

**Scheme & Syllabus of Examination for the post of Principal, Vice-Principal, PGT(Hindi/English/Physics/Chemistry/Maths/Biology/History/Economics/Geography), TGT(Hindi/English/Science/Social Studies/Maths) & Head Master through Limited Department Examination for Tier I**

**Tier –I Subject Knowledge Examination ( Combination of Pen-paper and OMR Based )**

| Component of the Test         | No. of questions |             | Total Marks |             | Duration of the Test |
|-------------------------------|------------------|-------------|-------------|-------------|----------------------|
|                               | Objective        | Descriptive | Objective   | Descriptive |                      |
| Detailed syllabus given below | 60               | 10          | 60          | 40          | 2 ½ hours            |

**TIER I : Detailed syllabus for the post of Principal**

**I Prospective on Education and Leadership:**

|          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
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| <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 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>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

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|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|          | <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 Foundational Stage-2022</li> <li>• National Curriculum Framework 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,</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
- CCS (Conduct) Rules 1964
- Fundamental & Supplementary Rules
- TA Rules
- Leave Travel Concession Rule.
- Principles of School Budget
- Medical Attendance Rules & CGHS
- Right to Information Act 2005
- Contract Labour (Abolition and Regulation) Act, 1970
- Income Tax & GST
- POSH & POCSO Acts
- MoE, NCPCR and NDMA guidelines for school safety and security
- Constitutional Provisions for PwD, EWS, SC/ST and other disadvantaged groups
- General Financial Rules – 2017
- CCS(Pension) Rules 2021, NPS
- Human Rights

## **TIER I : Detailed syllabus for the post of Vice- Principal**

### **I Prospective on Education and Leadership:**

| A | Understanding the Learner                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   | <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 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 | Understanding Teaching Learning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 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></ul>                                                                                                                                                                                                                                                                             |

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|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| II | <ul style="list-style-type: none"> <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> <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>                                                                                                                                                                                                                                                                                                                         |
| C  | <b>Planning and Organization of Teaching-Learning</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
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| D  | <b>Creating Conducive Learning Environment</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
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| E  | <b>School Organization and Leadership</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
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| F  | <b>Perspectives in Education</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
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- Human Rights.

**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  $\sin^2 x + \cos^2 x = 1$ , 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  $3 \times 3$  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.

### **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  $n$ th 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 I : 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 I: 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 I: 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 I : 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 I : 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 18th 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 events of 1857-58.
  - 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 I : 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 I: 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-वृत्तांत, 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, उद्घोषणा, 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

## 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, R<sup>2</sup>, R<sup>3</sup> as vector spaces over R and concept of R<sup>n</sup>. Standard basis for each of them. Linear Independence and examples of different bases. Subspaces of R<sup>2</sup>, R<sup>3</sup>. 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.

**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 nonmetals:**

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 reflexaction; 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., Homologus 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 I : 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, Pandyas - Dynasties that ruled over South India during the Sangam Age ".Vijay Nagar : Founder, Dynasties, Capital and Administration .**

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

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

### **GEOGRAPHY**

Motions of the Earth : Rotation, Revolution, Occurrence 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 I : 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 I : 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 I Syllabus – HEAD MASTER**

## **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 and preparatory 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>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>I</b>  | <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 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> <li>• Barriers in learning</li> </ul>                                                                                                                                                            |
| <b>II</b> | <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 and effective use of HPC</li> <li>• Instructional Material and Resources</li> <li>• Digital Technology in Teaching Learning</li> <li>• Art, Physical health and wellbeing</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>• The Rights of Persons with Disabilities Act, 2016</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> </ul>                                                                                                                                                                                                                                                                                                                                                                                                             |

|          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|          | <ul style="list-style-type: none"> <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.SQAF</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 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,</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**

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Management: its nature and scope; The Role of a Manager in an Organization.</li> <li>• The Management Processes; Planning, Organization, Directing and Controlling.</li> <li>• Leadership: The Tasks of a Leader, Leadership Styles; Leadership Theories; A successful Leader versus an effective Leader.</li> <li>• Performance Appraisal — Potential appraisal and development .Feedback and Performance Counseling. Career Planning, Training and Development, Rewards and Employee Welfare.</li> <li>• Motivation, Morale and Incentives: Theories of Motivation; How Managers Motivate; Concept of Morale; Factors determining morale; Role of Incentives in Building up Morale.</li> <li>• 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,</li> <li>• Role of Information Technology.</li> <li>• Class Observation and School Supervision.</li> <li>• Ethics in School Management. Emotional Intelligence.</li> </ul> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## **III Administration**

|                                                                                                                                                                                                                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>▪ CCS (CCA) Rules 1965</li> <li>▪ CCS (Conduct) Rules 1964</li> <li>▪ POSH &amp; POCSO Acts</li> <li>▪ MoE, NCPCR and NDMA guidelines for school safety and security</li> </ul> |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

# Scheme & Syllabus of Examination for Recruitment of Section Officer, Finance Officer, Assistant Section Officer, Senior Secretariat Assistant and Junior Secretariat Assistant through LDCE /LDE

## Tier –I Subject Knowledge Examination ( Combination of Pen-paper and OMR Based )

| Component of the Test         | No. of questions |             | Total Marks |             | Duration of the Test |
|-------------------------------|------------------|-------------|-------------|-------------|----------------------|
|                               | Objective        | Descriptive | Objective   | Descriptive |                      |
| Detailed syllabus given below | 60               | 10          | 60          | 40          | 2 ½ hours            |

### TIER I : Section Officer

- Office Procedure
- Office Management
- Noting & Drafting
- General Financial Rules
- Travelling Allowance Rules
- Leave Travel Concession
- Medical Attendance Rules & CGHS.
- Pay-Fixation(FR&SR)
- Leave rules & Joining Time
- CCS(CCA)Rules 1965
- CCS(Conduct ) Rules 1964
- CCS (Pension) Rules 2021, NPS & Provident Fund Rules
- Right to Information Act 2005
- E-Procurement – GeM
- Norms of opening of New Kendriya Vidyalaya
- Article 81 ( b ) & (d) of Education code
- Formation of Internal Complaints Committee
- Implementation of Rajbhasa
- Financial Upgradation ( Senior Scale /Selection Scale /MACP)
- Quarter Allotment Rules
- Annual Performance Appraisal Report (APAR )
- Counting of Past services.
- Probation & Confirmation.

(Additionally, it will also include miscellaneous general matters relevant to functioning of various sections of KVS where Rules of KVS/ Govt. of India are taken care of while discharging the duties).

## TIER I : Detailed Syllabus for the post of Finance Officer

| S.No.     | Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1.</b> | <b>Maintenance of Cashbook</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|           | <ul style="list-style-type: none"> <li>i) Simple cashbook</li> <li>ii) Columnar cashbook</li> <li>iii) Petty cashbook</li> <li>iv) Bank reconciliation statement</li> </ul>                                                                                                                                                                                                                                                                                                                             |
| <b>2.</b> | <b>Maintenance of Ledger</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|           | <ul style="list-style-type: none"> <li>i) Format of Ledger</li> <li>ii) Ledger posting</li> <li>iii) Balancing of Ledger</li> </ul>                                                                                                                                                                                                                                                                                                                                                                     |
| <b>3.</b> | <b>Recording of Financial Transactions through Tally Software</b>                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|           | <ul style="list-style-type: none"> <li>i) Basic Concepts</li> <li>ii) Receipt Voucher</li> <li>iii) Payment Voucher</li> <li>iv) Journal Voucher</li> <li>v) Contra Voucher</li> </ul>                                                                                                                                                                                                                                                                                                                  |
| <b>4.</b> | <b>Preparation of Annual Accounts</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|           | <ul style="list-style-type: none"> <li>i) Fund based Accounting</li> <li>ii) Difference between cash basis accounting and accrual basis of accounting</li> <li>iii) Trial Balance</li> <li>iv) Receipt &amp; Payment Account</li> <li>v) Income &amp; Expenditure Account</li> <li>vi) Balance Sheet</li> <li>vii) Accounting Standards-1,6,9,10,15,29 issued by ICAI</li> </ul>                                                                                                                        |
| <b>5.</b> | <b>Depreciation</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|           | <ul style="list-style-type: none"> <li>i) Methods of Depreciation- Straight Line Method (SLM) and Written Down Value Method (WDV)</li> <li>ii) Difference between SLM &amp; WDV</li> <li>iii) Provision for Depreciation/Accumulated Depreciation</li> <li>iv) Profit or Loss on disposal of Assets</li> </ul>                                                                                                                                                                                          |
| <b>6.</b> | <b>Taxation</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|           | <ul style="list-style-type: none"> <li>i) Deduction of Tax at source under various sections (192,194C, 194J etc.) of Income Tax Act. 1961 as amended from time to time</li> <li>ii) Deduction of Tax at source under GST Act. as amended from time to time</li> <li>iii) Filing of various TDS returns under Income Tax Act. and GST Act.</li> <li>iv) Penalty provisions due to Non Deduction of Tax / Non Filing of TDS returns under Income Tax Act. and GST Act and Tax calculation etc.</li> </ul> |
| <b>7.</b> | <b>Basic Principles of Auditing</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>8.</b> | <b>General Financial Rules 2017 relating to Procurement of Goods and Services and Award of Contracts etc. Procurement of goods and services through GeM. Funds remittance through PFMS/TSA.</b>                                                                                                                                                                                                                                                                                                         |
| <b>9.</b> | <b>Pay Fixation Rules</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

|            |                                                                                                                                                                                                                 |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>10.</b> | CCS (Pension Rules) 2021& National Pension System (NPS).                                                                                                                                                        |
| <b>11.</b> | TA Rules & LTC Rules                                                                                                                                                                                            |
| <b>12.</b> | Medical Attendance Rules & CGHS Rules                                                                                                                                                                           |
| <b>13.</b> | Pay & Allowances-<br>HRA, Transport Allowance, Dress Allowance, Conveyance Allowance,<br>Cash Handling Allowance, Tough Location Allowances, Children<br>Education allowance, Joining time pay, increments etc. |
| <b>14.</b> | Provident Fund Rules                                                                                                                                                                                            |
| <b>15.</b> | Chapter 21- Vidyalaya Vikas Nidhi of KVS Accounts Code.                                                                                                                                                         |

## **TIER I : Detailed Syllabus for the post of Assistant Section Officer**

1. CCS (CCA) Rules 1965
2. CCS (Conduct) Rules 1964
3. CCS (Leave) Rules
4. Fundamental Rules & Supplementary Rules
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 ( Senior Scale/ Selection Scale /MACP )
11. Legal Proceedings
12. Implementation of Rajbhasa
13. Quarter Allotment Rules
14. Chapter 21 of Accounts Code for KVs.
15. Income-Tax- Calculation, Tax deduction at source as per Income tax and GST
16. Purchase Procedure- E procurement through GeM.
17. Condemnation of Articles
18. Travelling Allowance Rules.
- 19.. LTC Rules.

### **TIER I : Detailed Syllabus for the post of Senior Secretariat Assistant**

1. Income -Tax – Calculation, TDS as per Income Tax & GST
2. CCS (Conduct) Rules 1964
3. CCS (Leave) Rules
4. Fundamental & Supplementary Rules
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 ( Senior Scale /Selection Scale/MACP)
11. Maintenance of Cash Book
12. Bank Re-Conciliation Statement
13. Maintenance of Ledger
14. Preparation of Annual Accounts
15. Chapter 21- Vidyalaya Vikas Nidhi of Accounts Code for KVs.
16. Quarter Allotment Rules
17. Pay Fixation Rules.
18. GFR- 2017 related to procurement of Goods and services through GeM

## **TIER I : 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)





