



# **EMRS STAFF SELECTION EXAM (ESSE)-2025**

**Syllabus for the posts of PGT**

**National Education Society for Tribal Students**

**[knclingarajvedu.com](http://knclingarajvedu.com)**

## **Syllabus Tier-I-PGTs**

- **Part-I-General awareness**

General knowledge and Current affairs.

- **Part-II-Reasoning Ability**

Puzzles & Seating arrangement, Data sufficiency, Statement based questions (Verbal reasoning), Inequality, Blood relations, Sequences and Series, Direction Test, Assertion and Reason, Venn Diagrams.

- **Part-III- Knowledge of ICT**

Fundamentals of Computer System, Basics of Operating System, MS Office, Keyboard Shortcuts and their uses, Important Computer Terms and Abbreviations, Computer Networks, Cyber Security, and Internet.

- **Part-IV-Teaching aptitude**

Teaching-Nature, Characteristics, Objectives and Basic requirements, Learner's characteristics, Factors affecting teaching, Methods of Teaching, Teaching Aids and Evaluation Systems.

- **Part-V- Domain Knowledge (a&b)**

**(a)**-Experiential activity-based pedagogy and case study based questions

**(b)**-National Education Policy (NEP)- 2020

- **Part-VI-Language Competency (a&b)**

**(a)General English**

Verb, Tenses, Voice, Subject-Verb Agreement, Articles, Comprehension, Fill in the Blanks, Adverb, Error Correction, Sentence Rearrangement, Unseen Passages, Vocabulary, Antonyms/Synonyms, Grammar, Idioms & Phrases

**(b)General Hindi**

संधि, समास, विलोम शब्द, पर्यायवाची शब्द, सामान्य असुद्धियाँ, वाक्यांशों के लिए एक शब्द, मुहावरे- लोकोक्तियाँ, अपठित गद्यांश पर आधारित प्रश्न |

## Syllabus Tier-II-PGTs

### PGT-Mathematics

#### **Sets:**

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

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

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

#### **Trigonometric Functions**

Positive and negative angles. Measuring angles in radians and in degrees and conversion from one measure to another. Definition of trigonometric functions with the help of unit circle. Truth of the identity  $\sin^2 x + \cos^2 x = 1$ , 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.

## **PGT- Physics**

### **Units and Measurements**

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

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

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

### **Motion in a Plane**

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

### **Laws of Motion:**

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

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

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

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

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

### **Gravitation:**

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

### **Mechanical Properties of Solids**

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

### **Mechanical Properties of Fluids**

Pressure due to a fluid column; Pascal's law and its applications -hydraulic lift and hydraulic brakes, effect of gravity on fluid pressure, Viscosity, Stokes' law, terminal velocity, streamline

and turbulent flow, critical velocity, Bernoulli's theorem and its simple applications, Surface energy and surface tension, angle of contact, excess of pressure across a curved surface, application of surface tension ideas to drops, bubbles and capillary rise.

### **Thermal Properties of Matter**

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

### **Thermodynamics**

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

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

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

### **Oscillations and Waves:**

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

### **Electric Charges and Fields:**

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

### **Electrostatic Potential and Capacitance:**

Electric potential, potential difference, electric potential due to a point charge, a dipole and system of charges; equipotential surfaces, electrical potential energy of a system of two-point charges and of electric dipole in an electrostatic field. Conductors and insulators, free charges and bound charges inside a conductor. Dielectrics and electric polarization, capacitors and capacitance, combination of capacitors in series and in parallel, capacitance of a parallel plate capacitor with and without dielectric medium between the plates, energy stored in a capacitor

### **Current Electricity:**

Electric current, flow of electric charges in a metallic conductor, drift velocity, mobility and their relation with electric current; Ohm's law, V-I characteristics (Linear & Non-Linear), electrical

energy and power, electrical resistivity and conductivity, temperature dependence of resistance, Internal resistance of a cell, potential difference and emf of a cell, combination of cells in series and in parallel, Kirchhoff's rules, Wheatstone bridge.

### **Magnetic Effects of Current and Magnetism:**

Concept of magnetic field, Oersted's experiment, Biot - Savart law and its application to current carrying circular loop, Ampere's law and its applications to infinitely long straight wire. Straight solenoid, force on a moving charge in uniform magnetic and electric fields. Force on a current-carrying conductor in a uniform magnetic field, force between two parallel current-carrying conductors-definition of ampere, torque experienced by a current loop in uniform magnetic field; Current loop as a magnetic dipole and its magnetic dipole moment, moving coil galvanometer - its current sensitivity and conversion to ammeter and voltmeter.

### **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, powerfactor, 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.

## **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, electrometric 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.

## **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.

### **Neural Control and Coordination**

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.

### **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 up to 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.

# **PGT- Computer Science**

## **Computer Systems and Organisation**

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

## **Computational Thinking and Programming**

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

slicing), traversing a list using loops, built-in functions: len(), list(), append(), extend(), insert(), count(), index(), remove(), pop(), reverse(), sort(), sorted(), min(), max(), sum(); nested lists, suggested programs: finding the maximum, minimum, mean of numeric values stored in a list; linear search on list of numbers and counting the frequency of elements in a list

- Tuples: introduction, indexing, tuple operations (concatenation, repetition, membership & slicing), built-in functions: len(), tuple(), count(), index(), sorted(), min(), max(), sum(); tuple assignment, nested tuple, suggested programs: finding the minimum, maximum, mean of values stored in a tuple; linear search on a tuple of numbers, counting the frequency of elements in a tuple
- Dictionary: introduction, accessing items in a dictionary using keys, mutability of dictionary (adding a new item, modifying an existing item), traversing a dictionary, built-in functions: len(), dict(), keys(), values(), items(), get(), update(), del(), clear(), fromkeys(), copy(), pop(), popitem(), setdefault(), max(), min(), count(), sorted(), copy(); suggested programs : count the number of times a character appears in a given string using a dictionary, create a dictionary with names of employees, their salary and access them
- Introduction to Python modules: Importing module using 'import ' and using from statement, Importing math module (pi, e, sqrt, ceil, floor, pow, fabs, sin, cos, tan); random module (random, randint, randrange), statistics module (mean, median, mode)

## **Society, Law and Ethics**

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

## **Computational Thinking and Programming - 2**

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

read, write/create, search, append and update operations in a binary file

- CSV file: import csv module, open / close csv file, write into a csv file using csv.writerow() and read from a csv file using csv.reader()

## **Computer Networks**

- Evolution of networking: introduction to computer networks, evolution of networking (ARPANET, NSFNET, INTERNET)
- Data communication terminologies: concept of communication, components of data communication (sender, receiver, message, communication media, protocols), measuring capacity of communication media (bandwidth, data transfer rate), IP address, switching techniques (Circuit switching, Packet switching)
- Transmission media: Wired communication media (Twisted pair cable, Co-axial cable, Fiber-optic cable), Wireless media (Radio waves, Micro waves, Infrared waves)
- Network devices (Modem, Ethernet card, RJ45, Repeater, Hub, Switch, Router, Gateway, WIFI card).
- Network topologies and Network types: types of networks (PAN, LAN, MAN, WAN), networking topologies (Bus, Star, Tree)
- Network protocol: HTTP, FTP, PPP, SMTP, TCP/IP, POP3, HTTPS, TELNET, VoIP, wireless/mobile communication protocol such as GSM, GPRS and WLL
- Introduction to web services: WWW, Hyper Text Markup Language (HTML), Extensible Markup Language (XML), domain names, URL, website, web browser, web servers, web hosting.

## **Database Management**

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

## **Introduction to Computer System**

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

## **Introduction to Python**

- Basics of Python programming, Python interpreter - interactive and script mode, the structure of a program, indentation, identifiers, keywords, constants, variables, types of operators, precedence of operators, data types, mutable and immutable data types, statements, expressions, evaluation of expressions, comments, input and output

statements, data type conversion, debugging, control statements: if-else, for loop Lists: list operations - creating, initializing, traversing and manipulating lists, list methods and built-in functions.: len(), list(), append(), extend(), insert(), count(), find(), remove(), pop(), reverse(), sort(), sorted(), min(), max(), sum()

- Dictionary: concept of key-value pair, creating, initializing, traversing, updating and deleting elements, dictionary methods and built-in functions: len(), dict(), keys(), values(), items(), get(), update(), clear(), del()

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

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

### **Emerging Trends**

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

### **Data Handling using Pandas**

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

### **Database Query using SQL**

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

### **Introduction to Computer Networks**

- Introduction to networks, Types of network: LAN, MAN, WAN.
- Network Devices: modem, hub, switch, repeater, router, gateway

- Network Topologies: Star, Bus, Tree, Mesh.
- Introduction to Internet, URL, WWW, and its applications- Web, email, Chat, VoIP.
- Website: Introduction, difference between a website and webpage, static vs dynamic webpage, web server and hosting of a website.
- Web Browsers: Introduction, commonly used browsers, browser settings, add-ons and plug-ins, cookies.

### **Societal Impacts**

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

# **PGT-Commerce**

## **Accountancy**

### **Introduction to Accounting**

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

### **Theory Base of Accounting**

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

### **Recording of Business Transactions**

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

- ii. Creating provision for depreciation/accumulated depreciation account
- iii. Treatment for disposal of asset
- Provisions and Reserves: Difference
- Types of Reserves: i. Revenue reserve ii. Capital reserve iii. General reserve iv. Specific reserve v. Secret Reserve
- Difference between capital and revenue reserve

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

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

### **Financial Accounting - II**

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

### **Accounting for Partnership Firms**

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

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

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

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

- effect of retirement / death of a partner on change in profit sharing ratio, treatment of goodwill (as per AS 26), treatment for revaluation of assets and reassessment of liabilities, adjustment of accumulated profits, losses and reserves, adjustment of

capital accounts and preparation of capital, current account and balance sheet. Preparation of loan account of the retiring partner.

- Calculation of deceased partner's share of profit till the date of death. Preparation of deceased partner's capital account and his executor's account.

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

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

#### **Accounting for Share Capital**

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

#### **Accounting for Debentures**

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

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

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

#### **Cash Flow Statement**

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

## **Foundation of Business**

- Meaning and features

## **Evolution and Fundamentals of Business**

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

## **Forms of Business organizations**

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

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

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

## **Business Services**

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

## **Emerging Modes of Business**

E-business: concept, scope and benefits

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

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

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

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

## **Small Business and Enterprises**

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

Centre (DIC) with special reference to rural, backward areas.

### **Internal Trade**

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

### **International trade:**

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

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

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

### **Principles of Management**

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

### **Business Environment**

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

### **Planning**

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

### **Organising**

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

### **Staffing**

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

### **Directing**

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

### **Controlling**

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

**Financial Management**

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

**Financial Markets**

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

**Marketing**

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

**Consumer Protection**

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

# **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
- India and Pakistan
- India and China
- Issues: economic growth, population, sectoral development and other Human Development Indicators

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# **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; agrobased 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

## **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-SUFI 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

## **PGT - English**

- **Reading:**

Unseen passage (Factual, descriptive or literary) to assess comprehension, interpretation inference and vocabulary, Unseen case-based passage with verbal/visual inputs like statistical data, charts etc., Note Making and Summarization based on a passage.

- **Creative Writing Skills:**

Notice, Formal/Informal Invitation and Reply, Letters based on verbal/visual input, Article/ Report Writing, descriptive and analytical in nature, based on verbal inputs. Classified Advertisements, Poster, Writing a Speech in 120-150 words based on verbal/ visual clues related to some contemporary / age-appropriate topic, Debate on contemporary topical issues based on visual/verbal inputs

- **Grammar:**

Questions on Gap filling (Tenses, Clauses), Questions on re-ordering/transformation of sentences.

- **Literature:**

Shakespeare's works. Romantic period (e.g. Shelley, Wordsworth, Keats, Coleridge etc) 19th and 20th Century American and English Literature (e.g. Robert Frost, Hemmingway, Whitman, Hawthorne, Emily Dickinson , Bernard Shaw, Arthur Miller etc. )

Modern Indian Writing in English (e.g. Anita Desai, Vikram Seth, Nissin Ezekiel, K N Daruwala, Ruskin Bond, R K Narayan, Mulk Raj Anand, Khushwant Singh etc) } Modern writing in English from other parts of the world e.g. Latin America / Africa / Australia / South Asia.

## पी.जी.टी- हिन्दी

खंड क - इतिहास एवं साहित्य

हिन्दी साहित्य के इतिहास का विस्तृत अध्ययन:-

### (1) 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 -

(i) निर्गुण भक्तिधारा ज्ञानमार्गी शाखा, प्रेममार्गी शाखा कबीर, दादू, रैदास, नानक, जायसी, कुतुबन ।

(ii) सगुण भक्तिधारा - राम भक्तिशाखा, औष्ण-भक्ति शाखा तुलसीदास, केशव, सूरदास, मीराबाई, अष्टछाप के कवि

(ग) रीतिकाल-

रीतिबद्ध, रीतिसिद्ध, रीतिमुक्त काव्य.....देव, घनानंद, बिहारी, मतिराम, सेनापति, भूषण, पद्माकर

### (II) आधुनिक काल

युगीन परिस्थितियाँ, साहित्यिक पृष्ठभूमि, मुख्य विचारधारा, मुख्य साहित्यकार, साहित्यिक रचनाएँ, विशेषताएँ, भाषा-शैली (क)

भारतेन्दुयुग भारतेन्दु - हरिश्चंद्र, बालमुकुन्दगुप्त. बदरीनारायण चौधरी प्रेमधन

(ख) द्विवेदीयुग महावीर प्रसाद द्विवेदी, - श्रीधर पाठक, अयोध्यासिंह उपाध्याय हरिऔध, मैथिलीशरण गुप्त

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

(घ) प्रगतिवाद पंत निराला, नरेन्द्र शर्मा, केदारनाथ अग्रवाल, नागार्जुन

(ङ) प्रयोगवाद मुक्तिबोध, नेमिचंद्र जैन, भारतभूषण अग्रवाल, - प्रभाकर माचवे, गिरिजा कुमार माथुर, रामविलास शर्मा, अज्ञेय

(च) नई कविता भवानी प्रसाद मिश्र, नरेन्द्र शर्मा, धूमिल, धर्मवीर भारती, शंभुनाथ सिंह

### गद्य साहित्य का विस्तृत अध्ययन

गद्य एवं अन्य विधाओं का प्रारम्भ, विकास, प्रमुख प्रवृत्तियाँ, प्रमुख साहित्यकार, रचनाएँ, साहित्यिक विशेषताएँ, भाषाशैली।

निबंध, कथासाहित्य उपन्यास और कहानी, नाटक, एकांकी, रेखाचित्र, संस्मरण, यात्रा-

वृत्तांत, आत्मकथा, जीवनी, पत्र, डायरी, आलोचना, रिपोर्ताज आदि इन सभी विधाओं का विस्तृत परिचय ।

## 2. हिंदी साहित्य

(काव्य साहित्य पर आधारित प्रश्न)

निम्नलिखित कवियों की प्रसिद्ध काव्य-रचनाओं में से लिए गए काव्यांशों पर आधारित सप्रसंग व्याख्या, भाव-सौंदर्य, शिल्प सौंदर्य पर एक वस्तुनिष्ठ प्रश्न एवं दो विषय परक प्रश्न -

(i) सप्रसंग व्याख्या, भाव सौंदर्य - विषय परक - प्रश्न

(ii) शिल्प सौंदर्य वस्तुनिष्ठ प्रश्न

अमीर खुसरो, विद्यापति, सूरदास, तुलसीदास, कबीरदास, जायसी, मीराबाई, रसखान, धनानंद, बिहारीलाल, भारतेन्दु, मैथिलीशरण गुप्त, दिनकर, जयशंकर प्रसाद, महादेवी वर्मा, निराला, पंत, हरिवंशराय बच्चन, मुक्तिबोध, रघुवीर सहाय, केदारनाथ सिंह, भवानीप्रसाद मिश्र, अज्ञेय इत्यादि (संकेत एम. ए. तक के पाठ्यक्रम में पढ़ी - उपरोक्त कवियों की प्रसिद्ध कविताएँ)

निम्नलिखित गद्य लेखकों की प्रसिद्ध रचनाओं में से व्याख्या से संबंधित अंश, आशय स्पष्टीकरण एवं भाषा प्रश्न शैली पर आधारित प्रश्न

(i) सप्रसंग व्याख्या एवं आशय स्पष्टीकरण पर आधारित दो विषय परक प्रश्न

(ii) भाषाशैली पर आधारित

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

3. कवियों और लेखकों के व्यक्तित्व एवं औचित्य पर आधारित एक प्रश्न जिसके पाँच भाग होंगे - यह प्रश्न हिन्दी साहित्य के प्रसिद्ध कवियों एवं लेखकों के जीवन-परिचय, साहित्यिक रचनाएँ एवं भाषाशैली पर आधारित होंगे।

### खंड ख - व्याकरण एवं रचना

#### 1. व्याकरण

(क) शब्द-विचार एवं शब्द भंडार - शब्द भेद अर्थ, रचना, स्रोत तथा प्रयोग की दृष्टि से शब्द भंडार - पर्यायवाची, विपरीतार्थक, एकार्थी, अनेकार्थी शब्द-युग्म शब्द निर्माण - उपसर्ग, प्रत्यय, समास

(ख) पद-विचार - पदबंध, पद-परिचय, संज्ञा, सर्वनाम, विशेषण, क्रिया, क्रिया विशेषण, पदबंध-भेद, प्रयोग, पद-परिचय

(ग) वाक्य- विचार- वाक्य संरचना, वाक्य भेद - अर्थ एवं रचना की दृष्टि से, वाक्य- परिवर्तन, वाक्य-संश्लेषण, वाक्य - विश्लेषण

(घ) सन्धि - स्वर सन्धि, व्यंजन सन्धि, विसर्ग सन्धि

#### 2. अपठित बोध -

(क) काव्यांश पर आधारित प्रश्न, भाव सौंदर्य, शिल्प -- सौंदर्य

(ख) गद्यांश (साहित्यिक / वर्णनात्मक)

3. (i) समसामयिक विषय,

(ii) वर्णनात्मक विषय

(iii) सर्जनात्मक विषय

(iv) साहित्यिक विषय

4. काव्यशास्त्रीय अध्ययन

(i) साहित्य का अर्थ, स्वरूप, उद्देश्य

(ii) साहित्य की विविध विधाएँ

(iii) रस-मीमांसा सभी रसों का ज्ञान, काव्य की आत्मा के रूप में रस मीमांसा

(iv) शब्द शक्ति अभिधा, लक्षणा, व्यंजना -

(v) काव्य-गुण प्रसाद, माधुर्य, ओज -

(vi) काव्य- -दोष विस्तृत जानकारी -

(vii) छंद ज्ञान वर्णिक, मात्रिक

(viii) अलंकार शब्दालंकार, अर्थालंकार, उभयालंकार एवं नए अलंकार

खण्ड ग – लेखन कौशल और पत्रकारिता

1. पत्रकारिता से संबंधित विषय

(i) प्रिंट माध्यम (समाचार और संपादकीय)

(ii) रिपोर्ट

(iii) आलेख

(iv) फीचर लेखन

(v) साक्षात्कार

(vi) रेडियो व दूरदर्शन के लिए लेखन?

(vii) विज्ञापन लेखन

(viii) उद्घोषणा

(ix) स्वागत भाषण

(x) संगोष्ठी संचालन

2. व्यावहारिक लेखन पर एक विषयपरक प्रश्न

(i) व्यावहारिक हिन्दी का स्वरूप

(ii) प्रयोजनमूलक हिन्दी और उसके विविध आयाम

(iii) कार्यालयी हिन्दी और उसके विविध आयाम

(iv) प्रतिवेदन, अर्थ, प्रमुख तत्व, विशेषताएँ, प्रकार प्रतिवेदन लेखन

(v) कार्यसूची कार्यसूची तैयार करने का नमूना

(vi) कार्यवृत्ता स्वरूप, निर्माण

3. सर्जनात्मक लेखन एवं मौलिक अभिव्यक्ति पर एक विषयपरक प्रश्न कविता, कहानी, लघुकथा, डायरी लेखन आदि के रूप में –

(i) दिए गए विषय पर कविता, लघुकथा संबंधी मौलिक रचना

(ii) कहानी का कविता में रूपान्तरण

(iii) अनुभवों के आधार पर लेखन

4. विभिन्न दक्षताओं के विकास हेतु एक विषयपरक प्रश्न

(i) वार्तालाप की दक्षता के विकास हेतु संवाद लेखन ।

(ii) कोई भी समसामयिक विषय द्वारा कहानी/कविता लेखन ।