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Date: 11-11-2026

MATHEMATICS

SYLLABUS for CET-2027

KEA, Sampige Road, 18th Cross, Malleswaram, Bangalore – 560 012

MATHEMATICS: CLASS XI

(Total Periods 180)

UNIT I: SETS AND FUNCTIONS

1. SETS (Periods 14)

Sets and their representations. Empty set. Finite and Infinite sets. Equal sets. Subsets. Subsets of a set of real numbers especially intervals (with notations). Universal set. Venn diagrams. Union and Intersection of sets. Difference of sets. Complement of a set, Properties of Complement sets.

2. Relations & Functions (Periods 16)

Ordered pairs, Cartesian product of sets. Number of elements in the Cartesian product of two finites sets. Cartesian product of the reals with itself (up to R× R× R). Definition of Relation, Pictorial diagrams, domain, co-domain and range of a relation. Function as a special kind of relation from one set to another. Pictorial representation of a function, Domain, Co-domain and Range of a function. Real valued function of a real variable, domain and range of these functions. Constant, identity, polynomial, rational, modulus, signum and greatest integer functions with their graphs. Sum, difference, product and quotients of functions.

3. Trigonometric Functions (Periods 20)

Positive and Negative angles, Measuring angles in radians and in degrees and conversion from one measure to another. Definition of trigonometric functions with the help of unit circle. Truth of the identity $\sin^2 x + \cos^2 x = 1$, for all x.

Signs of trigonometric functions and sketch of their graphs. Expressing *sin (x±y)* and *cos (x±y)* in terms of sin*x*, sin*y*, cos*x* & cos*y*. Deducing identities like following:

$\tan(x \pm y) = \frac{\tan x \pm \tan y}{1 \mp \tan x \tan y}$; $\cot(x \pm y) = \frac{\cot x \cot y \mp 1}{\cot y \pm \cot x}$

$\sin x + \sin y = 2\sin\left(\frac{x+y}{2}\right)\cos\left(\frac{x-y}{2}\right)$; $\cos x + \cos y = 2\cos\left(\frac{x+y}{2}\right)\cos\left(\frac{x-y}{2}\right)$,

$\sin x - \sin y = 2\cos\left(\frac{x+y}{2}\right)\sin\left(\frac{x-y}{2}\right)$; $\cos x - \cos y = -2\sin\left(\frac{x+y}{2}\right)\sin\left(\frac{x-y}{2}\right)$

Identities related to sin2*x*, cos2*x*, tan2 *x*, sin3*x*, cos3*x* and tan3*x*.

UNIT II: ALGEBRA

1. Complex Numbers and Quadratic Equations (Periods 10)

Need for complex numbers, especially $\sqrt{-1}$, to be motivated by inability to solve every quadratic equation. Brief description of algebraic properties of complex numbers. Argand plane.

2. Linear Inequalities (Periods 10)

Linear inequalities. Algebraic solutions of linear inequalities in one variable and their representation on the number line.

3. Permutations and Combinations. (Periods 14)

Fundamental principle of counting. Factorial *n*. Permutations and combinations, derivation of formulae and their connections, simple applications.

4. Binomial Theorem. (Periods 08)

Statement and proof of the binomial theorem for positive integral indices.
Pascal's triangle. Simple applications.

5. Sequence and Series (Periods 10)

Sequence, Series. Arithmetic Mean (A.M.), Geometric Progression (G.P.), general term of a G.P., sum of n terms of a G.P., Arithmetic and Geometric series, infinite G.P. and its sum, geometric mean (G.M.). Relation between A.M. and G.M.

UNIT III: COORDINATE GEOMETRY

1. Straight Lines. (Periods 10)

Brief recall of 2-D from earlier classes, Slope of a line and angle between two lines. Various forms of equations of a line: parallel to axes, point-slope form, slope-intercept form, two-point form, intercepts form. Distance of a point from a line.

2. Conic Sections. (Periods 14)

Sections of a cone: Circles, ellipse, parabola, hyperbola, a point, a straight line and pair of intersecting lines as a degenerated case of a conic section. Standard equations and simple properties of parabola, ellipse and hyperbola. Standard equation of a circle.

3. Introduction to Three-dimensional Geometry. (Periods 08)

Coordinate Axes and Coordinate planes in three-dimensions. Coordinates of a point. Distance between two points.

UNIT IV: CALCULUS

1.Limits and Derivatives (Periods 20)

Derivative introduced as rate of change both as that of distance function and geometrically, intuitive idea of limit, Definition of derivative, relate it to slope of tangent of the curve. Derivative of sum, product, quotient of functions. Derivative of polynomials and trigonometric functions.

UNIT V: STATISTICS AND PROBABILITY

1. Statistics (Periods 10)

Measure of dispersion: Mean deviation, Variance and Standard deviation of ungrouped/ grouped data.

2. Probability (Periods 16)

Events: Occurrence of events, 'not', 'and' & 'or' events, exhaustive events, mutually exclusive events. Axiomatic (set theoretic) probability, connections with the theories of earlier classes. Probability of an event, probability of 'not', 'and', & 'or' events.

Reference: NCERT MATHEMATICS TEXT BOOK FOR CLASS XI: Latest Edition.

MATHEMATICS: CLASS XII

(Total Periods 180)

UNIT I: RELATION AND FUNCTIONS

1. Relations and Functions **(Periods 10)**

Types of relations: Reflexive, symmetric, transitive and equivalence relations. One to one and onto functions.

2. Inverse Trigonometric Functions **(Periods 10)**

Definition, range, domain, principal value branches. Graphs of inverse trigonometric functions. Elementary properties of inverse trigonometric functions.

UNIT II: ALGEBRA

1. Matrices **(Periods 18)**

Concept, notation, order, equality, types of matrices, zero matrix, transpose of a matrix, symmetric and skew symmetric matrices. Addition, multiplication and scalar multiplication of matrices, simple properties of addition, multiplication and scalar multiplication. Non-commutativity of multiplication of matrices and existence of non-zero matrices whose product is the zero matrix (restrict to square matrices of order 2). Invertible matrices and proof of the uniqueness of inverse, if it exists (Here all matrices will have real entries).

2. Determinants **(Periods 20)**

Determinant of a square matrix (up to 3 × 3 matrices), minors, cofactors and applications of determinants in finding the area of a triangle. Adjoint and inverse of a square matrix. Consistency, inconsistency and number of solutions of system of linear equations by examples, solving system of linear equations in two or three variables (having unique solution) using inverse of a matrix.

UNIT III: CALCULUS

1. CONTINUITY AND DIFFERENTIABILITY **(Periods 22)**

Continuity and Differentiability, derivative of composite functions, chain rule, derivatives of inverse trigonometric functions, derivative of implicit function. Concepts of exponential, logarithmic functions. Derivatives of $\log_e x$ and e^x. Logarithmic differentiation. Derivative of functions expressed in parametric forms. Second order derivatives.

2.Application of Derivatives **(Periods 10)**

Applications of derivatives: Rate of change, increasing/decreasing functions, maxima and minima (first derivative test motivated geometrically and second derivative test given as a provable tool). Simple problems (that illustrate basic principles and understanding of the subject as well as real-life situations).

3. Integrals **(Periods 22)**

Integration as inverse process of differentiation. Integration of a variety of functions by substitution, by partial fractions and by parts, only simple integrals of the type –

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

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

Definite Integral. Fundamental Theorem of Calculus (without proof). Basic properties of definite integrals and evaluation of definite integrals.

4. Application of Integrals (Periods 10)

Applications in finding the area under simple curves, especially lines, arcs of circles/parabolas/ellipses (in standard form only).

5. Differential Equations (Periods 10)

Definition, order and degree, general and particular solutions of a differential equation. Solution of differential equations by method of separation of variables, homogeneous differential equations of first order and first degree. Solutions of linear differential equation of the type $-\frac{dy}{dx} + Py = Q$, where P and Q are function of x or constant.

$\frac{dx}{dy} + Px = Q$, where P and Q are function of y or constant.

UNIT IV: VECTORS AND THREE-DIMENSIONAL GEOMETRY

1. Vectors (Periods 12)

Vectors and scalars, magnitude and direction of a vector. Direction cosines/ratios of vectors. Types of vectors (equal, unit, zero, parallel and collinear vectors), position vector of a point, negative of a vector, components of a vector, addition of vectors, multiplication of a vector by a scalar, position vector of a point dividing a line segment in a given ratio. Scalar (dot) product of vectors, projection of a vector on a line. Vector (cross) product of vectors.

2. Three-dimensional Geometry (Periods 10)

Direction cosines/direction ratios of a line joining two points. Cartesian and vector equation of a line, coplanar & skew lines, shortest distance between two lines. Angle between two lines.

UNIT V: LINEAR PROGRAMMING (Periods 10)

Introduction, related terminology such as constraints, objective function, optimization, graphical method of solution for problems in two variables, feasible and infeasible regions, feasible and infeasible solutions, optimal feasible solutions (up to three non-trivial constraints).

UNIT VI: PROBABLITY (Periods 16)

Multiplication theorem on probability. Conditional probability, independent events, total probability, Bayes' theorem.

Reference: NCERT Mathematics Text Book for CLASS XII, Parts 1 & 2, Latest Edition.