning process. Single use and standing plans. Objectives, Strategy, Policy, Procedure, method Rule, budget and Programme.

### **Organising**

Concept and importance. Organising Process. Structure of organisation- functional and divisional concept. Formal and informal organisation- concept. Delegation: concept, elements and importance. Decentralization: concept and importance.

### **Staffing**

Concept and importance of staffing. Staffing as a part of Human Resource Management concept. Staffing process. Recruitment process. Selection – process. Training and Development - Concept and importance, Methods of training - on the job and off the job - vestibule training, apprenticeship training and internship training.

### **Directing**

Concept and importance. Elements of Directing. Motivation - concept, Maslow's hierarchy of needs, Financial and non-financial incentives. Leadership - concept, styles - authoritative, democratic and laissez faire. Communication - concept, formal and informal communication; barriers to effective communication, how to overcome the barriers.

### **Controlling**

Controlling - Concept and importance. Relationship between planning and controlling. Steps in process of control.

### **Financial Management**

Concept, role and objectives of Financial Management. Financial decisions: investment, financing and dividend- Meaning and factors affecting. Financial Planning - concept and importance. Capital Structure – concept and factors affecting capital structure. Fixed and Working Capital - Concept and factors affecting their requirements.

### **Financial Markets**

Financial Markets: Concept. Money Market: Concept. Capital market and its types (primary and secondary). Stock Exchange - Functions and trading procedure. Securities and Exchange Board of India(SEBI)-objectives and functions

### **Marketing**

Marketing – Concept, functions and philosophies. Marketing Mix – Concept and elements. Product - branding, labelling and packaging – Concept. Price - Concept, Factors determining price. Physical Distribution – concept, components and channels of distribution. Promotion – Concept and elements; Advertising, Personal Selling, Sales Promotion and Public Relations

### **Consumer Protection**

Concept and importance of consumer protection. The Consumer Protection Act, 2019: Meaning of consumer. Rights and responsibilities of consumers Who can file a complaint? Redressal machinery Remedies available. Consumer awareness - Role of consumer organizations and Non-Governmental Organizations (NGOs)

## **TIER II: Syllabus – PGT (Economics)**

### **Introduction**

Meaning, scope, functions and importance of statistics in Economics

### **Collection, Organisation and Presentation of data**

- Collection of data - sources of data - primary and secondary; how basic data is collected with concepts of Sampling; methods of collecting data; some important sources of secondary data: Census of India and National Sample Survey Organisation.
- Organisation of Data: Meaning and types of variables; Frequency Distribution.
- Presentation of Data: Tabular Presentation and Diagrammatic Presentation of Data: (i) Geometric forms (bar diagrams and pie diagrams), (ii) Frequency diagrams (histogram, polygon and Ogive) and (iii) Arithmetic line graphs (time series graph).

### **Statistical Tools and Interpretation**

- Measures of Central Tendency- Arithmetic mean, median and mode
- Correlation – meaning and properties, scatter diagram; Measures of correlation - Karl Pearson's method (two variables ungrouped data) Spearman's rank correlation.
- Introduction to Index Numbers - meaning, types - wholesale price index, consumer price index and index of industrial production, uses of index numbers; Inflation and index numbers.

### **Introduction to Microeconomics**

- Meaning of microeconomics and macroeconomics; positive and normative economics
- What is an economy? Central problems of an economy: what, how and for whom to produce; concepts of production possibility frontier and opportunity cost.

### **Consumer's Equilibrium and Demand**

- Consumer's equilibrium - meaning of utility, marginal utility, law of diminishing marginal utility, conditions of consumer's equilibrium using marginal utility analysis.
- Indifference curve analysis of consumer's equilibrium-the consumer's budget (budget set and budget line), preferences of the consumer (indifference curve, indifference map) and conditions of consumer's equilibrium.
- Demand, market demand, determinants of demand, demand schedule, demand curve and its slope, movement along and shifts in the demand curve; price elasticity of demand - factors affecting price elasticity of demand; measurement of price elasticity of demand – percentage-change method and total expenditure method.

### **Producer Behaviour and Supply**

- Meaning of Production Function – Short-Run and Long-Run
- Total Product, Average Product and Marginal Product.
- Returns to a Factor
- Cost: Short run costs - total cost, total fixed cost, total variable cost; Average cost; Average fixed cost, average variable cost and marginal cost-meaning and their relationships.
- Revenue - total, average and marginal revenue - meaning and their relationship.
- Producer's equilibrium-meaning and its conditions in terms of marginal revenue marginal cost. Supply, market supply, determinants of supply, supply schedule, supply curve and its slope, movements along and shifts in supply curve, price elasticity of supply; measurement of price elasticity of supply - percentage-change method.

### **Forms of Market and Price Determination under Perfect Competition with simple applications.**

- Perfect competition - Features; Determination of market equilibrium and effects of shifts

in demand and supply.

- Simple Applications of Demand and Supply: Price ceiling, price floor.

### **National Income and Related Aggregates**

- Basic concepts in macroeconomics: consumption goods, capital goods, final goods, intermediate goods; stocks and flows; gross investment and depreciation.
- Circular flow of income (two sector model); Methods of calculating National Income - Value Added or Product method, Expenditure method, Income method.
- Aggregates related to National Income: Gross National Product (GNP), Net National Product (NNP), Gross Domestic Product (GDP) and Net Domestic Product (NDP) - at market price, at factor cost; Real and Nominal GDP.
- GDP and Welfare

### **Money and Banking**

- Money – meaning and functions, supply of money - Currency held by the public and net demand deposits held by commercial banks.
- Money creation by the commercial banking system.
- Central bank and its functions (example of the Reserve Bank of India): Bank of issue, Govt. Bank, Banker's Bank, Control of Credit through Bank Rate, CRR, SLR, Repo Rate and Reverse Repo Rate, Open Market Operations, Margin requirement.

### **Determination of Income and Employment**

- Aggregate demand and its components.
- Propensity to consume and propensity to save (average and marginal).
- Short-run equilibrium output; investment multiplier and its mechanism.
- Meaning of full employment and involuntary unemployment.
- Problems of excess demand and deficient demand; measures to correct them - changes in government spending, taxes and money supply.

### **Government Budget and the Economy**

- Government budget - meaning, objectives and components.
- Classification of receipts - revenue receipts and capital receipts;
- Classification of expenditure – revenue expenditure and capital expenditure.
- Balanced, Surplus and Deficit Budget – measures of government deficit.

### **Balance of Payments**

- Balance of payments account - meaning and components;
- Balance of payments – Surplus and Deficit
- Foreign exchange rate - meaning of fixed and flexible rates and managed floating.
- Determination of exchange rate in a free market, Merits and demerits of flexible and fixed exchange rate. Managed Floating exchange rate system

### **Development Experience (1947-90) and Economic Reforms since 1991:**

- A brief introduction of the state of Indian economy on the eve of independence. Indian economic system and common goals of Five Year Plans.
- Main features, problems and policies of agriculture (institutional aspects and new agricultural strategy), industry (IPR 1956; SSI – role & importance) and foreign trade.
- Economic Reforms since 1991:  
Features and appraisals of liberalisation, globalisation and privatisation (LPG policy); Concepts of demonetization and GST

### **Current challenges facing Indian Economy**

- Human Capital Formation: How people become resource; Role of human capital in economic development; Growth of Education Sector in India

- Rural development: Key issues - credit and marketing - role of cooperatives; agricultural diversification; alternative farming - organic farming
- Employment: Growth and changes in work force participation rate in formal and informal sectors; problems and policies
- Sustainable Economic Development: Meaning, Effects of Economic Development on Resources and Environment, including global warming

**Development Experience of India:**

- A comparison with neighbours
- Issues: economic growth, population, sectoral development and other Human Development Indicators



## **TIER II : Syllabus – PGT (Geography)**

### **Geography as a Discipline**

- Geography as an integrating discipline, as a science of spatial attributes
- Branches of Geography: Physical Geography and Human Geography

### **The Earth**

- Origin and evolution of the earth
- Interior of the earth Earthquakes and volcanoes: causes, types and effects
- Distribution of oceans and continents : Wegener's continental drift theory and plate tectonics

### **Landforms**

- Geomorphic processes: weathering; mass wasting; erosion and deposition; soil- formation
- Landforms and their evolution- Brief erosional and depositional features

### **Climate**

- Atmosphere- composition and structure; elements of weather and climate
- Solar Radiation-Insolation-angle of incidence and distribution; heat budget of the earth- heating and cooling of atmosphere (conduction, convection, terrestrial radiation and advection); temperature- factors controlling temperature; distribution of temperature- horizontal and vertical; inversion of temperature
- Atmospheric circulation and weather systems - Pressure-pressure belts; winds-planetary, seasonal and local; air masses and fronts; tropical and extra tropical cyclones
- Water in the atmosphere-Precipitation- evaporation; condensation-dew, frost, fog, mist and cloud; rainfall-types and world distribution
- World Climate and Global Concerns

### **Water (Oceans)**

- Basics of Oceanography
- Oceans - distribution of temperature and salinity
- Movements of ocean water-waves, tides and currents; submarine reliefs

### **Life on the Earth**

- Biosphere - importance of plants and other organisms; biodiversity and conservation

### **India-Physical Environment**

- India : Location, space relations, India's place in the world

### **Physiography**

- Structure and Relief; Physiographic Divisions
- Drainage systems: Concept of river basins, watershed; the Himalayan and the Peninsular rivers

### **Climate, Vegetation and Soil**

- Weather and climate - spatial and temporal distribution of temperature, Indian monsoon: mechanism, onset and withdrawal
- Natural vegetation-forest types and distribution; wild life; conservation; biosphere reserves

### **Hazards and Disasters: Causes, Consequences and Management**

- Floods, Cloudbursts
- Droughts: types and impact
- Earthquakes and Tsunami Cyclones: features and impact

- Landslides

### **Fundamentals of Maps**

- Geo spatial data, Concept of Geographical data matrix; Point, line, area data
- Maps - types; scales-types; construction of simple linear scale, measuring distance; finding direction and use of symbols
- Map projection- Latitude, longitude and time, typology, construction and properties of projection: Conical with one standard parallel and Mercator's projection.

### **Topographic and Weather Maps**

- Study of topographic maps (1 : 50,000 or 1 : 25,000 Survey of India maps); contour cross section and identification of landforms-slopes, hills, valleys, waterfall, cliffs; distribution of settlements
- Satellite imageries, stages in remote sensing data- acquisition, platform and sensors and data products, (photographic and digital)

### **People**

- The World Population- distribution, density and growth
- Population change - Components of population change, Demographic Transition
- Human development-concept; selected indicators, international comparisons
- Population: distribution, density and growth; composition of population - linguistic, religious; sex, rural-urban and occupational-regional variations in growth of population

### **Human Activities**

- Primary activities - concept and changing trends; gathering, pastoral, mining, subsistence agriculture, modern agriculture; people engaged in agricultural and allied activities - some examples from selected countries
- Secondary activities- concept; manufacturing: types - household, small scale, large scale; agro based and mineral based industries;
- Tertiary activities - concept; trade, transport and tourism; services; people engaged in tertiary activities
- Quaternary activities- concept; people engaged in quaternary activities - case study from selected countries

### **Human Settlements**

- Rural settlements - types and distribution
- Urban settlements - types, distribution and functional classification

### **Transport, Communication and Trade**

- Land transport - roads, railways; trans- continental railways Water transport- inland waterways; major ocean routes
- Air transport- Intercontinental air routes Oil and gas pipelines
- Satellite communication and cyber space- importance and usage for geographical information; use of GPS
- International trade- bases and changing patterns; ports as gateways of international trade; role of WTO in international trade

### **Resources and Development**

- Land resources- general land use; agricultural land use; geographical conditions and distribution of major crops (Wheat, Rice, Tea, Coffee, Cotton, Jute, Sugarcane and Rubber); agricultural development and problems
- Water resources-availability and utilization- irrigation, domestic, industrial and other uses; scarcity of water and conservation methods-rain water harvesting and watershed management

- Mineral and energy resources- distribution of metallic (Iron ore, Copper, Bauxite, Manganese); non-metallic (Mica, Salt) minerals; conventional (Coal, Petroleum, Natural gas and Hydroelectricity) and non-conventional energy sources (solar, wind, biogas) and conservation
- Planning in India- target group area planning(case study); idea of sustainable development (case study)

### **Transport, Communication and International Trade**

- Transport and communication-roads, railways, waterways and airways: oil and gas pipelines; Geographical information and communication net works
- International trade- changing pattern of India's foreign trade; sea ports and their hinterland and airports

### **Geographical Perspective on selected issues and problems**

- Environmental pollution; urban-waste disposal
- Urbanization, rural-urban migration; problems of slums
- Land degradation

## **TIER II : Syllabus - PGT (History)**

### **Writing and City Life**

Iraq, 3rd millennium BCE

- Growth of towns
- Nature of early urban societies
- Historians' Debate on uses of writing

### **An Empire across Three Continents**

Roman Empire, 27 BCE to 600 CE

- Political evolution
- Economic Expansion
- Religion-culture foundation
- Late Antiquity
- Historians' view on the Institution of Slavery

### **NOMADIC EMPIRES**

The Mongol, 13th to 14th century

- The nature of nomadism
- Formation of empires
- Conquests and relations with other states
- Historians' views on nomadic societies and state formation

### **The Three Orders.**

Western Europe 13th - 16th century

- Feudal society and economy
- Formation of state
- Church and society
- Historians' views on decline of feudalism

### **Changing Cultural Traditions**

Europe 14th -17th century

- New ideas and new trends in literature and arts
- Relationship with earlier ideas
- The contribution of West Asia
- Historians' viewpoint on the validity of the notion 'European Renaissance'

### **Displacing Indigenous People**

North America and Australia, 18th to 20th century

- European colonists in North America and Australia
- Formation of White Settler societies
- Displacement and repression of local people
- Historians' viewpoint on the impact of European settlement on indigenous population

### **Paths to Modernization**

East Asia, late 19th to 20th century

- Militarization and economic growth in Japan
- China and the communist alternative
- Historians' Debate on the meaning of modernization

### **BRICKS, BEADS AND BONES**

The Harappan Civilization

- Broad overview: Early urban centers
- Story of discovery: Harappan civilization
- Excerpt: Archaeological report on a major site

### **KINGS, FARMERS AND TOWNS:**

- Early States and Economies (c. 600 BCE-600 CE)
- Broad overview: Political and economic History from the Mauryan to the Gupta period
- Story of discovery: Inscriptions and the Decipherment of the script. Shifts in the Understanding of political and economic history.
- Excerpt: Ashokan inscription and Gupta period land grant

### **KINSHIP, CASTE AND CLASS**

Early Society Societies (C. 600 BCE-600 CE)

- Broad overview: Social Histories: Using the Mahabharata
- Issues in social history, including caste, class, kinship and gender
- Story of discovery: Transmission and publications of the Mahabharat
- Excerpt: from the Mahabharata, illustrating how it has been used by historians.

### **THINKERS, BELIEFS AND BUILDINGS**

Cultural Developments (c. 600 BCE - 600 CE)

- Broad overview: A History of Buddhism: Sanchi Stupa a) A brief review of religious histories of Vedic religion, Jainism, Vaishnavism, Shaivism (Puranic Hinduism) b) Focus on Buddhism.
- Story of discovery: Sanchi stupa. Excerpt: Reproduction of sculptures from Sanchi.

### **THROUGH THE EYES OF TRAVELLERS**

Perceptions of Society (tenth to seventeenth century)

- Broad Overview: outlines of social and cultural life as they appear in traveller's account.
- Story of their writings: A discussion of where they travelled, what they wrote and for whom they wrote.
- Excerpts: from Al Biruni, Ibn Battuta, Francois Bernier.

### **BHAKTI –SUFİ TRADITIONS:**

Changes in Religious Beliefs and Devotional Texts (eighth to eighteenth centuries)

- Broad overview: a. Outline of religious developments during this period saints. b. Ideas and practices of the Bhakti-Sufi
- Story of Transmission: How Bhakti-Sufi compositions have been preserved.
- Excerpt: Extracts from selected Bhakti-Sufi works

### **AN IMPERIAL CAPITAL: VIJAYANAGARA(fourteenth to sixteenth centuries)**

- Broad Over View: New Architecture: Hampi a. Outline of new buildings during Vijayanagar period-temples, forts, irrigation facilities. b. Relationship between architecture and the political system
- Story of Discovery: Account of how Hampi was found.
- Excerpt: Visuals of buildings at Hampi

### **PEASANTS, ZAMINDARS AND THE STATE:**

Agrarian Society and the Mughal Empire (c. sixteenth-seventeenth centuries)

- Broad overview: The Aini-Akbari a. Structure of agrarian relations in the 16th and 17th centuries. b. Patterns of change over the period.
- Story of Discovery: Account of the compilation and translation of Ain I Akbari
- Excerpt: from the Ain-i-Akbari.

### **COLONIALISM AND THE COUNTRYSIDE: Exploring Official Archives**

- Broad overview: Colonialism and Rural Society: Evidence from Official Reports
  - a) Life of zamindars, peasants and artisans in the late 18<sup>th</sup> century
  - b). Permanent Settlement, Santhals and Paharias
- Story of official records: An account of why official Investigations in to rural societies were undertaken and the types of records and reports produced.
- Excerpts: From Fifth Report

### **REBELS AND THE RAJ: 1857 Revolt and its Representations**

- Broad overview:
  - a. The eventsof1857-58.
  - b. Vision of Unity
  - c. How these events were recorded and narrated. Focus: Lucknow
- Excerpts: Pictures of 1857.
- Extracts from contemporary accounts.

### **MAHATMA GANDHI AND THE NATIONALIST MOVEMENT:**

- Civil Disobedience and Beyond Broad overview:
  - a. The Nationalist Movement 1918 -48.
  - b. The nature of Gandhian politics and leadership.
- Focus: Mahatma Gandhi and the three movements and his last days as “finest hours”
- Excerpts: Reports from English and Indian language newspapers and other contemporary writings.

### **FRAMING THE CONSTITUTION:**

- The Beginning of a New Era Broad overview: The Making of the Constitution an overview:
  - a. Independence and then new nation state.
  - b. The making of the Constitution
- Focus: The Constituent Assembly Debates
- Excerpts: from the debates

## TIER II : SYLLABUS FOR PGT (ENGLISH)

### Section A: Reading

#### Comprehension

Three or four unseen passages from different genres (prose, poetry, drama, articles, editorials, scientific, and literary extracts).

Questions will test comprehension, inference, vocabulary, tone, rhetorical devices, and logical sequencing.

### Section B: Writing Ability

#### B1. Functional Writing:

Formal and Informal Letters: Business letters, job applications, letters to editors, complaints, and personal letters.

Report Writing: Factual description of events, newspaper reports, and analytical reports. Notices, Circulars, and Press Releases.

#### B2. Creative and Analytical Writing:

Essay Writing: Argumentative, analytical, reflective, and descriptive essays.

Article/Debate/Speech: Expressing opinions on socio-political, economic, and educational issues.

### Section C: Grammar and Usage

Parts of Speech: Nouns, Pronouns, Verbs, Adverbs, Adjectives, Prepositions, Conjunctions. Sentence Structure : Types of sentences, subject-verb agreement, parallelism, and sentence connectors.

Tenses and Their Usage: Active-passive voice, sequence of tenses, and reported speech. Clauses: Noun, adjective, and adverb clauses.

Common Errors: Articles, prepositions, modifiers, redundancy, and word order.

Editing and Proofreading: Error detection, sentence correction, and transformation.

### Section D: Literature

#### D1. British Literature:

Elizabethan and Jacobean Drama: William Shakespeare, Christopher Marlowe, Ben Jonson. Poetry: John Donne, Alexander Pope, William Wordsworth, Samuel Taylor Coleridge, John Keats.

Victorian and Modern Writers: Charles Dickens, Thomas Hardy, Virginia Woolf, T.S. Eliot, George Orwell.

#### D2. American Literature:

Poets: Robert Frost, Emily Dickinson, Langston Hughes.

Prose and Drama: Arthur Miller, Ernest Hemingway, Mark Twain, Harper Lee.

#### D3. Indian Writing in English:

R.K. Narayan, Mulk Raj Anand, Anita Desai, Vikram Seth, Arundhati Roy, Amitav Ghosh.

#### D4. World Literature:

Gabriel García Márquez, Chinua Achebe, Pablo Neruda, Khaled Hosseini.

#### D5. Literary Criticism and Movements:

Classicism, Romanticism, Modernism, Postmodernism, Feminism, Post colonialism, Structuralism.

## TIER II: पाठ्यक्रम स्नातकोत्तर शिक्षक (हिन्दी)

### साहित्यिक अभिरुचि परीक्षण

#### (i) आदिकाल से रीतिकाल

इसके अन्तर्गत कालगत परिस्थितियाँ एवं साहित्य पर उसका प्रभाव, प्रत्येक युग के साहित्य की प्रमुख प्रवृत्तियाँ, प्रमुख रचनाकार एवं उनकी रचनाएँ, साहित्यिक विशेषताएँ, भाषा शैली

(क) आदिकाल - चंदबरदाई, अमीर खुसरो, विद्यापति

(ख) भक्तिकाल - - -

(1) निर्गुण भक्तिधारा - ज्ञानमार्गी शाखा, प्रेममार्गी शाखा, कबीर, दादू, रैदास, नानक, जायसी, कुतुबन

(2) सगुण भक्तिधारा - राम भक्तिशाखा, कृष्ण-भक्ति शाखा, तुलसीदास, केशव, सूरदास, मीराबाई, अष्टछाप के कवि, रसखान

(ग) रीतिकाल - रीतिबद्ध, रीतिसिद्ध, रीतिमुक्त काव्य - देव, घनानंद, बिहारी, मतिराम, सेनापति, भूषण, पद्माकर

#### (ii) आधुनिक काल

इसके अन्तर्गत युगीन परिस्थितियाँ, साहित्यिक पृष्ठभूमि, मुख्य विचारधारा, मुख्य साहित्यकार, साहित्यिक रचनाएँ, विशेषताएँ, भाषा-शैली

(क) भारतेन्दु युग- भारतेन्दु हरिश्चंद्र, बालमुकुन्दगुप्त, बदरीनारायण चौधरी 'प्रेमधन,

(ख) द्विवेदीयुग- महावीर प्रसाद द्विवेदी, श्रीधर पाठक, अयोध्यासिंह उपाध्याय 'हरिऔध', मैथिलीशरणगुप्त

(ग) छायावाद - जयशंकर प्रसाद, महादेवी वर्मा, सुमित्रानन्दन पंत, सूर्यकान्त त्रिपाठी निराला,

(घ) छायावादोत्तर युग- हरिवंश राय बच्चन, माखनलाल चतुर्वेदी, बालकृष्ण शर्मा 'नवीन', नरेन्द्र शर्मा, केदारनाथ अग्रवाल, नागार्जुन, मुक्तिबोध, नेमिचंद्र जैन, प्रभाकर माचवे, गिरिजा कुमार माथुर, रामविलास शर्मा, 'अज्ञेय' भवानी प्रसाद मिश्र, नरेन्द्र शर्मा, धूमिल, धर्मवीर भारती, शंभुनाथ सिंह, रघुवीर सहाय

#### (iii) गद्य साहित्य

(□) अधोलिखित लेखकों का व्यक्तित्व और कृतित्व-

भारतेन्दु, रामचंद्र शुक्ल, प्रेमचंद, जैनेन्द्र कुमार, हजारीप्रसाद द्विवेदी, धर्मवीर भारती, रामविलास शर्मा, निर्मल वर्मा, फणीश्वरनाथ रेणु', कृष्णा सोबती, भीष्म साहनी, शेखर जोशी, विष्णु खरे, ममता कालिया

(ख) गद्य एवं अन्य विधाओं का प्रारम्भ, विकास, प्रमुख प्रवृत्तियाँ, प्रमुख साहित्यकार, रचनाएँ, साहित्यिक विशेषताएँ, भाषाशैली

(ग) निबंध, कथासाहित्य, उपन्यास और कहानी, नाटक, एकांकी, रेखाचित्र, संस्मरण, यात्रा-वृतांत, आत्मकथा, जीवनी, पत्र, डायरी, आलोचना, रिपोतार्ज आदि इन सभी विधाओं का विस्तृत परिचय

#### (iv) साहित्य शास्त्र :-

काव्य स्वरूप, काव्य-आत्मा, काव्य गुण-दोष, शब्द-शक्ति, रस, अलंकार (शब्दालंकार, अर्थालंकार, उभयालंकार एवं नए अलंकार) बिंब, छंद, प्रतीक, भाषा, भाषा-शैली एवं पाश्चात्य काव्यशास्त्र

(v) हिंदी भाषा का क्रमिक विकास, हिंदी भाषा की बोलियाँ एवं उपबोलियों एवं उसकी विशेषताएँ एवं भाषा परिवार

(vi) अपठित बोध- अपठित गद्यांश / काव्यांश पर आधारित अर्थग्रहण, भाव-सौंदर्य, शिल्प-सौंदर्य सम्बंधी प्रश्न

### व्याकरणिक प्रयोग परीक्षण

#### (i) वर्ण विचार -

- ❖ ध्वनियों का वर्गीकरण, वर्ण-वर्गीकरण, उच्चारण-स्थान
- ❖ वर्णमाला, वर्तनी, सन्धि/ सन्धिविच्छेद

#### (ii) शब्द - विचार एवं शब्द भंडार

- ❖ शब्द भेद - उत्पत्ति, रचना, रूप और अर्थ की दृष्टि से शब्द
- ❖ शब्द भंडार-पर्यायवाची, विपरीतार्थक, एकार्थी, अनेकार्थी, श्रुतिसम भिन्नार्थक शब्द
- ❖ शब्द-युग्म शब्द निर्माण - उपसर्ग, प्रत्यय, समास

#### (iii) पद-विचार, पदबंध, पद-परिचय

- ❖ संज्ञा, सर्वनाम, विशेषण, विशेष्य (परिभाषा, भेद, लिंग, वचन, कारक)
- ❖ क्रिया (परिभाषा, भेद, अकर्मक, सकर्मक, काल, संरचना की दृष्टि से क्रिया भेद, वाच्य, वाच्य भेद, वाच्य परिवर्तन),
- ❖ अव्यय (परिभाषा, भेद- क्रिया विशेषण, संबंधबोधक, समुच्चयबोधक, विस्मयादिबोधक - निपात)
- ❖ पदबंध - भेद एवं प्रयोग
- ❖ पद-परिचय

#### (iv) वाक्य- विचार

- ❖ वाक्य संरचना, वाक्य भेद - अर्थ एवं रचना की दृष्टि से
- ❖ वाक्य - परिवर्तन, वाक्य-संश्लेषण, वाक्य विश्लेषण



- ❖ विराम चिह्न, लोकोक्ति एवं मुहावरे

### **प्रयोजनमूलक हिंदी कौशल परीक्षण**

- ❖ पत्रकारिता एवं उसके विविध आयाम
- ❖ प्रिंटमाध्यम - समाचार, संपादकीय, रिपोर्ट, आलेख, फीचर, साक्षात्कार आदि के लिए लेखन,
- ❖ रेडियो व दूरदर्शन के लिए लेखन,
- ❖ विज्ञापन लेखन, उद् घोषणा, स्वागत भाषण, संगोष्ठी संचालन आदि
- ❖ कहानी का कविता में रूपान्तरण, कविता, कहानी, लघुकथा, डायरी लेखन आदि
- ❖ कार्यालयी हिन्दी, कार्यसूची, कार्यवृत्त, प्रतिवेदन, सरकारी पत्र, सूचनाएं, निविदाएं आदि

### **व्यावहारिक लेखन**

- ❖ व्यावहारिक हिन्दी का स्वरूप
- ❖ प्रयोजनमूलक हिन्दी और उसके विविध आयाम

### **सर्जनात्मक लेखन एवं मौलिक अभिव्यक्ति**

- ❖ दिए गए विषय पर कविता, लघुकथा एवं रचनात्मक लेख संबंधी मौलिक रचना
- ❖ कहानी का कविता में रूपान्तरण,
- ❖ अनुभवों के आधार पर लेखन
- ❖ वार्तालाप की दक्षता के विकास हेतु संवाद लेखन ।
- ❖ किसी भी समसामयिक विषय पर कहानी / कविता लेखन

## **TIER II: Syllabus - PGT (Biotechnology)**

### **Introduction to Bio-technology**

Historical perspectives, scope and importance, commercial potential, interdisciplinary challenge, a quantitative approach-scale up – stages in commercialization of product and process, the fermenter, aseptic operation. Manufacturing quality control, good manufacturing practices, good laboratory practices, product safety, bio safety principles-environment and health risk, assessment, bio safety regulatory guidelines and controlling agency, environmental law for hazardous drugs, microbes and GMO'S, Biotechnology related issues of Public concern, Bioethics. Marketing, Biotechnology in India and global trends.

**Fundamentals of Biochemical engineering**-Concept of pH, buffer, physical variables, dimensions and units, measurement conventions, physical and chemical properties, data, stoichiometry, errors in data and calculation, absolute and relative uncertainty and types of error statistical analysis presentation of experimental data, data analysis, trends, testing mathematical models, goodness to fit, use of graph paper with logarithmic coordination and plotting of data process flow diagrams, material balance, fluid flow and mixing, mass transfer, heat transfer, unit operations, homogenous reactions, microbial growth, substrates utilization and product formation kinetics, reactor engineering – rheology of fermentation fluids, scale up concepts, design of fermenting media, aseptic transfer, various microbial and enzyme reactors, instrumentation in bio reactors. **Biotechnology and Society**-Public perception of Biotechnology intellectual property, patents, reading a patent, International scenario, National scenario, Varietals protection, ethical issues in agriculture and health care.

### **Biochemistry**

**Biomolecules**- Structure and Dynamics; Thermodynamics: concept of free energy, entropy Building blocks of carbohydrates – sugars and their derivatives, chemical properties of sugar, polysaccharides – glycogen, cellulose, chitin etc. Building blocks of proteins – Amino acids, Chemical properties of amino acids, regulation of amino acid metabolism and inborn errors of metabolism determination of sequencing of amino acids, fragmentation of polypeptide chain, 3D structure of proteins, secondary, tertiary and quaternary structure of proteins, vitamins and enzymes. Lipids – simple fatty acids, Sphingosine, Glycerol and cholesterol and their chemical properties, lipid metabolism and its regulation. Nucleic acids- Nucleotides, chemical properties, optical activities and stereo chemistry of bio molecules, polarimetry, conformations and configuration, RNA, DNA, 3D model of DNA, chromosome structure, circular and super coiled DNA. Biochemical transformations- carbohydrates metabolism-glycolytic pathway, krebs cycle, homo fermentative pathway. KH, PPP, photosynthesis- light reaction Kelvin cycle, nitrogen fixation, nitrogen cycle, nitrogenase, gluconeogenesis, electron transport and oxidative phosphorylation, precursor-product relationship, supramolecular assembly, biomolecular database, biomembranes, structure and function of liposomes and their applications

### **Techniques, Instrumentation and principles**

Techniques based on molecular weight or size- Centrifugation and ultra centrifugation, gel permeation, osmotic potential. Techniques based on polarity- Ion exchange chromatography, electrophoresis, isoelectric focusing, hydrophobic interaction, partition chromatography. Techniques based on spectroscopy- Colorimetry, UV visible, spectrophotometry, fluorescence, spectroscopy, x-ray crystallography, mass spectrometry, radio isotopes techniques; Techniques based on solubility – Salt precipitation, precipitation with organic solvent.

**Cellular techniques**- Microscopy-LM, TEM, SEM cell sorting, cell fractionation, cell growth determination, electronic particle counter, culture based counting methods **Genetical techniques**- Chromosomal techniques- Staining, banding, pattern, Karyotyping, chromosomal painting. Mutagenic techniques- Bacterial and seed mutagenesis, recombination in bacteria, conjugation, transduction, breeding methods in plants, pedigree analysis, DNA isolation.

### **Cell Biology**

**Cell structure and components**- Cell membrane – composition, Structure, membrane, associated receptors, artificial membrane, membrane proteins, principles of membrane organization, cell junction, membrane lipids. Cell organelles – Golgi bodies, Endoplasmic reticulum, lysosomes, peroxisomes, ribosomes, internalisation of macro molecules, endo and exocytosis, mitochondrial structure and oxidative phosphorylation. Cytoskeleton- Microtubules, micro filaments, lattice and cytosol; Nucleus – nuclear envelope, nucleolus, chromosome tissue and organs, evolution and population, speciation, biodiversity, adaptation, natural selection, organization of life, size and complexity, interaction with environment. **Cell growth and development** - Cell division, cell cycles, cell communication and signal transduction, movement, nutrition, gaseous exchange, internal transport, maintaining the internal environment, reproduction, animal and plant development, immune response, apoptosis, plant-pathogen relation, secondary metabolism, defence strategy in microbes and insects.

### **Genetics and Molecular Biology**

**Principles of Genetics**- Mendelian genetics, role of chromosome in inheritance, multiple alleles, linkage and crossing over, genetic recombination, genetic mapping, gene interaction, sexed linked inheritance, extra nuclear inheritance, quantitative inheritance, genes at the population level, discovery of DNA as genetic material-Griffiths experiment, Hershey and Chase experiment, mutagenesis, types of mutations, genome, chromosome and gene mutations,

molecular mechanism of mutation , DNA repair , genetic disorder, transposons, animal and plant breeding.

**Genome function-** Genome organization, sequencing DNA replication, fine structure of gene, from gene to protein, transcription , genetic code , translation, regulation of gene expression, genetic basis of development, genetic of cancer, immuno genetics, evolutionary genetics.

### **Protein and gene manipulation**

**Protein Structure and engineering**.-3D shape of proteins, non covalent bonds, hydrogen bonds, van der waals forces, hydro phobic interaction. Structure function relationships in proteins – Chymotrypsin, molecular disease. protein finger printing, 2D gel electrophoresis, purification of proteins, characterization of proteins , proteins based products, mass spectrometry, blood products and vaccine , therapeutic antibodies and enzymes, hormones and growth factor, regulatory factor , analytical application , industrial enzymes , functional non catalytic proteins, nutraceutical proteins, designing proteins, proteomics, genes and proteins type of proteomics .

**Recombinant DNA Technology** -Tools of recombinant DNA technology, restriction enzymes, making of recombinant DNA , DNA library, introduction of recombinant DNA into host cells-plasmid , cosmid, vectors, lambda, bacteriophage , identification of recombinants , PCR, DNA probes, hybridization techniques , DNA sequencing, site directed mutagenesis, cloning strategies.

**Genomics and Bioinformatics**- Structural and functional genomics, genome sequencing projects, genetic mapping, gene prediction and counting , genome similarity, SNPs and comparative genomics , functional genomics-micro array techniques , fluorescence , in situ hybridization , comparative DNA hybridisation, history of bio informatics, sequences and nomenclature , DNA and protein sequences, information sources-major databases, blast family search tools, resources for gene level sequences , analysis using bio informatics tools.

### **Cell culture technology**

**Microbial cell culture and its applications**-nutrients , energy sources, sterilization procedures, environment for microbial growth, aeration and mixing , equipments for culture- bioreactors, Types of microbial culture, measurement and kinetics of microbial growth, scale up of microbial process, isolation of microbial products, strain isolation and improvement, application of microbial culture technology bioethics.

**Plant Cell culture and applications**- Cell and tissue culture techniques- Nutrient media, types of cultures, plant regeneration pathways, application of cell and tissue culture, gene transfer methods in plants, transgenic plants with beneficial traits, stress tolerance, herbicide tolerance, insect resistance, transgenic plant as bio reactor, diagnostics in agriculture and molecular breeding, morphological and molecular markers , bioethics.

**Animal cell culture and applications**- Primary cell culture, secondary cell culture and lines, types of cell lines , physical environment , osmolality , media , pH temperature cryopreservation, equipments required for animal cell culture, carbon dioxide incubators, Characterisation of cell lines-Scale up of animal culture, applications of animal cell culture- Tissue plasminogen activator, factor VIII , erythropoietin, hybridoma technology, mono clonal antibodies, therapeutic antibodies, stem cell technology- morphological approach, in vitro clonal assay, long term marrow culture, embryonic stem culture, cell and tissue engineering , bioethics in animal genetic engineering.

### **Immunology**

Immune system , molecules of immune system, immuno globulins , MHCs, cytokines, T cell receptor, generation of antibodies and T cell receptor diversity , complement system, humoral and cell mediated immunity, immune regulation, vaccines , hybridoma, immuno deficiencies, AIDS, transplantation immunity and cancer.

### **Applied Biotechnology**

Biotechnology industry , Bioinformatics, molecular technology for diagnosis of genetic disorders, onco viruses and immunity, lymphocyte, homeostasis, viral induced modulation of host immune response, HLA polymorphism, induction and maturation of B cells, safe limits for radiation determined , radiation carcinogenesis.

**REAL NUMBERS**

- Review of representation of natural numbers, integers, and rational numbers on the number line. Rational numbers as recurring/ terminating decimals. Operations on real numbers.
  - Examples of non-recurring/non-terminating decimals. Existence of non-rational numbers (irrational numbers) such as  $\sqrt{2}$ ,  $\sqrt{3}$ , and their representation on the number line. Explaining that every real number is represented by a unique point on the number line and conversely, viz. every point on the number line represents a unique real number.
  - Definition of nth root of a real number.
  - Rationalization, real numbers of the type  $\frac{1}{a+b\sqrt{x}}$  and  $\frac{1}{\sqrt{x}+\sqrt{y}}$  their combinations where x and y are natural number and a and b are integers.
  - Laws of exponents with integral powers. Rational exponents with positive real bases
- Fundamental Theorem of Arithmetic statements after reviewing work done earlier and after illustrating and motivating through examples, Proofs of irrationality of  $\sqrt{2}, \sqrt{3}, \sqrt{5}$
- Number theory, sequences and patterns, Triangular Number, Hexagonal Number, square Numbers, Cube Numbers, patterns, Shape sequences, super cells, palindromic patterns. Kaprekar Constant .clock and Calender Number, collatz conjecture Bhramagupta's method of Computation.

**POLYNOMIALS**

- Definition of a polynomial in one variable, with examples and counter examples.
- Coefficients of a polynomial, terms of a polynomial and zero polynomial.
- Degree of a polynomial. Constant, linear, quadratic and cubic polynomials. Monomials, binomials, trinomials. Factors and multiples.
- Zeros of a polynomial. Relationship between zeros and coefficients of quadratic polynomials.
- Remainder Theorem with examples, Factor Theorem.
- Factorization of  $ax^2 + bx + c$ ,  $a \neq 0$  where a, b and c are real numbers, and of cubic polynomials using the Factor Theorem.
- The algebraic expressions and identities. Verification of identities:

$$(x + y + z)^2 = x^2 + y^2 + z^2 + 2xy + 2yz + 2zx$$

$$(x \pm y)^3 = x^3 \pm y^3 \pm 3xy(x \pm y)$$

$$x^3 \pm y^3 = (x \pm y)(x^2 \mp xy + y^2)$$

$$x^3 + y^3 + z^3 - 3xyz = (x + y + z)(x^2 + y^2 + z^2 - xy - yz - zx)$$

And their use in factorization of polynomials.

**MATRICES**

R,R2,R3 as vector spaces over R and concept of Rn. Standard basis for each of them. Linear Independence and examples of different bases. Subspaces of R2, R3. Translation, Dilation, Rotation, Reflection in a point, line and plane. Matrix form of basic geometric transformations. Interpretation of eigen values and eigen vectors for such transformations and eigen spaces as invariant subspaces. Matrices in diagonal form. Reduction to diagonal form upto matrices of order 3. Computation of matrix inverses using elementary row operations. Rank of matrix, Solutions of a system of linear equations using matrices

## **LINEAR EQUATIONS IN TWO VARIABLES**

Linear equations in one variable. Introduction to the equation in two variables. Focus on linear equations of the type  $ax + by + c = 0$ . Explain that a linear equation in two variables has infinitely many solutions and justify their being written as ordered pairs of real numbers, plotting them and showing that they lie on a line.

## **PAIR OF LINEAR EQUATIONS IN TWO VARIABLES**

Pair of linear equations in two variables and graphical method of their solution, consistency/inconsistency. Algebraic conditions for number of solutions. Solution of a pair of linear equations in two variables algebraically - by substitution, by elimination. Simple situational problems.

## **QUADRATIC EQUATIONS**

Standard form of a quadratic equation  $ax^2 + bx + c = 0$ , ( $a \neq 0$ ). Solutions of quadratic equations (only real roots) by factorization, and by using quadratic formula. Relationship between discriminant and nature of roots.

## **ARITHMETIC PROGRESSIONS**

Arithmetic Progression,  $n$ th term and sum of the first  $n$  terms of A.P. and their application in solving daily life problems.

## **COORDINATE GEOMETRY**

The Cartesian plane, coordinates of a point, names and terms associated with the coordinate plane, notations. Graphs of linear equations. Distance formula. Section formula (internal division) Area of Triangle.

## **INTRODUCTION TO EUCLID'S GEOMETRY**

History - Geometry in India and Euclid's geometry. Euclid's method of formalizing observed phenomenon into rigorous Mathematics with definitions, common/obvious notions, axioms/postulates and theorems. The five postulates of Euclid. Showing the relationship between axiom and theorem, for example: (Axiom) 1. Given two distinct points, there exists one and only one line through them. (Theorem) 2. (Prove) Two distinct lines cannot have more than one point in common.

## **LINES AND ANGLES**

- If a ray stands on a line, then the sum of the two adjacent angles so formed is 180 degrees and the converse.
- If two lines intersect, vertically opposite angles are equal.
- Lines which are parallel to a given line are parallel.

## **TRIANGLES**

- Two triangles are congruent if any two sides and the included angle of one triangle is equal to any two sides and the included angle of the other triangle (SAS Congruence).
- Two triangles are congruent if any two angles and the included side of one triangle is equal to any two angles and the included side of the other triangle (ASA Congruence).
- Two triangles are congruent if the three sides of one triangle are equal to three sides of the other triangle (SSS Congruence).
- Two right triangles are congruent if the hypotenuse and a side of one triangle are equal (respectively) to the hypotenuse and a side of the other triangle. (RHS Congruence)
- The angles opposite to equal sides of a triangle are equal.
- The sides opposite to equal angles of a triangle are equal.

- If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio.
- If a line divides two sides of a triangle in the same ratio, the line is parallel to the third side.
- If in two triangles, the corresponding angles are equal, their corresponding sides are proportional and the triangles are similar.
- If the corresponding sides of two triangles are proportional, their corresponding angles are equal and the two triangles are similar.
- If one angle of a triangle is equal to one angle of another triangle and the sides including these angles are proportional, the two triangles are similar.

## **QUADRILATERALS**

- The diagonal divides a parallelogram into two congruent triangles.
- In a parallelogram opposite sides are equal, and conversely.
- In a parallelogram opposite angles are equal, and conversely.
- A quadrilateral is a parallelogram if a pair of its opposite sides is parallel and equal.
- In a parallelogram, the diagonals bisect each other and conversely.
- In a triangle, the line segment joining the mid points of any two sides is parallel to the third side and in half of it and (motivate) its converse.

## **CIRCLES**

- Equal chords of a circle subtend equal angles at the center and (motivate) its converse.
- The perpendicular from the center of a circle to a chord bisects the chord and conversely, the line drawn through the center of a circle to bisect a chord is perpendicular to the chord.
- Equal chords of a circle (or of congruent circles) are equidistant from the center (or their respective centers) and conversely.
- The angle subtended by an arc at the center is double the angle subtended by it at any point on the remaining part of the circle.
- Angles in the same segment of a circle are equal.
- If a line segment joining two points subtends equal angle at two other points lying on the same side of the line containing the segment, the four points lie on a circle.
- The sum of either of the pair of the opposite angles of a cyclic quadrilateral is  $180^\circ$  and its converse.
- Tangent to a circle at, point of contact
- The tangent at any point of a circle is perpendicular to the radius through the point of contact.
- The lengths of tangents drawn from an external point to a circle are equal.

## **AREAS**

Area of a triangle using Heron's formula, Area of sectors and segments of a circle. Problems based on areas and perimeter / circumference of the above said plane figures. (In calculating area of segment of a circle, problems should be restricted to central angle of  $60^\circ$ ,  $90^\circ$  and  $120^\circ$ .)

## **SURFACE AREAS AND VOLUMES**

Surface areas and volumes of spheres (including hemispheres) and right circular cones. Surface areas and volumes of combinations of any two of the following: cubes, cuboids, spheres, hemispheres and right circular cylinders/cones. Area of a Triangle using Hero's formula and its application in finding the area of a quadrilateral.

## **STATISTICS**

Bar graphs, histograms (with varying base lengths), and frequency polygons. Mean, median and mode of grouped and ungrouped data, infographics, presentation of data, tabular form.

**PROBABILITY**

Classical definition of probability. Simple problems on finding the probability of an event. elementary probability and basic law. Discrete and continuous random variable.

**TRIGONOMETRY**

Trigonometric ratios of an acute angle of a right-angled triangle. Proof of their existence (well defined); motivate the ratios whichever are defined at  $0^\circ$  and  $90^\circ$ . Values of the trigonometric ratios of  $30^\circ$ ,  $45^\circ$  and  $60^\circ$ . Relationships between the ratios.

**TRIGONOMETRIC IDENTITIES**

Proof and applications of the identity  $\sin^2 A + \cos^2 A = 1$ . Only simple identities to be given.

**HEIGHTS AND DISTANCES:**

Angle of elevation, Angle of Depression. Simple problems on heights and distances. Problems should not involve more than two right triangles. Angles of elevation / depression should be only  $30^\circ$ ,  $45^\circ$ , and  $60^\circ$

**CALCULUS.**

Sets. Functions and their graphs : polynomial, sine, cosine, exponential and logarithmic functions. Step function, Limits and continuity. Differentiation, Methods of differentiation like Chain rule, Product rule and Quotient rule. Second order derivatives of above functions. Integration as reverse process of differentiation. Integrals of the functions introduced above.

**INEQUALITIES**

Elementary Inequalities, Absolute value, Inequality of means, Cauchy – Schwarz Inequality, Tchebychef's Inequality.

## TIER II : Syllabus – TGT (Science)

### Matter-Nature and Behaviour

Gases, liquids, solids, plasma and Bose-Einstein condensate, types of intermolecular forces. Classification of matter into mixtures and pure substances. Henry's Law. Concentration of solutions. Colloids-phases of colloids, Tyndall effect, Brownian movement. Suspension. Properties of matter. Measurement of properties of matter-S.I. system of units, physical and chemical changes. Laws of chemical combination. Gay Lussac's law, Avogadro law, atomic and molecular masses, average atomic mass, mole concept and molar masses, percentage composition.

#### Nature of matter:

Elements, compounds and mixtures. Heterogeneous and homogeneous mixtures, colloids and suspensions. Physical and chemical changes (excluding separating the components of a mixture).

#### Particle nature and their basic units:

Atoms and molecules, Law of Chemical Combination, Chemical formula of common compounds, Atomic and molecular masses.

#### Structure of atoms:

Electrons, protons and neutrons, Valency, Atomic Number and Mass Number, Isotopes and Isobars, Discharge tube experiments.

#### Chemical reactions:

Chemical equation, Balanced chemical equation, implications of a balanced chemical equation, types of chemical reactions: combination, decomposition, displacement, double displacement, precipitation, endothermic exothermic reactions, oxidation and reduction.

#### Acids, bases and salts:

Their definitions in terms of furnishing of  $H^+$  and  $OH^-$  ions, General properties examples and uses, neutralization, concept of pH scale Numericals, Importance of pH in everyday life; preparation and uses of Sodium Hydroxide, Bleaching powder, Baking soda, Washing soda and Plaster of Paris.

#### Metals and non metals:

Properties of metals and non-metals; Reactivity series; Formation and properties of ionic compounds; Basic metallurgical processes; Corrosion and its prevention.

#### Carbon compounds:

Covalent bonding in carbon compounds. Versatile nature of carbon. Homologous series, difference between saturated hydrocarbons and unsaturated hydrocarbons. Chemical properties of carbon compounds Alcohols: Preparation and properties. Qualitative analysis of alcohols, iodoform test, effect of alcohols on living beings. Carboxylic acids: Preparation and properties, soaps and detergents. Concept of hybridization and shapes of molecules structural formula and molecular models. isomerism, IUPAC nomenclature of organic compounds.

#### Periodic Classification of Elements

Mendeleev's periodic law, Periodic properties of elements, trends in the periods and groups: Importance of the periodic table, position of hydrogen in the periodic table.

#### Tissues, Organs, Organ System, Organism:

Structure and functions of animal and plant tissues (only four types of tissues in animals);



Meristematic and Permanent tissues in plants).

**Life processes:**

'Living Being'. Basic concept of nutrition, respiration, transport and excretion in plants and animals.

**Control and co-ordination in animals and plants:**

Tropic movements in plants; Introduction of plant hormones; Control and co-ordination in animals: Nervous system; Voluntary, involuntary and re-flexaction; Chemical co- ordination: animal hormones.

**Reproduction:**

Reproduction in animals and plants (asexual and sexual) reproductive health – need and methods of family planning . Safe sex vs HIV/AIDS. Child bearing and women's health.

**Heredity and Evolution:**

Heredity; Mendel's contribution-Laws for inheritance of traits: Sex determination: brief introduction evolution. - Acquired and inherited traits., Homologous and Analogous organs. , What are fossils?.

**Cell - Basic Unit of life :**

Cell as a basic unit of life; prokaryotic and eukaryotic cells, multi cellular organisms; cell membrane and cell wall, cell organelles and cell inclusions; chloroplast, mitochondria, vacuoles, endoplasmic reticulum, Golgi apparatus; nucleus, chromosomes – basic structure, number.

**Motion:**

Distance and displacement, velocity; uniform and non-uniform motion along a straight line; acceleration, distance-time and velocity-time graphs for uniform motion and uniformly accelerated motion, elementary idea of uniform circular motion.

**Force and Newton's laws :**

Force and Motion, Newton's Laws of Motion, Action and Reaction forces, Inertia of a body, Inertia and mass, Momentum, Force and Acceleration.

**Gravitation:**

Gravitation; Universal Law of Gravitation, Force of Gravitation of the earth (gravity), Acceleration due to Gravity; Mass and Weight; Freefall.

**Floatation:**

Thrust and Pressure. Archimedes' Principle; Buoyancy.

**Work, Energy and Power:**

Work done by a Force, Energy, power; Kinetic and Potential energy; Law of conservation of energy).

**Sound:**

Nature of sound and its propagation in various media, speed of sound, range of hearing in humans; ultra sound; reflection of sound; echo.

**Effects of Current**

Electric current, potential difference and electric current. Ohm's law; Resistance, Resistivity,

Factors on which the resistance of a conductor depends. Series combination of resistors, parallel combination of resistors and its applications in daily life. Heating effect of electric current and its applications in daily life. Electric power, Interrelation between P, V, I and R.

### **Magnetic effects of current**

Magnetic field, field lines, field due to a current carrying conductor, field due to current carrying coil or solenoid; Force on current carrying conductor, Fleming's Left Hand Rule, Electric Motor, Electromagnetic induction. Induced potential difference, Induced current. Fleming's Right Hand Rule, Electric Generator, Direct current. Alternating current: frequency of AC. Advantage of AC over DC. Domestic electric circuits.

### **Food Production**

Plant and animal breeding and selection for quality improvement and management; Use of fertilizers and manures; Protection from pests and diseases; Organic farming.

### **Natural Phenomena**

Reflection of light by curved surfaces; Images formed by spherical mirrors, centre of curvature, principal axis, principal focus, focal length, mirror formula (Derivation not required), magnification. Refraction; Laws of refraction, refractive index. Refraction of light by spherical lens; Image formed by spherical lenses; Lens formula (Derivation not required); Magnification. Power of a lens. Functioning of a lens in human eye, defects of vision and their corrections, applications of spherical mirrors and lenses. Refraction of light through a prism, dispersion of light, scattering of light, applications in daily life

### **Our environment:**

Eco-system, Environmental problems, Ozone depletion, waste production and their solutions. Biodegradable and non-biodegradable substances.

Global warming and green house effect, acid rain, particulate pollutants, smog, formation of photochemical smog.

Water pollution-oxygen demand, chemical oxygen demand, international standard of drinking water, processing of drinking water.

### **Diversity of living organisms**

- Basis of Classification.
- Classification & Evolution.
- Hierarchy of classification-groups.
- Plantae, Animalia.
- Nomenclature

### **Why do we fall ill**

- Health & its failure.
- Diseases and their causes
- Types of diseases- Infectious, Noninfectious.
- Prevention of diseases
- Smmunisation

## TIER II : Syllabus – TGT (Social Science)

### **Livelihoods, Economies and Societies:**

#### **I. Forest Society and Colonialism:**

- Why Deforestation?
- The Rise of Commercial Forestry
- Rebellion in the Forest
- Forest Transformations in Java

#### **II. Pastoralists in the Modern World:**

- Pastoral Nomads and their Movements
- Colonial Rule and Pastoral Life
- Pastoralism in Africa

#### **III . Indus Valley Civilisation (Ancient History)**

the Cities of Harappa , Mohenjo Daro and Lothal as well as the art , town planning and agriculture of the civilizations.

#### **IV. Muvender (Medieval History):- Cheras , Cholas nad Pandyas -Dynastics that ruled over South India during the Sangam Age ".Vijay Nagar : Founder , Dynastics , Capital and Administraion .**

#### **V. Revolution of 1857 (Modern India)**

- Nawabs losing Power
- The Peasants and the Sepoys Responses to reforms
- Mutiny become as popular rebellion.

### **GEOGRAPHY**

Motions of the Earth : Rotation , Revolution , Occurance of Day and night ; Change of seasons ; Latitudes and Longitudes ; Finding time .

Earth's Interior: Origin of Continents and Ocean basins Wegener's Continental drift Theory, Theory of plate Tectonics , Earthquakes and Volcanoes , Folding and Faulting .

#### **1. India**

- Location
- Size
- India and the World
- India's Neighbours

#### **2. Physical Features of India:**

- Major Physiographic Divisions—Himalayan Mountains, Northern Plains, Peninsular Plateau, Indian Desert, Coastal Plains, Islands

#### **3. Drainage:**

- Concept
- Drainage Systems in India
- The Himalayan Rivers-Ganga and Brahmaputra River System
- The Peninsular Rivers- Narmada Basin,Tapti Basin, Godavari Basin, Mahanadi Basin, Krishna Basin, Kaveri Basin
- Lakes
- Role of Rivers in the Economy
- River Pollution

#### **4. Climate:**

- Concept
- Climatic Controls
- Factors influencing India's climate –Latitude, Altitude, Pressure and Winds (excluding Jet Streams and Western Cyclonic Disturbances and related figures)
- The Seasons –  
Cold Weather Season, Hot Weather Season, Advancing Monsoon, Retreating/Post Monsoons
- Distribution of Rainfall
- Monsoon a unifying bond

#### **5. Natural Vegetation and Wild Life:**

- Types of Vegetation –Tropical Evergreen Forests, Tropical Deciduous Forests, Thorn Forests and Shrubs, Montane Forests, Mangrove Forests
- Wild Life

#### **6. Population:**

- Population Size and Distribution –India's Population Size and Distribution by Numbers, India's Population Distribution by Density
- Population Growth and Processes of Population Change –Population Growth, Processes of Population Change/Growth

### **Democratic Politics – I**

#### **1. What is Democracy? Why Democracy?**

- What is Democracy?
- Features of Democracy
- Why Democracy?
- Broader Meanings of Democracy

#### **2. Constitutional Design:**

- Democratic Constitution in South Africa
- Why do we need a Constitution?
- Making of the Indian Constitution
- Guiding Values of the Indian Constitution

#### **3. Electoral Politics:**

- Why Elections?
- What is our System of Elections?
- What makes elections in India democratic?

#### **4. Working of Institutions:**

- How is the major policy decision taken?
- Parliament
- Political Executive
- The Judiciary

## **5. Democratic Rights:**

- Life without Rights
- Rights in a Democracy
- Rights in the Indian Constitution
- Expanding scope of rights

## **Economics**

### **1. People as Resource:**

- Overview
- Economic Activities by Men and Women
- Quality of Population
- Unemployment

### **2. Poverty as a Challenge:**

- Overview
- Two typical cases of Poverty
- Poverty as seen by Social Scientists
- Poverty Estimates
- Vulnerable Groups
- Interstate Disparities
- Global Poverty Scenario
- Causes of Poverty
- Anti-Poverty measures
- The Challenges Ahead

### **3. Food Security in India:**

- Overview
- What is Food Security?
- Why Food Security?
- Who are food insecure?
- Food Security in India
- What is Buffer Stock?
- What is the Public Distribution System?
- Current Status of Public Distribution System
- Role of Cooperatives in food security

## **India and the Contemporary World – II**

### **Events and Processes:**

#### **1. The Rise of Nationalism in Europe:**

- The French Revolution and the Idea of the Nation
- The Making of Nationalism in Europe
- The Age of Revolutions: 1830-1848
- The Making of Germany and Italy
- Visualizing the Nation
- Nationalism and Imperialism

## **2. Nationalism in India:**

- The First World War, Khilafat and Non - Cooperation
- Differing Strands within the Movement
- Towards Civil Disobedience
- The Sense of Collective Belonging

## **Livelihoods, Economies and Societies:**

### **3. The Making of a Global World:**

- The Pre-modern world
- The Nineteenth Century (1815-1914)
- The Inter war Economy
- Rebuilding a World Economy: The Post-War Era

### **4. The Age of Industrialization:**

- Before the Industrial Revolution
- Hand Labour and Steam Power
- Industrialization in the Colonies
- Factories Come Up
- The Peculiarities of Industrial Growth
- Market for Goods

## **Everyday Life, Culture and Politics:**

### **5. Print Culture and the Modern World:**

- The First Printed Books
- Print Comes to Europe
- The Print Revolution and its Impact
- The Reading Mania
- The Nineteenth Century
- India and the World of Print
- Religious Reform and Public Debates
- New Forms of Publication
- Print and Censorship

## **Contemporary India - II**

### **1. Resources and Development:**

- Concept
- Development of Resources
- Resource Planning – Resource Planning in India, Conservation of Resources
- Land Resources
- Land Utilization
- Land Use Pattern in India
- Land Degradation and Conservation Measures
- Soil as a Resource - Classification of Soils, Soil Erosion and Soil Conservation

## **2. Forest and Wildlife**

- Conservation of forest and wildlife in India
- Types and distribution of forests and wildlife resources
- Community and Conservation

## **3. Water Resources:**

- Water Scarcity and The Need for Water Conservation and Management
- Multi-Purpose River Projects and Integrated Water Resources Management
- Rainwater Harvesting

## **4. Agriculture:**

- Types of Farming – Primitive Subsistence, Intensive Subsistence,
- Commercial
- Cropping Pattern – Major Crops, Food Crops other than Grains, Non Food Crops, Technological and Institutional Reforms
- Food Security (excluding impact of globalization on agriculture)

## **5. Minerals and Energy Resources**

- What is a mineral?
- Mode of occurrence of Minerals – Where are these minerals found?, Ferrous Minerals, Non-Ferrous Minerals, Non-Metallic Minerals, Rock Minerals
- Conservation of Minerals
- Energy Resources – Conventional Sources of Energy, Non-Conventional Sources of Energy
- Conservation of Energy Resources

## **6. Manufacturing Industries:**

- Importance of Manufacturing – Industrial Location (excluding Industry Market Linkage), Agro based Industry (excluding Cotton Textiles, Jute Textiles, Sugar Industry), Mineral based Industries (excluding Iron Steel Industry, Cement Industry), Industrial Pollution and Environmental Degradation, Control of Environmental Degradation

## **7. Life Lines of National Economy:**

- Roadways
- Railways
- Pipelines
- Waterways
- Major Seaports
- Airways
- Communication
- International Trade
- Tourism as a Trade

## **Democratic Politics – II**

### **1. Power Sharing:**

- Belgium and Sri Lanka
- Majoritarianism in Sri Lanka
- Accommodation in Belgium
- Why power sharing is desirable?
- Forms of Power Sharing

## **2. Federalism:**

- What is Federalism?
- What make India a Federal Country?
- How is Federalism practiced?
- Decentralization in India

## **3. Gender, Religion and Caste:**

- Gender and Politics - Public/Private division, Women's political representation
- Religion, Communalism and Politics –Communalism, Secular State
- Caste and Politics - Caste inequalities, Caste in politics, Politics in caste

## **4. Political Parties:**

- Why do we need Political Parties? –
- Meaning, Functions, Necessity
- How many parties should we have?
- National Parties
- State Parties
- Challenges to Political Parties
- How can Parties be reformed?

## **5. Outcomes of Democracy:**

- How do we assess democracy's outcomes?
- Accountable, responsive and legitimate government
- Economic growth and development
- Reduction of inequality and poverty
- Accommodation of social diversity
- Dignity and freedom of the citizens

## **Understanding Economic Development**

### **1. Development:**

- What Development Promises – Different People, Different Goals
- Income and Other Goals
- National Development
- How to compare different countries or states?
- Income and other criteria
- Public Facilities
- Sustainability of Development

### **2. Sectors of the Indian Economy:**

- Sectors of Economic Activities
- Comparing the three sectors
- Primary, Secondary and Tertiary Sectors in India
- Division of sectors as organized and unorganized
- Sectors in terms of ownership: Public and Private Sectors

### **3. Money and Credit:**

- Money as a medium of exchange
- Modern forms of Money
- Loan activities of Banks
- Two different Credit situations
- Terms of Credit
- Formal Sector Credit in India



- Self Help Groups for the Poor

#### 4. **Globalization and the Indian Economy:**

- Production across countries
- Inter linking production across countries
- Foreign Trade and integration of markets
- What is Globalization?
- Factors that have enabled Globalization
- World Trade Organization
- Impact of Globalization in India
- The Struggle for a fair Globalization

#### 5. **Consumer Rights**

- Consumer in market place
- Consumer movement
- Consumer Rights

## TIER II : SYLLABUS FOR TGT (ENGLISH)

### Section A: Reading

#### Comprehension

Three or four unseen passages from different genres (prose, poetry, drama, articles, editorials, scientific, and literary extracts).

Questions will test comprehension, inference, vocabulary, tone, rhetorical devices, and logical sequencing.

### Section B: Writing Ability

#### B1. Functional Writing:

Formal and Informal Letters: Business letters, job applications, letters to editors, complaints, and personal letters.

Report Writing: Factual description of events, newspaper reports, and analytical reports. Notices, Circulars, and Press Releases.

#### B2. Creative and Analytical Writing:

Essay Writing: Argumentative, analytical, reflective, and descriptive essays.

Article/Debate/Speech: Expressing opinions on socio-political, economic, and educational issues.

### Section C: Grammar and Usage

Parts of Speech: Nouns, Pronouns, Verbs, Adverbs, Adjectives, Prepositions, Conjunctions. Sentence Structure : Types of sentences, subject-verb agreement, parallelism, and sentence connectors.

Tenses and Their Usage: Active-passive voice, sequence of tenses, and reported speech. Clauses: Noun, adjective, and adverb clauses.

Common Errors: Articles, prepositions, modifiers, redundancy, and word order. Editing and Proofreading: Error detection, sentence correction, and transformation.

### Section D: Literature

#### D1. British Literature:

Elizabethan and Jacobean Drama: William Shakespeare, Christopher Marlowe, Ben Jonson. Poetry: John Donne, Alexander Pope, William Wordsworth, Samuel Taylor Coleridge, John Keats.

Victorian and Modern Writers: Charles Dickens, Thomas Hardy, Virginia Woolf, T.S. Eliot, George Orwell.

#### D2. Indian Writing in English:

R.K. Narayan, Mulk Raj Anand, Anita Desai, Vikram Seth, Arundhati Roy, Amitav Ghosh.

#### D3. World Literature:

Gabriel García Márquez, Chinua Achebe, Pablo Neruda, Khaled Hosseini.

## TIER II : प्रशिक्षित स्नातक शिक्षक ( हिन्दी)

स्नातक स्तर पर पढ़े पाठ्यक्रम के अवधारणाओं, अनुप्रयोगों की गहन समझ का आकलन किया जाएगा ।

गद्य-खंड :

हिंदी साहित्य का इतिहास

हिंदी साहित्य उद्भव और विकास

गद्य साहित्य की विधाएं

कहानी, उपन्यास, नाटक/एकांकी, निबंध, रेखाचित्र, संस्मरण, जीवनी, आत्मकथा, यात्रा वृत्तांत, रिपोर्टाज, कथेतर गद्य

काव्य-खंड:

आदिकालीन कविता

भक्तिकाल (सगुण, निर्गुण, सूफी काव्य)

रीतिकाल की कविता

आधुनिक काल की कविता (भारतेन्दु युग, द्विवेदी युग, छायावाद, प्रगतिवाद, प्रयोगवाद, नई कविता, समकालीन कविता)

हिंदी भाषा का विकास एवं व्यवहारिक व्याकरण :-

हिंदी की उप-भाषाएं एवं बोलियां

वर्ण विचार (उच्चारण, वर्तनी)

शब्द विचार और शब्द रचना (विलोम शब्द पर्यायवाची, अनेकार्थक, श्रुतिसम भिन्नार्थक शब्द इत्यादि)

संधि, समास

विकारी शब्द, अविकारी शब्द

वाक्य रचना: (अर्थ एवं रचना के आधार पर)

पद - परिचय

अलंकार शब्दालंकार, अर्थालंकार (अनुप्रास, यमक, श्लेष, उपमा, रूपक, उत्प्रेक्षा, मानवीकरण, अतिशयोक्ति अलंकार)

शब्द-शक्तियां

मुहावरे एवं लोकोक्तियां

अपठित गद्यांश, पद्यांश

संविधान में हिंदी की स्थिति संबंधी धाराएं, उप धाराएं

हिंदी राजभाषा, संपर्क भाषा, प्रयोजन मूलक हिंदी, कार्यालयी हिंदी, मानक हिंदी ई मेल लेखन, लघु कथा लेखन, विज्ञापन लेखन इत्यादि लेखन ।

## TIER II : टीजीटी संस्कृत निर्धारित पाठ्यक्रम

भाग - क - व्याकरण  
भाग- ख - वाक्यरचना  
भाग- ग - काव्यांश  
भाग- घ - गद्यांश

### भाग- क - व्याकरण

शब्दरूप - राम, मति, नदी, हरि, गुरु, वधू, मधु, पितृ, मातृ, वारि, गो, भगवत्, जगत् आत्मन्, पथिन्, विद्वस्, सर्व, किम्,

तत्, एतत्, इदम्, अस्मद्, युष्मद्

धातुरूप - पठ्, पच्, भू, कृ, अस्, अद्, हन्, दिव्, तन्, तुद्, रुध्, क्री, चुर्, सेव्, लभ्,

(लट्, लङ्, लृट्, लोट् और विधिलिङ् लकारों में)

### कारक - परिचय - षड् कारकाणि, सभी विभक्तियाँ

प्रमुख प्रत्ययः - क्त्वा, तुमुन्, ल्यप्, शत्, शानच् क्त, क्तवतु, अनीयर्, तव्यत्, तव्य, त्व, तल, ठक्, मतुप्, टाप्, डीप्

अव्यय - उच्चैः, च, श्वः, ह्यः, अध, अत्र, तत्र, यत्र, कुत्र, इदानीम्, अधुना, सम्प्रति, साम्प्रतम्, यदा, तदा,

कदा, सहसा, वृथा, शनैः, अपि, कुतः, इतस्ततः, यदि, तर्हि, यावत्-तावत् ।

सन्धि - स्वर - दीर्घ, गुण, वृद्धि, यण, अयादि

व्यञ्जन - जशत्व, अनुस्वार, परसवर्ण

विसर्ग - उत्त्व, रत्व, सत्व, विसर्ग लोप, विसर्ग के स्थान पर स्, ष्, श्

समास - अव्ययीभाव, तत्पुरुष, कर्मधारय, द्विगु, नञ्-तत्पुरुष, बहुव्रीहि, द्वन्द्व ।

उपसर्गः - द्वाविंशतिः (22)

संख्या - शतम् यावत् (सौ तक)

### भाग- ख - वाक्यरचना

भाग - क में निर्धारित व्याकरण बिन्दुओं के प्रयोग पर आधारित शुद्ध-अशुद्ध-निर्णय ।

अपठित-अवबोधन

अपठित अनुच्छेदों का अवबोधन - अनुवाद एवं प्रश्नोत्तर

लघु संस्कृत निबन्ध - संस्कृत भाषा, साहित्य और संस्कृति से सम्बन्धित

### भाग- ग - काव्यांश

रघुवंशमहाकाव्यम् - प्रथम सर्ग - 1-25 श्लोक

अभिज्ञान शाकुन्तलम् - चतुर्थ अंकः

प्रतिमा नाटकम् - तृतीय अंकः

नीतिशतकम् - सम्पूर्ण

भगवद्गीता - द्वितीय-अध्यायः

### भाग- घ - गद्यांश

1

शुकनासोपदेशः - प्रारम्भ से लक्ष्मीवर्णन के प्रसंग 'स्वल्पसत्त्वमुन्मतीकरोति' (बाणभट्टकृत कादम्बरी के अन्तर्गत)

शिवराजविजयः - प्रथम - निःश्वास

कवि परिचय - कालिदास, भास, भवभूति, माघ, शूद्रक, भारवि, श्रीहर्ष, भर्तृहरि

संस्कृत सुभाषित - सूक्तियों का ज्ञान, प्रसिद्ध कथन

छन्द - अनुष्टुप, उपजाति, वंशस्थ, वसन्ततिलका, मालिनी, स्रग्धरा एवं शार्दूलविक्रीडित

अलंकार - अनुप्रास, उपमा, रूपक, उत्प्रेक्षा, यमक, श्लेष एवं अर्थान्तरन्यास

वैदिक साहित्य - चारों वेदों का सामान्य परिचय: ईशावाश्योपनिषद्, तैत्तिरीय उपनिषद्

## **TIER II : SPECIAL EDUCATOR (TGT)**

### **I Human Growth & Development**

1. Approaches to Human Development
2. Theoretical Approaches to Development
3. The Early Years (Birth to Eight Years)
4. Early Adolescence (From nine years to eighteen years)
5. Transitions into Adulthood

### **II Learning, Teaching and Assessment**

1. Human Learning and Intelligence
2. Learning Process and Motivation
3. Teaching Learning Process
4. Overview of Assessment and School System
5. Strategies and practices

### **III Pedagogy of Teaching (Select any Two)**

#### **(a) Pedagogy of Teaching Science**

1. Nature and Significance of Science
2. Planning for Instruction
3. Approaches and Methods of Teaching Sciences
4. Learning Resources with reference to Children with Disabilities for Teaching Science

#### **(b) Pedagogy of Teaching Mathematics**

1. Nature of Mathematics
2. Objectives and Instructional Planning in Mathematics
3. Strategies for Learning and Teaching Mathematics
4. Teaching-Learning Resources in Mathematics for Students with Disabilities
5. Assessment and Evaluation for Mathematics Learning

#### **(c) Pedagogy of Teaching Social Science**

1. Nature of Social Sciences: - Concept, scope and nature of social science
2. Curriculum and Instructional Planning
3. Approaches to teaching of Social Science
4. Social Science Teacher as a Reflective Practitioner
5. Teaching-Learning Resources in Social Sciences for Students with Disabilities

#### **(d) Pedagogy of Teaching Hindi**

1. भाषा, हिंदी भाषा के प्रकृति, प्रयोज्यता
2. पाठ्यवस्तुसंबंधन
3. पाठनियोजन
4. हिंदी की विविधविधाओं का परिचय
5. भाषा अधिगम के मूल्यांकन की प्राविधि

### **(e) Pedagogy of Teaching English**

1. Nature of English Language & Literature: Principles of Language Teaching
2. English language in the school context: An Evolutionary Perspective, Current
3. Trends in Modern English Literature in India context
4. Instructional Planning
5. Approaches and Methods of Teaching English
6. Instructional Materials

### **IV DISABILITY SPECIALIZATION (Select any ONE)**

**Important Note: Select any one disability specialization area as per the RCI Registration: Autism Spectrum Disorder/ Hearing impairment/ Intellectual Disability/ Multiple Disability/ Specific Learning Disability/ Visual Impairment. As per selected disability specialization, questions shall be changed.**

**Based on selected disability specialization area, questions will be based on followings:**

#### **a. Identification of Disability and Assessment of Needs**

- Concept, definition, causes, types and associated conditions.
- Characteristics, learning needs
- Screening, screening tools and procedure for identification
- Assessment of disability, areas of assessment, assessment tools, interpretation of assessment data for planning
- Differentiated diagnosis and certification of disability

#### **b. Curriculum Development, Adaptation and Evaluation**

- Concept, principles and approaches to curricular development, types, curricular transactions.
- Curricular adaptation, designing based on individual needs, adaptations to meet needs in different settings, role of technology in curriculum development, curriculum development and teaching, development of suitable teaching learning resources.
- Development of literacy academic skills (Reading, writing, computation), development of communication, language, social, recreational, self-care, independent living and life skills.

#### **c. Intervention and Teaching Strategies**

- Learning characteristics, teaching strategies, strategies for early intervention and its impact on school outcomes.
- Disability specific intervention and training strategies, types, approaches, techniques, use of technology peer mediated and cooperative learning.
- Inclusive teaching strategies, UDL, DI, Classroom management, home-based training, assistive technology.

#### **d. Psychosocial and Family Issues**

- Psycho-social aspects and disability, role of family and school in psycho-social development.
- Family needs and issues related to families of children with disabilities, empowering parents and families, social attitude- neighborhood, parents of other children, friendship, support, advocacy and legal rights.
- Family and community intervention, addressing mental health concerns, counselling and guidance.

## TIER II : Syllabus -TGT (Art Education)

### DRAWING AND PAINTING

#### HISTORY OF INDIAN ART

##### UNIT 1: Art of Indus Valley

(Harappan and Mohenjo-daro) (2500 B.C. to 1500 B.C.)

##### (1) Introduction

- (i) Period and Location.
- (ii) Extension: In about 1500 miles
  - (a) Harappa & Mohenjo-daro
  - (b) Ropar, Lothal, Rangpur, Alamgirpur, Kali Bangan, Banawali and Dhaula Veera (in India)

##### (2) Study of following Sculptures and Terracottas:

- (i) Dancing girl (Mohenjo-daro)  
Bronze, 10.5 x 5 x 2.5 cm.  
Circa 2500 B.C.  
(Collection : National Museum, New Delhi).
- (ii) Male Torso (Harappa)  
Stone, 9.2 x 5.8 x 3 cms. Circa  
2500 B. C.  
(Collection : National Museum, New Delhi).
- (iii) Mother Goddess (Mohenjo-daro) terracotta, 22 x 8 x 5  
cm. Circa 2500 B.C.  
(Collection : National Museum, New Delhi).

##### (3) Study of Following Seal:

- (i) Bull (Mohenjo-daro)  
Stone, 2.5 x 2.5 x 1.4 cm.  
Circa 2500 B.C.  
(Collection : National Museum, New Delhi).

##### (4) Study of following Decoration on earthen wares:

- (i) Painted earthen-ware(Jar)Mohenjo-daro  
(Collection : National Museum, New Delhi).

#### UNIT 2 : Buddishist, Jain and Hindu Art.

(3<sup>rd</sup> century B.C. to 8<sup>th</sup> century A.D.)

- (1) General Introduction to Art, during Mauryan, Shunga, Kushana & Gupta Period:
- (2) Study of following

##### Sculptures:

- (i) Lion Capital from Sarnath (Mauryan period)  
Polished sand stone,  
Circa 3<sup>rd</sup> Century B.C.  
(Collection: Sarnath Musseum, U.P.)
- (ii) Chauri Bearer from Didar Ganj (Mauryan period)  
Polished sand – stone  
Circa 3<sup>rd</sup> Century B.C.



- (Collection: Patna Museum, Bihar)
- (iii) Bodhisattva head from Taxila (Gandhara Period)  
Stone, 27.5 x 20 x 15 c.m.  
Circa 2<sup>nd</sup> Century A.D.
- (Collection: National Museum, New Delhi)
- (iv) Seated Buddha from Katra Tila  
Mathura – (Kushan Period)  
(Collection: Mathura Museum)
- (v) Seated Buddha from Sarnath (Gupta Period)  
Stone  
Circa 5<sup>th</sup> Century AD  
(Collection: Sarnath Museum, U.P.)
- (vi) Jain Tirathankara (Gupta period)  
Stone  
Circa 5<sup>th</sup> Century AD  
(Collection at State Museum, Lucknow U.P.)

(3) Introduction to Ajanta

Location, period, No. of caves, Chaitya and Vihara, Paintings and Sculptures  
subject matters and techniques etc.

(4) Study of following

Painting & Sculpture:

- (i) Padmapani Bodhisattva (Ajanta Cave No. 1)  
Mural Painting  
Circa 5<sup>th</sup> Century A.D.
- (ii) Mara Vijay (Ajanta Cave No. 26)  
Sculpture in stone  
Circa 5<sup>th</sup> Century A.D.

Unit 3: Temples Sculpture, Bronzes and Indo-Islamic

Architecture Artistic aspects of Indian Temples

(6<sup>th</sup> Century A.D. to 13<sup>th</sup> Century A.D.)

(1) Introduction to Temple Sculpture

(6<sup>th</sup> Century A.D. to 13<sup>th</sup> Century A.D.)

(2) Study of following Temple-Sculptures;

- (i) Descent of Ganga (Pallava period, Mahabalipuram Tamilnadu), Stone Circa 7<sup>th</sup>  
Century A.D.
- (ii) Ravana Shaking Mount Kailash (Rashtrakuta period, Ellora,  
(iii) Trimurti (Elephanta, Maharashtra)  
Stone  
Circa 9<sup>th</sup> Century A.D.
- (iv) Lakshmi Narayana (Kandariya Mahadev Temple) (Chandela;  
Period, Khajuraho, M.P.)  
Circa 10<sup>th</sup> Century A.D.

- (V) Cymbal Player Sun Temple (Ganga Dynesty, Konark, Orissa) Circa 13<sup>th</sup> Century A.D.
- (vi) Mother & Child (Vim la-Shah Temple, Solanki Dynesty, Dilwara, Mount Abu, Rajasthan) White marble. Circa 13<sup>th</sup> Century A.D.
- (3) Bronzes
  - (i) Introduction to Indian Bronzes
  - (ii) Method of casting (solid and hollow)
- (4) Study of following south Indian Bronzes:
  - (i) Nataraj (Thanjavur Distt., Tamilnadu)  
Chola period (12<sup>th</sup> Century a.D.) (Collection: National Museum, New Delhi)
  - (ii) Devi (Uma)  
Chola Period (12<sup>th</sup> Century a.D.) (Collection: National Museum, New Delhi)
- (5) Artistic Aspects of the Indo-Islamic Architecture
  - (i) Introduction
- (6) Study of following architectures:
  - (i) Qutab Minar, Delhi
  - (ii) Taj Mahal, Agra
  - (iii) Gol Gumbaj of Bijapur

Unit 4: The Rajasthani and Pahari Schools of Miniature painting (16<sup>th</sup> Century A.D to 19<sup>th</sup> Century A.D.)

Introduction to Indian Miniature Schools: Western-Indian, Pala, Rajasthani, Mughal, Central India, Deccan and Pahari.

- (A) The Rajasthan; Schools
  - (1) Origin and Development
  - (2) Schools-Mewar, Bundi, Jodhpur, Bikaner, Kishangarh and Jaipur
  - (3) Main features of the Rajasthani & Pahari Schools.
  - (4) Study of the following Rajasthani Paintings:

Title	Painter	School
Maru-Ragini	Sahibdin	Mewar
Raja Ajniruddha Singh Heera	Utkal Ram	Bundi
Chaugan Players	Dana	Jodhpur
Krishna on swing	Nuruddin	Bikaner
Radha (Bani – Thani)	Nihal Chand	Kishangarh
Bharat meets Rama at Chitrakut	Guman	Jaipur

- (B) The Pahari Schools:
  - (1) Origin and development
  - (2) Schools-Basohli and Kangra
  - (3) Main features of the Pahari School
  - (4) Study of the following pahari Paintings

Title	Painter	School
Krishna with Gopies		Basohli
Raga Megha		Kangra

Unit 5 The Mughal and Deccan Schools of Miniature Painting (16<sup>th</sup> Century AD to 19<sup>th</sup> Century A.D.)

(A) The Mughal School

- (1) Origin and development
- (2) Main features of the Mughal School
- (3) Study of the following Mughal paintings

Title	Painter	School
Krishna lifting mount	Goverdhan	Miskin Akbar
Babur crossing the river sone	Jaganath	Akbar
Jahangir holding the picture of Madona	Abul Hassan	Jahangir
Falcon on a bird nest	Ustad Mansoor	Jahangir
Kabir and Raidas	Ustad Faquirullah Khan	Shahjahan
Marriage procession of Dara Shikoh	Haji Madni	Provincial Mughal(Oudh)

(B) The Deccan School

- (1) Origin and development
- (2) Main features of the Deccan School
- (3) Study of the following Deccan paintings

Title	Painter	School
Raga Hindola		Ahmednagar
Chand Bibi Playing Polo(Chaugan)		Gol Konda

Unit 6 : The Bengal school and the Modern trends in Indian Art

- (A)
  - (1) A. New Era in Indian Art- an introduction
  - B. Study of the following painting
    - (i) Rama Vanquishing the pride of the ocean-Raja Ravi Verma
  - (2) Evolution of the Indian national Flag (First – 1906, Middle – 1921 and Final 1947 stages): Study of the form and the colour scheme
- (B)
  - (1) Introduction to the Bengal School of painting
    - (i) Origin and development of the Bengal School
    - (ii) Main Features of the Bengal school
  - (2) Contribution of Indian artists in the struggle for National Freedom Movement
  - (3) Study of the following paintings of the Bengal School
    - (i) Journey's End – Rabindranath Tagore
    - (ii) Parthasarathi – Nandlal Bose
    - (iii) Radhika – M.a.R. Chughtai
- (C) The Modern Trends in Indian Art

## Introduction

- (1) Study of the following Paintings:
  - (i) Magician-Gaganendranath Tagore
  - (ii) Mother and child-Jamini Roy
  - (iii) Woman face-Rabindranath Tagore
  - (iv) Tree Girls-Amrita Sher gill
- (2) Study of the following pieces of Sculpture:
  - (i) Triumph of labour- D.P. Roychowdhury
  - (ii) Santhal Family-Ramkinker Vajj
- (3) Study of the following work of contemporary Indian Art'
  - A Paintings
    - (i) Mother Teresa-M.F. Hussain.
    - (ii) Birth of Poetry- K.K. Hebbar
    - (iii) Gossip- N.S. Bendre
    - (iv) Diagonal- Tyeb Mehta
  - (4) Graphic Prints
    - (i) Whirl Pool-Krishna Reddy
    - (ii) Children-Somnath Hore
    - (iii) Devi-Jyoti Bhatt
    - (iv) Of Walls-Anupam Sud
    - (v) Man, Woman and Tree K. Laxman Goud
  - (5) Sculptures
    - (i) Standing Woman-Dhanraj Bhagat
    - (ii) Cries Un-heard-Amar nath Sehgal
    - (iii) Ganesha-P.V. Jankiram
    - (iv) Figure- sankho Chaudhuri
    - (v) Chatturmukhi – Aekka Yada Giri Rao

Note: The names of artists and their art work as listed above are only suggestive and in no way exhaustive.

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## TIER II : Syllabus -TGT (Physical & Health Education)

### Physical Education Theory

#### 1. Concept of Physical Education

Meaning and definition of physical education its aim and objectives, modern concept and scope of physical education need and importance of physical education , place of physical education in the total education process.

#### 2. Physiological aspects of physical education

Effect of exercise on :

Muscular system, circulatory system , respiratory system , Digestive system

#### 3. Psychological Aspects of Physical Education

Definition of Psychology and sports psychology , achievement and motivation and motivation in sports, sportsmanship and sports ethics

#### 4. Physical Fitness and Wellness

Meaning and importance of physical fitness and wellness, components of physical fitness and wellness , factors affecting physical fitness and wellness , principles of physical fitness development , mean of fitness development , aerobic activities – jogging , cycling calisthenics and Rhythmic exercises, participation in Games and sports , circuit Training.

#### 5. Training Methods

Meaning and concept of training arming up limbering down and their importance methods of training strength Development –Isometric, and Isokinetic Exercises, methods of Endurance Development-Continuous method, Interval Training and Fartlek, Methods of speed Development –Acceleration Runs and pace races.

#### 6. Sociological Aspects of Physical Education

Meaning of sociological and its Importance in physical education and sports. Games and sports as man IS cultural Heritage. Development of leadership qualities and group dynamics.

7. History of the game/sport (anyone game/sport of students choice), latest general rules of the game/sport (anyone game/sport of students choice), measurement of play field and specification of sport equipment, Fundamental skills of the game/port, Related sports terminologies , Important tournaments and venues, sports personalities, sports awards.

#### 8. Health Education

Concepts and objectives of Health Education, Importance of Health Education, Principles of Health Education, Importance of Community participation for health promotion and welfare of individual, family and community.

## 9. Communicable Diseases

Meaning of communicable Diseases, Essential conditions for communicable Diseases to occur and disease process, common alert signals indicating on set of communicable Diseases , Mode of transmission, common symptoms and prevention of spread (transmission) of AIDS, Hepatitis B and Hepatitis C

## 10 Contemporary Health Problems

Abuse of alcohol, tobacco and drugs and the effects of abuse on individual, family and community. Effect of alcohol, tobacco and drugs on sportsperson, eating habits that cause obesity and its effect on health of individual

## 11 Health living

Concept of environment , scope of environment – living environment , work place environment and environment for leisure activities, Essential element of healthful environment - safe water, low level of noise , clean air, sanitary surrounding, low levels of radioactive radiations and absence of hazards responsible for accidents in (i) home and neighborhood n rural and urban areas (ii) school and work place (iii) during leisure time activities recreation and prevention of accidents related to transportation swimming and water sports, Disaster preparedness and health care during disasters.

## 12 Family Health Education

Meaning and functions of family and its importance as a social institution, needs and problems of adolescents and their management , Human reproduction – menstruation, conceptional and prenatal care, problems associated with pre-marital sex and teenage pregnancies , Preparation of marriage, Role of Parents in child care.

## 13 Prevention and first aid for common sports injuries

Soft Tissue injuries – sprain and strain , Bone Injuries, Joint Injuries.

## **TIER II : Syllabus for Librarian**

### **Foundation of Library & Information Science.**

#### **1. Library as an Social Institution**

- Social & Historical foundations of Library.
- Different types of libraries- Academic, Public, Special –their distinguishing features and functions.
- Role of U.G.C. for development of Academic libraries.
- Role in Library of formal and informal education. Shivaji University, Kolhapur

#### **2. Normative Principles of Lib. & Inf. Science**

- Five Laws of Library Science.
- Implications of five laws in Lib. & Inf. Science
- Development of Libraries with special reference to India, Baroda Public Library system
- Library Co-operation Resource Sharing and Library Networking.

#### **3. Laws relating to Libraries & Information.**

- Library legislation need and essential features.
- Library legislation in India.
- Maharashtra Public Library Act.
- Press and registration act & Delivery of Books act (Public Library).
- Copyright act, Intellectual Property rights.

#### **4. Library and information Profession**

- Attribution of profession.
- Librarianship as a profession.
- Professional ethics.
- Professional associations & their role.
- National & International Library Associations- FID, IFLA, LA, ILA, ALA, IASLIC etc.
- Professional education & research.

#### **5. Promoters of Library & Information services**

- National level promoters- RRRLF.
- International level promoters- UNESCO

#### **6. Public relations & Extension activities**

- Definition
- facets and programs.
- publicity & extension, Out reach activities.
- Library path finders (Guides)
- Factors affecting Library development, Literacy, publishing, Book Trade.

### **Knowledge Organization, Information Processing & Retrieval.**

#### **1. Universe of Knowledge**

- Structure and attributes.
- Modes of formation of subjects.
- Different types of subjects.
- Universe of subjects as mapped in different schemes of classification.

#### **2. Bibliographic description**

- Catalogue purpose, Structure and types physical forms including OPAC filling rules.
- Normative Principles of cataloguing.
- Overview of principles and practice in document description.
- Current trends in Standardization, description and exchange.
- Standard codes of cataloguing.

#### **3. Methods of Knowledge Organization**

- General theory of Library Classification.
- Normative principles of classification and their application.
- Species of Library Classification.
- Standard Schemes of Classifications and their features, CC, DDC, UDC.
- Notation: Need, Functions, Characteristics
- Design and development of schemes of Library Classification, Standard sub-division Index.
- Trends in Library Classification.

#### 4. Subject Classification

- Principles of Subject Classification.
- Subject heading lists and their feature.

### **Information Technology: Basic**

#### 1. Information Technology

- Definition, Need, Scope and Objectives.

#### 2. Computer Basic (Hardware)

- Introduction to Computers
- Overview of Historical Development of Computers.
- Generations of Computers, Classification of Computers.
- Essential Components of Computer system.

#### 3. Computer Architecture-Organization of Computer

- Input and Output devices- Keyboard, Scanner, OCR, Printers, Monitor

#### 4. Software.

- Operating systems: Single & Multi User Systems, Basic features of MS-DOS, MS Windows, Linux, UNIX, Windows NT etc.
- Programming Languages: Concepts and Tools
- Algorithm & Flowcharting.

#### 5. Word Processors, Spread Sheet etc.

#### 6. DBMS Package

- Familiarity with DBASE, FOXPRO, CDS/ISIS, SOUL, MS Access (Basic features)

#### 7. Computer application to library & Information work - House keeping operations

#### 8. Communication Technology

- Communication Technology Basic Concepts
- Networking: Basic Concepts.
- Internet

### **Management of Libraries & Information Centres/Institutions**

#### 1. Management

- Concepts, definition and scope.
- Management styles and approaches.
- Management schools of thought.
- Functions and principles of Scientific Management.

#### 2. Human Resource Management

- Organizational structure.
- Delegation, Communication and Participation.
- Job Description and Analysis, Job evaluation.
- Inter-personal relation.
- Recruitment procedures.
- Motivation, group Dynamics.
- Training and Development.
- Disciplines and Grievances.
- Performance Appraisal.

#### 3. Financial Management

- Resources Mobilization
- Budgeting Techniques and Methods PPBS, Zero Based Budgeting etc.
- Budgetary Control.
- Cost effectiveness and Cost Benefit analysis.



- Outsourcing.

#### 4. Reporting

- Types of reports, Annual report-compilation, Contents and style.
- Library Statistics etc.

#### 5. System Analysis and Design

- Library as a system
- Project Management PERT/COM
- Decision Tables.
- Performance evaluation standards, MIS.
- Performance Measurement, reengineering, Time and Motion Study
- SWOT ( Strength Weakness Opportunities Threat)
- DFD (Data Flow Diagram)

#### 6. Total Quality Management (TQM)

- Definition, Concept, Element
- Quality Audit, LIS related standards.
- Technology Management.

#### 7. Library House Keeping Operations.

- Different sections of Library & Information Center and their functions.
- Collection Development and Management Policies Procedures.
- Book Ordering (Acquisition)
- Technical Processing.
- Serials Control, Circulation Control, Maintenance etc.
- Stock Verification- Policies and Procedures.
- Evaluation and Weeding.
- Archiving-conservation-Preservation.
- Restoration including Print, Non-Print and Electronic Materials.

#### 8. Planning

- Concept, Definition, Need and Purpose, Types.
- Policies and Procedures, MBO
- Building and Space management in Libraries and Information Centers.
- Library Building, Interior & Exterior, Furniture, Equipment's, Standards & Types.
- Risk Management, Contingency Management.
- Planning of related Infrastructure, Library Standards.

#### 9. Management of change.

- concept of change.
- changes in Procedures, Methods, Tools and Techniques.
- Problems of Incorporating Change.
- Techniques of Managing Change.

### **Information Sources & Services**

#### 1. Reference and information sources.

- Documentary Sources of Information, Print, Non-Print including Electronic: Special features, Scope, types
- Nature, Characteristic, Utility and evaluation of different types of Information sources: Physical formats, Authority, Content, Utility.
- Non-Documentary Information Sources.
- Reference Sources Categories, Primary, Secondary & Tertiary Information Sources.(Encyclopedia, Dictionary, Periodical, Thesis, Books, Year book, Patents, Trade literature, standards, Monographs, Reference Books, Year Books, Almanac, Atlas, Abstracting & Indexing periodicals, Bibliographies, Handbooks etc.)
- Internet as a Source of Information.

#### 2. Reference Service.

- Concept, Definition, Need, Scope and trends.
- Reference Interview and Search Techniques.

#### 3. Information Services and Products

- Information services and Products.
- Information services concepts, Definition, Need and trends.
- Need, Techniques and Evaluation of Alerting services (CAS &SDI)

- Bibliographic, Referral, Document Delivery and Translation Services.
- 4. Information System and their Services.
- Study of National, International and Commercial Information Systems and Services- Background, their Services and Products.

### **Library Users**

1. Techniques of Library and Information Centres Survey. - Proforma method.
  - Interview method.
  - Records analysis method.
2. Information users and their information Needs
  - Categories of Information users.
  - Information needs definition and models.
  - Information seeking behaviour.
3. User Education
  - Goals and Objectives level, Techniques and Methods, Evaluation of Users Education Programmes.
4. User Studies.
  - Methods and techniques of User studies.
  - Evaluation of User studies.
5. User Orientation Programmes:
  - Conventional and modern Techniques: Study tour, Newsletters, Handbooks, Leaflets, Power point Presentation, Websites etc

### **I- Knowledge, Organization, Information Processing & Retrieval**

1. Classification of Documents (Using CC & DDC) (Latest Ed.) - Classification of documents representing simple subject.
  - Classification of documents having common isolates.
  - Classification of documents representing compound subject.
  - Classification of documents representing complex subject.
2. Assignment of Book Number
  - (Using at least one standard Book Numbering System)
3. Cataloguing of Documents. (Using CCC & AACR (Latest Ed.)
  - Cataloguing of Simple documents
  - Cataloguing of complex documents
4. Subject Cataloguing
  - Assigning subject Heading Using at least one standard subject Heading.

### **II. Information Technology: Basic**

1. Use of Operating Systems
2. Word Processors, Spread Sheets,
3. Database Creation using at least one DBMS software.
4. Database Search and Retrieval.

### **III: Information Sources & Services**

1. Study and evaluation of Reference sources.
2. Compilatin of Current Awareness List/Biography/Content List/ Press Clippings.

### **IV: Library & Users**

1. Survey of Libraries and Information centres.
2. Survey of a group of user

## **TIER II : Syllabus - TGT (Work Experience)**

### **(1) Circuit Fundamentals**

Zero Reference Level - Chassis Ground - Ohm's Law - Formula Variations of Ohm's Law - Graphical Representation of Ohm's Law - Linear Resistor - Non-linear Resistor - Cells in Series and Parallel - Conventional Problems

### **(2) Resistive Circuits**

Series Circuit - Characteristics of a Series Circuit - The Case of Zero IR Drop - Polarity of IR Drops - Total Power - Series Aiding and Series Opposing Voltages - Proportional Voltage Formula in a Series Circuit Series Voltage Dividers - 'Opens in a Series Circuit - 'Shorts' in e Series Circuit - Parallel Circuits - Laws of Parallel Circuits Special Case of Equal Resistances in all Branches - Special Case of Only Two Branches Any Branch Resistance - Proportional Current Formula - 'Opens' in a Parallel Circuit - 'Shorts' in a Parallel Circuit - Series-Parallel Circuits Analyzing Series Parallel Circuits - 'Opens' in Series-Parallel Circuits 'Shorts' in SeriesParallel Circuits - Voltage Division in a Complex Series-Parallel Circuit - Conventional Problems

### **(3) Kirchhoff's Laws**

General - Kirchhoffs Current Law Kirchhoffs Voltage Law - Determination of Algebraic Sign - Assumed Direction of Current Flow - Conventional Problems.

### **(4) Network Theorems**

General - Superposition Theorem - Ideal Constant-Voltage Source - Ideal Constant-current Source - Thevenin's Theorem - How to Thevenize a Circuit? - Norton's Theorem - How to Nortonise a Given Circuit - Maximum Power Transfer Theorem - Conventional Problems

### **(5) Passive Circuit Elements**

General - Resistors - Resistor Types - Wire-wound Resistors - Carbon Composition Resistors - Carbon Film Resistors - Cermet Film Resistors .Metal Film Resistors - Power Rating - Value Tolerance - Variable Resistors - Potentiometers and Rheostats - Fusible Resistors - Resistor Colour Code - Resistance Colour Bands - Resistors under Ten Ohm - Resistor Troubles - Checking Resistors with an Ohmmeter - Inductor - Comparison of Different Cores - Inductance of an Inductor - Another Definition of Inductance - Mutual Inductance - Coefficient of Coupling - Variable Inductors - Inductors in Series or Parallel without M - Series Combination with N - Stray Inductance - Energy Inductance - Energy Stored in a Magnetic Field - DC Resistance of a Coil - Troubles in Coils - Reactance Offered by a Coil - Impedance Offered by a Coil - Q-Factor of a Coil - Capacitors - Capacitor Connected to a Battery –Capacitance-Factors Controlling Capacitance '- Types of Capacitors - Fixed Capacitors - Variable Capacitors - Voltage Rating of Capacitors - Stray Circuit Capacitance Leakage Resistance - Capacitors in Series - Two Capacitors in Series Capacitor's in Parallel - Two Capacitors in Parallel - Energy stored in e Capacitor - Troubles in Capacitors - Checking Capacitors with Ohmmeter - Charging of a Capacitor - Capacitor Connected Across an AC Source Capacitive Reactance

### **(6) Energy Sources**

Primary and Secondary Cells - Cell and Battery - Voltage and Current of a Cells - Cell life - Different Types of Dry Cells - Carbon Zinc Cell Alkaline Cell - Manganese Alkaline Cell – NickelCadmium Cell - Mercury Cell - Silver Oxide Cell - Lead Cells - Battery Rating - Testing Dry Cells - Photoelectric Devices - Photovoltaic Cell - Solar Cell Conventional Problems

### **(7) Magnetism and Electromagnetism**

Magnetic Materials- Ferrites - Types of Magnets - Demagnetizing or Degaussing -Magnetic Shielding - Magnetic Terms and Units - Ohm's Law for Magnetic Circuit - Transformer - Transformer Working - Transformer Impedance - Can a Transformer Operate on DC ? - RF Shielding - Autotransformer - Impedance Matching - Conventional Problems.

### **(8) A.C. Fundamentals**

Introduction - Types of Alternating Waveforms - The Basic AC Generator -Some Definitions - Characteristics of a Sine Wave - Audio an ,Radio Frequencies - Different Values of Sinusoidal Voltage and Current - Phase of an AC - Phase Difference - Vector Representation of an Alternating Quantity - AC Through Pure Resistance Only • AC Through Pure Inductance Only - AC Through Pure Capacitance Only - Non-sinusoidal Waveforms - Harmonics -Conventional Problems

### **(9) Series A.C. Circuits**

R-L Circuit - Q Factor of a Coil - Skin Effect - IR•C Circuit - Coupling Capacitor - R-L-C Circuit - Resonance in an R-L- C Circuit - Resonance Curve - Main Characteristics of Series Resonance - Bandwidth of a Tuned Circuit - Sharpness of Resonance - Tuning - Tuning Ratio - RaGio Tuning Dial- Parallel Resonance -Convectional Problem

### **(10) Time Constant**

Rise and Fall of Current In pure Resistance - Time :Constant at an R-L Circuit • Circuit Conditions - Inductive Kick - Time Constant of an RC circuit - Charging and Discharging of a Capacitor Decreasing Time Constant - Flasher -: Puke Response of an RC Circuit - Effect of Large and Short Time Constants - Square voltage Wave Applied to Short A. RC Circuit - Square Voltage Wave Applied to Long A, 'E.O circuit - Conventional Problems

### (11) Timing Circuits and Filters

What-is. a Tuning Circuit ? - Tuned Circuit - Operating Characteristics of a Tuning Circuit - Resonance - Actual Series Resonance - Is it Series or Parallel Resonance ? - Tuned Transformers - Double Tuned Transformers - Parallel Circuit - Coupled Circuits – Simple Coupled Circuits - Coefficient of Coupling - Filters Filter Definitions - Types of Filter Circuits - Low-pass Filter – High pass Filter - Bandpass Filter – Band stop Filter - Multisection Filter Circuits - Uses of Fitters - Conventional Problems

### (12) Solid State Physics

Definition of Matter - Crystalline Solids - Unit Cell - arms of Matter - Atom and Molecule - Atomic Structure - Atomic Number (Z) Atomic mass Number (A) - Electron Orbits or shells - Electron Distribution of Different Atoms Electron Sub orbits or Subshells - Valence Electrons Orbital Energy. - Normal, Excited and Ionized Atom. - Orbital Energies in hydrogen Atom - Energy Levels in an Isolated At W- Energy Bands in Solids - Bonds in Solids - Valence and Conduction Bands - Conduction in Solids - Hole Formation and its Movement Conductors, Semiconductors and Insulators - Types of Semiconductors - Intrinsic Semiconductors Extrinsic Semiconductors - Majority and Minority Charge Carriers - Mobile Charge Carriers and Immobile Torts - Drift Current in Good Conductors Drift Current in Intrinsic Semiconductors - Intrinsic Conduction -Conventional Problems

### (13) The P-N Junction

The P-N Junction - Formation of Depletion Layer Junction or Barrier Voltage (V B) - Effect of Temperature on Barrier Voltage - Forward Biased P-N Junction - Forward VII Characteristics - Reverse Biased P-N Junction - Reverse Saturation Current ( $I_s$  or  $I_0$ ) - Reverse V/ I Characteristic Combined Forward and Reverse VII Characteristics - Junction Breakdown - Junction Capacitance

### (14) P-N Junction Diode

P-N Junction Diode - Diode Ratings or Specifications - Diode Testing The Ideal Diode -The Real Diode - Diode Circuits with DC and A Voltage Sources - Diode Fabrication- Grown Junction - Alloy Junction Diffused Junction Epitaxial Junction - Point Contact Junction - Clippers and Campers - Clippers - Some Clipping

Circuits - Clampers

Summary of Clamping Circuits - Conventional Problems Questions.

### (15) Special Diode's I

Zener Diode - Voltage Regulation Zener Diode as Peak Clipper - Meter Protection – Tunneling Effect - Tunnel Diode - Tunnel Diode Oscillator Varactor - PIN Diode - Schottky Diode - Step Recovery Diode Thermistors -Conventional Problems

### (16) Optoelectronic Devices

Light Emitting Diode (LED) - Photoemissive Devices - Photomultiplier Tube - Photovoltaic Devices - Bulk Type Photoconductive Cells - Photodiodes -P-N Junction Photodiode - PIN Photodiode - Avalanche Photodiode

### (17) DC Power Supplies'

Introduction - Unregulated Power Supply - Regulated Power Supply Steady and Pulsating DC Voltages - Rectifiers Half-wave Rectifier Full-wave Rectifier - Full-wave Bridge Rectifier - Filters - Series Inductor Filter - Shunt Capacitor Filter - Effect of Increasing Filter Capacitance - LC Filter - The CLC or Pi Filter - Bleeder Resistor - Voltage Regulation Zener Diode Shunt Regulator - Transistor, Series Voltage Regulator - Controlled Transistor Series Regulator - Transistor Shunt Voltage Regulator Transistor Current Regulator - Voltage Dividers - Complete Power Supply - Voltage Multipliers - Half-wave Voltage Doubler - Full-wave Voltage Doubler - Voltage Tripler and Quadrupler Circuits - Troubleshooting Power Supplies - Controlled Rectification - Output Waveforms for Different Firing Angles - Output Voltage and Current Values in Controlled Rectifiers Average Values for FW Controlled Rectifier - Silicon Controlled Rectifier (SCR) - Pulse Control of SCR -  $90^\circ$  Phas- Control of SCR -  $180^\circ$  Phase Contr,gi of SCR - SCR Controlled Circuit - U3T Controlled Circuit Conventional Problems

### **(18) The Basic Transistor**

The Bipolar Junction Transistor - Transistor Biasing - Important Biasing Rule - Transistor Currents - Summing Up - Transistor Circuit Configurations - CB Configuration - CE Configuration - Relations between  $\alpha$  and  $\beta$  - CC Configuration - Relations between Transistor Currents - Leakage Currents in a Transistor - Thermal Runaway - Conventional Problems

### **(19) Transistor Characteristics and Approximations**

Transistor Static Characteristics - Common Base Test Circuit - Common Base Static - Characteristics - Common Emitter Test Circuit - Common Emitter Static Characteristics - Common Collector Static Characteristics - Different Ways of Drawing Transistor Circuits - Common Base Formulas - Common Emitter Formulas - Common Collector Formulas - The Beta Rule - Importance of  $V_{ce}$  - Cut-off and Saturation Points - Normal DC Voltage Transistor Indications - Transistor Fault Location - Solving Universal Stabilization Circuit

- Notation for Voltages and Currents - Increase / Decrease Notation - Applying AC to a DC Biased Transistor

- Transistor AC/DC

Analysis - Conventional problems

### **(20) Load Lines and DC Bias Circuits**

DC Load Line - Q-point and Maximum Undistorted Output - Need for Biasing a Transistor - Factors Affecting Bias Variations - Stability Factor - Beta Sensitivity - Stability Factor for CB and CE Circuits - Different Methods for Transistor Biasing - Base Bias - Base Bias with Emitter Feedback - Base Bias with Collector Feedback - Base Bias with Collector and Emitter Feedbacks - Voltage Divider Bias - Load Line and Output Characteristics - AC Load Line - Conventional Problems

### **(21) Transistor Equivalent Circuits and Models**

General DC Equivalent Circuit - AC Equivalent Circuit - Equivalent Circuit of a CB Amplifier - Effect of Source Resistance  $R_S$  on Voltage Gain - Equivalent circuit of a CE Amplifier - Effect of Source Resistance  $R_S$  - Equivalent Circuit of a CC Amplifier - Low-frequency Model or Representation - Generalized T-Model - Formulas for T-Model - Equivalent of a CB Circuit - Equivalent of a CE Circuit - What are h-parameters? - The h-parameter Formulas for Notation for Transistors - The h-parameters of an Ideal Transistor - The h-parameters of an Ideal CB Transistor - The h-parameters of an Ideal CE Transistor - Approximate Hybrid Equivalent Circuits - Typical Values of Transistor h-parameters - Hybrid Formulas for Transistor Amplifier - Approximate Hybrid Formulas - Conventional Problems

### **(22) Single-Stage Transistor Amplifiers**

Classification of Amplifiers - Common Base (CB) Amplifier - Various Gains of a CB Amplifier - Characteristics of a CB Amplifier - Characteristics of a CE Amplifier - Common Collector (CC) Amplifier - Various Gains of a CC Amplifier - Characteristics of a CC Amplifier - Uses - Comparison of Amplifier Configurations - Amplifier Classification Based on Biasing Condition - Graphic Representation - Class A Amplifiers - Power Distribution in a Class A Amplifier - Power Rectangle - Power Efficiency - Maximum AC Power in Load - Transformer-coupled, Class A Amplifier - Class B Amplifier - Power Relations for Class B Operation - Maximum Values - Class-B Push-Pull Amplifier - Crossover Distortion - Power Efficiency of Push-Pull Amplifiers - Complementary Symmetry Push-Pull Class-B Amplifier - Class C Amplifier - Tuned Amplifier - Distortion in Amplifier - Non-linear Distortion - Intermodulation Distortion - Frequency Distortion - Phase or Delay Distortion - Noise

### **(23) Multistage Amplifiers**

General Amplifier Coupling - RC-Coupled Two-stage Amplifier - Advantages of RC Coupling - Impedance-Coupled Two-stage Amplifier - Advantages of Impedance Coupling - Transformer-coupled Two-stage Amplifier - Advantages of Transformer Coupling - Frequency Response - Applications - Direct-coupled Two-stage Amplifier Using Similar Transistors - Direct-coupled Amplifier Using Complementary Symmetry of Two Transistors - Darlington Pair - Advantages of Darlington Pair - Comparison between Darlington Pair and Emitter Follower - Special Features of a Differential Amplifier - Common Model Input - Differential Amplifier - Conventional problems

### **(24) Decibels and Frequency Response**

The Decibel System - Other Expressions for Power Gain - Voltage and Current Levels - Characteristics of the Decibel System - Value of 1 dB Zero Decibel Reference Level - Variations in Amplifier Gain with Frequency - Changes in Voltage and Power Levels - Causes of Gain Variation: Miller Effect - Cut-off Frequencies of Cascaded Amplifiers - Transistor Cut-off Frequencies - Alpha Cut-off Frequency - Beta Cut-off Frequency - The  $f_T$  of a Transistor - Relation Between  $f_a$ ,  $f_{\beta}$  and  $f_T$  - Gain-Bandwidth Product - Conventional Problems

### **(25) Feedback Amplifier**

Feedback Amplifiers – Principal of Feedback Amplifiers – Advantages of Negative Feedback – Gain Stability – Decreased Distortion- Increased Bandwidth – Forms of Negative Feedback – Shunt-derived Series-fed Voltage Feedback – Current –Series Feedback Amplifier – Voltage-shunt Negative Feedback Amplifier – Current –shunt Negative Feedback Amplifier –Conventional Problems.

### **(26) Field Effect Transistor**

What is a FET? Junction FET (JEFT) – Static Characteristics of a JFET – JFET Drain Characteristic with  $V_{GS} = 0$  –JFET Characteristic with External Bias – Transfer Characteristic – Small Signal JFET Parameters DC Biasing of a JFET –DC Load Line – Common Source JFET

Amplifier - JEFF on an IC Chip - Advantages of FETs - MOSFET or IGFET DE MOSFET - Schematic Symbols for a DE MOSFET - Static Characteristics of a DE MOSFET - Enhancement only N-channel MOSFET Transfer Characteristic - FETs as Switches - FET Applications - MOS-FET Handling

### **(27) Breakdown Device's**

What are Breakdown Devices ? Uni junction Transistor - UJT Relaxation Oscillator - Silicon Controlled Rectifier - C10° Phase Control - Theft Alarm - Triac -Diac - Silicon Controlled Switch (SCS)

### **(28) Sinusoidal Oscillators**

What is an Oscillator? - Comparison between an Amplifier and an Oscillator - Classification of Oscillators - Damped and Undamped Oscillations - The Oscillatory Circuit - Frequency of Oscillatory Current - Frequency Stability of an Oscillator - Essentials of a Feedback LC Oscillator - Tuned Base Oscillator - Tuned Collector Oscillator - Tuned Drain Oscillator (FET) - Hartley Oscillator - FET Hartley Oscillator - Colpitts Oscillator - Clapp Oscillator – FETColpitts Oscillator - Crystals - Crystal Controlled Oscillator - Transistor Pierce Crystal Oscillator - FET Pierce Oscillator - Phase Shift Principle - Phase Shift Oscillator - Wien Bridge Oscillator

### **(29) Non sinusoidal Oscillators**

Non sinusoidal Waveforms - Classification of Non sinusoidal Oscillators Pulse Definitions - Basic Requirements of a Sawtooth Generator - UJT Sawtooth Generator – Multi vibrators (MV) – Uses of Multi vibrators - Astable Multi vibrator – Mono stable Multi vibrator (MMV) – Bi stable Multi vibrator (BMV) - Schmitt Trigger -Transistor Blocking Oscillator

### **(30) Modulation and De Modulation**

Introduction - What is a Carrier Wave? - Radio Frequency Spectrum Sound - Need for Modulation - Radio Broadcasting - Modulation Methods of Modulation - Amplitude Modulation - Per cent Modulation Upper and Lower Side Frequencies - Upper and Lower Sidebands - Mathematical Analysis of a Modulated Carrier Wave - Power Relations in an AM Wave - Forms of Amplitude Modulation - Generation of SSB - Methods of Amplitude Modulation - Block Diagram of an AM Transmitter - Modulating Amplifier Circuit - Frequency Modulation - Frequency Deviation and Carrier Swing - Modulation Index'-Deviation Ratio - Per cent Modulation - FM Sidebands ; - Modulation index and Number of Sidebands - Mathematical Expression for FM Wave - Demodulation or Detection - Essentials of AM Detection - Diode Detector for AM Signals - Transistor Detectors for AM Signals - FM Detection - Quadrature Detector - Frequency Conversion - Super heterodyne AM Receiver - FM Receiver - Comparison between AM and FM - The Four Fields of FM - Conventional Problems

### **(31) Integrated Circuits**

Introduction - What is an Integrated Circuit? - Advantages of ICs - Drawbacks of ICs - Scale of Integration - Classification of ICs by Structure Comparison between Different ICs -Classification of ICs by Function Linear Integrated Circuits (UCs) - Digital Integrated Circuits - IC Terminology - How Monolithic ICs are Made? - IC Symbols - Fabrication of IC Components - Complete Monolithic Integrated Circuits - Popular Applications of ICs MOS Integrated Circuits - What is an OP-AMP? OP-AMP Symbol - Polarity Conventions - Ideal Operational Amplifier - Virtual Ground and Summing Point - Why  $V_i$  is Reduced to almost Zero? - OP-AMP Applications - Linear Amplifier - Unity Follower - Adder or Summer - Subtractor - Integrator - Differentiator - Comparator

### **(32) Number Systems**

Number of Systems -The Decimal Number System - Binary System Binary to Decimal Conversion - Binary Fractions - Double-D add Method - Decimal to Binary Conversion - Shifting the Place Point - Binary Operations - Binary Addition - Binary Subtraction - Complement of a Number - 1's Complemental Subtraction - 2's Complemental Subtraction - Binary Multiplication - 8i4ry Division - Shifting a Number to Left or Right - Representation of Binary Numbers as Electrical Signals - Octal

Number System - Octal to Decimal Conversion – Decimal to Octal Conversion – Binary to Octal Conversion – Octal to Binary Conversion – Advantages of Octal Number System, Hexadecimal Number System – How to Count beyond F in Hex Number System? --- Binary to Hexadecimal conversion – Hexadecimal to Binary Conversion – Conventional Problems.

### (33) Logic Gates

Definition - Positive and Negative Logic - The OR Gate - Equivalent Relay Circuit of an OR Gate - Diode OR Gate - Transistor OR Gate OR Gate Symbolizes Logic Addition - Three Input OR Gate - Exclusive OR Gate - The AND Gate - Equivalent Relay Circuit of an AND Gate. Diode AND Gate — Transistor AND Circuit - AND Gate Symbolizes Logic Multiplication - The NOT Gate - Equivalent Circuits for a NOT Gate The NOT Operation ' Bubbled Gates The NOR Gate - NOR Gate is a Universal Gate - The NAND Gate - NAND gate is a Universal Gate The XNOR Gate - Logic Gates at a Glance - Adders and Subtractors Half Adder - Full Adder - Parallel Binary Adder - Half Subtractor - Full Subtractor - Conventional Problems

### (34) Boolean Algebra

Introduction - Unique Feature of Boolean Algebra - Lay of Boolean Algebra - Equivalent Switching Circuits - De Morgans Theorems - Duals - Conventional Problems

### (35) Logic Families

Main Logic Families Saturated and Non-saturated Logic Circuits - Characteristics of Logic Families - RTL Circuit - DTL Circuit -- '- TTL Circuits -TTL Subfamilies -ECL Circuit —I<sub>2</sub>L\_ Circuit - MOS Family - PMOS Circuit - NMOS, Circuit - CMOS Circuit

### (36) Transducer

What is a Transducer? - Classification of Transducers • Classification based on Electrical Principle Involved - Resistive Position Transducer - Resistive Pressure Transducer ---;-Inductive pressure Transducer - - Capacitive Pressure Transducer - Self-generating Inductive Transducers - Linear Variable Differential Transformer (.VDT) - Piezoelectric Transducer - Strain Gauge Temperature Transducers - Resistance Temperature Detectors - Thermistor - Thermocouples - Ultrasonic Temperature Transducers - photoelectric Transducers - Various Types of Microphones - Carbon Microphone Ribbon Microphone - Moving-Coil (Me) Microphone - Crystal Microphone - Ceramic Microphone - Capacitor Microphone - The Electret Microphone The Loudspeaker

### (37) Electronic Instruments

Introduction - Analog and Digital Instruments - Function of Instruments - Electronic versus Electrical Instruments - Essentials of an Electronic Instrument - Measurement Standards - The Basic Meter Movement - Characteristics of Moving Coil Meter Movement - Variations of Basic Meter Movement - Converting Basic Meter to DC Ammeter – Multi range Meter - Measurement of Current - Converting Basic Meter to DC Voltmeter Multi range DC Voltmeter - Loading Effect of a Voltmeter - Ohmmeter The Multimeter - Rectifier Ty e AC Meter Electronic Voltmeters - The Direct Current VTVM - Comparison of VOM and VTVM - Direct Current PET VM - Electronic Voltmeter for Alternating Currents - The Digital Voltmeter (DVM) -Cathode Ray Oscilloscope (CRO) - Cathode Ray Tube (CRT) - Deflection Sensitivity f a CRT - Normal Operation of a CRO Triggered and Non-triggered Scopes - Dual Trace CRO - Dual Beam CRO - Storage Oscilloscope - Sampling CRO - Digital Readout CRO - Lissajous Figures - Frequency Determination with Lissajous Figures - Applications of a CRO

## TIER II Syllabus – PRT

### Comprehension

Three or four unseen passages from different genres (prose, poetry, drama, articles, editorials, scientific, and literary extracts).

Questions will test comprehension, inference, vocabulary, tone, rhetorical devices, and logical sequencing.

### Writing Ability

#### Functional Writing:

Formal and Informal Letters: Business letters, job applications, letters to editors, complaints, and personal letters.

Report Writing: Factual description of events, newspaper reports, and analytical reports. Notices, Circulars, and Press Releases.

### Grammar and Usage

Parts of Speech: Nouns, Pronouns, Verbs, Adverbs, Adjectives, Prepositions, Conjunctions.

Sentence Structure : Types of sentences, subject-verb agreement, parallelism, and sentence connectors.

Tenses and Their Usage: Active-passive voice, sequence of tenses, and reported speech. Clauses: Noun, adjective, and adverb clauses.

Common Errors: Articles, prepositions, modifiers, redundancy, and word order. Editing and Proofreading: Error detection, sentence correction, and transformation.

1- हिन्दी साहित्य का इतिहास 2-गद्य साहित्य की विधाएँ कहानी, निबन्ध, जीवनी, आत्मकथा, रिपोर्ट। 3- अपठित गद्यांश, पद्यांश। 4- प्रसिद्ध मुहावरे और लोकोक्तियाँ

व्याकरण: संज्ञा, विशेषण, वचन और व्यावहारिक प्रयोग, गणित के पाठ्यक्रम, पाठ्यक्रम के अनुरूप हिन्दी में संख्याएँ, संयुक्त अक्षर की पहचान, पर्याय और विलोम (स्तरानुकूल), सर्वनाम और लिंग की पहचान, विशेषण का संज्ञा के साथ सुसंगत प्रयोग, वचन वचन का प्रयोग, क्रिया, काल और कारक चिन्हों की पहचान, शब्दों के संदर्भ में लिंग का प्रयोग, संधि, संधि विच्छेद, पर्यायवाची शब्द

Geometry: Shapes & Spatial Understanding, Solids around us.

Numbers: Developing a Sense of Numbers, Counting and Operations of Numbers, Addition and Subtraction, Multiplication, Division, Mental Arithmetic, Fractional Numbers, Money, Measurement and units, Length, Weight, Capacity (Volume), Time, Patterns, LCM, HCF, Mensuration, Area & Volume, Perimeter, Distance time & Speed, Profit & Loss, Percentage & Ratio, Average, Lines and angles, Circle, Triangles, Statics/Data Handling

Family, Friends and Communities, Natural Resources, Understanding the Environment and Environmental Impact, Life Around Us, Gifts of Nature. Food, Shelter, Water, Travel, Things we make and do. Physiological processes in Plants, Animals and Human Being. Weather, Climate, Landforms of India, Cultural Heritage and Traditions, Governance and Democracy, Constitution of India, Indus valley Civilization, Gupta Era, Resources of India, Magnets, Materials, Methods of separation.

Visual Art: Objects and Still life art, Colours, Paper Crafts, Seals and Prints, Local art forms of state.

Yoga, Physical and motor fitness, Diet and Health, First Aid and Safety, Ethics in Sports, Fundamental skill of games- Badminton, Football, Kabaddi, Handball, Kho Kho, cricket, Hockey. Local games of various states.



## **TIER II : Syllabus -PRT (Music)**

### **Science of Music and Studies of Shruties**

Vibration and frequency; pitch and its relation and vibrator, Vocal and Instrumental ranges of sound; Amplitude, Timber, Qualities and musical and unmusical overtones (Swayambhu-Swar); consonance and Dissonance; Main types of chords; Absorption, Echo; Reverberation and Resonance of sound, concept of Shruti (different Opinions on it). Placement of suddha and Vikrit Swars on different shruties according to Lochan, Ahobal, Pundarik, Ramamatya, Somnath etc. Comparative study of Vyankat-Mukhi's 72 meals, Bhatkhade's Ten That's and Modern thirty-two That's.

#### Study of Ragas and Tals

Critical, detailed and comparative study of the following Ragas:- SUDHAKALYAN, DESHKAR, KAMOD, CHHAYANAT, GOUDSARANG, JAIJAIWANTI, RAMKALI, POORIYA, MARWA, SOHANI AND SHANKARA, Illustrations of Nyas, Alpatva, Bahutva, Avirbhava and Tirobhava in the above Ragas by means of notes.

Knowledge of the following Tals with different types of Layakaries and writing of the Tals in Dugun, Tigun, Chougun and Ada:- Trital, Ektal, Rupak, Teevra, Sooltal, Jhoomra, Dhamar and Jat tal.

Writing the songs in notation in the above ragas with Alaps. Tans, Boltans in Khayals and Dugun, Tigun etc., in dhruvapad and Dhamar. Identification of Ragas from given notes.

#### Instrumental Music

### **Science of Music and Studies of Shruties**

Vibration and frequency, pitch and its relation with vibrator Vocal and Instrumental ranges of sound. Amplitude, Timber, qualities of musical, unmusical overtones (Swaymbhu-Swar) consonance and Dissonance. Main types of chords, Absorption, Echo, Reverberation and resonance of sound, concept of shruti (different opinions on it) placement of sudh and vikrit swara according to lochan, Ahobal, Pundarik Rammamatya, somnath etc. Comparative study of Swaras of Northern saptak, critical study of Vyankatmukhu's 72 Melas. Bhatkhade's Ten That's and Modern thirty two that's.

#### Study of Ragas and Tals

Critical, detailed and comparative study of the following Ragas:- SUDHAKALYAN, DESHKAR, KAMOD, CHHAYANT, GOUDSARANG, JAIJAIWANTI, RAMKALI, POORIYA, MARWA, SOHANI AND SHANKARA. Illustrations of Nyas, Aplatva, Bahutva, Tirobhav and Avirbhava in the above Ragas by means of notes. Knowledge of the following Tals with different types of Layakaries and writing of the Tals in Dugun, Tigun, Chougun and Ada:-

Trital Jhaptal, Choutal, Keharwa, Dadra, Tilwada, Rupak, Teevra, sool- Tal, Dhamar and jat-Tal.

Writing the Gats in notation in the above ragas with Alaps, Todas, Jhalas, Identification of Ragas from the given notes.

Candidates offering percussion Instruments must have critical details and comparative study of the following Tals:-

TEENTAL, JHAPTAL, RUPAK, CHOUTAL, SOOLTAL, TEEVRA, TILWADA, DADRA, KAHARWA, PANJABI, JATTAL.

They should also know the different types of Laykaries, Tukaras, paranas, Peshkara, Quada, Avartan, Bant, Kisim, Paita, Rela, Laggi, Ladi, etc. where applicable in the abovementioned talas, writing in notation of all the matter in above talas and identified – for given Bols.

### **Vocal Music**

#### **Notation system, scales and study of Bio-graphics of Musicians**

Notation system of Bhatkhande and vishnudigambar and western Music, writing of simple songs in these notations. Western Note, various types of intervals of notes. Time signature, different Musical scales, Dia-tonic scale, comparative study of scales of Bhatkhande and western Music. Harmony and Melody, placement of notes on veena according to Pt. Srinivas, comparative study of Northern and Southern Tal paddhaties, contribution of various scholars and musicians to the Indian Music.

Biographies and Bhatkhande, Vishnudigambar, Tansen, Ameer Khusroo, Faiyyaz Khan, Pt. Ravi Shankar, Pt. Ram Sahay, Ahmadjan Thirakwa, Kudau Singh, Nana Sahib panse.

Study of Musical Styles and Ragas

Geet, Gandharva, Gan, Deshi Sangeet, Sthaya, Mukhachalan, akshiptika, Nibadha and Anibadh Gan, Raglakshan, Ragalap, Alapti swasthan Niyam, prachalit Alap, Tan; Meend, Gamar, Raku

Critical detail and comparative study of the following Ragas with illustration of Nyas, Alapatva, Bahutva, Tirobhav and Avirbhav in them.

Lalit, Darbari, Adana, Mia-Malhar, Goudmalhar, Bahar, Todi, Multani, Deshi, Jogiya and Vibhas, Bhairav, Yaman

Knowledge of the followings Tals with different types of Layakaries and writing of the Talas in DUgun, Tigun, Chougun and Ada:

Trital, Ektaal, Jhaptal, Choutal, Kaharwa, Dadra, Tilwada, Rupak, teevra, Sooltal, Jhoomra, Dhamar and Jattal and pancham Sawari, Bhajani

Comparative and details study with the descriptions of different styles of Indian Music viz. Dhruvad, Dhamar, Khayal, Thumri, Tappa, Chaturang, Taranas, Trivat, etc. and their evolution writing of notation of songs in the above Ragas with alaps, Tans Boltans etc. and with different Layakaries in Dhruvad and Dhamar, Identification of ragas from given notes.

## Instrumental Music

Notation system of Bhatkhande, Vishnudigamber and western Music. Writing of simple gats in these notations. Western notes. Various types of intervals of notes. Time signature, different Musical scales Dia-tonic scale, pythagorain scale, Tempered scale, Major scale, Minor scale etc. Comparative study of scales of Bhatkhande and Western Music. Harmony and Melody, placement of notes on Veena according to Pt.Srinivas.

Comparative study of Northern and southern Tal paddhaties contribution of various scholars and Musicians to the Indian Music.

Biographies of Bhatkhande; Vishnudigamber, Tansen, Ameer Khusro Faiyaaz Khan, Onkarnath Thakur, Allauddin Khan, Pt. Ravishankar, Pt. Ram Sahai, Ahmad Jan Thirakwas, Kudau Singh, Nana Saheb Panse, Pt. Shiv Kumar Sharma, Pt. Debu Chaudhary

Study of Styles, Baj, Ragas and Tals

Geet, Gandharv, Gan, Deshi Sangeet, Sthaya Mukhchalan, Akshiptika Nibadha and Anibadha gan, Raglakshan, Raga-Alap, Rupakalap, Alpati Swasthan-Niyam, Prachalit Alap and Tan, Zamzama, Meend, Sootghaseet, Jor Alap, Toda, Jhala

Critical detailed comparative study of the following Ragas with illustrations of nyas, Alpatva, Bahutva, Tirobhava and Avirbhav in them.

Vibhas, Lalit, Darbari Kanhda, Adana, Miyan Malhar, Goud Malhar, Bahar, Todi, Multani, Deshi and Jogiya.

Identification of Raga from given notes. Knowledge of following tals;

Ada Chartal, Ektal, Deepchandi, Dhamar, Farodast, Pancha, Sawari, Kumbh, Sikhar.

Candidates offering percussion instruments must have critical detailes and comparative study of the following tals:

Adachartal, Ektal, Pancham Sawari, Farodast, Dhamar, Kumbh, Shikhar, Matt Tal, Dhumali, Deepachandi, Addha tal.

Knowledge of - Tukras, paranas, Tihai, Kayadas, Pattas, Relas, Peshkaras, Mukharas, Tipallis, chaupalli, Chakkardar bols, Farmaishi, Paranas, Lom-Bilom, Charbagh, Stuti Ke Bol, Jhulna ke bol. Dhamar and Bedamdar tihais in the above mentioned tals.

Recognition of tals by given bols, writing of all the matters in notations.

Knowledge of Baithaks, styles of playing and Gharanas. Ability to writ tals in different layakaries knowledge of different types of Musical Instruments and their system of classification.

## Vocal Music

### **History of Music and classification of Rags and Tals**

Short History of Music of Ancient periods up to 13<sup>th</sup> century A.D. with classification of Rags and Tals. Evolution of jatis Ragas, short history of Music of Medieval and Modern periods, prabandh. Revival of Indian Classical Music, comparison of the Hindustani and Karnataka Music systems. Impact of Modern Science in the development and propagation of Music.

### **Study of Musical Styles and Ragas**

Critical, detailed and comparative study of the following Ragas with illustrations of Nyas, Alpatva, Bahutva, Avirbhava and tirobhav.

Shree, Pooria-Dhanashree, Basant, Paraj, Hindol, Chandrakauns, Suddhasarang, Madhuwanti, Bageswari, Jaunpuri, Malgunji.

Critical study of different styles of Music of North and South, various Gharanas of Music, Gram, Moorchana, various kinds of Gamak, writing of notation of songs.

Knowledge of the following Tals with different types Layakaries: Ada- Choutal, Brahma, Lakshmi, Rudra, Shikhar, Pancham Sawari, sulfokta

## Instrumental Music

### **History of Music and Classification of Ragas and Tals**

Short history of Music of ancient period up to 13<sup>th</sup> century A.D. with particular reference to Natyasashtra, Brihaddesi, Sangeet Ratnakar. Classification of Ragas and Tals. Evolution of jatis, Ragas. Short History of Music in Medieval period. Revival of Indian classical Music. Comparison of the Hindustani and Karnataka Music system. Impact of Modern science in the development and propagation of Music. Critical, comparative and detailed study of Musical styles and the following Ragas with illustration of Nyas, Apatva, Bahutva, Avirbhav and Tirobhav:

Shree, Pooria – Dhanashree, Basant, Paraj, Hindol, Chandrakauns, Suddh Sarang, Madhuwanti, Bageshree, Jaunpuri, Malgunji.

Critical study of the different styles of Music of North and South. Various Gharanas of Music, Gram, Moorchana, various kinds of Gamaks, Writing of Notation of gats.

Knowledge of the following Tals with different types of layakaries and writing of Tals in Dugun, Tigun, Chougun, Ada. And kuad, and Biyad.

Basant, Rudra, Laxmi, Gajjjhampa, Pashto, Brahma. Candidates offering percussion instruments should also know the various kinds of baj and styles of Table and pakhawaj and should also know peskharas, Paran, Tihais, Tukaras, Kishime, Kyadas, Paltas, Relas, Mukhras, Tripalli, Choupallies, Chakkardar, Bols, Farmaishi paran, Kamali paran, Lom-Bilom, Charbagh, Stuti ke bole, Jhulan ke

bole, Jababi Paran, Nayahakka, Damdar and Bedam ki tihal where applicable in the following Talas, along with their critical, detailed and comparative study:

Rudra, Badi swari, Jattal, Basant, Laxmi, Gaj Jhampa, Brahma Tal, Asth Mangal, Ganesh Tal, Mani Tal, Pashto.

Various kinds of chands in the Tals where applicable and writing of different layakaries, Dugun, Tigun, Chougun, Ada, Kaud and Biyad.

## TIER II : Syllabus for Special Educator ( PRT )

### (PRT) Section A (Compulsory)

#### Understanding Disability

- Historical perspectives, Concept, Categories, Courses, Prevention, Cross Disability Approach.
- Definition, Causes and Prevention, Types, Educational Implication & Management of various disabilities & sensory, developmental & other.
- Early Identification & Intervention
- Concept, Models, Cross Disability, services, screening & assessments, Role of parents, Community
- Human Resource in Disability sector, need and current status, International conventions & policies, Role of National Institutes.

#### Growth & Development

- Definition, meaning, principles & factors affecting development, Domains of development, Developmental milestones.
- Ages & stages of development (Birth to childhood) Prenatal to childhood.
- Psychology & Learning, relevance, basic principles, learning styles, factors affecting learning.
- Psychological processes & their implications for children with different disabilities attention, Perception, Memory, Intelligence & Motivation.
- Classroom Management  
Stimulating learning environment, common behavior in children including children having special needs & management in inclusive classroom.

#### Education in The Emerging Indian Society

- Nature and agencies of Education: Meaning, definition and aims of education; Education in the 21<sup>st</sup> century in India; Formal, Informal and Non-Formal education
- Functions and modes of education Regular, Open, Distance & Online, Blended learning, Mainstream, Inclusive and Special School, Home- based education; Role of Government and Non-Govt agencies of education
- Philosophy and Educational Foundations in India: Different Educational Philosophies, National and International Educational Philosophers- Gandhi, Aurobindo, Rabindra Nath Tagore, Vivekanand, John Dewey, Locke, Piaget, Rousseau, Maria Montessori
- Indian constitutional and education: Directive Principles, Fundamental Rights and Duties, Constitutional Provisions on Education; Acts and Provisions: RTE Act 2009 and Amendments; Educational provisions enshrined in RPWD Act, 2016
- Education Commissions since Independence and National Education Policy 1986, Plan of Action 1992 and National Education Policy 2020.

#### Inclusive Education:

- Diversity & Inclusivity: Meaning & Concept, Disability as a human diversity, Strength of diversity for inclusivity
- Concept & Meaning of Inclusive Education, Principles of inclusion, Framework, Acts, Policy provisions for inclusive education.
- Creating supports for inclusive education: Early identification & intervention for inclusion, Foundational literacy, Empowering families, Sensitizing stakeholders, Teacher preparation
- Curricular strategies for inclusive Education: Curricular challenges, Need for curricular adaptations; Adaptations, accommodations & modifications; Differentiated instructions & Universal design of learning

- Collaborations for inclusive education: Special schools & inclusive schools, special educators & general teachers, voluntary organizations and Govt. agencies.

### **Section B (Optional)**

**Note: Select Anyone Disability Specialization: IDD/HI/VI/MD**

#### **Characteristics of Children with disability (As per disability area selected)**

- Concept, definition, causes, types, prevention
- Anatomical, physiological or psychological limitations and characteristics related to area of disability
- Psychosocial and educational implications of disability.
- Early identification, screening and assessment
- Learning characteristics and needs
- Educational and rehabilitation perspective

#### **Education, Curriculum Development and Adaptation (As per disability area selected)**

- Assessing children with disabilities and their learning needs
- Approaches to curriculum development, adaptation, role of assistive technology and ICT, curricular transaction, aids and adaptation
- Teaching and learning strategies, inclusive teaching strategies
- Addressing needs of students with additional disability

#### **Disability Specific Interventions (As per disability area selected)**

- Planning individual intervention/learning plans
- Disability specific interventions to manage their disability specific limitation
- Preparation, disability specific learning resources, managing resource room
- Therapeutic intervention, recreation
- Promoting role of family and community and managing the issues to facilitate learning and inclusion

#### **Teaching of Various Subjects (As per the disability area selected)**

- Development of literacy/ foundational academic skills, development of communication, language, social, recreational, self-care and independent living skills: methods and strategies for learning and teaching
- Development of reading, writing and computational (arithmetic) skills to students with disabilities: methods and strategies for learning, teaching and assessment
- Teaching of language to students with disabilities: methods and strategies for learning, teaching and assessment
- Teaching of EVS to students with disabilities: methods and strategies for learning, teaching and assessment
- Teaching of Mathematics to students with disabilities: methods and strategies for learning, teaching and assessment
- Teaching of co-scholastic/co-curricular, recreation and sports to students with disabilities: methods and strategies for learning, teaching and assessment

**Tier II : Detailed syllabus for the post of Administrative Officer**

1. Office Procedure & Office Management
2. General Financial Rules-2017 as amended from time to time.
3. Fundamental Rules & Supplementary Rules
4. Medical Attendance Rules & CGHS
5. Travelling Allowance Rules
6. LTC Rules
7. CCS Leave Rules
8. CCS (CCA) Rules, 1965
9. CCS (Conduct) Rules, 1964
10. CCS (Pension) Rules-2021 & National Pension System
11. Provident Fund Rules
12. Reservation Policy
13. Recruitment Rules
14. Legal proceedings
15. Quarter Allotment Rules
16. Seniority Rules
17. Promotion Rules
18. Centralized Public Grievance Redress and Monitoring System (CPGRAMS)
19. Condemnation of Articles
20. Right to Information Act 2005
21. Implementation of Rajbhasa
22. Pay Fixation
23. Financial Upgradation under MACP
24. Confirmation and Probation
25. Counting of Past services.
26. POSH & POCSO Acts



## **Tier II : Detailed syllabus for the post of Finance Officer**

<b>S.No.</b>	<b>Contents</b>
<b>1.</b>	<b>Fundamental accounting concepts</b>
	i) Going concern ii) Accrual basis of accounting iii) Business entity concepts iv) Post Principle v) Matching Principle vi) Materiality concepts vii) Other concepts
<b>2.</b>	<b>Basic Accounting Terms</b>
	i) Fixed Assets (Tangible & Intangible) ii) Current Assets iii) Current Liabilities iv) Revenue Expenditure v) Capital Expenditure vi) Debtors vii) Creditors viii) Capital
<b>3.</b>	<b>Maintenance of Cashbook</b>
	i) Simple cashbook ii) Columnar cashbook iii) Petty cashbook iv) Bank reconciliation statement
<b>4.</b>	<b>Maintenance of Ledger</b>
	i) Format of Ledger ii) Ledger posting iii) Balancing of Ledger
<b>5.</b>	<b>Recording of Financial Transactions through Tally Software</b>
	i) Basic Concepts ii) Receipt Voucher iii) Payment Voucher iv) Journal Voucher v) Contra Voucher
<b>6.</b>	<b>Preparation of Annual Accounts</b>
	i) Fund based Accounting ii) Difference between cash basis accounting and accrual basis of accounting iii) Trial Balance iv) Receipt & Payment Account v) Income & Expenditure Account vi) Balance Sheet vii) Accounting Standards-1,6,9,10,15,29 issued by ICAI
<b>7.</b>	<b>Depreciation</b>
	i) Methods of Depreciation- Straight Line Method (SLM) and Written Down Value Method (WDV) ii) Difference between SLM & WDV iii) Provision for Depreciation/Accumulated Depreciation iv) Profit or Loss on disposal of Assets
<b>8.</b>	<b>Taxation</b>
	i) Deduction of Tax at source under various sections (192,194C, 194J etc.) of Income Tax Act. 1961 as amended from time to time ii) Deduction of Tax at source under GST Act. as amended from time to time iii) Filing of various TDS returns under Income Tax Act. and GST Act. iv) Penalty provisions due to Non Deduction of Tax / Non Filing of TDS returns under Income Tax Act. and GST Act and calculation of Income Tax etc.
<b>9.</b>	<b>Basic Principles of Auditing</b>

<b>10.</b>	General Financial Rules 2017 as amended from time to time. Procurement of goods and services through GeM. Funds remittance through PFMS/TSA.
<b>11.</b>	Pay Fixation Rules
<b>12.</b>	CCS (Pension Rules) 2021, CCS(Commutation of Pension Rules, 1981) & National Pension System(NPS).
<b>13.</b>	TA Rules & LTC Rules
<b>14.</b>	Medical Attendance Rules & CGHS Rules
<b>15.</b>	Fundamental Rules and Supplementary Rules.
<b>16.</b>	Provident Fund Rules
<b>17.</b>	Payment of Gratuity Act 1972 as amended from time to time

**Tier II : Detailed syllabus for the post of Assistant Section Officer**

1. CCS (CCA) Rules 1965 – Basic concept
2. CCS (Conduct) Rules 1964 - Basic concept
3. CCS (Leave) Rules
4. Pay & Allowances- HRA, Transport Allowance, Dress Allowance, Conveyance Allowance, Cash Handling Allowance, Tough Location Allowances, Children Education allowance, Joining time pay, increments etc.
5. Pension Rules 2021 & National Pension System
6. Medical Attendance Rules & CGHS
7. Provident Fund Rules
8. Noting and Drafting
9. Advances
10. Financial Upgradation under MACP
11. Legal Proceedings- Basic concepts
12. Implementation of Rajbhasa
13. Seniority Rules
14. Promotion Rules
15. Quarter Allotment Rules
16. Income Tax- Calculation, TDS as per Income tax & GST
17. Auditing & Accounting – Basic concepts
18. GFR- 2017 related to procurement of Goods and services through GeM
19. Travelling Allowance Rules.
20. Leave Travel Concession Rules.
21. Fundamental Rules and Supplementary Rules
22. Pay Fixation Rules.

## **Tier II : Detailed syllabus for the post of Assistant Engineer**

### **1) Building Material/Building Construction/Building maintenance –**

Masonry material (stones, bricks, mortar), Timber and Miscellaneous material (glass, plastic, fibre, aluminium steel, galvanized iron, bitumen, PVC, CPVC, PPF, FRP and Ceramics), Properties/Classification/Testing/selection criteria of various building material.

Building maintenance- cracks/ seepage/ settlement/ special repair (causes/ type /repair method)

### **2) Structural and Geotechnical Engineering-**

Theory of structures, Concrete technology, Reinforced concrete design, Design of steel structures

Soil Mechanics, Soil exploration, Properties/type/classification/testes of Soil, Permeability & Seepage, Compressibility, Consolidation and earth pressure theories and stress distribution in soil.

Foundation Engineering- type of foundation & selection criteria, Bearing capacity, settlement analysis, Design and testing of shallow and deep foundation, Earth retaining structures

### **3) Construction Planning and management/ Estimation costing /Contracts management**

Construction- Planning and management using various tools, Site investigation and planning, Quality control, land acquisition

Preparation of detailed project report (DPR), Labor safety and welfare laws

Types of engineering contracts, Tender and tender document, payment, specifications, Contract management

Estimation and costing- Types of estimates, mode of measurements and rate analysis

### **4) Surveying/ Building planning and drawing**

Classification of survey, various methodologies, instrument & analysis of measurement of distances, elevation and plan, Global positioning system (GPS), geographical information system (GIS), Remote sensing concept, Photogrammetry,

Computer aided Design- CAD software, CAD command, Generation of plan, elevation, section, site plan, area statement, SD view

Building Drawing- Conventions (type of lines, symbols), Planning of building (principle of planning for residential, administrative and school building, rules and bylaws)

Green building norms, fire safety norms

## **Tier II : Detailed syllabus for the post of Hindi Translator**

### **Language Proficiency Test**

#### **General English**

(Comprehension, One word substitution, Synonyms and Antonyms, Spelling error, Spotting error in sentences Grammar- Noun, Pronoun, Adjective, Verb, Preposition, Conjunction, Use of 'A', 'AN' and 'THE', Idioms and Phrases.)

#### **General Hindi**

व्याकरण : मुहावरे , कहावते, विलोम शब्द , समानार्थी शब्द , वाक्य शुद्धि  
संदेश लेखन , अनुच्छेद लेखन ( किसी विषय पर )

#### **Computer Literacy**

(Characteristics of Computers, Computer

Organization including RAM, ROM, File System, Input Devices, Computer Software-Relationship between Hardware and Software, Operating System, MS-Office (exposure of Word, Excel/spread sheet, Power point), Information Technology and Society-Indian IT Act, Digital Signatures, Application of information technology in Government for E-Governance, mobile/Smartphone's, information Kiosks)

#### **राजभाषा नियमों / अधिनियमों की जानकारी**

Translation from Hindi to English; and -English to Hindi

Official translation

Literacy translation

**Tier II : Detailed syllabus for the post of Stenographer Grade I**

**Language Proficiency Test**

**General English**

(Comprehension, One word substitution, Synonyms and Antonyms, Spelling error, Spotting error in sentences Grammar- Noun, Pronoun, Adjective, Verb, Preposition, Conjunction, Use of 'A', 'AN' and 'THE', Idioms and Phrases.)

**General Hindi**

(गदयांश आधारित प्रश्न, तत्सम, तद्भव, पर्यायवाची, विलोम, मुहावरे और लोकोत्तियाँ, शुद्ध अशुद्ध वाक्य, संधि-विच्छेद, अलंकार और समास, वचन, लिंग, अनेकार्थी और वाक्य के लिए एक शब्द)

**General Awareness**

**General Knowledge**

(Indian History, Indian Geography, Indian Economy, Indian Polity & Constitution, Scientific Research, awards, Sports, Current India & World)

**Computer Literacy**

(Characteristics of Computers, Computer Organization including RAM, ROM, File System, Input Devices, Computer Software-Relationship between Hardware and Software, Operating System, MS-Office (exposure of Word, Excel/spread sheet, Power point), Information Technology and Society-Indian IT Act, Digital Signatures, Application of information technology in Government for E-Governance, mobile/Smartphone's, information Kiosks)

**Office Procedure**

**Noting and Drafting**

**SKILL TEST ( Stenographer Grade I )**

<b>Shorthand Test</b> Dictation 10 minutes @ 80 w.p.m. Transcription : 50 minutes English, / 65 minutes Hindi, on computer	Qualify the shorthand and typing test
<b>Typing Test</b> Typing Test only on computer Net typing speed English- 40 w.p.m. or Hindi - 35 w.p.m	
<b>Computer Proficiency Test</b> MS Word, MS Excel, MS Access, MS Power Point and internet.	100 marks.

## **Tier II : Detailed syllabus for the post of Stenographer Grade II**

### **Language Proficiency Test**

#### **General English**

(Comprehension, One word substitution, Synonyms and Antonyms, Spelling error, Spotting error in sentences Grammar- Noun, Pronoun, Adjective, Verb, Preposition, Conjunction, Use of 'A', 'AN' and 'THE', Idioms and Phrases.)

#### **General Hindi**

(गद्यांश आधारित प्रश्न, तत्सम, तद्भव, पर्यायवाची, विलोम, मुहावरे और लोकोत्तियाँ, शुद्ध अशुद्ध वाक्य, संधि-विच्छेद, अलंकार और समास, वचन, लिंग, अनेकार्थी और वाक्य के लिए एक शब्द)

#### **General Awareness**

#### **General Knowledge**

(Indian History, Indian Geography, Indian Economy, Indian Polity & Constitution, Scientific Research, awards, Sports, Current India & World)

#### **Computer Literacy**

(Characteristics of Computers, Computer Organization including RAM, ROM, File System, Input Devices, Computer Software-Relationship between Hardware and Software, Operating System, MS-Office (exposure of Word, Excel/spread sheet, Power point), Information Technology and Society-Indian IT Act, Digital Signatures, Application of information technology in Government for E-Governance, mobile/Smartphone's, information Kiosks)

#### **Office Procedure**

#### **Noting and Drafting**

### **SKILL TEST ( Stenographer Grade II)**

<b>Shorthand Test</b> Dictation 10 minutes @ 80 w.p.m. Transcription : 50 minutes English, / 65 minutes Hindi, on computer	Qualify the shorthand and typing test
<b>Typing Test</b> Typing Test only on computer Net typing speed English- 40 w.p.m. or Hindi - 35 w.p.m	
<b>Computer Proficiency Test</b> MS Word, MS Excel, MS Access, MS Power Point and internet.	100 marks.

**Tier II : Detailed syllabus for the post of Senior Secretariat Assistant**

1. CCS (CCA) Rules 1965 – Rule 1,2,3,10 & 11
2. CCS (Conduct) Rules 1964  
- Rule 1 to 10
3. CCS (Leave) Rules
4. Pay & Allowances- HRA, Transport Allowance, Dress Allowance, Conveyance Allowance, Cash Handling Allowance, Tough Location Allowances, Children Education allowance, Joining time pay, increments etc.
- 5 Pension Rules 2021 & National Pension System
6. Medical Attendance Rules & CGHS
7. Provident Fund Rules
8. Noting and Drafting
9. Advances
10. Financial Upgradation under MACP.
11. Implementation of Rajbhasa.
12. Seniority Rules
13. Promotion Rules
14. Quarter Allotment Rules
15. Maintenance of Cash Book
16. Bank Reconciliation Statement.
17. Audit
18. Income Tax- Calculation, TDS as per Income Tax and GST
19. Basic Accounting concepts
20. GFR- 2017 related to procurement of Goods and services through GeM
21. Pay Fixation Rules.



**Tier II : Detailed syllabus for the post of Junior Secretariat Assistant**

**General Knowledge**

(Indian History, Indian Geography, Indian Economy, Indian Polity & Constitution, Scientific Research, awards, Sports, Current India & World)

**Logical Reasoning**

(Analogies-Semantic Analogy, Symbolic/Number Analogy, Figural Analogy, Similarities and difference, word building, relationship concepts, Arithmetic number series-Semantic Series, Number Series, Coding and decoding- Small & Capital letters/numbers coding, decoding and classification)

**Computer Literacy**

(Characteristics of Computers, Computer

Organization including RAM, ROM, File System, Input Devices, Computer Software-Relationship between Hardware and Software, Operating System, MS-Office (exposure of Word, Excel/spread sheet, Power point), Information Technology and Society-Indian IT Act, Digital Signatures, Application of information technology in Government for E-Governance, mobile/Smartphone's, information Kiosks)

**SKILL TEST ( Junior Secretariat Assistant )**

<b>Typing Test</b> Typing Test only on computer Net typing speed English- 35 w.p.m. or Hindi - 30 w.p.m.	Qualify the typing test.
<b>Computer Proficiency Test</b> MS Word, MS Excel, MS Access, MS Power Point and internet.	100 marks. .

