K.T.S.P.Mandal's

Hutatma Rajguru Mahavidyalaya, Rajgurunagar

Department of Mathematics

Teaching Plan

Academic Year-2022-23

Sem-II

Sr. No.	Class	Subject	Name of Teacher
1	F.Y.B.Sc.	Analytical Geometry	Prof. Wayal R.M.
		Calculus-II	Prof. Rakshe A.R.
2	S.Y.B.Sc.	Linear Algebra	Prof. Wayal R.M.
		Vector Calculus	Prof. Wayal R.M.
3	F.Y.B.Cs.	Graph Theory	Prof. Rakshe A.R.
		Linear Algebra	Prof. Bhambure P. D.
4	S.Y.B.Cs.	Computational Geometry	Prof. Arude J. B.
		Operation Research	Prof. Rakshe A.R.
5	F.Y.B.Com	Business Mathematics & Statistics	Prof. Bhambure P. D.
6	F.Y.B.B.A.(C.A.)	Business Mathematics	Prof. Arude J. B.

Class - F.Y.B.Sc. **Subject:- Analytical Geometry**

Name:-Prof. Wayal R. M. **No. of lectures per week - 03**

Month	Topic
March	Change of axes Translation and Rotation. Conic Section: general equation of second degree in two variables. Centre of conic ,nature of conic. Reduction of conic to standard form. Direction cosines and direction ratios,
April	Equation of plane , normal form ,transform to the normal form , plane passing through three non-linear points ,intercept form ,angle between two planes , Distance of a point from plane ,distance between parallel planes, system of planes, two sides of planes ,bisector of planes, Equation of a line in symmetric

May	Unsymmetrical forms, line passing through two points, angle between a line and a plane, perpendicular distance of a point from a plane, condition for two lines to be coplanar. Equation of a sphere in different forms, plane section of a sphere Equation of a circle, sphere through a given circle ,intersection of sphere and a line , equation of tangent plane to sphere

Class: S.Y.B.Sc. **Subject: Linear Algebra**

Name: Prof. Wayal R. M. **No. of lectures per week-03**

Month	Topic
March	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 and Gauss-Jordan method.
April	Vector spaces, subspaces.Linear dependence and independence, Dimension of a vector space, row, column and null space of a matrix. Rank and nullity.
May	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. Wayal R.M. **No. of lectures per week-03**

Month	Topic
March	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.
April	Work 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. Parameterizations of Surfaces.
May	Implicit surfaces, Surface integrals, Orientation of Surfaces. Surface Integrals of Vector Fields. The Curl Vector Field, Stokes' Theorem, Conservative Fields and Stokes' Theorem.

Class - F.Y.B.Sc. **Subject: Calculus -II**

Name:-Prof. Rakshe A.R. **No. of lectures per week - 03**

Month	Topic
March	The Derivatives, Definition of the derivative of a function at a point, every differentiable function is continuous, Rules of differentiation, Caratheodary's theorem(without proof), The chain rule, Derivative of inverse function (without proof , only examples). The Mean Value Theorems, Interior extremum theorem, Mean Value theorems and their Consequences, Intervals of increasing and decreasing of a function,first derivative test for extrema. Derivative of inverse function The Mean Value Theorems.
April	Interior extremum theorem, Mean Value theorems and their Consequences, Intervals of increasing and decreasing of a function,first derivative test for extrema.L'Hospital Rule, Indeterminate forms, L'Hospital Rules(without proof),Taylor's theorem and Maclaurin'stheorem with Lagrange's form of remainder(Without proof), The nth derivative and Leibnitz theorem for successive differentiation Separable equations.
May	Existence and Uniqueness of solutions of nonlinear equations. The nth derivative and Leibnitz theorem for successive differentiation Separable equations, Existence and Uniqueness of solutions of nonlinear equations Linear first order equations. Transformation of nonlinear equations to separable equations. Exact differential equations, Integrating factors.

Class - F.Y.B.Cs. **Subject:- Graph Theory**

Name:-Prof. Rakshe A.R . **No. of lectures per week-03**

Month	Topics
March	Definition, Elementary terminologies and results, Graphs as Models. Special types of graphs. Isomorphism Adjacency and Incidence Matrix of a Graph Subgraphs, induced subgraphs, Vertex delition, Edge delition. Complement of a graph and self-complementary graphs. Union, Intersection and Product of graphs. Fusion of vertices. Connected Graphs Walk, Trail, Path, Cycle : Definitions and elementary properties.
April	Connected Graphs : definition and properties. Distance between two vertices, eccentricity, center, radius and diameter of a graph. Isthmus, Cutvetex : Definition and properties. Cutset, edge-connectivity, vertex connectivity. Weighted Graph and Dijkstra's Algorithm Eulerian and Hamiltonian Graphs 05 Lectures Seven Bridge Problem, Eulerian Graph : Definition and Examples, Necessary and Sufficient condition. Fleury's

	Algorithm. Hamiltonian Graphs : Definition and Examples, Necessary Condition. Introduction of Chinese Postman Problem and Travelling Salesman Problem.
May	Definition, Properties of trees. Center of a tree. Binary Tree : Definition and properties. Tree Traversal : Ordered rooted Tree, Preorder traversal, inorder traversal and postorder traversal, Prefix Notation. Spanning Tree : Definition, Properties, Shortest Spanning Tree, Kruskal's Algorithm. Definition, Examples Elementary Terminologies and properties. Special Types of Digraphs. Connectedness of digraphs. Network and Flows : definition and examples.

Class - S.Y.B.Cs. **Subject:- Operational Research**

Name:-Prof. Rakshe A.R . **No. of lectures per week-03**

Month	Topic
March	Graphical method Two-Variable LP Model , Graphical LP Solution, Linear Programming Applications, LP Model in Equation Form.
April	Transition from Graphical to Algebraic Solution ,The Simplex Method , Artificial Starting Solution , Special Cases in Simplex Method, Dual problem , Definition of the dual problem.
May	Primal dual relationships ,Examples, Transportation problem ,Definition of the Transportation problem
June	The Transportation Algorithm ,The Assignment Model Optimal solution of two person zero sum games , Solution of mixed strategy games

Class - F.Y.B.Cs. **Subject:- Linear Algebra**

Name:-Prof. Bhambure P. D. **No. of lectures per week - 03**

Month	Topic
March	**Vector Spaces:** Vector spaces & subspaces, Null spaces column spaces & linear transformations, Linearly independent sets: Bases, Co-ordinate systems, The dimension of a vector space, Rank
April	**Eigen Values:** Eigen values & Eigen vectors, The characteristic equation, Diagonalization, eigen vectors & linear transformations **Orthogonality & Symmetric matrices:** Inner Product, length & orthogonality, Orthogonal sets
May	Orthogonal Projections diogonalization of Symmetric Matrices, Quadratic forms

Class - F.Y.B.Com. **Subject:- Business Mathematics and Statistics-II**

Name:-Prof. Bhambure P. D. **No. of lectures per week:-04**

Month	Topics
March	Definition of a Matrix, Types of Matrices, Algebra of Matrices, Determinants, Adjoint of a Matrix, Inverse of a Matrix via Adjoint Matrix, Homogeneous System of Linear equations, Condition for Consistency of homogeneous system, Solution of Non-homogeneous System of Linear equations ,Applications in Business and Economics, Examples and Problems.
April	Concept of index number, price index number, price relatives. Problems in construction of index number. Construction of price index number: Weighted index Number, Laspeyre's, Paasche's and Fisher's method. Cost of living / Consumer price index number: Definition, problems in construction of index number. Methods of construction: Family budget and aggregate expenditure. Inflation, Uses of index numbers, commonly used index numbers. Examples and problems.
May	Definition and terms in a LPP, formulation of LPP, Solution by Graphical method, Examples and Problems , Concept and types of correlation, Scatter diagram, Interpretation with respect to magnitude and direction of relationship. Karl Pearson's coefficient of correlation for ungrouped data. Spearman's rank correlation coefficient. Concept of regression, Lines of regression for ungrouped data, predictions using lines of regression. Regression coefficients and their properties. Examples and problems.

Class - S.Y.B.Cs **Subject:- Computational Geometry**

Name:-Prof. Arude J. B. **No. of lectures per week: 03**

Month	Topics
March	Two dimensional transformations ,Introduction , Representation of points, ransformation of a unit square, Solid body transformations, Transformation and homogeneous coordinates. Translation , Rotation about an arbitrary point, Reflection through an arbitrary line , Projection – a geometric interpretation of homogeneous coordinates, Overall Scaling , Point at infinity
April	Three dimensional transformations , Introduction, Three dimensional – Scaling, shearing, rotation, reflection, translation. Multiple transformations , Rotation about – an axis parallel to coordinate axes, an arbitrary axis in space. Reflection through – coordinate planes, planes parallel to coordinate planes, arbitrary planes , Affine and perspective transformations,

	Orthographic projections , Axonometric projections.
May	Oblique projections , Single point perspective transformations Vanishing points , Plane Curves , Introduction. Curve representation ,Non – parametric curves , Parametric curves. Parametric representation of an ellipse and generation of ellipse.

Class - F.Y.B.B.A. **Subject:- Business Mathematics**

Name:-Prof. Arude J. B. **No. of lectures per week - 04**

Month	Topic
March	Multivariable data, Definition of a Matrix, Types of Matrices, Algebra of Matrices, Determinants, Ad joint of a Matrix, Inverse of a Matrix via ad joint Matrix, Homogeneous System of Linear equations, Condition for Uniqueness for the homogeneous system, Solution of Non homogeneous System of Linear equations Condition for existence and uniqueness of solution, Solution using inverse of the coefficient matrix .
April	Ratio- Definition, Continued Ratio, Inverse Ratio, Proportion, Continued Proportion, Direct, Proportion , Inverse Proportion, Variation, Inverse Variation, Joint .Variation, Percentage- Meaning and Computations of Percentages , Simple Interest, Compound interest (reducing balance & Flat Interest rate of interest), Equated Monthly Installments(EMI), Problems
May	Terms and Formulae, Trade discount, Cash discount, Problems involving cost price, Selling Price, Trade discount and Cash Discount. Introduction to Commission and brokerage, Problems on Commission and brokerage Statement and meaning of T.P.methods of finding initial basic feasible solution by North West corner Rule, Matrix Minimum method and Vogel's approximation method. Simple numerical problems. Problems Meaning of LPP, Formulation of LPP, and solution by graphical methods.

R. M. Wayal
Head
Department of Mathematics
Hutatma Rajguru
Mahavidyalaya,Rajgurunagar