G.K.S.M Govt. College Tanda
Unitization of Syllabus
B.A/B.sc 1st Sem
Department of Mathematics

Month	Geometry
July	**Transformation of Axes in two dimensions.** Shifting of origin, rotation of axes, invariants
August	**Pair of straight Lines:** Joint equation of pair of straight lines and angle between them, condition of parallelism and perpendicularity joint equation of angle bisectors, joint equation of lines joining origin to the intersection of line and a curve **Circle** General equation of circle, circle through intersection of two lines, tangents, normals, chord of contact, pole and polar.
September	**Circle** Pair of tangents from a point, equation of chord in terms of mid point, angle of intersection and orthogonality Power of point w.r.t circle, radical axis, co axial family of circles, limiting points. **Conic**: General equation of a conic, tangent, normals, chord of contact
October	**Conic**: Pole and polar, pair of tangents from a point, equation of chord in terms of midpoint, diameter, conjugate diameter of ellipse and hyperbola.
November	**Conic**: Special properties of parabola, ellipse and hyperbola, conjugate hyperbola, asymptotes of hyperbola rectangular hyperbola, identification of conics in general second degree equations.

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Trigonometry and Matrices	
Month	
July	De Moivre's Theorem
August	Applications of De Moivre's Theorem including primitive nth root of unity, expansions of $Sinn\theta, Cosn\theta, Sin^n\theta, Cos^n\theta (n \in N)$. The exponential, Logarithmic, Direct and inverse circular and hyperbolic functions of a complex variable.
September	Summation of series including Gregory series, Hermitian and skew-Hermitian matrices. Linear dependence of row and column vectors, row rank, column rank and rank of a matrix and their equivalence.
October	Theorems on Consistency of a system of linear equations (both homogenous and non homogenous) Eigen values, Eigen Vector and characteristics equation of a matrix.
November	Coyley-Hamilton theorem and its use in finding inverse of a matrix, Diagonalization.

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Month	Calculus
July	Order property of real numbers, bounds l.u.b and g.l.b
August	Order completeness property of Real Numbers Archimedean property of real numbers. Limits E-S definition of the limit of a function, basic properties of limits, infinite limits, in determinants Forms
September	Continuity:- Continuous Functions, Types of discontinuous, Continuity of composite functions, continuity of $|f(x)|$, sign of a function in a neighborhood of a point of continuity. Intermediate value theorem maximum and minimum value theorem.
October	**Mean Value Theorems** Rolle's Theorem, Lagrange's Mean value theorem, Cauchy's mean value theorem, their geometric interpretation and applications. Taylor's Theorem, Maclaurin's theorem with various form of remainders and their applications.
November	Hyperbolic, Inverse Hyperbolic Functions of a real variable and their derivatives, successive differentiation, Leibnitz's Theorem

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	Statics
July	Basic Notions, Composition and Resolution of Concurrent Forces Parallelogram law of forces
August	Components of Force in given derivations Resolved parts of force, Resultant of any number of coplanar concurrent forces, Equilibrium conditions for coplanar concurrent forces.
September	Equilibrium of a body resting on a smooth inclined balance, Equilibrium of three forces acting at a point, Triangle law of forces, $\lambda - \mu$ Theorem, Lami's Theorem, Parallel forces **Moments and Couples** Moment of force about a point and line centre of parallel forces. Theorem on moment of a couple.
October	Varignon's Theorem, Generalized Theorem of Moments, Resultant of a force and a couple. Resolution of a force into a force and a couple. Reduction of a system of coplanar forces to a force and a couple.
November	Equilibrium conditions for any number of coplanar non concurrent forces. **Friction** Definition and nature of frictions, Laws of Friction, Equilibrium of a particle on a rough plane, Problems on ladders, rods, spheres and Circles.

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	Differential Equations
July	Exact Differential Equations
August	First Order and Higher degree equations solvable for x, y, p. Clairut's Form. Singular solution as an envelope of general solutions. Geometrical meaning of a differential equation.
September	Orthagonal Trajectories, Linear differential equations with constant coefficient, Linear differential equations with variable coefficients.
October	Couchy and Legendre equations, linear differential equations of second order-transformation of the equation by changing the dependent variable the independent variable.
November	Method of Variation of parameters and reduction of order simultaneous Differential Equations

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Advanced Calculus

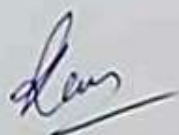| Month	
July	Limit and continuity of function of two and three variable.
August	**Partial differentiation**, Change of Variable Partial derivation and differentiability of real valued functions of two and three variables Schwarz and young's theorem
September	Statements of Inverse and Implicet function theorems and applications vector differentiation, Gradient, divergence and curl with their properties and application.
October	Euler's Theoram on Homogenous Functions, Taylor's Theoram for function of two and three variables, jacobians, Envelopes and Evolutes.
November	Maxima, Minima and saddle points of functions of two and three variables Lagrange's Multiplier Method.

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	Probability Theory
July	Review of Notion of Probability, Conditional probability and independence, Baye's theorem
August	**Random Variable** Concept, Probability density function, cumulative distribution function, Discrete and continuous random Variables, Expectations Mean, Variance, Moment generating function, skewness and kurtosis.
September	**Discrete Random Variable** Bernoulli Random Variable, Binomial Random Variable, Negative binomial random variable, Geometric random variable, Poisson Random Variable.
October	**Continuous Random Variable** Uniform Random Variable, Exponential Random Variable, Beta Random Variable, Gamma Random Variable, Chi- Square Random Variable, Normal Random Variable.
November	**Bivariate Random Variable** Joint Distribution, joint and conditional distributions, conditional expectations, Independent random variables, the correlation coefficient, Bivariate normal Distribution.

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Modern Algebra	
July	Groups Introduction with examples
August	Subgroups, Lagrange's Theorem, Normal Subgroups and Quotients Groups, Homomorphism and Isomorphism theorem.
September	Conjugate elements, Class equations, Permutation Groups, Alternative Groups, Simplicity of An, n>5 (without proof)
October	Rings, Integral Domains, Subrings and Ideals, Characteristic of a ring, Quotient Rings, Prime and maximal ideals, Homomorphism and Isomorphism Theorems.
November	Polynomial Rings

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	Analysis
July	Countable and Uncountable sets
August	Riemann Integral, Integrability of Continuous and monotonic functions, Properties of Integrable functions. The fundamental theorem of Integral Calculus.
September	Mean Value Theorems of Integral Calculus, Beta and Gamma Functions
October	Improper Integrals and their convergence, comparison tests, Absolute and conditional convergence Abel's and Dirichlet's Tests.
November	Frullani's Integral, Integral as a function of a parameter, Continuity derivability and integrability of an integral of function of a parameter.