Detailed Syllabus of ISAT

Syllabus - Physics

Mechanics

Units and Measurements

Motion in a straight line

Motion in a plane

Laws of motion

Work, Power and Energy

System of particles and rotational motion

Gravitation

Electromagnetism

Electrostatic Potential and capacitance

Electric charges and Fields

Alternating Current

Electromagnetic induction

Moving charges and Magnetism

Current Electricity

Magnetism and Matter

Optics and Waves

Ray Optics and Optical Instruments

Wave Optics

Waves

Properties of Matter, Thermodynamics

Kinetic theory

Thermal properties of matter

Mechanical properties of solids

Thermodynamics

Syllabus - Chemistry

Inorganic Chemistry

Basic Concepts of Chemistry

Classification of Elements and Periodicity in Properties

d and f Block Elements

S-Block Elements (Group 1 and Group 2 elements

P-Block Elements

Actinides

Hydrogen

General Principles and Processes of Isolation of Elements

Lanthanides

Physical Chemistry

States of Matter

Thermodynamics

Equilibrium

Redox Reactions

Electrochemistry

Chemical Kinetics

Surface Chemistry

Nuclear chemistry

Organic Chemistry

Hydrocarbons

Aromatic hydrocarbons

Haloalkanes and haloarenes

Aldehydes, Organic Compounds Containing Nitrogen, Ketones and Carboxylic Acids

Alcohols, Phenols and Ethers

Syllabus - Mathematics

Binomial Theorem and Its Simple Applications

Sets, Relations and Functions

Mathematical Induction

Permutations and Combinations

Sequences and Series

Trigonometry

Matrices and Determinants

Complex Numbers and Quadratic Equations

Limit, Continuity and Differentiability

Three-Dimensional Geometry

Integral Calculus

Differential Equations

Co-Ordinate Geometry

Statistics and Probability

Vector Algebra

ISI Admission Test B.Stat and B.Maths Syllabus Topics

- Algebra and Number Theory
- Trigonometry
- Geometry
- Calculus

Algebra and Number Theory

- Sets, operations on sets.
- Remainder Theorem, Theory of quadratic equations and expressions

- Rational and irrational numbers
- Polynomials: relations between roots and coefficients
- Binomial Theorem
- Permutations and combinations
- Inequalities involving arithmetic, geometric & harmonic means
- Prime numbers, factorization of integers and divisibility
- Logarithms
- Arithmetic and geometric progressions
- Complex numbers

Trigonometry

- Properties of triangles, heights, and distances
- Measures of angles, trigonometric and inverse trigonometric functions, trigonometric identities including addition formulae, solutions of trigonometric equations

Geometry

- Class 10 level plane geometry
- The angle between two lines
- Distance from a point to a line, area of a triangle, equations of a circle, parabola, ellipse and hyperbola and equations of their tangents and normals, mensuration
- The geometry of 2 dimensions with Cartesian and polar coordinates, the concept of a locus, equation of a line

Calculus

- Functions – one-one functions, onto functions
- Derivatives and methods of differentiation
- Limit, continuity, and differentiability of functions of a single real variable
- Methods of integration, defi nite and indefi nite integrals
- The slope of a curve, tangents, and normals
- Maxima and minima
- Sequences – bounded sequences, monotone sequences, the limit of a sequence
- Use of calculus in sketching graphs of functions
- Evaluation of areas using integrals

Applicants who are eagerly waiting for the ISI Admission Test can start preparing for the test. In this article, we have provided the details clearly along with the Course Wise **Indian Statistical Institute Admission Test Syllabus**. Therefore, candidates don't get confused and right now start your preparation to get admission in the **Indian Statistical Institute**. As we

all know that it is one of the reputed university. Every year an enormous number of people are applying for the entrance exams to get admission. So to help those talented and capable competitors, we have provided detailed information.

AIEEE Exam Syllabus

Mathematics syllabus:

1. UNIT 1: SETS,RELATIONS,FUNCTIONS.
2. UNIT 2: COMPLEX NUMBERS AND QUADRATIC EQATIONS.
3. UNIT 3. MATRICES AND DETERMINANTS.
4. UNIT 4:PERMUTATIONS AND COMBINATIONS.
5. UNIT 5: MATHEMATICAL INDUCTION.
6. UNIT 6: BINOMIAL THEROM AND IT'S SIMPLE APPLICATIONS.
7. UNIT 7: SEQUENCES AND SERIES.
8. UNIT 8: LIMIT,CONTINUITY AND DIFFERENTIABILITY.
9. UNIT 9: INTEGRAL CALCULUS.
10. UNIT 10: DIFFERENTIAL EQUATIONS.
11. UNIT 11: CO-ORDINATE GEOMETRY.
    - STRAIGHT LINES.
    - CONICAL SECTIONS,CIRCLES
12. UNIT 12: THREE DIMENSIONAL GEOMETRY.
13. UNIT 13: VECTOR ALGEBRA
14. UNIT 14: STATISTICS AND PROBABILITY
    - Measurement Of Dispersion
    - Probability
15. UNIT 15: TRIGONOMETRY
16. UNIT 16: MATHEMATICAL REASONING

Physics syllabus:

SECTION - A

1. UNIT 1: PHYSICS AND MEASUREMENT

- Physics, technology and society, SI units, Fundamental and derived units
- Least count, accuracy and precision of measuring instruments, Errors in measurement, Dimensions of Physical quantities, dimensional analysis and its applications.

2. UNIT 2: KINEMATICS
   - Frame of reference, Motion in a straight line: Position-time graph, speed and velocity
   - Uniform and non-uniform motion, average speed and instantaneous velocity
   - Uniformly accelerated motion, velocity-time, position-time graphs, relations for uniformly accelerated motion. Scalars and Vectors, Vector addition and Subtraction, Zero Vector, Scalar and Vector products, Unit Vector, Resolution of a Vector
   - Relative Velocity, Motion in a plane, Projectile Motion, Uniform Circular Motion.
3. UNIT 3: LAWS OF MOTION
   - Force and Inertia, Newton's First Law of motion; Momentum, 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
   - Dynamics of uniform circular motion: Centripetal force and its applications.
4. UNIT 4: WORK, ENERGY AND POWER
   - Work done by a constant force and a variable force; kinetic and potential energies, work energy theorem, power
   - Potential energy of a spring, conservation of mechanical energy, conservative and non- conservative forces; Elastic and inelastic collisions in one and two dimensions.
5. UNIT 5: ROTATIONAL MOTION
   - Centre of mass of a two-particle system, Centre of mass of a rigid body
   - Basic concepts of rotational motion; moment of a force, torque, angular momentum, conservation of angular momentum and its applications; moment of inertia, radius of gyration
   - Values of moments of inertia for simple geometrical objects, parallel and perpendicular axes theorems and their applications, Rigid body rotation, equations of rotational motion.
6. UNIT 6: GRAVITATION
   - The universal law of gravitation
   - Acceleration due to gravity and its variation with altitude and depth
   - Kepler's laws of planetary motion, Gravitational potential energy; gravitational potential. Escape velocity. Orbital velocity of a satellite, Geo-stationary satellites.
7. UNIT 7: PROPERTIES OF SOLIDS AND LIQUIDS

- Elastic behaviour, Stress-strain relationship, Hooke's Law, Young's modulus, bulk modulus, modulus of rigidity. Pressure due to a fluid column
- Pascal's law and its applications. Viscosity, Stokes' law, terminal velocity, streamline and turbulent flow, Reynolds number
- Bernoulli's principle and its applications. Surface energy and surface tension, angle of contact, application of surface tension - drops, bubbles and capillary rise
- Heat, temperature, thermal expansion; specific heat capacity, calorimetry; change of state, latent heat. Heat transfer conduction, convection and radiation, Newton's law of cooling.

8. UNIT 8: THERMODYNAMICS
   - Thermal equilibrium, zeroth law of thermodynamics, concept of temperature
   - Heat, work and internal energy
   - First law of thermodynamics. Second law of thermodynamics: reversible and irreversible processes. Carnot engine and its efficiency.
9. UNIT 9: KINETIC THEORY OF GASES
   - Equation of state of a perfect gas, work done on compressing a gas
   - Kinetic theory of gases - assumptions, concept of pressure. Kinetic energy and temperature: rms speed of gas molecules; Degrees of freedom, Law of equi partition of energy, applications to specific heat capacities of gases
   - Mean free path, Avogadro's number.
10. UNIT 10: OSCILLATIONS AND WAVES
    - Periodic motion - period, frequency, displacement as a function of time. Periodic functions. Simple harmonic motion (S.H.M.) and its equation; phase; oscillations of a spring -restoring force and force constant; energy in S.H.M. - kinetic and potential energies
    - Simple pendulum - derivation of expression for its time period; Free, forced and damped oscillations, resonance.
    - Wave motion. Longitudinal and transverse waves, speed of a 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, Doppler effect in sound
11. UNIT 11: ELECTROSTATICS
    - Electric charges: Conservation of charge, Coulomb's law-forces 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 a uniform electric field
    - Electric flux, Gauss's law and its applications to find field due to infinitely long uniformly charged straight wire, uniformly charged infinite plane sheet and uniformly charged thin spherical shell. Electric potential and its calculation for a point charge, electric dipole and system of charges
    - Equipotential surfaces, Electrical potential energy of a system of two point charges in an electrostatic field

- Conductors and insulators, Dielectrics and electric polarization, capacitor, 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.

12. UNIT 12: CURRRENT ELECTRICITY

    - Electric current, Drift velocity, Ohm's law, Electrical resistance, Resistances of different materials, V-I characteristics of Ohmic and non ohmic conductors, Electrical energy and power, Electrical resistivity, Colour code for resistors
    - Series and parallel combinations of resistors; Temperature dependence of resistance
    - Electric Cell and it s Internal resistance, potential difference and emf of a cell, combination of cells in series and in parallel
    - Kirchhoff's laws and their applications. Wheatstone bridge, Metre bridge
    - Potentiometer - principle and its applications.

13. UNIT 13: MAGNETIC EFFECTS OF CURRENT AND MAGNETISM

    - Biot - Savart law and its application to current carrying circular loop. Ampere's law and its applications to infinitely long current carrying straight wire and solenoid. Force on a moving charge in uniform magnetic and electric fields. Cyclotron.
    - 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
    - Moving coil galvanometer, its current sensitivity and conversion to ammeter and voltmeter.
    - Current loop as a magnetic dipole and its magnetic dipole moment. Bar magnet as an equivalent solenoid, magnetic field lines; Earth's magnetic field and magnetic elements. Para-, dia- and ferro- magnetic substances.
    - Magnetic susceptibility and permeability, Hysteresis, Electromagnets and permanent magnets

14. UNIT 14: ELECTROMAGNETIC INDUCTION AND ALTERNATING CURRENTS

    - Electromagnetic induction, Faraday's law, induced emf and current Lenz's Law, Eddy currents, Self and mutual inductance.
    - Alternating currents, peak and rms value of alternating current/ voltage;
    - Reactance and impedance LCR series circuit, resonance;
    - Quality factor, power in AC circuits, wattless current.
    - AC generator and transformer.

15. UNIT 15: ELECTROMAGNETIC WAVES

    - Electromagnetic waves and their characteristics. Transverse nature of electromagnetic waves.
    - Electromagnetic spectrum (radio waves, microwaves, infrared, visible, ultraviolet, Xrays, gamma rays). Applications of e.m. waves.

16. UNIT 16: OPTICS

- Reflection and refraction of light at plane and spherical surfaces, mirror formula, Total internal reflection and its applications, Deviation and Dispersion of light by a prism, Lens Formula, Magnification, Power of a Lens, Combination of thin lenses in contact, Microscope and Astronomical Telescope (reflecting and refracting) and their magnifying powers

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- Wave optics: wave front and Huygens' principle, Laws of reflection and refraction using Huygen's principle.
- Interference, Young's double slit experiment and expression for fringe width.
- Diffraction due to a single slit, width of central maximum.
- Resolving power of microscopes and astronomical telescopes, Polarisation, plane polarized light
- Brewster's law, uses of plane polarized light and Polaroids.

17. UNIT 17: DUAL NATURE OF MATTER ANDRADIATION
    - Dual nature of radiation. Photoelectric effect, Hertz and Lenard's observations; Einstein's photoelectric equation; particle nature of light. Matter waves- wave nature of particle, de Broglie relation.
    - Davisson-Germer experiment.
18. UNIT 18: ATOMS AND NUCLEAR
    - Alpha-particle scattering experiment; Rutherford's model of atom; Bohr model, energy levels, hydrogen spectrum.
    - Composition and size of nucleus, atomic masses, isotopes, isobars; isotones.
    - Radioactivity-alpha, beta and gamma particles/rays and their properties; radioactive decay law.
    - Mass-energy relation, mass defect; binding energy per nucleon and its variation with mass number, nuclear fission and fusion.
19. UNIT 19: ELECTRONIC DEVICES
    - Semiconductors; semiconductor diode: I-V characteristics in forward and reverse bias; diode as a rectifier; I-V characteristics of LED, photodiode, solar cell and Zener diode; Zener diode as a voltage regulator.
    - Junction transistor, transistor action, characteristics of a transistor; transistor as an amplifier (common emitter configuration) and oscillator.
    - Logic gates (OR, AND, NOT, NAND and NOR), Transistor as a switch.
20. UNIT 20: COMMUNICATION SYSTEMS
    - Propagation of electromagnetic waves in the atmosphere; Sky and space wave propagation, Need for modulation, Amplitude and Frequency Modulation, Bandwidth of signals, Bandwidth of Transmission medium, Basic Elements of a Communication System (Block Diagram only).

SECTION -B

21. UNIT 21: EXPERIMENTAL SKILLS

Familiarity with the basic approach and observations of the experiments and activities:

- Vernier callipers-its use to measure internal and external diameter and depth of a vessel.
- Screw gauge-its use to determine thickness/diameter of thin sheet/wire.
- Simple Pendulum-dissipation of energy by plotting a graph between square of amplitude and time.
- Metre Scale - mass of a given object by principle of moments.
- Young's modulus of elasticity of the material of a metallic wire.
- Surface tension of water by capillary rise and effect of detergents.
- Co-efficient of Viscosity of a given viscous liquid by measuring terminal velocity of a given spherical body.
- Plotting a cooling curve for the relationship between the temperature of a hot body and time.
- Speed of sound in air at room temperature using a resonance tube.
- Specific heat capacity of a given (i) solid and (ii) liquid by method of mixtures.
- Resistivity of the material of a given wire using metre bridge.
- Resistance of a given wire using Ohm's law.
- Potentiometer - (i) Comparison of emf of two primary cells (ii) Determination of internal resistance of a cell
- Resistance and figure of merit of a galvanometer by half deflection method
- Focal length of (i) Convex mirror (ii) Concave mirror, and (iii) Convex lens - using parallax method.
- Plot of angle of deviation vs angle of incidence for a triangular prism.
- Refractive index of a glass slab using a travelling microscope.
- Characteristic curves of a p-n junction diode in forward and reverse bias.
- Characteristic curves of a Zener diode and finding reverse break down voltage.
- Characteristic curves of a transistor and finding current gain and voltage gain.
- Identification of Diode, LED, Transistor, IC, Resistor, Capacitor from mixed collection of such items.
- Using multimeter to:
  - Identify base of a transistor
  - Distinguish between npn and pnp type transistor
  - See the unidirectional flow of current in case of a diode and an LED.
  - Check the correctness or otherwise of a given electronic component (diode, transistor or IC).

Chemistry syllabus

1. UNIT 1: Some Basic conceptS IN CHEMISTRY Matter and its nature, Dalton's atomic theory; Concept of atom, molecule, element and compound; Physical quantities and their measurements in Chemistry, precision and accuracy, significant figures, S.I. Units, dimensional analysis; Laws of chemical combination; Atomic and molecular masses, mole concept, molar mass, percentage composition, empirical and molecular formulae; Chemical equations and stoichiometry.

2. UNIT 2: States of Matter Classification of matter into solid, liquid and gaseous states. Gaseous State: Measurable properties of gases; Gas laws - Boyle's law, Charle's law, Graham's law of diffusion, Avogadro's law, Dalton's law of partial pressure; Concept of Absolute scale of temperature; Ideal gas equation, Kinetic theory of gases (only postulates); Concept of average, root mean square and most probable velocities; Real gases, deviation from Ideal behaviour, compressibility factor, van der Waals equation, liquefaction of gases, critical constants. Liquid State: Properties of liquids - vapour pressure, viscosity and surface tension and effect of temperature on them (qualitative treatment only). Solid State: Classification of solids: molecular, ionic, covalent and metallic solids, amorphous and crystalline solids (elementary idea); Bragg's Law and its applications; Unit cell and lattices, packing in solids (fcc, bcc and hcp lattices), voids, calculations involving unit cell parameters, imperfection in solids; Electrical, magnetic and dielectric properties.

3. UNIT 3: Atomic Structure Discovery of sub-atomic particles (electron, proton and neutron); Thomson and Rutherford atomic models and their limitations; Nature of electromagnetic radiation, photoelectric effect; Spectrum of hydrogen atom, Bohr model of hydrogen atom - its postulates, derivation of the relations for energy of the electron and radii of the different orbits, limitations of Bohr's model; Dual nature of matter, de-Broglie's relationship, Heisenberg uncertainty principle. Elementary ideas of quantum mechanics, quantum mechanical model of atom, its important features, * and *2, concept of atomic orbitals as one electron wave functions; Variation of * and * 2 with r for 1s and 2s orbitals; various quantum numbers (principal, angular momentum and magnetic quantum numbers) and their significance; shapes of s, p and d - orbitals, electron spin and spin quantum number; Rules for filling electrons in orbitals - aufbau principle, Pauli's exclusion principle and Hund's rule, electronic configuration of elements, extra stability of half-filled and completely filled orbitals.

4. UNIT 4: Chemical Bonding and Molecular Structure Kossel - Lewis approach to chemical bond formation, concept of ionic and covalent bonds. Ionic Bonding: Formation of ionic bonds, factors affecting the formation of ionic bonds; calculation of lattice enthalpy. Covalent Bonding: Concept of electronegativity, Fajan's rule, dipole moment; Valence Shell Electron Pair Repulsion (VSEPR) theory and shapes of simple molecules. Quantum mechanical approach to covalent bonding: Valence bond theory - Its important features, concept of hybridization involving s, p and d orbitals; Resonance. Molecular Orbital Theory - Its important features, LCAOs, types of molecular orbitals (bonding, antibonding), sigma and pi-bonds, molecular orbital electronic configurations of homonuclear diatomic molecules, concept of bond order, bond length and bond energy. Elementary idea of metallic bonding. Hydrogen bonding and its applications.

5. UNIT 5: CHEMICAL THERMODYNAMICS Fundamentals of thermodynamics: System and surroundings, extensive and intensive properties, state functions, types of processes. First law of thermodynamics - Concept of work, heat internal energy and enthalpy, heat capacity, molar heat capacity; Hess's law of constant heat summation; Enthalpies of bond dissociation, combustion, formation, atomization, sublimation, phase transition, hydration, ionization and solution. Second law of thermodynamics- Spontaneity of processes; DS of the universe and DG of the system as criteria for spontaneity, DGo (Standard Gibbs energy change) and equilibrium constant.

6. UNIT 6: SOLUTIONS Different methods for expressing concentration of solution - molality, molarity, mole fraction, percentage (by volume and mass both), vapour pressure of solutions and Raoult's Law - Ideal and non-ideal solutions, vapour pressure - composition, plots for ideal and non-ideal solutions; Colligative properties of dilute solutions - relative lowering of vapour pressure, depression of freezing point, elevation of boiling point and osmotic pressure; Determination of molecular mass using colligative properties; Abnormal value of molar mass, van't Hoff factor and its significance.

7. UNIT 7: EQUILIBRIUM Meaning of equilibrium, concept of dynamic equilibrium. Equilibria involving physical processes: Solid -liquid, liquid - gas and solid - gas equilibria, Henry's law, general characterics of equilibrium involving physical processes. Equilibria involving chemical processes: Law of chemical equilibrium, equilibrium constants (Kp and Kc) and their significance, significance of DG and DGo in chemical equilibria, factors affecting equilibrium concentration, pressure, temperature, effect of catalyst; Le Chatelier's principle. Ionic equilibrium: Weak

and strong electrolytes, ionization of electrolytes, various concepts of acids and bases (Arrhenius, Br?nsted - Lowry and Lewis) and their ionization, acid - base equilibria (including multistage ionization) and ionization constants, ionization of water, pH scale, common ion effect, hydrolysis of salts and pH of their solutions, solubility of sparingly soluble salts and solubility products, buffer solutions.

8. UNIT 8: REDOX REACTIONS AND ELECTROCHEMISTRY Electronic concepts of oxidation and reduction, redox reactions, oxidation number, rules for assigning oxidation number, balancing of redox reactions. Eectrolytic and metallic conduction, conductance in electrolytic solutions, specific and molar conductivities and their variation with concentration: Kohlrausch's law and its applications. Electrochemical cells - Electrolytic and Galvanic cells, different types of electrodes, electrode potentials including standard electrode potential, half - cell and cell reactions, emf of a Galvanic cell and its measurement; Nernst equation and its applications; Relationship between cell potential and Gibbs' energy change; Dry cell and lead accumulator; Fuel cells; Corrosion and its prevention.

9. UNIT 9: CHEMICAL KINETICS Rate of a chemical reaction, factors affecting the rate of reactions: concentration, temperature, pressure and catalyst; elementary and complex reactions, order and molecularity of reactions, rate law, rate constant and its units, differential and integral forms of zero and first order reactions, their characteristics and half - lives, effect of temperature on rate of reactions - Arrhenius theory, activation energy and its calculation, collision theory of bimolecular gaseous reactions (no derivation).

10. UNIT 10: SURFACE CHEMISTRY Adsorption- Physisorption and chemisorption and their characteristics, factors affecting adsorption of gases on solids - Freundlich and Langmuir adsorption isotherms, adsorption from solutions. Catalysis - Homogeneous and heterogeneous, activity and selectivity of solid catalysts, enzyme catalysis and its mechanism. Colloidal state - distinction among true solutions, colloids and suspensions, classification of colloids - lyophilic, lyophobic; multi molecular, macromolecular and associated colloids (micelles), preparation and properties of colloids - Tyndall effect,Brownian movement, electrophoresis, dialysis, coagulation and flocculation; Emulsions and their characteristics.

SECTION-B INORGANIC CHEMISTRY

11. UNIT 11: CLASSIFICATON OF ELEMENTS AND PERIODICITY IN PROPERTIES Modem periodic law and present form of the periodic table, s, p, d and f block elements, periodic trends in properties of elementsÂ¬atomic and ionic radii, ionization enthalpy, electron gain enthalpy, valence, oxidation states and chemical reactivity.

12. UNIT 12: GENERAL PRINCIPLES AND PROCESSES OF ISOLATION OF METALS Modes of occurrence of elements in nature, minerals, ores; steps involved in the extraction of metals - concentration, reduction (chemical. and electrolytic methods) and refining with special reference to the extraction of Al, Cu, Zn and Fe; Thermodynamic and electrochemical principles involved in the extraction of metals.

13. UNIT 13: HYDROGEN Position of hydrogen in periodic table, isotopes, preparation, properties and uses of hydrogen; Physical and chemical properties of water and heavy water; Structure, preparation, reactions and uses of hydrogen peroxide; Classification of hydrides - ionic, covalent and interstitial; Hydrogen as a fuel.

14. UNIT 14: S - BLOCK ELEMENTS (ALKALI AND ALKALINE EARTH METALS) Group - 1 and 2 Elements General introduction, electronic configuration and general trends in physical and chemical properties of elements, anomalous properties of the first element of each group, diagonal relationships. Preparation and properties of some important compounds - sodium carbonate, sodium chloride, sodium hydroxide and sodium hydrogen carbonate; Industrial uses of lime, limestone, Plaster of Paris and cement; Biological significance of Na, K, Mg and Ca.

15. UNIT 15: P - BLOCK ELEMENTS Group - 13 to Group 18 Elements General Introduction: Electronic configuration and general trends in physical and chemical properties of elements across the periods and down the groups; unique behaviour of the first element in each group. Groupwise study of the p - block elements Group - 13 Preparation, properties and uses of boron and aluminium; Structure, properties and uses of borax, boric acid, diborane, boron trifluoride, aluminium chloride and alums. Group - 14 Tendency for catenation; Structure, properties and uses of

allotropes and oxides of carbon, silicon tetrachloride, silicates, zeolites and silicones. Group - 15 Properties and uses of nitrogen and phosphorus; Allotrophic forms of phosphorus; Preparation, properties, structure and uses of ammonia, nitric acid, phosphine and phosphorus halides, (PCl3, PCl5); Structures of oxides and oxoacids of nitrogen and phosphorus. Group - 16 Preparation, properties, structures and uses of dioxygen and ozone; Allotropic forms of sulphur; Preparation, properties, structures and uses of sulphur dioxide, sulphuric acid (including its industrial preparation); Structures of oxoacids of sulphur. Group - 17 Preparation, properties and uses of chlorine and hydrochloric acid; Trends in the acidic nature of hydrogen halides; Structures of Interhalogen compounds and oxides and oxoacids of halogens. Group -18 Occurrence and uses of noble gases; Structures of fluorides and oxides of xenon.

16. UNIT 16: d - and f - BLOCK ELEMENTS Transition Elements General introduction, electronic configuration, occurrence and characteristics, general trends in properties of the first row transition elements - physical properties, ionization enthalpy, oxidation states, atomic radii, colour, catalytic behaviour, magnetic properties, complex formation, interstitial compounds, alloy formation; Preparation, properties and uses of K2Cr2O7 and KMnO4. Inner Transition Elements Lanthanoids - Electronic configuration, oxidation states, chemical reactivity and lanthanoid contraction. Actinoids - Electronic configuration and oxidation states.
17. UNIT 17: CO-ORDINATION COMPOUNDS Introduction to co-ordination compounds, Werner's theory.
18. UNIT 18: ENVIRONMENTAL CHEMISTRY Environmental pollution.
19. UNIT 19: Purification and Characterisation of Organic Compounds Purification.
20. UNIT 20: Basic principles of organix chemistry.
21. UNIT 21: Hydrocarbons Classification, isomerism, IUPAC nomenclature, general methods of preparation, properties and reactions.
22. UNIT 22: Organic Compounds Containing Halogens General methods of preparation, properties and reactions.
23. UNIT 23: Organic compounds containing Oxygen General methods of preparation, properties, reactions and uses.
24. UNIT 24: Organic Compounds Containing Nitrogen General methods of preparation, properties, reactions and uses.
25. UNIT 25: Polymers General introduction and classification of polymers, general methods of polymerization
26. UNIT 26: Bio Molecules General introduction and importance of biomolecules.
27. UNIT 27: Chemistry in everyday life Chemicals in medicines.
28. UNIT 28: Principles related to practical Chemistry Detection of extra elements (N,S, halogens) in organic compounds;

NEET SYLLABUS

CHEMISTRY

Class 11

- Some Basic Concepts of Chemistry
- Structure of Atom
- Classification of Elements and Periodicity in Properties
- Chemical Bonding and Molecular Structure

- States of Matter: Gases and Liquids
- Thermodynamics
- Equilibrium
- Redox Reactions
- Hydrogen
- s-Block Element (Alkali and Alkaline earth metals)
- Some p-Block Elements
- Organic Chemistry- Some Basic Principles and Techniques
- Hydrocarbons
- Environmental Chemistry

Class 12

- Solid State
- Solutions
- Electrochemistry
- Chemical Kinetics
- Surface Chemistry
- General Principles and Processes of Isolation of Elements
- p- Block Elements
- d and f Block Elements
- Coordination Compounds
- Haloalkanes and Haloarenes
- Alcohols, Phenols and Ethers
- Aldehydes, Ketones and Carboxylic Acids
- Organic Compounds Containing Nitrogen
- Biomolecules
- Polymers
- Chemistry in Everyday Life

PHYSICS

Class 11

- Physical-world and measurement
- Kinematics
- Laws of Motion
- Work, Energy and Power
- Motion of System of Particles and Rigid Body
- Gravitation
- Properties of Bulk Matter
- Thermodynamics
- Behaviour of Perfect Gas and Kinetic Theory
- Oscillations and Waves

Class 12

- Electrostatics
- Current Electricity
- Magnetic Effects of Current and Magnetism
- Electromagnetic Induction and Alternating Currents
- Electromagnetic Waves
- Optics
- Dual Nature of Matter and Radiation
- Atoms and Nuclei
- Electronic Devices

BIOLOGY

Class 11

- Diversity in Living World
- Structural Organisation in Animals and Plants
- Cell Structure and Function
- Plant Physiology
- Human physiology

Class 12

- Reproduction

- Genetics and Evolution
- Biology and Human Welfare
- Biotechnology and Its Applications
- Ecology and environment

DIFFERENCE BETWEEN CAT, MAT AND CMAT

Having understood the formats of these exams, now let's have a look at the key differences between these exams with the help of a table.

Basic	**CAT**	**CMAT**	**MAT**
Number of Sections	Three	Four	Five
Duration	180 Minutes	180 Minutes	150 Minutes
No. of Questions	100	100 (25 from each section)	200 (40 from each section)
No. of Papers	1	1	1
Test Centre	Candidates can choose four cities as per the choices	Candidates can choose three cities	Candidates can choose three cities
Level of Difficulty	High	Moderate	Moderate
Marking Scheme	Correct Answer: +3 Incorrect Answer: -1	Correct Answer: +4 Incorrect Answer: -1	Correct Answer: +1 Incorrect Answer: -.25

No. of Exam conducted per year	Once in a year	Once in a year	Four times in a year

Section	CAT	CMAT	MAT
Logical Reasoning	✓	✓	✓
Verbal Ability	✓	✓	✓
Quantitative Aptitude	✓	✓	✓
General Knowledge	X	✓	✓

Difference between MAT Syllabus and CMAT Syllabus:

The major difference in syllabus of MAT and CMAT exams is of the subjects included in the question papers i.e. MAT exam has one additional subject - Indian and Global Environment section carrying questions on general knowledge topics. Where in CMAT exam, the General Awareness section has same topics. Moreover, Indian and Global Environment is not considered while evaluating final scores and percentiles of MAT but for CMAT, the General Awareness section has equal importance like other sections in final results and rank calculation. Check below the difference in syllabus of both the exams:

abus	**CMAT Syllabus**

natical Skills Topics Number System Mixtures and Allegation Profit and Loss Interest & Percentage Ratio and Proportion Trigonometry Algebra	Quantitative Techniques & Data Interpretation Topics • Algebra • Time, Speed, Distance & Work • Allegation and Mixtures • Geometry • Graph, Charts and Tables • Quadratic Equation • Linear Equations
nce and Critical Reasoning Topics Passage Conclusions Fact Inference Judgment Statement Argument Blood Relations Charts and Analogy	Logical Reasoning Topics • Analytical Reasoning • Linear Arrangements • Series • Matrix Arrangements • Blood Relations
ge Comprehension Topics Fill in the blanks Reading Comprehension English proficiency Vocabulary and grammar Para Jumble	Language Comprehension Topics • Reading Passage • Grammar • Usage Errors • Para jumbles • Sentences
& Global Environment Topics Current Affairs World Records Books and Authors Top Officials of Big Companies Space Research Missions Awards – National, International and Different	General Awareness Topics • Economic events • Corporate events • Current affairs • Politics • Sports • Culture & Society

Industries	
alysis and Sufficiency Topics Data Interpretation in Tables, Graphs Data Sufficiency – Sentence and Conclusions Venn Diagram Charts (Column, Bar, Pie)	

TOEFL VS IELTS

The TOEFL (Test of English as a Foreign Language) and IELTS (International English Language Testing System) are two of the most widely-accepted tests to certify your English proficiency. The decision to take the TOEFL vs IELTS will ultimately depend on a number of factors. At this point, you may even be asking, “What is the TOEFL test?” or “What is the IELTS?” Read on to discover which test is best for you.

EXAM	TOEFL	IELTS
Length	About 3 hours long	2 hours and 45 minutes long
Locations	Available at over 500 locations in the US, over 4,500 worldwide	Available at 59 locations in the US, about 900 worldwide
Price	Cost is usually between 160	Cost varies widely even within the same country; usually is around

EXAM	TOEFL	IELTS
	and 200 USD	200 USD

Scoring	Score on a sliding scale from 0 to 120	Score in any of 9 "bands," or levels

TOEFL vs IELTS at a glance

The TOEFL and IELTS exams are fairly different, and therefore some people will find that they are naturally better suited for one than they are for the other. You probably want to know which test *you* should study for. But before we discuss their similarities and differences, remember that both IELTS and TOEFL are standardized tests.

The TOEFL is a language test for non-native English speakers, and is commonly used as an entrance exam at universities and graduate schools. Because of this, the TOEFL offers only academic English. On the other hand, the IELTS offers an academic option as well as a general test; this is generally the preferred test for immigration purposes to the UK and Canada.

The IELTS academic test and the TOEFL compared to the IELTS general test are both more difficult, but they are usually the only options if you want to study at any level higher than secondary school. No matter which test you take, be aware that the scores all expire 2 years after your test date.

When you compare the format of the IELTS, you will notice a couple of things. First of all, both of them have four basic sections, each of which tests a basic skill (reading, listening, speaking, writing). But while the TOEFL only tests academic subjects, the IELTS academic option will have academic reading and writing sections combined with general listening and speaking sections. Overall, the IELTS has more of a real-world feel than the TOEFL. versus the IELTS truly depends on your English background.

The IELTS also doesn't have a listening component on the integrated assignments, although on one of the two assignments you will have to incorporate a graphic or other written information source into your argument. Both tests contain an independent question that simply asks your opinion about some issue.

The TOEFL speaking section is done by recorder and mostly involves explaining your opinions and summarizing/interpreting information from other sources. On the IELTS, your speaking test will take place in person and will include a short speech (you'll have a small period in which to prepare it) and a conversation component.

Although it would be great if every English program gave equal time to each major dialect of English, the vast majority of students spend 90% of their time with only one dialect. If you're most experienced with American English, you may find some parts of the IELTS unfamiliar; if you've learned British English or another dialect, the TOEFL will feel a little strange. It's important to note that neither test will penalize you for using one or the other dialect, as long as your answers are fluent, clear, and, of course, correct.

WB POLICE CONSTABLE RECRUITMENT PROCESS :

- Preliminary Written Test
- Physical Measurement Test (PMT)
- Physical Efficiency Test (PET)
- Final Written Exam
- Interview

Preliminary Written Test

Exam Pattern :-

The Exam Pattern will be as Follows:

- The Exam Will be Written Objective Type.
- The Exam Will be of **100 Questions/ Marks**.
- The Time Duration For the Exam Will be **1 hours**.
- The Preliminary Exam Will be **Qualifying in Nature**.
- There will be **NEGATIVE** marking of **¼th Marks**.
- The question paper will be set in **two languages** (Bengali & Nepali).
- Questions of the Preliminary Written Test shall be from the following subjects: –

Sr. No,	Name of Subjects	Max. Marks
i.	General Awareness and General Knowledge	50 Marks
ii.	Elementary Mathematics (Madhyamik standard)	30 Marks
iii.	Reasoning	20 Marks

Syllabus :

The West Bengal Police Constable Syllabus Will be as Follows:

General Awareness & General Knowledge :- History, Geography and Socio Economic development of West Bengal & India. Knowledge of current events of National and International importance and such matters of every day observation and experience in their scientific aspects as may be expected of an educated person who has not made a special study of any

scientific subject. Paper will also include questions on Modern History of India, Indian culture, Indian Polity, Indian Economy, Geography of India.

Elementary Mathematics :- The test of Arithmetical and Numerical abilities will cover Number Systems including questions on Simplification, Decimals, Fractions, L.C.M., H.C.F., Ratio & Proportion, Percentage, Average, Profit & Loss, Discount, Simple & Compound Interest, Mensuration, Time & Work, Time & Distance, Tables & Graphs, etc.

Reasoning :- Questions will be from topics- Analogies, Similarities, Differences, Space visualization, Problem solving, Analysis and Judgment, Decision-making, Visual memory, Discrimination, Observation, Relationship, Concepts, Arithmetical reasoning, Verbal and figure classification, Arithmetical number series, Abilities to deal with abstract ideas and symbols and their relationships, Arithmetical computations and other analytical functions.

Physical Measurement Test (PMT)

Minimum Physical Standard: –

Must have a minimum physical measurement as mentioned below: –

Category	**Height (Barefoot) (in cm.)**	**Weight (in kg.)**	**Chest (in cm)**
Candidates of all categories (except Gorkhas, Garhwalies, Rajbanshis and Scheduled Tribes)	167	57	78 cms – 83 cms
Gorkhas, Garhwalies, Rajbanshis and Scheduled Tribes	160	53	76 cms – 81 cms.

Physical Efficiency Tests :

Candidates who will qualify in PMT will be allowed to take part in PET which consists of 1600 (Sixteen hundred) meters run within 06 (six) minutes 30 (thirty) seconds.

Note : *PMT & PET are qualifying in nature.*

Final Written Exam

Exam Pattern :- The Exam Pattern will be as Follows:

- The Exam Will be Written Objective Type.
- The Exam Will be of **85 Questions/ Marks**.
- The Time Duration For the Exam Will be **1 hours**.
- There will be **NEGATIVE** marking of **¼th Marks**.
- The question paper will be set in **two languages (Bengali & Nepali)**.

Question of the Final Written Examination shall be from the following subjects:-

Sr. No.	**Name of Subjects**	**Max. Marks**

A.	General Awareness and General Knowledge	25 Marks
B.	English	25 Marks
C.	Elementary Mathematics (Madhyamik standard)	20 Marks
D.	Reasoning and Logical Analysis	15 Marks

Interview :

A Interview of **15 Marks** Will be Conducted. In the Interview, the general awareness and suitability of the candidate for public service will be tested.

SSC CHSL SYLLABUS

In order to score well in SSC CHSL exam, all candidates should be aware about the SSC CHSL syllabus and exam pattern. It is crucial to know the structure of the exam and the syllabus and subject wise topics that need to be prepared in and out.

Here, we start with understanding the exam pattern and Syllabus of SSC CHSL exam:

SSC CHSL Syllabus

SSC CHSL exam has three different phases that candidates need to clear to get selected for various posts in the Government Offices. Tier I is Objective Multiple Choice Question paper, Tier II exam is Descriptive Paper in English/Hindi, while Tier III is the Computer Proficiency Test.

Tier	**Type**	**Mode**
Tier – I	Objective Multiple Choice	Computer Based (online)
Tier – II	Descriptive Paper in English/Hindi	Pen and Paper Mode (Letter/Application Writing, Essay Writing)
Tier – III	Skill Test/Computer Proficiency Test	Wherever Applicable (Speed Typing Test)

SSC CHSL Tier-I Exam Pattern

Section	**Subject**	**No of Questions**	**Max Marks**	**Exam Duration**
1	General Intelligence	25	50	60 minutes (80 Minutes for

2	General Awareness	25	50	PWD candidates)
3	Quantitative Aptitude (Basic Arithmetic Skill)	25	50	
4	English Language (Basic Knowledge)	25	50	
	Total	100	200	

The SSC CHSL Tier I exam is a computer-based online test (CBT) exam conducted online. Candidates are given a total of 60 minutes to solve SSC CHSL Tier-I paper comprising 100 questions that count to a total of 200 marks (2 marks each question). For each wrong attempt, candidates are penalised with 1/2 marks in Tier-1 exam.

SSC CHSL Syllabus for Tier-I Exam

SSC CHSL is conducted in three different levels, the syllabus of all the three levels is different. All candidates must be well-informed about the latest changes (if introduced any) in SSC CHSL syllabus and exam pattern to prepare for SSC CHSL.

There are 4 secctions in Tier I of SSC CHSL exam which are given below:

- Reasoning Ability
- Quantitative Aptitude
- English Language
- General Awareness

SSC CHSL Tier-I Syllabus

SSC CHSL Tier-I Syllabus comprises of 4 subjects which are: English Language, Quantitative Aptitude,General Intelligence: & General Awareness. The subject wise topics for SSC CHSL Tier-I exam is given below:

General Intelligence	**Quantitative Aptitude (Basic Arithmetic Skill)**	**English Language (Basic Knowledge)**	**General Awareness**
Logical Reasoning	Simplification	Reading Comprehension	History
Alphanumeric Series	Profit & Loss	Cloze Test	Culture
Ranking/Direction/Alphabet Test	Mixtures & Allegations	Para jumbles	Geography
Data Sufficiency	Simple Interest & Compound Interest & Surds & Indices	Miscellaneous	Economic Scene

General Intelligence	Quantitative Aptitude (Basic Arithmetic Skill)	English Language (Basic Knowledge)	General Awareness
Coded Inequalities	Work & Time	Fill in the blanks	General Policy
Seating Arrangement	Time & Distance	Multiple Meaning/Error Spotting	Scientific Research
Puzzle	Mensuration – Cylinder, Cone, Sphere	Paragraph Completion	Awards and Honors
Tabulation	Data Interpretation	One Word Substitution	Books and Authors
Syllogism	Ratio & Proportion, Percentage	Active/Passive Voice	
Blood Relations	Number Systems		
Input Output	Sequence & Series		
Coding Decoding	Permutation, Combination & Probability		

RRB NTPC Exam Pattern

The exam of will be conducted in the below-mentioned steps:

- First Stage of CBT,
- Second Stage of CBT,
- Typing Test (Skill Test)/ Aptitude Test,
- Document Verification
- Medical Examination

The candidates will have to qualify each stage in order to be eligible for an appointment into the Indian Railways.

RRB NTPC Syllabus: CBT 1 Exam Pattern

Candidates can check the RRB NTPC CBT 1 Exam Pattern in the table given below. This is just a **screening round** i.e., the marks of CBT 1 will **not be included** in the final merit list. It is to remove the slightly non-serious candidates. The normalized score of CBT 1 shall be used for shortlisting of candidates for CBT 2 which will be around **20 times the vacancies**. All the questions will be objective in nature, i.e. Multiple Choice Questions (MCQ's).

Sections	No. of Questions	Total Marks	Duration
General Awareness	40	40	• 90 minutes • 120 minutes for PWD
Mathematics	30	30	
General Intelligence and Reasoning	30	30	
	100	**100**	

Note: There will be a negative marking of 1/3 Marks for every question wrongly attempted. No marks will be deducted for a question left unanswered.

RRB NTPC Syllabus: CBT 1 Syllabus

Mathematics

Sections	Topics to Prepare
Simplification	• BODMAS Rule • Fractions • Approximate Value • Surds & Indices
Interest	• Problems on Simple Interest • Problems on Compound Interest • Installments
Percentage	• Calculation on Basic Percentage Problems
Ratio & Proportion	• Problems on Simple Ratios • Problems on Compound Ratio • Direct/Indirect Proportions
Average	• Problems on Average

	• Problems on Weight • Problems on Height • Problems on Marks
Problems on Ages	• Basic Problems
Speed, Time & Distance	• Problems on Average • Problems on Relative Speeds • Problems on Boats, Train, etc.
Algebra	• Basic Linear Equation in One variable • Basic Linear Equation in two variable
Profit & Loss	• Problems on Profit/Loss • Dishonest/Successive Dealings • Partnerships
Number Series	• Complete the Series • Finding Missing/Wrong Term
Mensuration	• Problems on Plane Figures: Square, Rectangle, Circle, etc.
Time & Work	• Problems on Work Efficiency • Problems on Wages • Problems on Pipes
Mixture Problems	• Make a mixture from two or more entries/mixtures

General Intelligence & Reasoning

Sections	Topics to Prepare
Classification	• Number • Letter & Meaningful Words • GK Based Questions

Analogy	• Number • General Knowledge • Meaning & Letter Based Questions
Series	• number & Alphabet Series
Coding-Decoding	• Letter Shifting • Coding Letters by words • Coding by Analogy • Coding-Decoding based on Numbers • Operations on Place Value • Coding & Decoding on Fictitious Language
Blood Relations	• family Tree Problems • General Blood Relation Problems
Clock & Calendar	• Calendar Based Questions • Questions on Time & Clock Hands
Ordering & Ranking	• Simple ranking Questions
Directions & Distances	• Simple Problems on Directions • Formula Based Distance Questions
Word Formation	• Arranging words in a meaningful order
Non-Verbal Reasoning	• Complete the Pattern • Figure Based Analogy • Classification • Series • Cube-Based Questions
Others	• Missing Number • Venn Diagram

	• Puzzle

General Awareness

Sections	Topics to Prepare
Current Affairs/General Awareness	• Economics • Current Affairs • Geography • History • Polity • Computers • Sports • Literature • Awards • Books & Authors • Miscellaneous
General Science	• Environment • Living Organism • Life Processes in Organisms & Plants • Heredity & Evolution • Natural Resources • Atoms & Molecules • Chemical Reactions & Equations • Acid, Bases & Salts • Metals & Non-Metals • Periodic Table • Force & Laws of Motions • Work & Energy • Sound • Light

	• Electricity • Sources of Energy • Diseases, Reasons & Cure • Improvement in Food Resources

RRB NTPC CBT 2 Exam Pattern

This is both a **screening and scoring round** i.e., the marks of CBT 2 **will be included in the final merit list**. It is the merit deciding round.

The normalized score of CBT 2 shall be used for shortlisting of candidates for Skill Test/ Aptitude Test. RRB NTPC Phase-II will as well have MCQ's.

	Sections	No. of Questions	Total Marks	Duration
	General Questions Awareness	50	50	• 90 minutes • 120 minutes for PwD
	Mathematics	35	35	
	General Intelligence and Reasoning	35	35	
		120	**120**	

Note: There will be a **negative marking of 1/3 Marks** for every question attempted wrong. No marks will be deducted for a question left unanswered.

RRB NTPC Syllabus: CBT 2 Syllabus

Mathematics

- BODMAS Rule
- Fractions
- Approximate Value
- Surds & Indices
- Problems on Simple Interest
- Problems on Compound Interest
- Installments
- Calculation on Basic Percentage Problems
- Problems on Simple Ratios

- Problems on Compound Ratio
- Direct/Indirect Proportions
- Problems on Average
- Problems on Weight
- Problems on Height
- Problems on Marks
- Basic Problems
- Problems on Average
- Problems on Relative Speeds
- Problems on Boats, Train, etc.
- Basic Linear Equation in One variable
- Basic Linear Equation in two variable
- Problems on Profit/Loss
- Dishonest/Successive Dealings
- Partnerships
- Complete the Series
- Finding Missing/Wrong Term
- Problems on Plane Figures: Square, Rectangle, Circle, etc.
- Problems on Work Efficiency
- Problems on Wages
- Problems on Pipes
- Make a mixture from two or more entries/mixtures

General Intelligence & Reasoning

Sections	**Topics to Prepare**
Classification	• Number • Letter & Meaningful Words • GK Based Questions
Analogy	• Number

	• General Knowledge • Meaning & Letter Based Questions
Series	• number & Alphabet Series
Coding-Decoding	• Letter Shifting • Coding Letters by words • Coding by Analogy • Coding-Decoding based on Numbers • Operations on Place Value • Coding & Decoding on Fictitious Language
Blood Relations	• family Tree Problems • General Blood Relation Problems
Clock & Calendar	• Calendar Based Questions • Questions on Time & Clock Hands
Ordering & Ranking	• Simple ranking Questions
Directions & Distances	• Simple Problems on Directions • Formula Based Distance Questions
Word Formation	• Arranging words in meaningful order
Non-Verbal Reasoning	• Complete the Pattern • Figure Based Analogy • Classification • Series • Cube-Based Questions
Others	• Missing Number • Venn Diagram • Puzzle

General Awareness

Sections	Topics to Prepare
Current Affairs/General Awareness	• Economics • Current Affairs • Geography • History • Polity • Computers • Sports • Literature • Awards • Books & Authors • Miscellaneous
General Science	• Environment • Living Organism • Life Processes in Organisms & Plants • Heredity & Evolution • Natural Resources • Atoms & Molecules • Chemical Reactions & Equations • Acid, Bases & Salts • Metals & Non-Metals • Periodic Table • Force & Laws of Motions • Work & Energy • Sound • Light • Electricity

	• Sources of Energy • Diseases, Reasons & Cure • Improvement in Food Resources

RRB NTPC Syllabus: Computer Aptitude Test (CABT)

The candidates who have opted for **Traffic Assistant and Station Master** will have to appear for th**e RRB NTPC CBT Exam.** The candidates need to secure a minimum T-Score of 42 marks in each of the test batteries to qualify. This is applicable to all candidates irrespective of community or category i.e. irrespective of SC/ST /OBC-NCL /EWS /PwBD/ Ex-SM and no relaxation in the minimum T- Score is permissible

Serial no.	Name of Post	Level in 7th CPC	1st stage CBT	2nd stage CBT	Skill Test requirement
1.	Junior Clerk cum Typist	2	Common for all posts	Common for all Level 5 posts	Typing Skill Test
2.	Accounts Clerk cum Typist	2			Typing Skill Test
3.	Junior Time Keeper	2			Typing Skill Test
4.	Trains Clerk	2		Common for all Level 2 posts	–
5.	Commercial cum Ticket Clerk	3		Separate for Level 3 post	–
6.	Traffic Assistant	4		Separate for Level 4 post	Computer-Based Aptitude Test
7.	Goods Guard	5			–
8.	Senior Commercial cum Ticket Clerk	5			–
9.	Senior Clerk cum Typist	5			Typing Skill Test
10.	Junior Account Assistant cum Typist	5			Typing Skill Test
11.	Senior Time Keeper	5			Typing Skill Test

12.	Commercial Apprentice	6			–
13.	Station Master	6		Common for all Level 6 posts	Computer-Based Aptitude Test

RRB NTPC Syllabus: Typing Skill Test (TST)

The candidates should be able to type 30 words per minute (WPM) in English or 25 WPM in Hindi on Personal Computer only without editing tools and spell check facility.

RRB NTPC 2020 Typing Skill Test (TST)	
Medium of Language	**Typing Speed**
English	30 words per minute (w.p.m.)
Hindi	25 words per minute (w.p.m.)

Note:

- The candidate should be able to type on Personal Computer only without editing tools and spell check facility.
- For guidelines of those who appear for typing skill test in Hindi, Kruti Dev and Mangal font shall be made available for typing skill test on Personal Computer.
- Exemption in Typing Skill Test may be extended to candidates who are permanently disabled due to Blindness/Low Vision, Cerebral Palsy & Loco Motor Disability with not less than 40% permanent disability. Such eligible PwBD candidates have to upload a scanned copy of the Typing Skill Test Exemption Certificate issued by the Competent Medical Board on the website of respective RRBs before the conduct of the typing skill test.
- The merit will be drawn only for the candidates qualified in the TST or TST exempted PwBD candidates based on performance in 2nd Stage CBT.

RRB NTPC Syllabus: Document Verification/ Medical Examination

Based on the performance of candidates in 2nd Stage CBT and CBAT/TST, candidates equal to the number of vacancies will be called for Document Verification as per their merit and options. Appointment of **selected candidates is subject to their passing requisite Medical Fitness Test to be conducted by the Railway Administration**, final verification of educational and community certificates, and verification of antecedents/ character of the candidates.

IBPS PO Preliminary Exam Pattern

The **IBPS PO preliminary examination will be** conducted online and candidates are allocated total duration of **1 hour** to complete the preliminary exam. It consists of **3 sections with a total of 100 questions** and maximum score of **100 marks**. There is negative marking in IBPS PO preliminary exam and **0.25 marks are deducted for each wrong answer** attempted by a candidate. It is necessary to clear the cut-off in all 3 sections to qualify for the IBPS PO Main exam.

IBPS PO Prelims Exam Pattern 2020

S.No.	Name of Tests(Objective	No. of Questions	Maximum Marks	Duration
1	English Language	30	30	20 minutes
2	Numerical Ability	35	35	20 minutes
3	Reasoning Ability	35	35	20 minutes
Total		100	100	60 minutes

IBPS PO Mains Exam Pattern

• **Introduction of Descriptive Paper:** Just like SBI PO Exam, IBPS introduced Descriptive Paper in its Mains Examination where candidates will be judged on their written skills. An essay and a letter will be given to candidates to write that will constitute of 25 marks and that has to be completed in a time span of 30 minutes.

• The overall time allotted for each section has also been changed.

• **No separate paper will be conducted for Computer Applications. Reasoning is teamed up with Computer Aptitude** section and this entire section will contain **45 questions of a total of 60 marks.**

• The **overall time allotted for IBPS PO Mains Exam** has also been changed from **140 minutes to 180 minutes.**

IBPS PO Mains Exam Pattern

Sr. No.	Name of test	No. of Questions	Max. Marks	Medium of Examination	Time Allotted
1	Reasoning & Computer Aptitude	45	60	English & Hindi	60 minutes
2	English Language	35	40	English only	40 minutes
3	Data Analysis and Interpretation	35	60	English & Hindi	45 minutes
4	General, Economy/Banking Awareness	40	40	English & Hindi	35 minutes

	Total	155	200		180 minutes
	English Language (Letter Writing & Essay)	2	25	English	30 minutes

IBPS PO Interview Process

Candidates who qualify the Mains Exam are finally called for the Interview Process by IBPS. The Interview Process will constitute of **100 marks** and the minimum marks for qualifying this round will be **40% which is reduced to 35% for candidates belonging to SC/ST/OBC/PWD categories.**

Penalty for Wrong Answers:

0.25 marks will be deducted for every question attempted wrong by a candidate in both IBPS PO 2020 Preliminary Exam and IBPS PO Mains Exam. There will be no deduction of marks for a question left blank/unattempted by a candidate.

Final Selection

The final selection of the candidate to the post of Probationary Officer will be made by taking into consideration the cumulative score of **Mains Exam and the interview Process**. The weightage of both these phases of examination will be in the **ratio 80:20 respectively**. A merit list will be generated after the Interview Process of IBPS PO Exam has been conducted. Candidates who make it to the list will be thus offered the joining letter by the Bank of their choice.

IBPS Clerk Exam Pattern: Preliminary Exam

Major changes have been observed in the Exam Pattern of IBPS Clerk Prelims Exam. The IBPS Clerk preliminary examination is conducted online and candidates are allocated **total duration of 1 hour (20 minutes for each section)** to complete the preliminary exam.

Candidates have to qualify in each of the three tests by securing cut-off marks to be decided by IBPS. Adequate number of candidates in each category as decided by IBPS depending upon requirements will be shortlisted for Online Main examination.

S.No.	**Name of Tests(Objective**	**No. of Questions**	**Maximum Marks**	**Duration**
1	English Language	30	30	20 minutes
2	Numerical Ability	35	35	20 minutes
3	Reasoning Ability	35	35	20 minutes
Total		100	100	1 Hour

IBPS Clerk Exam Pattern: Mains Exam

In the latest update by IBPS, **IBPS Clerk Mains Exam will now constitute of 190 questions** that needs to be completed in a time frame of **160 minutes**.

Previously, **Computer Aptitude and Reasoning Ability** Section used to be conducted separately. But, in the recent update by IBPS, both these sections are amalgamated together and will constitute of **50 questions** that needs to be solved in a time duration of **45 minutes**. Both Preliminary Exam and Mains Exam will be conducted bilingually, i.e. both in English and in Hindi. Let's have a look at the Exam Pattern for IBPS Clerk CWE VII.

S.No.	Name of Tests(Objective	No. of Questions	Maximum Marks	Duration
1	Reasoning Ability & Computer Aptitude	50	60	45 minutes
2	English Language	40	40	35 minutes
3	Quantitative Aptitude	50	50	45 minutes
4	General/ Financial Awareness	50	50	35 minutes
Total		190	200	160 minutes

Now that we have seen the IBPS Clerk Exam Pattern. Let's discuss the detailed syllabus of all the sections asked in Preliminary and Mains Exam of IBPS Clerk Exam:

IBPS CLERK SYLLABUS

IBPS Clerk Syllabus: English Language

Vocabulary	Grammar	Reading Comprehension
Homonyms, Antonyms, Synonyms, Word Formation, Spelling	Spotting Errors, Phrases and idioms, Direct and Indirect speech, Active/ Passive voice	Theme Detection, Passage completion, Topic rearrangement of passage, Deriving Conclusion.

IBPS Clerk Syllabus: Reasoning

Verbal Reasoning	Non-Verbal Reasoning
Analogy, Classification, Word formation, Statement and conclusions Syllogism, Statement and assumptions, Statement and arguments, Coding Decoding, Blood Relations, Passage and conclusions, Alphabet test, Series Test, Number, Ranking and time sequence, Direction sense Test,	Series test, Odd figure Out, Analogy, Miscellaneous Test

Verbal Reasoning	Non-Verbal Reasoning
Decision making test, Figure series, Input/output, Assertion and reasoning, Sitting Arrangement	

IBPS Clerk Syllabus: Quantitative Aptitude

Ratio and proportion, Averages, Time and work, Speed, Distance and time, Mixture and allegation Stocks and shares, Percentages, Partnership, Clocks, Volume and surface Area, Bar & Graphs, Line charts, Tables	Height and Distances, Logarithms, Permutation and combinations, Simple and compound interest, Equations, Probability, Trigonometry, Profit, Loss and Discount, Mensuration, Elements of Algebra, Data Interpretation, Pie charts

IBPS Clerk Syllabus: Computer Knowledge

Basics of Hardware and software, Windows operating system basics, Internet terms and services, Basic Functionalities of MS-Office(MS-word, MS-Excel, MS-PowerPoint)	History of computers, Networking and communication, Database basics, Basics of Hacking, Security Tools and Viruses

IBPS Clerk Syllabus: General Awareness

Current affairs related to national and international issues of last 6 months, Overview of Indian Financial System, History of Indian banking system, Recent credit and monetary policies	Introduction to National financial institutions like RBI, SEBI, IRDA, FSDC etc and of International organizations like IMF, World Bank, ADB, UN etc, Abbreviations and Economic terminologies, Banking Terms, Important Government Schemes on capital & money market.

PUBLIC SERVICE COMMISSION, WEST BENGAL

WEST BENGAL CIVIL SERVICE (EXE.) etc. EXAMINATION

Scheme of the Preliminary Examination : The Preliminary Examination will consist of only one paper, viz., a paper on "General Studies". The paper will be of an objective type consisting of 200 multiple-choice questions. The paper will carry

200 marks and will be of 2½ hours duration. The standard of the paper will be of the level of knowledge as expected of a graduate of any faculty of a recognized University. The paper will include questions covering the following fields of knowledge:

(i)	English Composition	25 Marks
(ii)	General Science	25 Marks
(iii)	Current events of National & International Importance	25 Marks
(iv)	History of India	25 Marks
(v)	Geography of India with special reference to West Bengal	25 Marks
(vi)	Indian Polity and Economy	25 Marks
(vii)	Indian National Movement	25 Marks
(viii)	General Mental Ability	25 Marks

Compulsory Papers : Six compulsory papers are as follows:-

Paper I : Bengali/Hindi/Urdu/Nepali/Santali - Letter writing (within 150 words) / Drafting of Report (within 200 words), Précis Writing, Composition and Translation from English to Bengali/Hindi/Urdu/Nepali/Santali

Paper II : English - Letter writing (within 150 words) / Drafting of Report (within 200 words), Précis Writing, Composition and Translation from Bengali/Hindi/Urdu/Nepali/Santali to English

Paper III : General Studies-I : (i) Indian History with special emphasis on National Movement and (ii) Geography of India with special reference to West Bengal.

Paper IV : General Studies-II : Science and Scientific & Technological advancement, Environment, General Knowledge and Current Affairs.

Paper V : The Constitution of India and Indian Economy including role and functions of the Reserve Bank of India.

Paper VI : Arithmetic and Test of Reasoning.

List of Optional Subjects :

SUBJECT CODE

Bengali	01
Hindi	02
Sanskrit	03
English	04
Pali	05
Arabic	06
Persian	07
French	08
Urdu	09
Santali	10
Comparative Literature	11
Agriculture	12
Animal Husbandry and Veterinary Science	13
Anthropology	14
Botany	15
Chemistry	16
Civil Engineering	17
Commerce and Accountancy	18
Computer Science	19
Economics	20
Electrical Engineering	21
Geography	22
Geology	23
History	24
Law	25
Mathematics	26

1. A summary of the group-wise papers in the Main Examination :

Group ‘A’ & ‘B’ Services & Posts : All 6 compulsory papers and one optional subject consisting of two papers.

Group ‘C’ & ‘D’ Services & Posts : All 6 compulsory papers.

2. **Personality Test :** A number of candidates selected in order of merit on the results of the Main Examination for all the services and posts included in Groups A, B, C and D shall have to appear at a Personality Test. Each candidate will be asked questions on matters of general interest. The object of the test will be to assess the candidate’s personal qualities e.g., alertness of mind, power of clear and logical exposition, intellectual and moral integrity, leadership and also the candidate’s range of interests.

Candidates for Group ‘B’ Service (West Bengal Police Service) will be specially tested at the interviews with regard to their suitability for the service.

Marks for the Personality Test

(i) Group ‘A’ & ‘B’ 200 Marks

(ii) Group ‘C’ 150 Marks

(iii) Group ‘D’ 100 Marks

Note : No separate Personality Test will be held for different groups viz. Group-‘A’, Group-‘B’, Group-‘C’ and Group-‘D’ in respect of a candidate. Marks will be awarded according to different services against allotted full marks for Personality Test.

In all the answer papers under examination due credit will be given for proper economy of words combined with clarity, precision and effectiveness of expression and originality of approach.

3. **Deduction of marks :** A deduction of 10% of full marks may be made from the total marks secured by a candidate in a particular paper if he / she discloses his / her identity by writing his / her name, roll number or by putting any identifying marks in the answer script of that paper.

There shall be negative marking for each wrong answer to multiple-choice questions (MCQ) type.

4. **Discretion of the Commission :** The Commission has discretion to fix qualifying marks in any or all the papers/subjects and in the aggregate.

If a candidate fails to secure qualifying marks in any paper / subject, the marks in that paper / subject will not be considered in calculating his / her aggregate.

Abstract Table of Papers / Subjects and Marks Main Examination and Personality Test

l No.	Compulsory Papers	Marks			
		Group 'A'	**Group 'B'**	**Group 'C'**	**Group 'D'**
.	Bengali/Hindi/Urdu/Nepali/Santali - Letter writing (within 150 words) / Drafting of Report (within 200 words), Précis Writing, Composition and Translation from English to Bengali/Hindi/Urdu/Nepali/Santali	200	200	200	200
.	English - Letter writing (within 150 words) / Drafting of Report (within 200 words), Précis Writing, Composition and Translation from Bengali/Hindi/Urdu/Nepali/Santali to English	200	200	200	200
.	General Studies-I : (i) Indian History with special emphasis on National Movement and (ii) Geography of India with special reference to West Bengal.	200	200	200	200
.	General Studies-II : Science and Scientific & Technological advancement, Environment, General Knowledge and Current Affairs.	200	200	200	200
.	The Constitution of India and Indian Economy including role and functions of Reserve Bank of India.	200	200	200	200
.	Arithmetic and Test of Reasoning.	200	200	200	200
.	Optional Subject - One subject to be chosen, Two papers of 200 marks each.	400	400	--	--
.	Personality Test	200	200	150	100
	Total Marks	**1800**	**1800**	**1350**	**1300**

SC CGL SYLLABUS

TIER I

Preliminary Exam are **General Awareness, Reasoning, Quantitative Aptitude and English Language**. The detailed syllabus & exam pattern for SSC CGL exam are mentioned below:

SSC CGL Tier-I Exam Pattern

S No.	Sections	No. of Questions	Total Marks	Time Allotted
1	General Intelligence and Reasoning	25	50	A cumulative time of 60 minutes
2	General Awareness	25	50	
3	Quantitative Aptitude	25	50	
4	English Comprehension	25	50	
Total		100	200	

SSC CGL Tier 1 Syllabus

Quantitative Aptitude Syllabus

Quantitative Aptitude questions will be designed to test the ability of appropriate use of numbers and number sense of the candidate. The scope of the test will be computation of whole numbers, decimals, fractions and relationships between numbers, Profit and Loss, Discount, Partnership Business, Mixture and Alligation, Time and distance, Time & Work,Percentage. Ratio & Proportion, Square roots, Averages, Interest, Basic algebraic identities of School Algebra & Elementary surds, Graphs of Linear Equations, Triangle and its various kinds of centres, Congruence and similarity of triangles, Circle and its chords, tangents, angles subtended by chords of a circle, common tangents to two or more circles, Triangle, Quadrilaterals, Regular Polygons, Circle, Right Prism, Right Circular Cone, Right Circular Cylinder, Sphere, Heights and Distances, Histogram, Frequency polygon, Bar diagram & Pie chart, Hemispheres, Rectangular Parallelepiped, Regular Right Pyramid with triangular or square base, Trigonometric ratio, Degree and Radian Measures, Standard Identities, Complementary angles.

General Intelligence and Reasoning Syllabus

General Intelligence and Reasoning includes questions of both **verbal and non-verbal type**. This component may include questions on analogies, similarities and differences, space visualization, spatial orientation, problem solving, analysis, judgment, decision making, visual memory, discrimination, observation, relationship concepts, arithmetical reasoning and figural classification, arithmetic number series, non-verbal series, coding and decoding, statement conclusion, syllogistic reasoning etc.

The topics are, Semantic Analogy, Symbolic/ Number Analogy, Figural Analogy, Semantic Classification, Symbolic/ Number Classification, Figural Classification, Semantic Series, Number Series, Figural Series, Problem Solving, Word Building, Coding & de-coding, Numerical Operations, symbolic Operations, Trends, Space Orientation, Space Visualization, Venn Diagrams, Drawing inferences, Punched hole/ pattern- folding & un-folding, Figural Pattern-folding and completion, Indexing, Address matching, Date & city matching, Classification of centre codes/roll numbers, Small & Capital letters/ numbers coding, decoding and classification, Embedded Figures, Critical thinking, Emotional Intelligence, Social Intelligence, Other sub-topics, if any.

English Syllabus is section measures Candidates' ability to understand correct English, his/ her basic comprehension and writing ability, etc. would be tested. This section may include questions on **Phrases and Idioms, One word Substitution, Sentence Correction, Error Spotting, Fill in the Blanks, Spellings Correction, Reading Comprehension, Synonyms-Antonyms, Active Passive, Sentence Rearrangement, Sentence Improvement, Cloze test** etc.

General Awareness Syllabus

Questions in this section will be aimed at testing the candidates' general awareness (GK+GS) of the environment around him and its application to society.

After the preliminary exam has been conducted, it will be necessary to gear up for Mains Exam of SSC CGL Exam.

SSC CGL Syllabus: Tier II

The Mains Exam will be conducted online and is an objective multiple choice exam. This year, the Tier-II & Tier-III exam will be conducted on same day. The major sections asked in Mains Exam are **Quantitative Aptitude, English Language and Comprehension, Statistics, General Studies (Finance and Economics)** .

SSC CGL Tier-II Exam Pattern

S No.	Sections	No. of Questions	Total Marks	Time Allotted
1	Quantitative Ability	100	200	2 hours
2	English Language and Comprehension	200	200	2 hours
3	Statistics	100	200	2 hours
4	General Studies (Finance and Economics)	100	200	2 hours

SSC CGL Tier 2 Syllabus

Paper-I (Quantitative Abilities) Syllabus:

The questions will be designed to test the ability of appropriate use of numbers and number sense of the candidate. The scope of the test will be the computation of whole numbers, decimals, fractions and relationships between numbers, Percentage, Ratio & Proportion, Square roots, Averages, Interest, Profit and Loss, Discount, Partnership Business, Mixture and Alligation, Time and distance, Time & Work, Basic algebraic identities of School Algebra & Elementary surds, Graphs of Linear Equations, Triangle and its various kinds of centres, Congruence and similarity of

triangles, Circle and its chords, tangents, angles subtended by chords of a circle, common tangents to two or more circles, Triangle, Quadrilaterals, Regular Polygons, Circle, Right Prism, Right Circular Cone, Right Circular Cylinder, Sphere, Hemispheres, Rectangular Parallelepiped, Regular Right Pyramid with triangular or square base, Trigonometric ratio, Degree and Radian Measures, Standard Identities, Complementary angles, Heights and Distances, Histogram, Frequency polygon, Bar diagram & Pie chart.

Paper-II (English Language and Comprehension) Syllabus:

Questions in this section will be designed to test the candidate's understanding and knowledge of English Language and will be based on spot the error, fill in 21 the blanks, synonyms, antonyms, spelling/ detecting misspelled words, idioms & phrases, one word substitution, improvement of sentences, active/ passive voice of verbs, conversion into direct/ indirect narration, shuffling of sentence parts, shuffling of sentences in a passage, cloze passage & comprehension passage.

Paper-III (Statistics) Syllabus:

1. Collection, Classification and Presentation of Statistical Data – Primary and Secondary data, Methods of data collection; Tabulation of data; Graphs and charts; Frequency distributions; Diagrammatic presentation of frequency distributions.

2. Measures of Central Tendency - Common measures of central tendency – mean median and mode; Partition values- quartiles, deciles, percentiles.

3. Measures of Dispersion- Common measures dispersion – range, quartile deviations, mean deviation and standard deviation; Measures of relative dispersion.

4. Moments, Skewness and Kurtosis – Different types of moments and their relationship; meaning of skewness and kurtosis; different measures of skewness and kurtosis.

5. Correlation and Regression – Scatter diagram; simple correlation coefficient; simple regression lines; Spearman‟s rank correlation; Measures of association of attributes; Multiple regression; Multiple and partial correlation (For three variables only).

6. Probability Theory – Meaning of probability; Different definitions of probability; Conditional probability; Compound probability; Independent events; Bayes‟ theorem.

7. Random Variable and Probability Distributions – Random variable; Probability functions; Expectation and Variance of a random variable; Higher moments of a random variable; Binomial, Poisson, Normal and Exponential distributions; Joint distribution of two random variable (discrete).

8. Sampling Theory – Concept of population and sample; Parameter and statistic, Sampling and non-sampling errors; Probability and nonprobability sampling techniques(simple random sampling, stratified sampling, multistage sampling, multiphase sampling, cluster sampling, systematic sampling, purposive sampling, convenience sampling and quota sampling); Sampling distribution(statement only); Sample size decisions.

9. Statistical Inference - Point estimation and interval estimation, Properties of a good estimator, Methods of estimation (Moments method, Maximum likelihood method, Least squares method), Testing of hypothesis, Basic concept of testing, Small sample and large sample tests, Tests based on Z, t, Chi-square and F statistic, Confidence intervals.

10. Analysis of Variance - Analysis of one-way classified data and twoway classified data.

11. Time Series Analysis - Components of time series, Determinations of trend component by different methods, Measurement of seasonal variation by different methods.

12. Index Numbers - Meaning of Index Numbers, Problems in the construction of index numbers, Types of index number, Different formulae, Base shifting and splicing of index numbers, Cost of living Index Numbers, Uses of Index Numbers.

Paper-IV (General Studies-Finance and Economics):

Part A: Finance and Accounts-(80 marks):

Fundamental principles and basic concept of Accounting:

1.1 Financial Accounting: Nature and scope, Limitations of Financial Accounting, Basic concepts and Conventions, Generally Accepted Accounting Principles.

1.2 Basic concepts of accounting: Single and double entry, Books of original Entry, Bank Reconciliation, Journal, ledgers, Trial Balance, Rectification of Errors, Manufacturing, Trading, Profit & loss Appropriation Accounts, Balance Sheet Distinction between Capital and Revenue Expenditure, Depreciation Accounting, Valuation of Inventories, Non-profit organisations Accounts, Receipts and Payments and Income & Expenditure Accounts, Bills of Exchange, Self Balancing Ledgers.

Part B: Economics and Governance-(120 marks):

2.1 Comptroller & Auditor General of India- Constitutional provisions, Role and responsibility.

2.2 Finance Commission-Role and functions.

2.3 Basic Concept of Economics and introduction to Micro Economics: Definition, scope and nature of Economics, Methods of economic study and Central problems of an economy and Production possibilities curve.

2.4 Theory of Demand and Supply: Meaning and determinants of demand, Law of demand and Elasticity of demand, Price, income and cross elasticity; Theory of consumer‟s behaviourMarshallian approach and Indifference curve approach, Meaning and determinants of supply, Law of supply and Elasticity of Supply.

2.5 Theory of Production and cost: Meaning and Factors of production, Laws of production- Law of variable proportions and Laws of returns to scale.

2.6 Forms of Market and price determination in different markets: Various forms of markets-Perfect Competition, Monopoly, Monopolistic Competition and Oligopoly ad Price determination in these markets.

2.7 Indian Economy:

2.7.1 Nature of the Indian Economy Role of different sectorsRole of Agriculture, Industry and Services-their problems and growth.

2.7.2 National Income of India-Concepts of national income, Different methods of measuring national income.

2.7.3 Population-Its size, rate of growth and its implication on economic growth.

2.7.4 Poverty and unemployment- Absolute and relative poverty, types, causes and incidence of unemployment.

2.7.5 Infrastructure-Energy, Transportation, Communication.

2.8 Economic Reforms in India: Economic reforms since 1991; Liberalisation, Privatisation, Globalisation and Disinvestment.

2.9 Money and Banking:

2.9.1 Monetary/ Fiscal policy- Role and functions of Reserve Bank of India; functions of commercial Banks/RRB/Payment Banks.

2.9.2 Budget and Fiscal deficits and Balance of payments.

2.9.3 Fiscal Responsibility and Budget Management Act, 2003.

2.10 Role of Information Technology in Governance.

Note: Questions in Paper-I will be of Matriculation Level, Paper-II of 10+2 Level and in Paper-III and Paper-IV of Graduation Level.

SSC CGL Tier-III Syllabus

Tier-III of exam is a **descriptive exam** to test the written skills of the candidates in **English/Hindi**. The mode of examination is **offline (Pen and Paper mode)** and students are required to write essays, précis, application, letter etc. in this exam. The exam **carries 100 marks** and the **time allotted** for the same is **60 minutes**. The time allotted for candidates belonging to **PWD category** is increased to **80 minutes**. Tier-III paper is given by specific candidates who are interested only for the post of "Statistical Investigator Grade II" & "Compiler".

SSC CGL Tier-III Exam Pattern

Subject	**Marks**	**Time**
Descriptive Paper in English/Hindi (Writing of Essay, Precis, Letter, Application etc.)	100 marks	1 hour or 60 minutes

SSC CGL Tier-IV Syllabus (Skill Test)

Tier-IV examination comprises of couple of skill sets required for certain Government Posts all over the country.

DEST (Data Entry Speed Test): For the post of Tax Assistant (Central Excise and Income Tax),DEST Exam through SSC CGL exam is conducted to check the typing speed of the candidate. The candidates are given an article in English which they have to type on Computer. A candidate is required to type 2000 words in 15 minutes.

CPT (Computer Proficiency Test): Word Processing, Spread Sheets and Generation of slides are the three modules that are important for this exam and the commission demands a candidate to be proficient in it for the post of CSS, MEA, Inspector (Central Excise), Inspector (Preventive Officer), Inspector (Examiner).

SSC CGL Syllabus: Important Points

Tier-I exam is compulsory **for all posts** mentioned in the SSC CGL Notification. Candidates will have to **prepare for both Tier 2 and Tier 3 exam simultaneously**. However, the evaluation of Tier 3 Descriptive exam will be done only if a candidate clears the combined cut off for Tier 1 and Tier 2. So, **candidates may appear for both Tier 2 and Tier 3** exams but your Tier 3 answer sheets will be evaluated only if you clear the cut-off. **Tier-IV exam** is taken by candidates applying specifically **for TA, CSS, MEA and Inspector**.

Tier-I and Tier-II will consist of Objective Type, Multiple choice questions only. The questions will be set both in English & Hindi except for English Comprehension in Tier-I and Paper-II in Tier-II.

In Tier-II, Paper-I and Paper-II are compulsory for all the posts.

Penalty for wrong answers

Giving a wrong answer to a question will lead to deduction of 0.5 marks in Tier – I exam.

In Tier-II, there will be negative marking of 0.25 for each wrong answer in Paper-II (English Language and Comprehension) and of 0.50 marks for each wrong answer in Paper-I, Paper-III and Paper-IV.

GATE SYLLABUS OF MATHEMATICS

There are 11 chapters in GATE Syllabus for Mathematics paper. Each chapter has many subtopics. The complete syllabus of Mathematics paper is given below.

Section 1: Calculus

- Functions of two or more variables, continuity, directional derivatives, partial derivatives, total derivative, maxima and minima, saddle point, method of Lagrange's multipliers;
- Double and Triple integrals and their applications to area, volume and surface area; Vector Calculus: gradient, divergence and curl, Line integrals and Surface integrals, Green's theorem, Stokes' theorem, and Gauss divergence theorem.

Section 2: Linear Algebra

- Finite dimensional vector spaces over real or complex fields; Linear transformations and their matrix representations, rank and nullity; systems of linear equations, characteristic polynomial, eigenvalues and eigenvectors, diagonalization, minimal polynomial
- Cayley-Hamilton Theorem, Finite dimensional inner product spaces, Gram-Schmidt orthonormalization process, symmetric, skew-symmetric
- Hermitian, skew-Hermitian, normal, orthogonal and unitary matrices; diagonalization by a unitary matrix, Jordan canonical form; bilinear and quadratic forms.

Section 3: Real Analysis

- Metric spaces, connectedness, compactness, completeness; Sequences and series of functions, uniform convergence, Ascoli-Arzela theorem;Weierstrass approximation theorem; contraction mapping principle
- Power series; Differentiation of functions of several variables, Inverse and Implicit function theorems; Lebesgue measure on the real line, measurable functions; Lebesgue integral, Fatou's lemma, monotone convergence theorem, dominated convergence theorem.

Section 4: Complex Analysis

- Functions of a complex variable: continuity, differentiability, analytic functions, harmonic functions; Complex integration: Cauchy's integral theorem and formula

- Liouville's theorem, maximum modulus principle, Morera's theorem; zeros and singularities; Power series, radius of convergence
- Taylor's series and Laurent's series; Residue theorem and applications for evaluating real integrals; Rouche's theorem, Argument principle, Schwarz lemma; Conformal mappings, Mobius transformations.

Section 5: Ordinary Differential equations

- First order ordinary differential equations, existence and uniqueness theorems for initial value problems, linear ordinary differential equations of higher order with constant coefficients
- Second order linear ordinary differential equations with variable coefficients; Cauchy-Euler equation, method of Laplace transforms for solving ordinary differential equations, series solutions (power series, Frobenius method); Legendre and Bessel functions and their orthogonal properties; Systems of linear first order ordinary differential equations
- Sturm's oscillation and separation theorems, Sturm-Liouville eigenvalue problems, Planar autonomous systems of ordinary differential equations: Stability of stationary points for linear systems with constant coefficients, Linearized stability, Lyapunov functions.

Section 6: Algebra

- Groups, subgroups, normal subgroups, quotient groups, homomorphisms, automorphisms; cyclic groups, permutation groups,Group action,Sylow's theorems and their applications; Rings, ideals, prime and maximal ideals, quotient rings, unique factorization domains
- Principle ideal domains, Euclidean domains, polynomial rings, Eisenstein's irreducibility criterion; Fields, finite fields, field extensions,algebraic extensions, algebraically closed fields.

Section 7: Functional Analysis

- Normed linear spaces, Banach spaces, Hahn-Banach theorem, open mapping and closed graph theorems, principle of uniform boundedness; Inner-product spaces
- Hilbert spaces, orthonormal bases, projection theorem,Riesz representation theorem, spectral theorem for compact self-adjoint operators.

Section 8: Numerical Analysis

- Systems of linear equations: Direct methods (Gaussian elimination, LU decomposition, Cholesky factorization), Iterative methods (Gauss-Seidel and Jacobi) and their convergence for diagonally dominant coefficient matrices; Numerical solutions of nonlinear equations: bisection method, secant method, Newton-Raphson method, fixed point iteration; Interpolation
- Lagrange and Newton forms of interpolating polynomial, Error in polynomial interpolation of a function; Numerical differentiation and error.
- Numerical integration: Trapezoidal and Simpson rules, Newton-Cotes integration formulas, composite rules, mathematical errors involved in numerical integration formulae; Numerical solution of initial value problems for ordinary differential equations: Methods of Euler, Runge-Kutta method of order 2.

Section 9: Partial Differential Equations

- Method of characteristics for first order linear and quasilinear partial differential equations; Second order partial differential equations in two independent variables: classification and canonical forms, method of separation of variables for Laplace equation in Cartesian and polar coordinates, heat and wave equations in one space variable
- Wave equation: Cauchy problem and d'Alembert formula, domains of dependence and influence, non-homogeneous wave equation; Heat equation: Cauchy problem; Laplace and Fourier transform methods.

Section 10: Topology

- Basic concepts of topology, bases, subbases, subspace topology, order topology, product topology, quotient topology, metric topology, connectedness, compactness, countability and separation axioms, Urysohn's Lemma.

Section 11: Linear Programming

- Linear programming models, convex sets, extreme points;Basic feasible solution,graphical method, simplex method, two phase methods, revised simplex method ; Infeasible and unbounded linear programming models, alternate optima; Duality theory, weak duality and strong duality; Balanced and unbalanced transportation problems
- Initial basic feasible solution of balanced transportation problems (least cost method, north-west corner rule, Vogel's approximation method); Optimal solution, modified distribution method; Solving assignment problems, Hungarian method.

Weightage of Important Topics

Important Topics	Weightage of Topics (In %)
Linear Algebra	10%
Complex Variables	10%
Vector Calculus	20%
Calculus	10%
Differential Equation	10%
Probability & Statistics	20%

CS	GATE COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

Section1: Engineering Mathematics

Discrete Mathematics: Propositional and first order logic. Sets, relations, functions, partial orders and lattices. Groups. Graphs: connectivity, matching, coloring. Combinatorics: counting, recurrence relations, generating functions.

Linear Algebra: Matrices, determinants, system of linear equations, eigenvalues and eigenvectors, LU decomposition.

Calculus: Limits, continuity and differentiability. Maxima and minima. Mean value theorem. Integration.

Probability: Random variables. Uniform, normal, exponential, poisson and binomial distributions. Mean, median, mode and standard deviation. Conditional probability and Bayes theorem.

Computer Science and Information Technology

Section 2: Digital Logic

Boolean algebra. Combinational and sequential circuits. Minimization. Number representations and computer arithmetic (fixed and floating point).

Section 3: Computer Organization and Architecture

Machine instructions and addressing modes. ALU, data -path and control unit. Instruction pipelining. Memory hierarchy: cache, main memory and secondary storage; I /O interface (interrupt and DMA mode).

Section 4: Programming and Data Structures

Programming in C. Recursion. Arrays, stacks, queues, linked lists, trees, binary search trees, binary heaps, graphs.

Section 5: Algorithms

Searching, sorting, hashing. Asymptotic worst case time and space complexity.

Algorithm design techniques: greedy, dynamic programming and divide- and-conquer. Graph search, minimum spanning trees, shortest paths.

Section 6: Theory of Computation

Regular expressions and finite automata. Context -free grammars and push -down automata. Regular and contex -free languages, pumping lemma. Turing machines and undecidability.

Section 7: Compiler Design

Lexical analysis, parsing, syntax -directed translation. Runtime environments. Intermediate code generation.

Section 8: Operating System

Processes, threads, inter -process communication, concurrency and synchronization. Deadlock. CPU scheduling. Memory management and virtual memory. File systems.

Section 9: Databases

ER-model. Relational model: relational algebra, tuple calculus, SQL. Integrity constraints, normal forms. File organization, indexing (e.g., B and B+ trees). Transactions and concurrency c ontrol.

Section 10: Computer Networks

Concept of layering. LAN technologies (Ethernet). Flow and error control techniques, switching. IPv4/IPv6, routers and routing algorithms (distance vector, link state). TCP/UDP and sockets, congestion control. Application layer protocols (DNS, SMTP, POP, FTP, HTTP). Basics of Wi -Fi. Network security: authentication, basics of public key and private key cryptography, digital signatures and certificates, firewalls.

WB JECA EXAM PATTERN

Knowing the exam pattern of WB JECA will help candidates prepare effectively. candidates will find out the marking scheme and section-wise breakup of marks. This will, in turn, help them in planning their preparation and time management at the time of writing the exam. The WB JECA exam pattern is as follows:

WB JECA Exam Pattern

Mode of exam	Pen and Paper based (OMR sheets will be provided)
Medium of Exam	English
Number of Sections	Two (Mathematics, Aptitude)
Type of Questions	Objective
Marking Scheme	+1 for correct response -0.25 for incorrect response

Section-wise distribution of Marks

Section	**Total no. of Questions/ Marks**	**Time Duration**

Mathematics	100	2 hours (11 AM - 1 PM)
Aptitude	50	1 hour (2 PM - 3 PM)
Total	**150**	**3 hours**

WB JECA Syllabus

syllabus before starting their exam preparation. The syllabus of WB JECA states the subjects and its contents which will be assessed in the exam.

List of Topics for WB JECA

Mathematics	
Calculus	Maxima & minima
	First and second order differential equation
	Differentiation
	Partial differentiation
	Limit
	Functions of several variables
	Continuity
	Taylor & Maclaurin's Series: Definite and indefinite integrals
Algebra	Addition of vectors
	Ring and Field
	Sets and elements
	Determinants
	Venn diagram
	Empty set

	Complex number
	Complements
	Inequation
	Matrices
	Group
	Union and intersection of sets
	Summation of signal series
	Cross product
	Scalar and Vector products
	De Moiver's theorem
	Class of sets
	Finite sets
	Universal set
	Algebra of sets
	Subsets
	Partitions
	Solution of linear equations
	Mean
	Correlation coefficient
	Combination
	Standard Deviation
Probability & Statistics	Permutation

	Probability distribution
	Median
	Probability
	Mode
	Cartesian and polar coordinate;
	Translation & Rotation of axes
	Straight line
	Ellipse
	Hyperbola
	Parabola

Aptitude
Data interpretation
Quantitative Comparison
Problem Solving
Reasoning
Discrete Quantitative Analysis

	Circle

CSIR-UGC NATIONAL ELIGIBILITY TEST (NET) FOR JUNIOR RESEARCH FELLOWSHIP AND LECTURER-SHIP

COMMON SYLLABUS FOR PART 'B' AND 'C' MATHEMATICAL SCIENCES

Analytical Geometry

UNIT – 1

Analysis: Elementary set theory, finite, countable and uncountable sets, Real number system as a complete ordered field, Archimedean property, supremum, infimum.

Sequences and series, convergence, limsup, liminf. Bolzano Weierstrass theorem, Heine Borel theorem.

Continuity, uniform continuity, differentiability, mean value theorem. Sequences and series of functions, uniform convergence.

Riemann sums and Riemann integral, Improper Integrals.

Monotonic functions, types of discontinuity, functions of bounded variation, Lebesgue measure, Lebesgue integral.

Functions of several variables, directional derivative, partial derivative, derivative as a linear transformation, inverse and implicit function theorems.

Metric spaces, compactness, connectedness. Normed linear Spaces. Spaces of continuous functions as examples.

Linear Algebra: Vector spaces, subspaces, linear dependence, basis, dimension, algebra of linear transformations.

Algebra of matrices, rank and determinant of matrices, linear equations. Eigenvalues and eigenvectors, Cayley-Hamilton theorem.

Matrix representation of linear transformations. Change of basis, canonical forms, diagonal forms, triangular forms, Jordan forms.

Inner product spaces, orthonormal basis.

Quadratic forms, reduction and classification of quadratic forms

UNIT – 2

Complex Analysis: Algebra of complex numbers, the complex plane, polynomials, power series, transcendental functions such as exponential, trigonometric and hyperbolic functions.

Analytic functions, Cauchy-Riemann equations.

Contour integral, Cauchy's theorem, Cauchy's integral formula, Liouville's theorem, Maximum modulus principle, Schwarz lemma, Open mapping theorem.

Taylor series, Laurent series, calculus of residues. Conformal mappings, Mobius transformations.

Algebra: Permutations, combinations, pigeon-hole principle, inclusion-exclusion principle, derangements.

Fundamental theorem of arithmetic, divisibility in Z, congruences, Chinese Remainder Theorem, Euler's Ø-function, primitive roots.

Groups, subgroups, normal subgroups, quotient groups, homomorphisms, cyclic groups, permutation groups, Cayley's theorem, class equations, Sylow theorems.

Rings, ideals, prime and maximal ideals, quotient rings, unique factorization domain, principal ideal domain, Euclidean domain.

Polynomial rings and irreducibility criteria.

Fields, finite fields, field extensions, Galois Theory.

Topology: basis, dense sets, subspace and product topology, separation axioms, connectedness and compactness.

UNIT – 3

Ordinary Differential Equations (ODEs):

Existence and uniqueness of solutions of initial value problems for first order ordinary differential equations, singular solutions of first order ODEs, system of first order ODEs.

General theory of homogenous and non-homogeneous linear ODEs, variation of parameters, Sturm-Liouville boundary value problem, Green's function.

Partial Differential Equations (PDEs):

Lagrange and Charpit methods for solving first order PDEs, Cauchy problem for first order PDEs.

Classification of second order PDEs, General solution of higher order PDEs with constant coefficients, Method of separation of variables for Laplace, Heat and Wave equations.

Numerical Analysis :

Numerical solutions of algebraic equations, Method of iteration and Newton-Raphson method, Rate of convergence, Solution of systems of linear algebraic equations using Gauss elimination and Gauss-Seidel methods, Finite differences, Lagrange, Hermite and spline interpolation, Numerical

differentiation and integration, Numerical solutions of ODEs using Picard, Euler, modified Euler and

Runge-Kutta methods.

Calculus of Variations:

Variation of a functional, Euler-Lagrange equation, Necessary and sufficient conditions for extrema. Variational methods for boundary value problems in ordinary and partial differential equations.

Linear Integral Equations:

Linear integral equation of the first and second kind of Fredholm and Volterra type, Solutions with separable kernels. Characteristic numbers and eigenfunctions, resolvent kernel.

Classical Mechanics:

Generalized coordinates, Lagrange's equations, Hamilton's canonical equations, Hamilton's principle and principle of least action, Two-dimensional motion of rigid bodies, Euler's dynamical equations for the motion of a rigid body about an axis, theory of small oscillations.

UNIT – 4

Descriptive statistics, exploratory data analysis

Sample space, discrete probability, independent events, Bayes theorem. Random variables and distribution functions (univariate and multivariate); expectation and moments. Independent random variables, marginal and conditional distributions. Characteristic functions. Probability inequalities (Tchebyshef, Markov, Jensen). Modes of convergence, weak and strong laws of large numbers, Central Limit theorems (i.i.d. case).

Markov chains with finite and countable state space, classification of states, limiting behaviour of n-step transition probabilities, stationary distribution, Poisson and birth-and-death processes.

Standard discrete and continuous univariate distributions. sampling distributions, standard errors and asymptotic distributions, distribution of order statistics and range.

Methods of estimation, properties of estimators, confidence intervals. Tests of hypotheses: most powerful and uniformly most powerful tests, likelihood ratio tests. Analysis of discrete data and chi-square test of goodness of fit. Large sample tests.

Simple nonparametric tests for one and two sample problems, rank correlation and test for independence. Elementary Bayesian inference.

Gauss-Markov models, estimability of parameters, best linear unbiased estimators, confidence intervals, tests for linear hypotheses. Analysis of variance and covariance. Fixed, random and mixed effects models. Simple and multiple linear regression. Elementary regression diagnostics. Logistic regression.

Multivariate normal distribution, Wishart distribution and their properties. Distribution of quadratic forms. Inference for parameters, partial and multiple correlation coefficients and related tests. Data reduction techniques: Principle component analysis, Discriminant analysis, Cluster analysis, Canonical correlation.

Simple random sampling, stratified sampling and systematic sampling. Probability proportional to size sampling. Ratio and regression methods.

Completely randomized designs, randomized block designs and Latin-square designs. Connectedness and orthogonality of block designs, BIBD. 2K factorial experiments: confounding and construction.

Hazard function and failure rates, censoring and life testing, series and parallel systems.

Linear programming problem, simplex methods, duality. Elementary queuing and inventory models. Steady-state solutions of Markovian queuing models: M/M/1, M/M/1 with limited waiting space, M/M/C, M/M/C with limited waiting space, M/G/1.

NET SYLLABUS

SUBJECT: ENGLISH CODE NO. : 30

Unit –I : Drama Unit –II : Poetry

Unit –III : Fiction, short story Unit –IV : Non-Fictional Prose

NOTE: The first four units must also be tested through comprehension passages to assess critical reading, critical thinking and writing skills. These four units will cover all literatures in English.

Unit –V : Language: Basic concepts, theories and pedagogy. English in Use. Unit –VI : English in India: history, evolution and futures

Unit –VII : Cultural Studies Unit –VIII : Literary Criticism

Unit –IX : Literary Theory post World War II

Unit –X : Research Methods and Materials in English

UGC NET COMPUTER SCIENCE SYLLABUS

Let's look at the Chapter-wise Syllabus of UGC NET Computer Science & Application Subject in detail:

Unit 1: DISCRETE STRUCTURES AND OPTIMIZATION

S. No	Discrete Structures and Optimization Chapters
1	**Mathematical Logic:** Propositional and Predicate Logic, Propositional Equivalences, Normal Forms, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference.

2	**Sets and Relations:** Set Operations, Representation and Properties of Relations, Equivalence Relations, Partially Ordering.
3	**Counting, Mathematical Induction and Discrete Probability:** Basics of Counting, Pigeonhole Principle, Permutations and Combinations, Inclusion- Exclusion Principle, Mathematical Induction, Probability, Bayes' Theorem.
4	**Group Theory:** Groups, Subgroups, Semi Groups, Product and Quotients of Algebraic Structures, Isomorphism, Homomorphism, Automorphism, Rings, Integral Domains, Fields, Applications of Group Theory.
5	**Graph Theory:** Simple Graph, Multigraph, Weighted Graph, Paths and Circuits, Shortest Paths in Weighted Graphs, Eulerian Paths and Circuits, Hamiltonian Paths and Circuits, Planner graph, Graph Coloring, Bipartite Graphs, Trees and Rooted Trees, Prefix Codes, Tree Traversals, Spanning Trees and Cut-Sets
6	**Boolean Algebra:** Boolean Functions and its Representation, Simplifications of Boolean Functions
7	**Optimization: Linear Programming -** Mathematical Model, Graphical Solution, Simplex and Dual Simplex Method, Sensitive Analysis; Integer Programming, Transportation and Assignment Models, PERT-CPM: Diagram Representation, Critical Path Calculations, Resource Levelling, Cost Consideration in Project Scheduling.

Unit 2: COMPUTER SYSTEM ARCHITECTURE

S. No	Computer System Architecture Chapters
1	**Digital Logic Circuits and Components:** Digital Computers, Logic Gates, Boolean Algebra, Map Simplifications, Combinational Circuits, Flip-Flops, Sequential Circuits, Integrated Circuits, Decoders, Multiplexers, Registers and Counters, Memory Unit.
2	**Data Representation:** Data Types, Number Systems and Conversion, Complements, Fixed Point Representation, Floating Point Representation, Error Detection Codes, Computer Arithmetic - Addition, Subtraction, Multiplication and Division Algorithms.
3	**Register Transfer and Microoperations:** Register Transfer Language, Bus and Memory Transfers, Arithmetic, Logic and Shift Microoperations.
4	**Basic Computer Organization and Design:** Stored Program Organization and Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-Output, Interrupt.

5	**Programming the Basic Computer:** Machine Language, Assembly Language, Assembler, Program Loops, Subroutines, Input-Output Programming.
6	**Microprogrammed Control:** Control Memory, Address Sequencing, Design of Control Unit
7	**Central Processing Unit:** General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, RISC Computer, CISC Computer
8	**Pipeline and Vector Processing:** Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, Vector Processing Array Processors.
9	**Input-Output Organization:** Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, DMA, Serial Communication.
10	**Memory Hierarchy:** Main Memory, Auxillary Memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware.
11	**Multiprocessors:** Characteristics of Multiprocessors, Interconnection Structures, Interprocessor Arbitration, Interprocessor Communication and Synchronization, Cache Coherence, Multicore Processors.

Unit 3: PROGRAMMING LANGUAGES AND COMPUTER GRAPHICS

S. No	Programming Languages and Computer Graphics Chapters
1	**Language Design and Translation Issues:** Programming Language Concepts, Paradigms and Models, Programming Environments, Virtual Computers and Binding Times, Programming Language Syntax, Stages in Translation, Formal Transition Models
2	**Elementary Data Types:** Properties of Types and Objects; Scalar and Composite Data Types.
3	**Programming in C:** Tokens, Identifiers, Data Types, Sequence Control, Subprogram Control, Arrays, Structures, Union, String, Pointers, Functions, File Handling, Command Line Argumaents, Preprocessors.
4	**Object Oriented Programming:** Class, Object, Instantiation, Inheritance, Encapsulation, Abstract Class, Polymorphism.
5	**Programming in C++:** Tokens, Identifiers, Variables and Constants; Data types, Operators, Control statements, Functions Parameter Passing, Virtual Functions, Class and Objects; Constructors and Destructors; Overloading, Inheritance, Templates, Exception and Event

	Handling; Streams and Files; Multifile Programs.
6	**Web Programming:** HTML, DHTML, XML, Scripting, Java, Servlets, Applets.
7	**Computer Graphics:** Video-Display Devices, Raster-Scan and Random-Scan Systems; Graphics Monitors, Input Devices, Points and Lines; Line Drawing Algorithms, Mid-Point Circle and Ellipse Algorithms; Scan Line Polygon Fill Algorithm, Boundary-Fill and FloodFill.
8	**2-D Geometrical Transforms and Viewing:** Translation, Scaling, Rotation, Reflection and Shear Transformations; Matrix Representations and Homogeneous Coordinates; Composite Transforms, Transformations Between Coordinate Systems, Viewing Pipeline, Viewing Coordinate Reference Frame, Window to View-Port Coordinate Transformation, Viewing Functions, Line and Polygon Clipping Algorithms
9	**3-D Object Representation, Geometric Transformations and Viewing:** Polygon Surfaces, Quadric Surfaces, Spline Representation, Bezier and B-Spline Curves; Bezier and B-Spline Surfaces; Illumination Models, Polygon Rendering Methods, Viewing Pipeline and Coordinates; General Projection Transforms and Cipping

Unit 4: DATABASE MANAGEMENT SYSTEMS

S. No	**Database Management Systems Chapters**
1	**Database System Concepts and Architecture:** Data Models, Schemas, and Instances; Three-Schema Architecture and Data Independence; Database Languages and Interfaces; Centralized and Client/Server Architectures for DBMS.
2	**Data Modeling:** Entity-Relationship Diagram, Relational Model - Constraints, Languages, Design, and Programming, Relational Database Schemas, Update Operations and Dealing with Constraint Violations; Relational Algebra and Relational Calculus; Codd Rules.
3	**SQL:** Data Definition and Data Types; Constraints, Queries, Insert, Delete, and Update Statements; Views, Stored Procedures and Functions; Database Triggers, SQL Injection.
4	**Normalization for Relational Databases:** Functional Dependencies and Normalization; Algorithms for Query Processing and Optimization; Transaction Processing, Concurrency Control Techniques, Database Recovery Techniques, Object and Object-Relational Databases; Database Security and Authorization.
5	**Enhanced Data Models:** Temporal Database Concepts, Multimedia Databases, Deductive Databases, XML and Internet Databases; Mobile Databases, Geographic Information

	Systems, Genome Data Management, Distributed Databases and Client-Server Architectures.
6	**Data Warehousing and Data Mining:** Data Modeling for Data Warehouses, Concept Hierarchy, OLAP and OLTP; Association Rules, Classification, Clustering, Regression, Support Vector Machine, K-Nearest Neighbour, Hidden Markov Model, Summarization, Dependency Modeling, Link Analysis, Sequencing Analysis, Social Network Analysis.
7	**Big Data Systems:** Big Data Characteristics, Types of Big Data, Big Data Architecture, Introduction to Map-Reduce and Hadoop; Distributed File System, HDFS.
8	**NOSQL:** NOSQL and Query Optimization; Different NOSQL Products, Querying and Managing NOSQL; Indexing and Ordering Data Sets; NOSQL in Cloud.

Unit 5: SYSTEM SOFTWARE AND OPERATING SYSTEM

S. No	System Software and Operating System Chapters
1	**System Software:** Machine, Assembly and High-Level Languages; Compilers and Interpreters; Loading, Linking and Relocation; Macros, Debuggers.
2	**Basics of Operating Systems:** Operating System Structure, Operations and Services; System Calls, Operating-System Design and Implementation; System Boot.
3	**Process Management:** Process Scheduling and Operations; Interprocess Communication, Communication in Client–Server Systems, Process Synchronization, Critical-Section Problem, Peterson's Solution, Semaphores, Synchronization.
4	**Threads:** Multicore Programming, Multithreading Models, Thread Libraries, Implicit Threading, Threading Issues.
5	**CPU Scheduling:** Scheduling Criteria and Algorithms; Thread Scheduling, Multiple Processor Scheduling, Real-Time CPU Scheduling.
6	**Deadlocks:** Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Avoidance and Detection; Recovery from Deadlock.
7	**Memory Management:** Contiguous Memory Allocation, Swapping, Paging, Segmentation, Demand Paging, Page Replacement, Allocation of Frames, Thrashing, Memory-Mapped Files.

8	**Storage Management:** Mass-Storage Structure, Disk Structure, Scheduling and Management, RAID Structure.
9	**File and Input/Output Systems:** Access Methods, Directory and Disk Structure; FileSystem Mounting, File Sharing, File-System Structure and Implementation; Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance; Recovery, I/O Hardware, Application I/O Interface, Kernel I/O Subsystem, Transforming I/O Requests to Hardware Operations.
10	**Security:** Protection, Access Matrix, Access Control, Revocation of Access Rights, Program Threats, System and Network Threats; Cryptography as a Security Tool, User Authentication, Implementing Security Defenses.
11	**Virtual Machines:** Types of Virtual Machines and Implementations; Virtualization.
12	**Linux Operating Systems:** Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, File Systems, Input and Output; Interprocess Communication, Network Structure.
13	**Windows Operating Systems:** Design Principles, System Components, Terminal Services and Fast User Switching; File System, Networking.
14	**Distributed Systems:** Types of Network based Operating Systems, Network Structure, Communication Structure and Protocols; Robustness, Design Issues, Distributed File Systems.

Unit 6: SOFTWARE ENGINEERING

S. No	Software Engineering Chapters
1	**Software Process Models:** Software Process, Generic Process Model – Framework Activity, Task Set and Process Patterns; Process Lifecycle, Prescriptive Process Models, Project Management, Component Based Development, Aspect-Oriented Software Development, Formal Methods, Agile Process Models – Extreme Programming (XP), Adptive Software Development, Scrum, Dynamic System Development Model, Feature Driven Development, Crystal, Web Engineering.
2	**Software Requirements:** Functional and Non-Functional Requirements; Eliciting Requirements, Developing Use Cases, Requirement Analysis and Modelling; Requirements Review, Software Requirment and Specification (SRS) Document.
3	**Software Design:** Abstraction, Architecture, Patterns, Separation of Concerns, Modularity, Information Hiding, Functional Independence, Cohesion and Coupling; Object-Oriented

	Design, Data Design, Architectural Design, User Interface Design, Component Level Design
4	**Software Quality:** McCall's Quality Factors, ISO 9126 Quality Factors, Quality Control, Quality Assurance, Risk Management, Risk Mitigation, Monitoring and Management (RMMM); Software Reliability
5	**Estimation and Scheduling of Software Projects:** Software Sizing, LOC and FP based Estimations; Estimating Cost and Effort; Estimation Models, Constructive Cost Model (COCOMO), Project Scheduling and Staffing; Time-line Charts.
6	**Software Testing:** Verification and Validation; Error, Fault, Bug and Failure; Unit and Integration Tesing; White-box and Black-box Testing; Basis Path Testing, Control Structure Testing, Deriving Test Cases, Alpha and Beta Testing; Regression Testing, Performance Testing, Stress Testing.
7	**Software Configuration Management:** Change Control and Version Control; Software Reuse, Software Re-engineering, Reverse Engineering

Unit 7: DATA STRUCTURES AND ALGORITHMS

S. No	**Data Structures and Algorithms Chapters**
1	**Data Structures:** Arrays and their Applications; Sparse Matrix, Stacks, Queues, Priority Queues, Linked Lists, Trees, Forest, Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree, B Tree, B+ Tree, B* Tree, Data Structure for Sets, Graphs, Sorting and Searching Algorithms; Hashing.
2	**Performance Analysis of Algorithms and Recurrences:** Time and Space Complexities; Asymptotic Notation, Recurrence Relations.
3	**Design Techniques:** Divide and Conquer; Dynamic Programming, Greedy Algorithms, Backtracking, Branch and Bound.
4	**Lower Bound Theory:** Comparison Trees, Lower Bounds through Reductions.
5	**Graph Algorithms:** Breadth-First Search, Depth-First Search, Shortest Paths, Maximum Flow, Minimum Spanning Trees.
6	**Complexity Theory:** P and NP Class Problems; NP-completeness and Reducibility.
7	**Selected Topics:** Number Theoretic Algorithms, Polynomial Arithmetic, Fast Fourier

	Transform, String Matching Algorithms.
8	**Advanced Algorithms:** Parallel Algorithms for Sorting, Searching and Merging, Approximation Algorithms, Randomized Algorithms.

Unit 8: THEORY OF COMPUTATION AND COMPILERS

S. No	Theory of Computation and Compilers Chapters
1	**Theory of Computation:** Formal Language, Non-Computational Problems, Diagonal Argument, Russels's Paradox
2	**Regular Language Models:** Deterministic Finite Automaton (DFA), Non-Deterministic Finite Automaton (NDFA), Equivalence of DFA and NDFA, Regular Languages, Regular Grammars, Regular Expressions, Properties of Regular Language, Pumping Lemma, NonRegular Languages, Lexical Analysis.
3	**Context Free Language:** Pushdown Automaton (PDA), Non-Deterministic Pushdown Automaton (NPDA), Context Free Grammar, Chomsky Normal Form, Greibach Normal Form, Ambiguity, Parse Tree Representation of Derivation Trees, Equivalence of PDA's and Context Free Grammars; Properties of Context Free Language.
4	**Turing Machines (TM):** Standard Turing Machine and its Variations; Universal Turing Machines, Models of Computation and Church-Turing Thesis; Recursive and Recursively Enumerable Languages; Context-Sensitive Languages, Unrestricted Grammars, Chomsky Hierarchy of Languages, Construction of TM for Simple Problems.
5	**Unsolvable Problems and Computational Complexity:** Unsolvable Problem, Halting Problem, Post Correspondence Problem, Unsolvable Problems for Context-Free Languages, Measuring and Classifying Complexity, Tractable and Intractable Problems.
6	**Syntax Analysis:** Associativity, Precedence, Grammar Transformations, Top Down Parsing, Recursive Descent Predictive Parsing, LL(1) Parsing, Bottom up Parsing, LR Parser, LALR(1) Parser.
7	**Semantic Analysis:** Attribute Grammar, Syntax Directed Definitions, Inherited and Synthesized Attributes; Dependency Graph, Evaluation Order, S-attributed and L-attributed Definitions; Type-Checking.
8	**Run Time System:** Storage Organization, Activation Tree, Activation Record, Stack Allocation of Activation Records, Parameter Passing Mechanisms, Symbol Table.

9	**Intermediate Code Generation:** Intermediate Representations, Translation of Declarations, Assignments, Control Flow, Boolean Expressions and Procedure Calls.
10	**Code Generation and Code Optimization:** Control-flow, Data-flow Analysis, Local Optimization, Global Optimization, Loop Optimization, Peep-Hole Optimization, Instruction Scheduling.

Unit 9: Data Communication and Computer Networks

S. No	Data Communication and Computer Networks Chapters
1	**Data Communication:** Components of a Data Communication System, Simplex, HalfDuplex and Duplex Modes of Communication; Analog and Digital Signals; Noiseless and Noisy Channels; Bandwidth, Throughput and Latency; Digital and Analog Transmission; Data Encoding and Modulation Techniques; Broadband and Baseband Transmission; Multiplexing, Transmission Media, Transmission Errors, Error Handling Mechanisms.
2	**Computer Networks:** Network Topologies, Local Area Networks, Metropolitan Area Networks, Wide Area Network, Wireless Networks, Internet.
3	**Network Models:** Layered Architecture, OSI Reference Model and its Protocols; TCP/IP Protocol Suite, Physical, Logical, Port and Specific Addresses; Switching Techniques.
4	**Functions of OSI and TCP/IP Layers:** Framing, Error Detection and Correction; Flow and Error Control; Sliding Window Protocol, HDLC, Multiple Access – CSMA/CD, CSMA/CA, Reservation, Polling, Token Passing, FDMA, CDMA, TDMA, Network Devices, Backbone Networks, Virtual LANs. IPv4 Structure and Address Space; Classful and Classless Addressing; Datagram, Fragmentation and Checksum; IPv6 Packet Format, Mapping Logical to Physical Address (ARP), Direct and Indirect Network Layer Delivery; Routing Algorithms, TCP, UDP and SCTP Protocols; Flow Control, Error Control and Congestion Control in TCP and SCTP.
5	**World Wide Web (WWW):** Uniform Resource Locator (URL), Domain Name Service (DNS), Resolution - Mapping Names to Addresses and Addresses to Names; Electronic Mail Architecture, SMTP, POP and IMAP; TELNET and FTP.
6	**Network Security:** Malwares, Cryptography and Steganography; Secret-Key Algorithms, Public-Key Algorithms, Digital Signature, Virtual Private Networks, Firewalls.
7	**Mobile Technology:** GSM and CDMA; Services and Architecture of GSM and Mobile Computing; Middleware and Gateway for Mobile Computing; Mobile IP and Mobile

	Communication Protocol; Communication Satellites, Wireless Networks and Topologies; Cellular Topology, Mobile Adhoc Networks, Wireless Transmission and Wireless LANs; Wireless Geolocation Systems, GPRS and SMS.
8	**Cloud Computing and IoT:** SaaS, PaaS, IaaS, Public and Private Cloud; Virtualization, Virtual Server, Cloud Storage, Database Storage, Resource Management, Service Level Agreement, Basics of IoT.

Unit 10: ARTIFICIAL INTELLIGENCE (AI)

S. No	Artificial Intelligence (AI) Chapters
1	**Approaches to AI:** Turing Test and Rational Agent Approaches; State Space Representation of Problems, Heuristic Search Techniques, Game Playing, Min-Max Search, Alpha Beta Cutoff Procedures.
2	**Knowledge Representation:** Logic, Semantic Networks, Frames, Rules, Scripts, Conceptual Dependency and Ontologies; Expert Systems, Handling Uncertainty in Knowledge.
3	**Planning:** Components of a Planning System, Linear and Non Linear Planning; Goal Stack Planning, Hierarchical Planning, STRIPS, Partial Order Planning.
4	**Natural Language Processing:** Grammar and Language; Parsing Techniques, Semantic Analysis and Prgamatics.
5	**Multi Agent Systems:** Agents and Objects; Agents and Expert Systems; Generic Structure of Multiagent System, Semantic Web, Agent Communication, Knowledge Sharing using Ontologies, Agent Development Tools.
6	**Fuzzy Sets:** Notion of Fuzziness, Membership Functions, Fuzzification and Defuzzification; Operations on Fuzzy Sets, Fuzzy Functions and Linguistic Variables; Fuzzy Relations, Fuzzy Rules and Fuzzy Inference; Fuzzy Control System and Fuzzy Rule Based Systems.
7	**Genetic Algorithms (GA):** Encoding Strategies, Genetic Operators, Fitness Functions and GA Cycle; Problem Solving using GA
8	**Artificial Neural Networks (ANN):** Supervised, Unsupervised and Reinforcement Learning; Single Perceptron, Multi Layer Perceptron, Self Organizing Maps, Hopfield Network.

WHAT ARE THE OLYMPIADS ?

International Olympiads in Science and Mathematics are the world championships for school students held every year in a different country.

The most famous Olympiads are The International Mathematical Olympiad (IMO), The International Physics Olympiad (IPhO), The International Chemistry Olympiad (IChO), The International Biology Olympiad (IBO), The International Olympiad in Informatics (IOI) and The International Astronomy Olympiad (IAO).

Countries send a delegation of students and leaders to participate at the International level. India conducts National Olympiads to identify the best students who can represent India at the international level.

MATHEMATICAL OLYMPIAD

The Mathematical Olympiad Programme in India, which leads to participation of Indian students in the International Mathematical Olympiad (IMO) is organized by the Homi Bhabha Centre for Science Education (HBCSE) on behalf of the National Board for Higher Mathematics (NBHM) of the Department of Atomic Energy (DAE), Government of India. This programme is one of the major initiatives undertaken by the NBHM. Its main purpose is to spot mathematical talent among pre-university students in the country.

For the purpose of training and selection of students for the Olympiad contest, 25 regions all over the country have been designated and each assigned a Regional Coordinator. Additionally, three groups (Central Board of Secondary Education (CBSE), Navodaya Vidyalaya Samiti (NVS) and Kendriya Vidyalaya Sangathana (KVS) have a 'Regional Coordinator' each. The Mathematical Olympiad programme consists of five stages.

- **Stage 1: Regional Mathematical Olympiad (RMO and pre - RMO):** The RMO is a three-hour written test with six or seven problems. On the basis of the performance in RMO, a certain number of students from each region is selected for Stage 2 (INMO). The Regional Coordinators are in charge of conducting the RMO in their respective regions. They have the option of preparing RMO question papers all by themselves or they may choose to use the central RMO question paper prepared by the Mathematical Olympiad Cell, HBCSE, TIFR. Some regions may hold a pre-RMO examination by way of which students will be selected to appear for RMO. All pre-RMOs will be conducted by the concerned regions. The format of the pre-RMO paper and the criteria for selecting students for RMO are at the sole discretion of the respective Regional Coordinator.

- **Stage 2: Indian National Mathematical Olympiad (INMO):** The INMO will be held on the first Sunday of February between 1.00 pm and 5.00 pm. Only those students who are selected in RMO 2015 and those who have received an INMO certificate of merit in 2015 are eligible to appear for the INMO. This contest is a four hour written test. On the basis of the INMO, the top 30-35 students in merit from all over the country are chosen as INMO awardees. In addition to INMO awardees, the next 45-50 students who are in class X or lower and have done well in INMO, but have not qualified as INMO awardee are awarded INMO certificate of merit.

- **Stage 3: International Mathematical Olympiad Training Camp (IMOTC):** The INMO awardees are invited to a month long training camp in April-May each year at the Homi Bhabha Centre for Science Education (HBCSE), Mumbai. The INMO awardess of the previous years who are eligible for IMO 2016 and, in addition, who have satisfactorily gone through postal tuition throughout the year are invited to the training camp as senior students.The junior students will receive INMO certificate and a prize in the form of books.The senior students will receive a prize in the form of books and cash. On the basis of a number of selection tests through the Camp, a team of the best six students is selected from the combined pool of junior and senior batch participants.

- **Stage 4: Pre-departure Training Camp for IMO**

The selected team of six students goes through another round of training and orientation for about ten days prior to departure for IMO.

- **Stage 5: International Mathematical Olympiad (IMO):** The six member team selected at the end of IMOTC accompanied by a leader, a deputy leader and an observer represents the country at the IMO, held in July each year in a different member country of the IMO. The IMO contest consists of two written tests held on two consecutive days. On each day of the contest the test consists of three problems and lasts for four and half hours. India has been participating in the IMO since 1989. Students of the Indian Team who receive gold, silver and bronze medals at the IMO receive a cash prize of Rs. 5000/-, Rs. 4000/- and Rs. 3000/- respectively at a formal ceremony at the end of the training camp during the following year.

The selection of the members of the Indian team for IMO will be subject to their fulfilling criteria such as age limit, medical fitness, parental consent, etc., as may be applicable. In particular, the selected students need to have a valid Indian passport meeting the visa regulations of the host country. Ministry of Human Resource Development (MHRD) finances international travel of the team, the leader and the deputy leader, while NBHM (DAE) finances the other expenditures connected with the international participation and the entire in-country programme. Students aiming to go through the Mathematical Olympiad programme leading to international participation (IMO) should note that RMO is the first essential step for the programme. To appear for the RMO, the students should get in touch with the RMO co-ordinator of their region well in advance for enrollment and payment of stipulated (nominal) fees.

PHYSICS, CHEMISTRY, BIOLOGY, ASTRONOMY, JUNIOR SCIENCE OLYMPIADS

STAGE I - NATIONAL STANDARD EXAMINATION (NSE) IN PHYSICS, CHEMISTRY, BIOLOGY, ASTRONOMY, JUNIOR SCIENCE ORGANIZED BY IAPT

Every student aspiring to go through successive stages of the Olympiad programme must enroll for NSE. NSEs are held at a large number of centres in the country usually in the last week of November. All students of Class XII or below (science stream) are eligible to appear for NSEs. A student may appear for more than one Olympiad as per the examination schedule. Students who have passed Class XII are not eligible.

Astronomy: For the Junior level, students should be in Class IX. For the Senior level, students should be in Class X or Class XI. NSE emphasizes comprehension of the subject, not rote memory.

STAGE II - INDIAN NATIONAL OLYMPIAD EXAMINATIONS

For Indian National Olympiad Examinations, the national top 200-250 students selected from NSEP, NSEC, NSEB and NSEA each are eligible to appear for Indian National Physics Olympiad (INPhO), Indian National Chemistry Olympiad (INChO), Indian National Biology Olympiad (INBO) and Indian National Astronomy Olympiad (INAO) respectively.

Indian National Olympiads are held sometime in the last week of January or early February. These examinations are held at about 16 Centres in the country.

Questions and problems in National Olympiads are usually non-conventional and of high difficulty level, comparable to the International Olympiads. On the basis of performance in the National Olympiads (theory) about 50 students are short-listed in each subject.

STAGE III - ORIENTATION CUM SELECTION CAMP (OCSC)

BIOLOGY, PHYSICS AND CHEMISTRY

The selected group of students in different subjects will be invited to the Orientation Cum Selection Camps at HBCSE. These camps are typically of two to three weeks duration in each subject. The camps include several theoretical and experimental tests. Orientation is provided to students especially for the experimental tests. A camp concludes with a valedictory function where distinguished scientists are invited to speak to the students. On the basis of their performance in OCSC the top 5 students in Physics, top 4 in Chemistry and top 4 in Biology will be declared to be special merit awardees. These special merit awardees are given a prize each in the form of books and cash. In addition there will be special prizes in each subject to recognize meritorious performance in theory and experiments. The 5 special merit awardees in Physics constitute the 5-member student team to represent India at the International Physics Olympiad. The 4 special merit awardees in Chemistry constitute the 4-member student team to represent India at the International Chemistry Olympiad. The 4 special merit awardees in Biology constitute the 4-member student team to represent India at the International Biology Olympiad (IBO).

ASTRONOMY

Since HBCSE is academically involved in the hosting of the 10th International Olympiad on Astronomy and Astrophysics (IOAA) in Bhubaneswar in 2016, the second stage (INAO) examination, the third stage (OCSC-Astronomy) and the fourth stage (Training of the Indian team for IOAA 2016) will be organized by a different organisation (to be announced later). The selected group of students in Astronomy will be invited to the Orientation Cum Selection Camp. The camp is of about three weeks duration. The camp includes several theoretical, data analysis and observation tests. Students are trained in basic concepts in astronomy and astrophysics during the camp. Orientation is provided to students especially for problem-solving in astronomy, astrophysics and for observational astronomy tests. The camp concludes with a valedictory function where distinguished scientists are invited to speak to the students. On the basis of the performance in OCSC, the top 5 students will be declared special merit awardees. These special merit awardees will be given a prize each in the form of books and cash. In addition there will be special certificates to recognize meritorious performance in theory, data analysis and observation.

JUNIOR SCIENCE

The selected group of students from INJSO will be invited to the Orientation Cum Selection Camp at HBCSE. The camp is of two to three weeks duration. The camp includes several theoretical and experimental tests. Orientation is provided to students especially for the experimental tests. The camp concludes with a valedictory function where distinguished scientists are invited to speak to the students. On the basis of their performance in OCSC the top 6 students will be declared to be special merit awardees. These special merit awardees will be given a prize each in the form of books and cash. The 6 special merit awardees will constitute the 6-member student team to represent India at the International Junior Science Olympiad (IJSO).

STAGE IV - TRAINING OF INDIAN TEAMS FOR INTERNATIONAL OLYMPIADS

The selected Indian teams undergo a rigorous training program at HBCSE in theory and experiment.

STAGE V - PARTICIPATION IN INTERNATIONAL OLYMPIADS

- The 5-member student team, 2 teacher leaders and one scientific observer constitute the delegation to represent India at the International Physics Olympiad (IPhO)

- The 4-member student team, 2 teacher leaders and one scientific observer constitute the delegation to represent India at the International Chemistry Olympiad (IChO)
- The 4-member student team, 2 teacher leaders and one scientific observer constitute the delegation to represent India at the International Biology Olympiad (IBO)
- The 5-member student team, 2 teacher leaders and one scientific observer constitute the delegation to represent India at the International Astronomy Olympiad (IAO).
- The 5-member student team, 2 teacher leaders and one scientific observer constitute the delegation to represent India at the International Astronomy Olympiad (IAO).
- The 6-member student team, 3 teacher leaders and one scientific observer constitute the delegation to represent India at the International Junior Science Olympiad (IJSO).

OLYMPIAD IN INFORMATICS

The Indian Computing Olympiad is used to select the team of four students to represent India at the International Olympiad for Informatics (IOI). The competition is held in three stages: the Zonal Informatics Olympiad, the Indian National Olympiad in Informatics, and the International Olympiad in Informatics Training Camp.

Stage I: The Zonal Informatics Olympiad (ZIO) is a written round. Most of the questions can be solved with the use of algorithmic techniques, although logic is usually enough.

Stage II: The Indian National Olympiad in Informatics (INOI) - In this students have to write programs on a computer. The INOI is a programming competition round. Students are expected to solve two algorithmic problems in 3 hours in either C, C++ or Pascal. Questions in this round are similar to those in the IOI and other national computing Olympiads.

About thirty top-performing students in the INOI are selected for the International Olympiad in Informatics Training Camp (IOITC).

Stage III: The International Olympiad in Informatics Training Camp (IOITC) is a one fortnight long annual training camp held in India to select and train students to represent India at the International Olympiad in Informatics.

At the completion of the camp, 4 students are selected to represent India at the International Olympiad in Informatics.

WHEN AND HOW SHOULD I START PREPARING FOR THE OLYMPIADS?

The Olympiads are the most prestigious school competitions in the world. Students have to go through a rigorous process to be selected for the Indian team. Students selected to represent the country get an opportunity to compete and win prizes at an International level.

Students who represent **India** in the International Olympiads in Physics / Chemistry /Mathematics / Informatics and Astronomy automatically qualify for KVPY Fellowship. Organisations like Infoysys, Sasken, NASSCOM etc. also give prizes to the participants and winners of the International Olympaids.

Usually students appear for the Olympiads in Class XI but brilliant students can appear for the stage I exam even in lower classes and increase their number of attempts and even their medal tally as they can participate in the International Olympiads till they reach Class XII.

To help students excel in Olympiads, RGET EDUCATION has various programs available depending on which class the student is studying in.

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