**Syllabus for NATA – 2021**

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**DRAWING TEST**

Understanding of scale and proportion of objects, geometric composition, shape, building forms and elements, aesthetics, colour texture, harmony & contrast. Conceptualization and Visualization through structuring objects in memory. Drawing of patterns – both geometrical and abstract. Form transformations in 2D and 3D like union, subtraction, rotation, surfaces and volumes. Generating plan, elevation and 3D views of objects. Creating 2D and 3D compositions using given shape and forms. Perspective drawing, Sketching of urban scape and landscape, Common day-to-day life objects like furniture, equipment etc., from memory.

**PHYSICS**

Electrostatics – Electric charges and Fields; Electrostatic Potential and Clearance.

Current Electricity; Magnetic Effects to Current and Magnetism; Moving Charges and magnetism; Magnetism and Matter.

Electromagnetic Induction and Alternating currents-Electromagnetic Induction; Alternating Current

Optics – Ray optics and optical instruments, Wave Optics.

Dual nature of radiation and Matter.

Atoms and Nuclei – Atoms, Nuclei.

Electronic devices – Semiconductor Electronics, Materials, Devices and Simple Circuits.

**CHEMISTRY**

Some Basic Concepts of Chemistry; Structure of Atom; Classification of Elements and Periodicity in Properties.

Chemical Bonding and Molecular; States of Matter; Gases and Liquids.

**Chemical Thermodynamics;** Equilibrium; Redox Reactions; Hydrogen; s-Block Elements p-Block Elements Organic Chemistry; Some basic principles and Techniques; Hydrocarbons; Environmental Chemistry.
MATHEMATICS

Algebra : Definitions of A.P. and G.P.; General term; Summation of first n-terms of series Σn, Σn²

Logarithms : Definition; General Properties; Change of base.

Matrices : Concepts of m x n (m ≤ 3, n ≤ 3) real matrices, operations of addition, scalar
multiplication and multiplication of matrices. Transpose of a matrix. Determinant of a square
matrix, Properties of determinants (statement only). Minor, cofactor and adjoint of a matrix.
Nonsingular matrix. Inverse of a matrix. Finding area of a triangle. Solutions of system of linear
equations. (Not more than 3 variables).

Trigonometry : Trigonometric functions, addition and subtraction formulae, formulae involving
multiple and submultiple angles, general solution of trigonometric equations. Properties of triangles,
inverse trigonometric functions and their properties.

Coordinate Geometry : Distance formula, section formula, area of a triangle, condition of
collinearity of three points in a plane. Polar coordinates, transformation from Cartesian to polar
coordinates and vice versa. Parallel transformation of axes, concept of locus, elementary locus
problems. Slope of a line. Equation of lines in different forms, angle between two lines. Condition
of perpendicularity and parallelism of two lines. Distance of a point from a line. Distance between
two parallel lines. Lines through the point of intersection of two lines. Equation of a circle with a
given center and radius. Condition that a general equation of second degree in x, y may represent a
circle. Equation of a circle in terms of endpoints of a diameter. Equation of tangent, normal and
chord. Parametric equation of a circle. Intersection of a line with a circle. Equation of common
chord of two intersecting circles.

3-Dimensional Co-ordinate Geometry : Direction cosines and direction ratios, distance between
two points and section formula, equation of a straight line, equation of a plane, distance of point
from a plane.

Theory of Calculus : Functions, composition of two functions and inverse of a function, limit,
continuity, derivative, chain rule, derivative of implicit functions and functions defined
parametrically. Integration as a reverse process of differentiation, indefinite integral of standard
functions. Integration by parts, Integration by substitution and partial fraction. Definite integral as a
limit of a sum with equal subdivisions. Fundamental theorem of integral calculus and its
applications. Properties of definite integrals. Formation of ordinary differential equations, solution
of homogeneous differential equations, separation of variables method, linear first order differential
equations.

Application of a Calculus: Tangents and normals, conditions of tangency. Determination of
monotonicity, maxima and minima. Differential coefficient as a measure of rate. Motion in a
straight line with constant acceleration. Geometric interpretation of definite integral as area,
calculation of area bounded by elementary curves and straight lines. Area of the region included
between two elementary curves.

Permutation and combination : Permutation of n different things taken r at a time (r ≤ n).
Permutation of n things not all different. Permutation with repetitions (circular permutation
excluded). Combinations of n different things taken r at a time (r ≤ n). Combination of n things not
all different. Basic properties. Problems involving both permutations and combinations.
Statistics and Probability: Measure of dispersion, mean, variance and standard deviation, frequency distribution. Addition and multiplication rules of probability, condition probability and Bayes' Theorem, independence of events, repeated independent trials and Binomial distribution.

GENERAL APTITUDE

Objects, texture related to architecture and built environment. Interpretation of pictorial compositions, Visualizing three-dimensional objects from two-dimensional drawing. Visualizing different sides of 3D objects. Analytical reasoning, mental ability (visual, numerical and verbal), General awareness of national / international architects and famous architectural creations.

Mathematical Reasoning: Statements, logical operations like and, or, if and only if, implies, implied by. Understanding of tautology, converse, contradiction and contrapositive.