K.T.S.P.Mandal's

Hutatma Rajguru Mahavidyalaya, Rajgurunagar

Department Of Mathematics

Teaching Plan

Academic Year-2024-25

Sem-I

Sr. No.	Class	Subject	Name of Teacher
1	F.Y.B.Sc.	Algebra and Calculus-I	Prof. Wayal R. M.
2	S.Y.B.Sc.	Calculus of Several Variable	Prof. Wayal R.M.
		Numerical Analysis & its application	Prof. Wayal R.M.
3	F.Y.B.Com	OE- Basic Mathematics	Prof. Wayal R.M.

Class: F.Y.B.Sc   **Subject : Algebra and Calculus-I**
Name: Prof. R. M. Wayal   **No. of lectures per week - 02**

Month	Topic
June	Well ordering principle and principle of mathematical induction, divisibility of integers, gcd, lcm, Euclidean algorithm, relatively prime integers.
July	Fundamental theorem of arithmetic, Euclid's lemma, theory of congruences, Fermat's theorem, Euler's phi function, Euler's theorem. Definition and algebra of polynomials, gcd of polynomials, synthetic division, remainder theorem, factor theorem, relation between roots and co-efficient of polynomial. Algebraic properties of real numbers.
August	Absolute value of a real number, geometrical meaning, absolute value properties of R, triangle inequality, examples on absolute value of R. Boundedness of R, neighborhood of a point on real line. Intervals, lower bound, upper bound and examples. Well ordering principle of N.

	Supremum and infimum of a subset of R and examples. Completeness property of R. Definition and examples on limit.
September	Continuity of a function at a point, algebra of a continuous function, properties, continuity on interval, definition and examples of bounded function, boundedness theorem.
October	absolute maximum and minimum of function. Location of roots theorem, Bolzano's theorem. Revision.

Class: S.Y.B.Sc **Subject : Calculus of Several Variables**
Name: Prof. R. M. Wayal   **No. of lectures per week - 03**

Month	Topic
June	Functions of two variables, Domain and Range, Graphs, Level Curves.
July	Functions of Three or More Variables, Limits by using definition, different paths, polar coordinates. Continuity, Definition and examples of partial derivative. Higher Derivatives, Clairaut's Theorem , higher order partial derivative,
August	Differential, Equations, Wave equation. Differentiable function, Differentials, Chain Rule, homogeneous Functions, Euler's theorem, Extreme values of functions of two variables. Necessary conditions for extreme values. Second Derivative Test, Lagrange Multipliers.
October	Iterated Integrals, Fubini's Theorem. Double integral over general regions, Change of order of integration for two variables. Double integral in Polar coordinates.
November	Jacobians, Change of variables in multiple integrals. Triple integrals, Evaluation of triple integrals. Triple integrals in spherical coordinates.

Class - S.Y.B.Sc. **Subject:- Numerical Analysis &It's Application**
Name:- Prof. R. M. Wayal   **No. of lectures per week - 03**

Month	Topic
July	Errors and their computations, Bisection method. The method of False position,Newton- Raphson method.
August	Finite Difference Operators and their relations (Forward, Backward difference and Shift operator). Differences of a polynomial, Newton's forward Interpolation Formula, Newton's Backward Interpolation Formulae, Lagrange's Interpolation Formula, Numerical Differentiation,

Month	Topic
September	A General Quadrature formula, The Trapezoidal rule, Simpson's 1/3rd rule. Simpson's 3/8th rule.
October	Taylor's series method, Picard's Method successive approximations. Euler's & Modified Euler's Methods. Runge Kutta Method (Second and fourth order).

Class - F.Y.B.Com.   **Subject:- Basic Mathematics**
Name:- Prof. R. M. Wayal   **No. of lectures per week - 03**

Month	Topic
July	Introduction to number system, Basic operations of integers
August	Highest Common Factor (H.C.F.) and Least Common Multiple (L.C.M.) Square root and cube Root, Introduction to ratio and proportion
September	Finding ratio and proportion, Types of ratios, Introduction to average, Finding the average
October	Introduction to profit and loss , Finding profit and loss.

Sem-II

Sr. No.	Class	Subject	Name of Teacher
1	F.Y.B.Sc.	Algebra and Calculus-II	Prof. Wayal R. M.
2	S.Y.B.Sc.	Linear Algebra	Prof. Wayal R.M.
		Vector Calculus	Prof. Wayal R.M.

Class: F.Y.B.Sc   **Subject : Algebra and Calculus-II**
Name: Prof. R. M. Wayal   **No. of lectures per week - 03**

Month	Topic
December	Matrices and Matrix Operations, Inverses; Algebraic Properties of Matrices, Elementary Matrices and a Method for Finding A^{-1}, Matrix, Matrix Notation and Size of Matrix, Diagonal, Triangular, and

Month	Topic
	Symmetric Matrices, More on Linear Systems and Invertible Matrices.
January	Introduction to Systems of Linear Equations, Gaussian Elimination Method, Determinants by Cofactor Expansion, Evaluating Determinants by Row Reduction, Properties of Determinants; Cramer's Rule.
February	Applications towards Balancing Chemical Equations, Applications in Cryptography, The Derivative as a Function, Differentiation Rules, The Derivative as a Rate of Change, Derivatives of Trigonometric Functions, The Chain Rule, Applications, Extreme Values of Functions..
March	The Mean Value Theorem, L'Hospital Rule, Cauchy's Mean Value Theorem, Revision.

Class: S.Y.B.Sc   **Subject : Linear Algebra**
 Name: Prof. R. M. Wayal   **No. of lectures per week - 03**

| Month	Topic
January	Definition and example of linear system of equations, Row echelon form and reduced row echelon form of a matrix, consistency of homogeneous and non-homogeneous system of linear equations using rank, condition for consistency, Gauss elimination method.
February	Gauss-Jordan method, Vector spaces, subspaces. Linear dependence and independence, Basis of Vector Space.
March	Dimension of a vector space, row and null space of a matrix. Column space, Rank and nullity.
April	Definition and example of a linear transformation, kernel and range of L. T, rank-nullity theorem, matrices and linear transformation, linear isomorphism.

Class - S.Y.B.Sc.   **Subject:- Vector Calculus**
 Name:- Prof. R. M. Wayal   **No. of lectures per week - 03**

Month	Topic
January	Curves in Space, Limits and Continuity, Derivatives and Motion, Differentiation ,Rules for Vector Function, Vector Functions of Constant Length. Integrals of Vector Functions. Arc Length along a Space Curve, Speed on a Smooth Curve, Unit Tangent Vector. Curvature of a Plane Curve, Circle of Curvature for Plane Curves, Curvature and Normal Vectors for a Space Curve., Line Integral of Scalar Functions, Additivity, Line integral in the Plane.
	Vector Fields, Gradient Fields, Line Integral of Vector Fields. Work

February	done by a Force over a Curve in Space, Flow Integrals and Circulation for Velocity Fields, Flow across the Simple Closed Plane Curve. Path Independence, Conservative and Potential Functions. Divergence, Two forms for Green's Theorem, Green's Theorem in the Plane.
March	Parameterizations of Surfaces. Implicit surfaces, Surface integrals, Orientation of Surfaces. Surface Integrals of Vector Fields. The Curl Vector Field, Stokes' Theorem, Conservative Fields and Stokes' Theorem, Divergence in three Dimensions, Divergence Theorem.
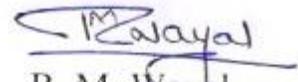
R. M. Wayal

Head

Department of Mathematics

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