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SYLLABUS FOR GSAT-2019
FOR ADMISSION TO M.Sc. Applied Mathematics
(TEST CODE NO: 101)

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SECTION-A   **(15 marks)**

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REAL NUMBERSYSTEM, SEQUENCES AND SERIES: Field axioms, Dedikind's axiom, Bolzano weistrass's theorem, Countability of sets, Sequences and their limits, Subsequences, Convergence and Divergence of sequences, Limit of a sequence, Cauchy sequences, Cauchy general principle of convergence, Definition of infinite series, necessary condition for convergence, Comparison test, nth root test, Ratio test, Integral test, Alternating series, Leibnitz test, Absolute convergence and Conditional convergence

LIMITS, CONTINUITY, DIFFERENTIATION AND INTEGRATION

Real valued functions, Limit of a function, Algebra of limits, Continuity of a function at a point, Uniform continuity, Derivative, Mean value theorems, Taylor's theorem
Riemann integral, Riemann integrable functions, Fundamental theorem on integral calculus

VECTOR CALCULUS

Vector differentiation, Ordinary derivatives of vectors, Space curves, Continuity, Differentiability, Gradient, Divergence, Curl operators, Formulae involving these operators.
Vector integration, theorems of Gauss and Stokes, Green's theorem in plane and applications of these theorems.

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SECTION-B   **(20 marks)**

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RINGS

Definition and basic properties, Fields, Integral domains, divisors of zero and cancellation laws, Integral domains, the characteristic of ring, some non-commutative rings, matrices over a filed, homomorphism of rings-definition and elementary properties, maximal and prime ideal, prime fields

VECTOR SPACES

Vector spaces, Vector subspaces, Linear span, linear sum of two subspaces, linear independence and dependence of vectors, basis of vector space, finite dimensional vector spaces, linear transformations, linear operators, Range and Null space of linear transformation, Rank and Nullity of linear transformations

INNERPRODUCT SPACES

Inner product spaces, Euclidean and unitary spaces, Norm or length of a vector, Schwartz inequality, orthogonality, orthonormal set, complete orthonormal set, Gram-Schmidt orthogonalization process

SECTION-C   **(25 marks)**

DIFFERENTIAL EQEUATIONS

Linear differential equations, Exact differential equations, Simultaneous differential equations, orthogonal trajectories, equations solvable for p,x,y, solution of homogeneous linear differential equations of order n with constant coefficients, method of variation of parameters

SOLID GEOMETRY

Equation of plane, equation of line, angle between a line and a plane, the shortest distance between two lines, definition and equation of the sphere, intersection of a sphere and a line, power of a point, tangent plane, plane of contact, polar plane, pole of a plane, conjugate points, conjugate planes, radical plane, coaxial system of spheres

MATRICES

Determinants, properties of determinants, elementary matrix operations and elementary matrices, the rank of a matrix and matrix inverse, system of linear equations, eigenvalues and eigenvectors, diagonalization, Caley-Hamilton theorem

GROUPS

Groups, subgroups and cyclic groups, Permutations, Isomorphism-definition and elementary properties, Cayley's theorem, Groups of Cosets, Normal subgroups-factor groups, the fundamental theorem of homomorphisms

MODEL PAPER

1. The derivative of a differential even function is   [   ]
     a) odd function   (b) even function   (c) constant function   (d) None of these

2. The system of equations
   $$2x + 3y + 4z + 1 = 0, 2x + 6y + 8z + 3 = 0, x + y + z + 1 = 0 \ has$$ [   ]
           (a) no solution   (b) a unique solution
           (c) infinite number of solutions   (d) none of these

3. The probability that a non-leap year should have 53 Tuesdays is   [   ]
     a) 1/7   (b) 2/7   (c) 3/7   (d) 4/7