## UPSC NDA Syllabus 2024 for Paper I

The UPSC NDA Paper I syllabus for mathematics is subdivided into various topics, i.e. algebra, differential calculus, trigonometry, matrices, vector algebra, etc. Check out the list of important topics included in the NDA syllabus 2024 for the mathematics section shared below.

| Subject | UPSC NDA Syllabus 2024 |
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| Algebra | Concept of sets, operations on sets, Venn diagrams. De Morgan laws, Cartesian product, relation, equivalence relation. Representation of real numbers on a line. Complex numbers—basic properties, modulus, argument, cube roots of unity. Binary system of numbers. Conversion of a number in the decimal system to the binary system and vice-versa. Arithmetic, geometric, and harmonic progressions. Quadratic equations with real coefficients. Solution of linear equations of two variables by graphs. Permutation and Combination. Binomial theorem and its applications. Logarithms and their applications. |
| Matrices and Determinants | Types of matrices and operations on matrices. Determinant of a matrix, basic properties of determinants. Adjoint and inverse of a square matrix, Applications-Solution of a system of linear equations in two or three unknowns by Cramer’s rule and by the Matrix Method. |
| Trigonometry | Angles and their measures in degrees and in radians. Trigonometrical ratios. |

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| | Trigonometric identities Sum and difference formulae. Multiple and sub-multiple angles. Inverse trigonometric functions. Applications-Height and distance, properties of triangles. |
| Analytical Geometry of Two and Three Dimensions | Rectangular Cartesian Coordinate System. Distance formula. Equation of a line in various forms. The angle between two lines. Distance of a point from a line. Equation of a circle in standard and in general form. Standard forms of parabola, ellipse, and hyperbola. Eccentricity and axis of a conic. A point in a three-dimensional space, distance between two points. Direction Cosines and direction ratios. Equation two points. Direction Cosines and direction ratios. Equations of a plane and a line in various forms. The angle between two lines and the angle between two planes. Equation of a sphere. |
| Differential Calculus | Concept of a real valued function–domain, range, and graph of a function. Composite functions, one to one, onto, and inverse functions. Notion of limit, Standard limits—examples. Continuity of functions—examples, algebraic operations on continuous functions. Derivative of function at a point, geometrical and physical interpretation of a derivative—applications. Derivatives of sum, product, and quotient of functions; |

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| | derivative of a function with respect to another function; derivative of a composite function. Second order derivatives. Increasing and decreasing functions. Application of derivatives in problems of maxima and minima. |
| Integral Calculus and Differential Equations | Integration as the inverse of differentiation, integration by substitution and by parts, standard integrals involving algebraic expressions, trigonometric, exponential and hyperbolic functions. Evaluation of definite integrals—determination of areas of plane regions bounded by curves—applications.<br>Definition of order and degree of a differential equation; formation of a differential equation by examples. General and particular solutions of differential equations, solutions of first order and first-degree differential equations of various types—examples. Application in problems of growth and decay. |
| Vector Algebra | Vectors in two and three dimensions, magnitude and direction of a vector. Unit and null vectors, addition of vectors, scalar multiplication of a vector, scalar product or dot product of two vectors. Vector product or cross product of two vectors. Applications—work done by a force and moment of a force and in geometrical problems. |

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| Statistics and Probability | Statistics: Classification of data, Frequency distribution, cumulative frequency distribution—examples. Graphical representation—Histogram, Pie Chart, frequency polygon— examples. Measures of Central tendency—Mean, median and mode. Variance and standard deviation—determination and comparison. Correlation and regression.<br><br>Probability: random experiment, outcomes and associated sample space, events, mutually exclusive and exhaustive events, impossible and certain events. Union and Intersection of events. Complementary, elementary, and composite events. Definition of probability—classical and statistical—examples. Elementary theorems on probability—simple problems. Conditional probability, Bayes' theorem—simple problems. Random variable as function on a sample space. Binomial distribution, examples of random experiments giving rise to Binominal distribution |

## UPSC NDA Syllabus 2024 for Paper II

The UPSC NDA Paper II syllabus for the general ability test comprises two parts, i.e. English and general knowledge. The NDA GK question paper is subdivided into various subjects, i.e. Physics, Chemistry, General Science, Social Studies, Geography and Current Events. Check the list of important topics included in the NDA syllabus 2024 for the Paper II section shared below.

| Subject | UPSC NDA Paper II Syllabus 2024 |
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| English | Spotting Errors<br>Ordering of Words in a Sentence<br>Selecting Words<br>Comprehension<br>Synonyms<br>Sentence Improvement<br>Antonyms |
| Physics | Physical Properties and States of Matter, Mass, Weight, Volume, Density, and Specific Gravity, Principle of Archimedes, Pressure Barometer.<br>Motion of objects, Velocity and Acceleration, Newton's Laws of Motion, Force and Momentum, Parallelogram of Forces, Stability and Equilibrium of bodies Gravitation, elementary ideas of work, power, and energy. Effects of Heat, Measurement of Temperature and Heat, Change of State and Latent Heat, Modes of Transference of Heat. Sound waves and their properties, Simple musical instruments. Rectilinear propagation of light, reflection, and refraction. Spherical mirrors and lenses, human eye.<br>Natural and artificial magnets, properties of a magnet, and Earth as a magnet.<br>Static and Current Electricity, conductors and Nonconductors, Ohm's Law, Simple Electrical Circuits, Heating, Lighting and Magnetic effects of Current,<br>Measurement of Electrical Power, Primary and Secondary Cells, and Use of X-Rays. |

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| | General Principles in the Work of the Following:<br>Simple Pendulum, Simple Pulleys, Syphon, Levers, Balloon, Pumps, Hydrometer, Pressure Cooker, Thermos Flask, Gramophone, Telegraphs, Telephone, Periscope, Telescope, Microscope, Mariner's Compass, Lightning Conductors, Safety Fuses. |
| Chemistry | Physical and Chemical changes. Elements, Mixtures and Compounds, Symbols, Formulae and simple Chemical Equations, Law of Chemical Combination (excluding problems). Properties of Air and Water. Preparation and Properties of Hydrogen, Oxygen, Nitrogen and Carbondioxide, Oxidation and Reduction. Acids, bases and salts. Carbon—different forms. Fertilizers—Natural and Artificial. Material used in the preparation of substances like Soap, Glass, Ink, Paper, Cement, Paints, Safety Matches and Gun-Powder. Elementary ideas about the structure of Atom, Atomic Equivalent and Molecular Weights, Valency. |
| General Science | Difference between the living and non-living. Basis of Life—Cells, Protoplasms, and Tissues. Growth and Reproduction in Plants and Animals. Elementary knowledge of Human Body and its important organs. Common Epidemics, their causes and prevention. Food—Source of Energy for man. |

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| | Constituents of food, Balanced Diet. The Solar System—Meteors and Comets, Eclipses. Achievements of Eminent Scientists. |
| History, Freedom Movement etc | A broad survey of Indian History, with emphasis on Culture and Civilisation. Freedom Movement in India. Elementary study of Indian Constitution and Administration. Elementary knowledge of Five Year Plans of India. Panchayati Raj, Co-operatives and Community Development. Bhoodan, Sarvodaya, National Integration and Welfare State, Basic Teachings of Mahatma Gandhi. Forces shaping the modern world; Renaissance, Exploration and Discovery; War of American Independence. French Revolution, Industrial Revolution and Russian Revolution. Impact of Science and Technology on Society. Concept of one World, United Nations, Panchsheel, Democracy, Socialism and Communism. Role of India in the present world |
| Geography | The Earth, its shape and size. Lattitudes and Longitudes, Concept of time. International Date Line. Movements of Earth and their effects. Origin of Earth. Rocks and their classification; Weathering—Mechanical and Chemical, Earthquakes and Volcanoes. Ocean Currents and Tides Atmosphere and its composition; Temperature and Atmospheric Pressure, Planetary Winds, |

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| | Cyclones and Anti-cyclones; Humidity; Condensation and Precipitation; Types of Climate, Major Natural regions of the World. Regional Geography of India—Climate, Natural vegetation. Mineral and Power resources; location and distribution of agricultural and Industrial activities. Important Sea ports and main sea, land and air routes of India. Main items of Imports and Exports of India |
| Current Events | Knowledge of Important events that have happened in India in recent years. Current important world event. Prominent personalities—both Indian and International including those connected with cultural activities and sports. |