VIDYARTHI VIGYAN MANTHAN 2025-26
SYLLABUS (CLASS - XI)

CLASS XI

PHYSICS

1. **Units and Measurements:** Need for measurement: Units of measurement; systems of units; SI units, fundamental and derived units. significant figures, Determining the uncertainty in the result. Dimensions of physical quantities, dimensional analysis and its applications.

2. **Kinematics:** Motion in a Straight Line Frame of reference, Motion in a straight line, Elementary concepts of differentiation and integration for describing motion, uniform and non-uniform motion, average speed and average velocity and instantaneous velocity, uniformly accelerated motion, velocity-time and position-time graphs. Relations for uniformly accelerated motion (graphical and calculus treatment).

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

4. **Laws of Motion:** Laws of Motion. Intuitive concept of force, 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, and lubrication. Dynamics of uniform circular motion: Centripetal force, examples of circular motion (vehicle on a level circular road, vehicle on a banked road).

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

6. **Motion of System of Particles and Rigid Body:** System of Particles and Rotational Motion Centre of mass of a two-particle system, momentum conservation and Centre of mass motion. Centre of mass of a rigid body; centre of mass of a uniform rod. Moment of a force, torque, angular momentum, law of conservation of angular momentum and its applications. Equilibrium of rigid bodies, rigid body rotation and equations of rotational motion, comparison of linear and rotational motions. Moment of inertia, radius of gyration, values of moments of inertia for simple geometrical objects (no derivation).

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

8. **Properties of Bulk Matter:** Mechanical Properties of Solids Elasticity, Stress-strain relationship, Hooke's law, Young's modulus, bulk modulus, shear modulus of rigidity (qualitative idea only), Poisson's ratio; elastic energy. Application of the elastic behaviour of materials (qualitative idea only).

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

10. **Thermal Properties of Matter:** Heat, temperature, thermal expansion; thermal expansion of solids, liquids and gases, anomalous expansion of water; specific heat capacity; Cp, Cv - calorimetry; change of state - latent heat capacity. Heat transfer-conduction, convection and radiation, thermal conductivity, qualitative ideas of Blackbody radiation, Wein's displacement Law, Stefan's law.

11. **Thermodynamics:** Thermodynamics, Thermal equilibrium and definition of temperature, zeroth law of thermodynamics, heat, work and internal energy. First law of thermodynamics, Second law of thermodynamics: Thermodynamic state variable and equation of state. Change of condition of gaseous state isothermal, adiabatic, reversible, irreversible, and cyclic processes.

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

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

CHEMISTRY

- Some Basic Concepts of Chemistry
- Structure of Atoms
- Classification of Elements and Periodicity in properties
- Chemical Bonding and Molecular Structure
- Thermodynamics

- Equilibrium
- Redox Reaction
- Organic Chemistry: Some Basic Principles and Techniques
- Hydrocarbons

BIOLOGY

- Animal and plant diversity
- Classification in living organisms
- The plant kingdom
- The Animal Kingdom
- Morphology and anatomy of flowering plants
- Structural organization of animals
- Cell: structure and function; bio-molecules; Cell cycle and division
- Plant Physiology: Photosynthesis in higher plants; Respiration; Growth and development
- Human Physiology: Respiration; Circulation; Excretion; Movement; Neuronal and chemical coordination

MATHEMATICS

1. **Number Theory:** Sets – Representation, Types, Subsets, Operations on Sets, Applications Relations – Cartesian Product, Relations, Domain, Co-domain, Range, Arrow Diagram, Complex Numbers – Operations, Argand Plane, Modulus and Argument, Polar Form, De Movire's Theorem, Logarithms – Definition and Results

2. **Algebra:** Linear Inequalities – In one and Two Variables, Quadratic Equation, Inequalities, Wavy Curve Method Binomial Theorem – Expansion, General & Middle Term, Sequences & Series – AP, GP, HP, AM, GM, Special Series

3. **Trigonometry:** Identities, Trigonometric Equations and Inequations, Properties of Triangles, Inverse Trigonometric Functions, Graphs

4. **Geometry:** Straight Lines – Various Forms of a Line, Pair of Straight Lines, Conic Sections – Circles, Parabola, Ellipse, Hyperbola Vectors – Components of a Vector, Dot and Cross Product Three-Dimensional Geometry – Distance Formula & Section Formula

5. **Combinatorics:** Counting Principles – Factorial, Fundamental Principles, Permutations, Combinations, Recurrence Relations – Fibonacci Sequence.

6. **Calculus:** Functions - Domain, Co-domain, Range, Types – Graph, Limits – Definition, Special Limits, Differentiation – First Principle, Results, Algebra of Derivatives, Geometric Meaning, Measure of Dispersions – Mean Deviation, Standard Deviation,

7. **Statistics & Probability:** Variance, Coefficient of Variation, Probability – Events, Types, Algebra of Events, Probability, Addition and Multiplication Theorem of Probability, Binomial and Poisson Distribution

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LOGIC AND REASONING

Cryptarithmetic/Alphametics, Logical Sequence Series(number, alphabet & image and more), odd one out, Coding-decoding, Blood Relations, Binary Logic, Mathematical Operations, Standard Logical Reasoning Sets, Visual Puzzles, Word Problems, IQ puzzles, Sequencing, Grid Puzzles, Visual Puzzles, Cubes and Dices, Venn Diagrams, Math based reasoning, Direction, Order and Ranking, Clocks & Calender, Analogy, Syllogism, Analytical puzzles, logical Inequalities, Image based sequence(like mirror & water image, rotation, best fit, Odd one out and more), Figure counting, Critical path puzzles, Odd one out, shape constructions, symmetry, number puzzle, Logical Sequence of Words, pattern-based puzzle, Sudoku, Geometrical figures related problem, Input & Output series, Linear and Circular Seating Arrangements, Games and Tournaments, Logical connectives, Math based reasoning, Decision making, meaningful word formation, Paper folding, Figure matrix, spatial visualization, Data Sufficiency.

LIFE STORY OF INDIAN SCIENTIST(S)

Satyendra Nath Bose: Father of Bosons (All Chapters)

INDIAN CONTRIBUTIONS TO SCIENCE

Indian Contributions to Science (All Chapters)

UNITS AND TOPICS FOR LEVEL-II

IKS-ICS SUPPLEMENTARY READING (INDIAN KNOWLEDGE SYSTEM)

Units		**Sub-units (Scope and Limitations)**
Unit No.	**Title of the Unit**	**Sub-units included**
1	**IKS and overview of the ICS**	Origins and Evolution of the Indian Knowledge system, Knowledge Production and Propagation in India through ages, Revival of the Indian knowledge systems, Comparison between Indian Knowledge Systems (IKS) and Contemporary Knowledge Systems (CKS)
2	**Astronomy**	Astronomy in the Indian Context, Different measures of time, The *Karaṇa* and *Vākya* systems, Various ancient Indian astronomical *yantras*, Solar and lunar calendars, Various significant eras
3	**Mathematics**	Geometry in Śulbasūtras, Mathematics during India's classical period, The Kerala school of mathematics

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Units		Sub-units (Scope and Limitations)
Unit No.	**Title of the Unit**	**Sub-units included**
4	**Chemistry**	Metallurgical processesin ancient India, Ancient Indian texts - *Rasārṇava* and *Rasaratnasamuccaya*, Various *yantras* for different chemical processes
5	**Agriculture**	Ancient texts on agriculture, Indigenous knowledge and agricultural practices, Rainfall prediction methods
6	**Āyurvēda and Medical Science**	Schools and traditions of Ayurveda, Pharmacological principles in Āyurvēda, Pharmaceutics in Āyurvēda, Properties and usage of the important medicinal Plants.
7	**Environmental conservation**	Importance of flora and fauna in Indian culture, Importance of wildlife and conservation techniques in Hinduism, Jainism, and Buddhism, Animals and plants in ancient sculptures, Conventional, non-conventional and clean energy sources in modern India
8	**Modern Sciences**	Indian space programme and major achievements like INSAT, Chandrayan, Mangalyan, Aditya L1 mission, Gaganyan etc. Indian Contributions in the discovery of gravitational waves, Achievements in atomic energy, Armaments developed by India