Syllabus for Paper 2A (B.Arch)

MATHEMATICS

UNIT 1: SETS, RELATIONS, AND FUNCTIONS:

Sets and their representation: Union, intersection and complement of sets and their algebraic properties; Power set; Relation, Type of relations, equivalence relations, functions; one-one, into and onto functions, the composition of functions.

UNIT 2: COMPLEX NUMBERS AND QUADRATIC EQUATIONS:

Complex numbers as ordered pairs of reals, Representation of complex numbers in the form a + ib and their representation in a plane, Argand diagram, algebra of complex number, modulus and argument (or amplitude) of a complex number, triangle inequality, Quadratic equations in real and complex number system and their solutions Relations between roots and co-efficient, nature of roots, the formation of quadratic equations with given roots.

UNIT 3: MATRICES AND DETERMINANTS:

Matrices, algebra of matrices, type of matrices, determinants, and matrices of order two and three, properties of determinants, evaluation of determinants, area of triangles using determinants, Adjoint, and evaluation of inverse of a square matrix using determinants and elementary transformations, Test of consistency and solution of simultaneous linear equations in two or three variables using determinants and matrices.

UNIT4:PERMUTATIONS AND COMBINATIONS:

The fundamental principle of counting, permutation as an arrangement and combination as section, Meaning of P (n,r) and C (n,r), simple applications.

UNIT 5: MATHEMATICAL INDUCTIONS:

Principle of Mathematical Induction and its simple applications.

UNIT 6: BINOMIAL THEOREM AND ITS SIMPLE APPLICATIONS:

Binomial theorem for a positive integral index, general term and middle term, properties of Binomial coefficients, and simple applications.

UNIT 7: SEQUENCE AND SERIES:

Arithmetic and Geometric progressions, insertion of arithmetic, geometric means between two given numbers, Relation between A.M and G.M sum up to n terms of special series; Sn, Sn2, Sn3. Arithmetico-Geometric progression.

UNIT 8: LIMIT, CONTINUITY, AND DIFFERENTIABILITY:

Real–valued functions, algebra of functions, polynomials, rational, trigonometric, logarithmic, and exponential functions, inverse function. Graphs of simple functions. Limits, continuity, and differentiability. Differentiation of the sum, difference, product, and quotient of two functions. Differentiation of trigonometric, inverse trigonometric, logarithmic, exponential, composite and implicit functions; derivatives of order up to two, Rolle's and Lagrange's Mean value Theorems, Applications of derivatives: Rate of change of quantities, monotonic-Increasing and decreasing functions, Maxima and minima of functions of one variable, tangents and normal.

UNIT 9: INTEGRAL CALCULAS:

Integral as an anti-derivative, Fundamental Integrals involving algebraic, trigonometric,

exponential, and logarithms functions. Integrations by substitution, by parts, and by partial functions. Integration using trigonometric identities.

Evaluation of simple integrals of the type

$\int \frac{dx}{x^2+a^2}$, $\int \frac{dx}{\sqrt{x^2 \pm a^2}}$, $\int \frac{dx}{a^2- x^2}$, $\int \frac{dx}{\sqrt{a^2- x^2}}$, $\int \frac{dx}{ax^2+bx+c}$, $\int \frac{dx}{\sqrt{ax^2+ bx+c}}$, $\int \frac{(px+q)dx}{ax^2+bx+c}$, $\int \frac{(px+q)dx}{\sqrt{ax^2+ bx+c}}$, $\int \sqrt{a^2 \pm x^2}\ dx$, $\int \sqrt{x^2 - a^2}\ dx$

Integral as limit of a sum. The fundamental theorem of calculus, properties of definite integrals. Evaluation of definite integrals, determining areas of the regions bounded by simple curves in standard form.

UNIT 10: DIFFRENTIAL EQUATIONS

Ordinary differential equations, their order, and degree, the formation of differential equations, solution of differential equation by the method of separation of variables, solution of a homogeneous and linear differential equation of the type

$\frac{dy}{dx} + p(x)y = q(x)$

UNIT11: CO-ORDINATE GEOMETRY

Cartesian system of rectangular coordinates 10 in a plane, distance formula, sections formula, locus, and its equation, translation of axis, slop of a line, parallel and perpendicular lines, intercept of a line on the co-ordinate axes.

Straight line

Various forms of equations of a line, intersection of lines, angles between two lines, conditions for concurrence of three lines, the distance of a point form a line, equations of internal and external by sectors of angles between two lines co-ordinate of the centroid, orthocentre, and circumcentre of a triangle, equation of the family of lines passing through the point of intersection of two lines.

Circle, conic sections

A standard form of equations of a circle, the general form of the equation of a circle, its radius and central, equation of a circle when the endpoints of a diameter are given, points of intersection of a line and a circle with the centre at the origin and condition for a line to be tangent to a circle, equation of the tangent, sections of conics, equations of conic sections (parabola, ellipse, and hyperbola) in standard forms, condition for Y = mx + c to be a tangent and point (s) of tangency.

UNIT12:THREE DIMENSIONAL GEOMETRY

Coordinates of a point in space, the distance between two points, section formula, directions ratios, direction cosines, the angle between two intersecting lines. Skew lines, the shortest distance between them, and its equation. Equations of a line and a plane in different forms, the intersection of a line and a plane, coplanar lines.

UNIT 13: VECTOR ALGEBRA

Vectors and scalars, the addition of vectors, components of a vector in two dimensions and three-dimensional space, scalar and vector products, scalar and vector triple product.

UNIT 14: STATISTICS AND PROBABILITY

Measures of discretion; calculation of mean, median, mode of grouped and ungrouped data calculation of standard deviation, variance and mean deviation for grouped and ungrouped data.

Probability: Probability of an event, addition and multiplication theorems of probability, Baye's theorem, probability distribution of a random variate, Bernoulli trials, and binomial distribution.

UNIT 15: TRIGONOMETRY

Trigonometrical identities and equations, trigonometrical functions, inverse trigonometrical functions, and their properties, heights, and distance.

UNIT 16: MATHEMATICAL REASONING

Statement logical operations and, or, implies, implied by, if and only if, understanding of tautology, contradiction, converse, and contrapositive.

Part –II APTITUDE

UNIT - 1 Awareness of persons. Buildings, Materials.

Objects, Texture related to Architecture and Build-envirounmentVisusalising three-dimensional objects from two-dimensional drawings. Visualizing. Different sides of three-dimensional objects. Analytical Reasoning Mental Ability (Visual. Numerical and Verbal)

UNIT – 2 Three dimensional- perception: Understanding and appreciation of scale and proportions of objects, building forms and elements, colour texture harmony and contrast Design and drawing of geometrical or abstract shapes and patterns in pencil. Transformation of forms both 2D and 3D union, subtraction rotation, development of surfaces and volumes, Generation of plans, elevations, and 3D views of objects, Creating two-dimensional and three-dimensional compositions using given shapes and forms.

Part – III DRAWING

Sketching of scenes and activities from memory of urbanscape (public space, market, festivals, street scenes, monuments, recreational spaces, etc). landscape (riverfronts. Jungle. Gardens, trees. Plants, etc.) and rural life.

To be conducted in a Drawing sheet.

Note: Candidates are advised to bring pencils. Own geometry box set, crasets and colour pencils, and crayons for the Drawing Test.