

K.T.S.P.Mandal's
Hutatma Rajguru Mahavidyalaya, Rajgurunagar
Department of Mathematics
Syllabus Completion Report
Academic Year-2021-22
Sem-II

Sr. No.	Class	Subject	Name of Teacher
1	F.Y.B.Sc.	Analytical Geometry	Prof. Gargote A.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	T.Y.B.Sc.	Complex Analysis	Prof. Gargote A.M.
		Real Analysis-II	Prof. Rakshe A.R.
		Ring Theory	Prof. Karle S.N.
		Partial Diff. Equation	Prof. Wayal R.M.
		Optimization Technique	Prof. Rakshe A.R.
		Computational Geometry	Prof. Gargote A.M.
4	F.Y.B.Cs.	Graph Theory	Prof. Rakshe A.R.
		Linear Algebra	Prof. Karle S.N..
5	S.Y.B.Cs.	Computational Geometry	Prof. Karle S.N..
		Operation Research	Prof. Udhane R.B.
6	F.Y.B.Com	Business Mathematics & Statistics - II	Prof. Udhane R.B.

Class - F.Y.B.Sc.

Subject:- Analytical Geometry

Name:-Prof. Gargote A.M.

No. of lectures per week - 03

MONTH	TOPIC
April	Analytical Geometry of Two Dimension: Change of axes Translation and Rotation.Conic Section: general equation of second degree in two variables.Reduction to standard form , centre of conic ,nature of conic, Planes: Direction cosines and direction ratios, equation of plane ,
May	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

June	Lines in three dimensions: Equation of a line in symmetric and 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 Sphere: 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
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Class - F.Y.B.Sc.

Subject: Calculus -II

Name:-Prof. Rakshe A.R.

No. of lectures per week - 03

MONTH	TOPIC
April	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. L'Hospital Rule, Indeterminate forms,
May	L'Hospital Rules(without proof), Taylor's theorem and Maclaurin's theorem with Lagrange's form of remainder(Without proof), 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.
June	Exact differential equations, Integrating factors.

Class: S.Y.B.Sc

Subject: Linear Algebra

Name: Prof. Wayal R.M.

No. of lectures per week-03

MONTH	TOPIC
April	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, Vector spaces, subspaces,
May	Linear dependence and independence., Dimension of a vector space, row, column and null space of a matrix, rank and nullity

June	Definition and example of a linear transformation, kernel and range of L. T., rank-nullity theorem, matrices and linear transformation, linear isomorphism.
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Class: S.Y.B.Sc

Subject: Vector Calculus

Name: Prof. Wayal R.M.

No. of lectures per week-03

MONTH	TOPIC
April	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 done by a Force over a Curve in Space.
May	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. Implicit surfaces, Surface integrals, Orientation of Surfaces. Surface Integrals of Vector Fields.
June	The Curl Vector Field, Stokes' Theorem, Conservative Fields and Stokes' Theorem.

Class: T.Y.B.Sc

Subject: Complex Analysis

Name: Prof. Gargote A. M.

No. of lectures per week-03

MONTH	TOPIC
March	Sums and products, Basic algebraic properties, Further properties, Vectors and Moduli, Complex Conjugates, Exponential Form, Products and powers in exponential form, Arguments of products and quotients, Roots of complex numbers, Examples.
April	Regions in the complex plane. Functions of Complex Variables, Limits, Theorems on limits, Limits involving the point at infinity, Continuity, Derivatives, Differentiation formulas, Cauchy- Riemann Equations, Sufficient Conditions for differentiability, Polar coordinates, Analytic functions, Harmonic functions. The Exponential functions, The Logarithmic function, Branches and derivatives of logarithms,

May	Some identities involving logarithms, Complex exponents, Trigonometric functions, Hyperbolic functions. Derivatives of functions, Definite integrals of functions, Contours, Contour integral, Examples, Upper bounds for Moduli of contour integrals,
June	Anti-derivatives, Examples, Cauchy-Goursat's Theorem, Simply and multiply Connected domains. Cauchy integral formula, Derivatives of analytic functions. Liouville's Theorem

Class - T.Y.B.Sc.

Subject:- Real Analysis-II

Name:-Prof. Rakshe A.R

No. of lectures per week :-03

MONTH	TOPIC
March	Sets of measure zero definition and theorem .Definition and existence of Riemann integral, properties of Riemann integral, Fundamental theorem of integral calculus.
April	Mean value theorems of integral calculus. Definition of improper integral of first kind, comparison test, test, absolute and conditional convergence, integral test for convergence of series,
May	definition of improper integral of second kind, Cauchy principal value. Point wise and uniform convergence of sequences of functions, consequences of uniform convergence
June	convergence and uniform convergence of series of functions, integration and differentiation of series of functions.

Class - T.Y.B.Sc.

Subject:- Ring Theory

Name:-Prof. Karle S.N.

No.of Lectures per week :-03

MONTH	TOPIC
March	Definition and examples of Rings and Fields,.Integral Domains, The Fields of Quotients of an Integral Domain, Rings of Polynomials, Factorization of Polynomials over a Field
April	Homeomorphisms and Factor Rings, Prime and Maximal Ideals
May	Gaussian Integers and Multiplicative Norms Unique Factorization Domains , Euclidean Domain Euclidean Domains

Class: T.Y.B.Sc

Subject: Partial Differential equation

Name: Prof. Wayal R.M.

No. of lectures per week-03

MONTH	TOPIC
March	Surface and curves in three dimensions , simultaneous differential equations of the first order and the first degree in three variables. methods of solution of $dx/P=dy/Q=dz/R$. Pfaffian differential forms and equations.
April	solution of Pfaffian differential equations in three variables, introduction to partial differential equations, origin of first order partial differential equations, linear equations of first order equations, integral surfaces passing through given curve. The origin of second order partial differential equations.linear partial differential equations with constant coefficients.
May	methods of solving linear partial differential equations, solution of reducible equations solution of irreducible equations with constant coefficients, rules of finding complementary functions, rule of finding particular integrals, classification of second order partial differential equations, canonical forms.
June	Solution of Laplace equations, periodic differential equations, wave equation by separation variables method.

Class - T.Y.B.Sc.

Subject:- Optimization Techniques

Name:-Prof. Rakshe A.R .

No. of lectures per week:- 04

MONTH	TOPIC
March	CPM and PERT, Network representation, Critical Path Computations, Construction of the time schedule, Linear programming formulation of CPM, PERT calculations , Decision under uncertainty, Game theory, Some basic terminologies,
April	Optimal solution of two person zero sum game, Solution of mixed strategy games, graphical solution of games, linear programming solution of games.
May	Replacement of items whose efficiency deteriorates with time. Introduction, Notation, terminology and assumptions, processing n jobs through two machines, processing n jobs through three machines. Unconstrained problems, Necessary and sufficient conditions,
June	Newton Raphson method, Constrained problems, Equality constraints

Class - T.Y.B.Sc.

Subject:- Computational Geometry

Name:-Prof. Gargote A.M.

No. of lectures per week - 03

MONTH	TOPIC
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March	Introduction, Representation of Points, Transformations and Matrices, Transformation of Points, Transformation of Straight Lines, Midpoint Transformation, Transformation of Parallel Lines, Transformation of Intersecting Lines, Rotation, Reflection, Scaling, Combined Transformations, Transformation of the Unit Square, Solid Body Transformation, Translations and Homogeneous Coordinates, Rotation About an Arbitrary Point, Reflection Through an Arbitrary Line, Projection - A Geometric Interpretation of Homogeneous Coordinates, Overall Scaling, Points at Infinity. Three Dimensional Scaling and Shearing,
April	Three Dimensional Rotation. Three Dimensional Reflection. Three Dimensional Translation. Multiple Transformations, Rotations about an Axis Parallel to a coordinate axis, Rotation about an Arbitrary Axis in Space, Reflection Through an Arbitrary Plane. Affine and Perspective Geometry, Orthographic Projections, Axonometric Projections, Oblique Projections, Perspective Transformations.
May	Techniques for generating perspective views, Vanishing points. Curve representation, non-parametric curves, parametric curves, parametric representation of a circle, parametric representation of an Ellipse, parametric representation of a parabola, parametric representation of a Hyperbola.
June	Introduction, definition, properties curve fitting (up to $n = 3$), equation of the curve in matrix form (up to $n = 3$).

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 deletion, Edge deletion. 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. Connected Graphs : definition and properties.
April	Distance between two vertices, eccentricity, center, radius and diameter of a graph. Isthmus, Cutvertex : 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

May	Introduction of Chinese Postman Problem and Travelling Salesman Problem. 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.
June	Definition, Examples Elementary Terminologies and properties. Special Types of Digraphs. Connectedness of digraphs. Network and Flows : definition and examples.

Class - F.Y.B.Cs.

Subject:- Linear Algebra

Name:-Prof. Karle S. N.

No. of lectures per week - 03

Month	Topic
March	Real vector space ,subspace, linear independence ,basis & dimension
April	row space, column space & null space,rank & nullity,,Eigen value & eigen vectors, Diagonalization , quadratic form, general linear transformation ,kernel & range,inverse linear
May	transformation,,Matrix of general linear transformation,Cyclic group,normal subgroup,Product "ient of group,Coding of binary information &errore detection, Decoding & error correction
June	public key cryptology

Class - S.Y.B.Cs.

Subject:- Operational Research

Name:-Prof. Udhane R.B.

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
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Class - S.Y.B.C.S.

Subject:- Computational Geometry

Name:-Prof. Karke S.N.

No. of lectures per week: 03

Month	Topics
March	Two dimensional transformations ,Introduction , Representation of points, Transformation 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. Parametric representation of a parabola and generation of parabolic , segment , Parametric representation of a hyperbola and generation of hyperbolic, segment , Bezier Curves – Introduction, definition, properties, curve fitting (up to $n = 3$), equation of the curve in matrix form (up to $n = 3$)

Class - F.Y.B. Com.

Subject:- Business Mathematics and Statistics-II

Name:-Prof. Udhane R.B.

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. Concept of index number, price index number, price relatives. Problems

April	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. Definition and terms in a LPP, formulation of LPP, Solution by Graphical method, Examples and Problems ,
May	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.
June	Concept of regression, Lines of regression for ungrouped data, predictions using lines of regression. Regression coefficients and their properties. Examples and problems.

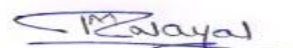
Class - S.Y.B.B.A.

Subject:- Business Mathematics

Name:-Prof. Rakshe A.R.

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. Ratio- Definition, Continued Ratio, Inverse Ratio, Proportion, Continued Proportion, Direct, Proportion ,
April	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, Terms and Formulae, Trade discount, Cash discount,
May	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.
June	Problems Meaning of LPP, Formulation of LPP, and solution by graphical methods.


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