K.T.S.P.Mandal's

Hutatma Rajguru Mahavidyalaya, Rajgurunagar

Department Of Mathematics

Syllabus Completion Report

Academic Year-2023-24

Sem-I

Sr. No.	Class	Subject	Name of Teacher
1	F.Y.B.Sc.	Algebra	Prof. Toke R.N.
		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	Business Mathematics & Statistics	Prof. Toke R.N.

Class: F.Y.B.Sc   **Subject : Algebra**
Name: Prof. R. N. Toke   **No. of Lectures:40**

Month	Topic	No. of lectures
July	Sets, relation, equivalence relation,.	09
August	Equivalence classes, Function Types of function, inverse of function, composition of function, Mathematical induction, division algorithm, greatest common divisor, Euclid's lemma. The Euclidean algorithm, fundamental theorem of arithmetic.	11
September	Prime numbers, theory of congruence, properties of congruence. Fermat's theorem,.	09
October	Sums and products, basic algebraic properties, moduli, complex conjugates Polar and exponential form of complex number, De-Moivers theorem, N^{th} root of unity	11

Class - F.Y.B.Sc   **Subject:- Calculus I**
Name:-Prof. R. M. Wayal   **Total No. of lectures - 37**

Month	Topic	No. of lectures
July	Algebraic properties of R, Order properties of R, Well-Ordering Property of N, Arithmetic mean-Geometric mean inequality, Bernoulli's inequality, Absolute value function and its properties, triangle inequality and its consequences. Definitions of Upper bound, Lower bound, supremum, infimum of subsets of R, completeness property of R. Archimedean property and its consequences, The density theorem**.**	13
August	Sequences of real numbers. Definition of limit of sequence and uniqueness of limit, bounded sequence, Monotone sequences, Monotone convergence theorem, Definition of subsequence, Divergence criteria, Monotone Subsequence theorem, Bolzano - Wierstrass theorem, The Completeness Property of R.	12
September	Functions, domain and range, graphs of functions, Piecewise defined functions, increasing and decreasing functions, symmetry, common functions, limit of a function, divergence criteria, Squeeze theorem, one-sided limits, infinite limits,	
October	Definition of continuous function at a point , sequential criterion for continuity, Divergence criterion, combination of continuous functions. Properties of continuous functions on an interval, Boundedness theorem, The minimum -maximum theorem,	8
November	Location of root theorem, Bolzano's intermediate value theorem. Continuous function maps closed bounded interval to closed bounded interval.	4

Class: S.Y.B.Sc   **Subject : Calculus of Several Variables**
Name: Prof. R. M. Wayal   **No. of Lectures:44**

Month	Topic	No. of lectures
July	Functions of two variables	2
August	Domain and Range, Graphs, Level Curves.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, Differential, Equations, Wave equation.	12
September	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.	10

Month	Topic	No. of lectures
October	Lagrange Multipliers.Iterated Integrals, Fubini's Theorem. Double integral over general regions, Change of order of integration for two variables. Double integral in Polar coordinates. Triple integrals, Evaluation of triple integrals. Triple integrals in spherical coordinates.	14
November	Jacobians, Change of variables in multiple integrals	06

Class - S.Y.B.Sc.   **Subject:- Numerical Analysis &It's Application**
Name:- Prof. R. M. Wayal   **Total No. of lectures - 46**

Month	Topic	No. of lectures
August	Errors and their computations, Bisection method. The method of False position,Newton- Raphson method, Finite Difference Operators and their relations (Forward, Backward difference and Shift operator). Differences of a polynomial,	15
September	Newton's forward Interpolation Formula, Newton's Backward Interpolation Formulae, Lagrange's Interpolation Formula, Numerical Differentiation, A General Quadrature formula, The rapezoidal rule, Simpson's 1/3rd rule.	13
October	Simpson's 3/8th rule. . Taylor's series method, Picard's Method successive approximations.Euler's & Modified Euler's Methods. Runge Kutta Method (Second and fourth order).	18

Class - F.Y.B.Com.   **Subject:- Business Mathematics & Statistics**
Name:- Prof. R. N. Toke   **Total No. of lectures - 54**

Month	Topic	No. of lectures
July	Interest:-Concept of Present value and future value , simple interest ,compound interest, nominal and effective rate of interest, example and problems. Annuity:- Ordinary Annuity, Sinking Fund, Annuity due, present value and future value, equated monthly installment by interest of reducing balance and flat interest method, examples and problem	15
August	Share :-Concept of share, face value, market value, dividend, brokerage, equity shares, preferential shares, examples and problem.Mutual Funds:- Concept of mutual funds, problems on calculation of net income ,Change in net asset value.	14
September	Definition of Statistics, Scope of statistics in economics , Management Science and Industry. Concept population and sample, method of data collection: Census and sampling with illustration . method of random sampling -(SRSWR, SRSWOR, Stratified, Systematic)	12
October	Frequency distribution : Row data, attributes and variables,	13

classification of data, frequency distribution, cumulative frequency distribution, Histogram and ogive curves. Requisites of ideal, Arithmetic mean, Median, Mode, Geometric mean,Harmonic mean, Standard Deviation (S.D),Coefficient of variation(C.V)

Sem-I

Sr. No.	Class	Subject	Name of Teacher
1	F.Y.B.Sc.	Analytical Geometry	Prof. Toke R.N.
		Calculus-II	Prof. Wayal R. M.
2	S.Y.B.Sc.	Linear Algebra	Prof. Wayal R.M.
		Vector Calculus	Prof. Wayal R.M.
3	F.Y.B.Com	Business Mathematics & Statistics II	Prof. Toke R.N.

Class: F.Y.B.Sc   **Subject : Analytical Geometry**
Name: Prof. R. N. Toke   **No. of Lectures:37**

Month	Topic	No. of lectures
December	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	07
January	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	10
February	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	10
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,	10

Class - F.Y.B.Sc   **Subject:- Calculus II**
Name:-Prof. R. M. Wayal   **Total No. of lectures - 40**

Month	Topic	No. of lectures
December	The Derivatives, Definition of the derivative of a function at a point, every differentiable function is continuous, Rules of differentiation, Caratheodary's theorem The chain rule, Derivative of inverse function. 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. 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	12
January	Taylor's theorem and Maclaurin'stheorem with Lagrange's form of remainder, The nth derivative and Leibnitz theorem for successive differentiation Separable equations. 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.	11
February	Ex. on variable separable form. Exact differential equations.	07
March	Integrating factors and solution of non-exact differential equation.	07
April	Revision	03

Class: S.Y.B.Sc   **Subject : Linear Algebra**
Name: Prof. R. M. Wayal   **No. of Lectures:42**

Month	Topic	No. of lectures
January	Definition and example of linear system of equations.	03
February	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. Linear dependence and independence.	12
March	Dimension of a vector space, row and null space of a matrix.	09
April	Column space, Rank and nullity. Definition and example of a linear transformation, kernel and range of L. T., rank-nullity theorem, matrices and linear transformation, linear isomorphism.	12
November	Jacobians, Change of variables in multiple integrals	06

Class - S.Y.B.Sc.   **Subject:- Vector Calculus**
 Name:- Prof. R. M. Wayal   **Total No. of lectures - 36**

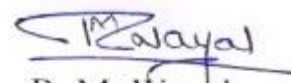| Month	Topic	No. of lectures
February	Curves in Space, Limits and Continuity, Derivatives and Motion, Differentiation ,Rules for Vector Function, Vector Functions of Constant Length. Integrals of Vector Functions. Arc Length along a Space Curve, Speed on a Smooth Curve, Unit Tangent Vector. Curvature 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.	12
March	Vector Fields, Gradient Fields, Line Integral of Vector Fields.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.	13
April	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.	11

Class - F.Y.B.Com.   **Subject:- Business Mathematics & Statistics II**
 Name:- Prof. R. N. Toke   **Total No. of lectures - 49**

Month	Topic	No. of lectures
December	**Matrices & Determinants**:Definition of a Matrix, Types of Matrices, Algebra of Matrices, Determinants, Adjoint of a Matrix, Inverse of a Matrix via Adjoint Matrix, Examples and Problems.	13
January	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.	12
February	**Index Numbers:** 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	11

	problems .**Linear programming Problems:** Definition and terms in a LPP, formulation of LPP, Solution by Graphical method, Examples and Problems.	
March	**Correlation & Regression:** 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.	13

R. M. Wayal

Head

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