K.T.S.P.Mandal's HUTATMA RAJGURU MAHAVIDYALAYA, RAJGURUNAGAR DEPARTMENT OF MATHEMATICS SYLLABUS COMPLETION REPORT ACADEMIC YEAR-2021-22

Sem-I

Sr. No.	Class	Subject	Name of Teacher
		Algebra	Prof. Gargote A.M.
1	F.Y.B.Sc.	Calculus-I	Prof. Gargote A.M.
		Calculus of Several Variable	Prof. Wayal R.M.
2	S.Y.B.Sc.	Numerical Analysis & its application	Prof. Udhane R.B.
		Metric Spaces	Prof. Wayal R.M
		Real Analysis-I	Prof. Rakshe A.R.
		Group Theory	Prof. Karle S.N.
3	T.Y.B.Sc.	Ordinary Diff. Equation	Prof. Wayal R.M.
		Operation Research	Prof. Rakshe A.R.
		Laplace Transform & Fourier series	Prof. Gargote A.M.
		Discrete Mathematics	Prof. Rakshe A.R.
4	F.Y.B.Cs.	Matrix Algebra	Prof. Karle S.N
5	S.Y.B.Cs.	Group and coding theory	Prof. Karle S.N
		Numerical Techniques	Prof. Udhane R.B.
6	F.Y.B.Com	Business Mathematics & Statistics	Prof. Udhane R.B.

Class: S.Y.B.Sc Name: R. M. Wayal

Subject : Calculus of Several Variables No. of Lectures:49

Month	Торіс	No. of lecture
Oct 2021	Limit by using substitution, different paths and polar co-ordinates	05
Nov 2021	Functions of Several Variables, Functions of two variables, Domain and Range, Graphs, Level Curves, Functions of Three or More Variables	09
Dec 2021	Definition and examples of Higher Derivatives, Clairaut's Theorem (Statement Only), Partial Differential Equations, Wave equation. Differentiable function, Differentials. Chain Rule, Homogeneous Functions, Euler's theorem	16
	Extreme values of functions of two variables. Necessary conditions for extreme values. Second Derivative Test. Lagrange Multipliers. Iterated	

Jan	Integrals, Fubini's Theorem. Double integral over general regions,	
2022	Change of order of integration for two variables.	12
	Double integral in Polar coordinates. Triple integrals, Evaluation of triple	
	integrals. Triple integrals in spherical coordinates. Jacobians, Change of	
Feb	variables in multiple integrals	07
2022		

Class: T.Y.B.Sc Name: R. M. Wayal

Subject : Metric Spaces No. of Lectures:42

Month	Торіс	No. of lecture
Oct 2021	Definition and examples. Open Balls.	06
Nov 2021	Open Sets, Convergent Sequences	07
Dec 2021	Limit and Cluster points, Cauchy Sequences and Completeness, Bounded Sets, Dense Sets Boundary of a set. Continuous Functions. Equivalent Definitions of Continuity, Topological Property. Uniform Continuity. Limit of a Function	13
Jan 2022	Open and closed maps. Compact Spaces and their Properties	10
Feb 2022	Connected Spaces	06

Class: T.Y.B.Sc Name: R. M. Wayal

Subject : Ordinary Differential Equation No. of Lectures:42

Month	Торіс	No. of lecture
Oct 2021	Constant coefficient homogeneous equations Characteristic equations, distinct real roots, repeated roots	
		05
	Complex roots. Particular solution, Initial value problem, The operator	
Nov 2021	$\frac{1}{f(D)}$ and its evaluation for the functions x^m , e^{ax} , $e^{ax}V$.	06
Dec 2021	xV and the operator $\frac{1}{D^2+a^2}$ acting on sin <i>ax</i> and cos <i>ax</i> , Principle of superposition, Method of undetermined coefficients 2.3 Method of	
	reduction of order 2.4 Method of variation of parameters.	12
Jan 2022	Review the properties of power series, Series solution near an ordinary point, Regular singular points, Euler equations, Introduction to system of differential equations	10

	Linear systems: basic theory of homogeneous linear systems, constant	
Feb	coefficient Homogeneous systems.	07
2022		

Class: T.Y.B.Sc Name: R. M. Wayal

Subject : LaTeX No. of Lectures:40

Month	Торіс	No. of
		lecture
	Definition and application of LaTeX, Preparation and Compilation of	
Dec	LaTeX input file LaTeX Syntax, Keyboard Characters in LaTeX Unit.	16
2021	Text and Math Mode Fonts. Emphasized and Colored Fonts, Sectional	
	Units, Labeling and Referring Numbered Items, Texts Alignment and	
	Quoted text, New Lines and Paragraphs, Creating and Filling Blank	
	Space Producing Dashes Within Texts Unit	
	Listing Texts, Tabbing Texts Through the tabbing Environment	14
Jan		
2022		
	Table Through the tabular Environment, Table Through the tabularx	12
Feb	Environment, Vertical Positioning of Tables, Sideways (Rotated) Texts	
2022	in Tables, Adjusting Column Width in Tables, Additional Provisions for	
	Customizing Columns of Tables, Merging Rows and Columns of Tables.	

Class - F.Y.B.Cs(Comp. Sci)

Subject:- Discrete Mathematics

Name:-Prof. Rakshe A.R.

Total No. of lectures per week - 53

Month	Торіс	No. of
		lecture
October	Propositional Logic, Predicates and Quantifiers Rules of Inference, Poset Hasse diagram Lattices Complemented lattice Bounded	
2021	lattice and Distributive lattice . Boolean Functions Boolean Function of degree n	06
	Boolean identities, Definition of Boolean A lgebra .Representation of	08
November	Minterm, Maxterm Disjunctive normal form, Conjunctive normal	
2021	Form. Counting Principles Cardinality of a finite set.	
	The Product Rule, The Sum Rule, The Inclusion-Exclusion Principle.	
December	The Pigeonhole Principle: Statement, The Generalized Pigeonhole	16
2021	Principle, Its applications.	
January	Permutation and Combination with Repetitions, Permutations with	14
2022	Indistinguishable Objects, Distributing objects into box.	
February	Recurrence Relations : Introduction, Formation. Linear Recurrence	09
2022	Relations with constant coefficients. Homogeneous Solutions.	
	Particular Solutions. Total Solutions	

Subject:- Operation Research Total No. of lectures - 42

Month	Торіс	No. of
		lecture
Oct	Two variable LP Model, Graphical LP solution, Selected LP	06
2021	Applications, Graphical Sensitivity analysis. LP Model in equation form,	
Nov	Transition from graphical to algebraic solutions, the simplex method,	06
2021	Artificial starting solutions.	
Dec	Unbounded Solution, No Solution, Alternate Solution.	12
2021		
January 2022	Definition of the dual problem, How to find primal solution LPP.	13
February 2022	Primal dual relationship , Definition of the Transportation model . The Transportation algorithm , The Hungarian method , Simplex explanation of the Hungarian method.	05

Class - T.Y.B.Sc

Subject:- Real Analysis - I

Name:-Prof. Rakshe A.R. Total No. of lect		tures - 45
Month	Торіс	No. of lecture
October 2021	Operations on sets, Functions, Real-valued functions, Equivalence countability, Real numbers, Cantor set, Least upper bounds	06
November 2021	Definition of sequence and subsequence, Limit of a sequence, Convergent sequences, Monotone sequences, Divergent sequences, Limit superior	06
December 2021	Limit inferior, Cauchy sequences ,Convergent and divergent series, series with non-negative terms, alternating series, Conditional and Absolute convergence, Rearrangement of series	13
January 2022	Tests of absolute convergence, ratio test, comparision test, cauchy condesation test	15
February 2022	series whose terms form a non-increasing sequence, The class l2	05

Class - F.Y.B.Sc Name:-Prof. Gargote A.M. Subject:- Algebra Total No. of lectures -45

Month	Торіс	No. of
		lecture
October	Definition of sets, types of sets, def of Relation, Equivalence relation &	
(2021)	examples Equivalence classes and partitions of a set ,Def of function &	06
	its example, Basic terminology, Types of Function, Inverse of function,	
	Composition of function	
November	Mathematical induction, well ordering principle, the Division	
(2021)	Algorithm, The greatest common Divisor, Euclid's lemma, the Least	06
	common multiple, the Euclidean Algorithm	
December	The Fundamental theorem of Arithmatic, Def of prime	
(2021)	numbers, theorems and examples, Euclid's lemma, The theory of	12
	Congruences, Basic proprties of Congruences, theorems and	
	examples,Fermat's theorem and examples.	
January	Introduction of Complex number, sum & products of complex	
(2022)	no.s,Basic algebraic properties of complex no.s,Moduli, Complex	14
	conjugates, Exponential form, Products & Quotients.	
February	De-Moivres thm,Roots of complex no.s, The nth roots of unity,	07
(2022)	Regions in complex plane.	

Class - F.Y.B.Sc

Name:-Prof. Gargote A.M.

Subject:- Calculus I Total No. of lectures - 45

Month	Торіс	No. of lecture
October	Algebraic properties of R, Order properties of R, Well-Ordering	
(2021)	Property of N, Arithmetic mean-Geometric mean inequality,	06
	Bernoulli's inequality, Absolute value function and its properties,	
	triangle inequality and its consequences.	
November	Definitions of Upper bound, Lower bound, supremum, infimum of	
(2021)	subsets of R, completeness property of R, Archimedean property and	06
	its consequences, The density theorem, sequences of real numbers	
December	Definition of limit of sequence and uniqueness of limit, bounded	
(2021)	sequence, Monotone sequences, Monotone convergence theorem,	12
	Definition of subsequence, Divergence criteria, Monotone	
	Subsequence theorem, Bolzano -Wierstrass theorem, The	
	Completeness Property of R.	
January	Functions, domain and range, graphs of functions, Piecewise defined	
(2022)	functions, increasing and decreasing functions, symmetry, common	14
	functions, limit of a function, divergence criteria, Squeeze theorem,	
	one-sided limits, infinite limits, Definition of continuous function at a	
	point, sequential criterion for continuity, Divergence criterion,	
	combination of continuous functions.	
February	Properties of continuous functions on an interval, Boundedness	07
(2022)	theorem, The minimum -maximum theorem, Location of root theorem,	
	Bolzano's intermediate value theorem. Continuous function maps	
	closed bounded interval to closed bounded interval.	

Class:- T.Y.B.S	Sc Subject:- Laplace Transforms and Fou	rier series
Name:-Prof. G	argote A.M. Total No. of lectures - 38	
Month	Торіс	No. of lecture
October	Definition, Laplace Transform of some elementary functions.	
(2021)	Some important properties of Laplace Transform.	06
November	Laplace Transform of derivatives, Laplace Transform of Integrals.,	
(2021)	Methods of finding Laplace Transform, Evaluation of Integrals.	
		05
December	The Gamma function, Unit step function and Dirac delta function.	
(2021)	Definition, Some inverse Laplace Transform.	
	Some important properties of Inverse Laplace Transform, Inverse	12
	Laplace Transform of derivative.	
January	Inverse Laplace Transform of integrals. Convolution Theorem,	10
(2022)	Evaluation of Integrals. Solution of Ordinary Differential Equations	
	with constant coefficients.	
February (2022)	Definition and examples of Fourier Series.	05

Class - S.Y.B.Sc. Name:- Prof. Udhane R.B.

Class:- T.Y.B.Sc

Subject:- Numerical Analysis &It's Application Total No. of lectures - 37

Month	Торіс	
		lecture
November	Solution of Algebraic and Transcendental	10
(2021)	Introduction, Error and their computation	
	Bisection method - without derivation and convergence, The	
	method of false position,	
	Newton - Raphson Method - without derivation & convergence.	
December	Interpolation Introduction, Finite difference operators and their	9
(2021)	relation, Difference Operators - Forward, Backward, Shift (E),	
	Relations between them. Forward & Backward Difference tables.	
	Factorial notation Newton's Forward Difference & Backward	
	Difference	
January	interpolation Formula Lagrange's formula for interpolation with	6
(2022)	unequallypace points, Numerical Differentiation Introduction.	
	Numerical Differentiation. Numerical Integration - A General	
	Quadrature formula, The rapezoidal rule, Simpson's 1/3rd rule,	
	Simpson's 3/8th rule.	
February	Numerical Solutions of Ordinary Differential Equations	12
(2022)	Introduction. 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 Name:- Prof. Udhane R.B.

Subject:- Business Mathematics & Statistics Total No. of lectures - 46

Month	Торіс		
November	Interest & Annuity	06	
(2021)	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		
December	Shares and Mutual Funds	11	
(2021)	Interest, 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.		
January	Population and Sample	12	
(2022)	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)		
February	Measures of Central Tendency and Measures of Dispersion	17	
(2022)	Frequency distribution : Row data, attributes and variables,		
	classification of data, frequency distribution, cumulative frequency		
	distribution, Histogram and ogive curves. Requisites of ideal		

Class - S.Y.B.Sc(Comp.Sci) Name:- Prof. Udhane R.B

Subject:- Numerical Techniques Total No. of lectures - 36

Month	Торіс	No. of
		lecture
November	Solution of Algebraic and Transcendental	5
(2021)	Introduction, Error and their computation Bisection method -	
	without derivation and convergence, The method of false position,	
	Newton - Raphson Method - without derivation & convergence.	
December	Interpolation, Introduction, Finite difference operators and their	11
(2021)	relation, Difference Operators - Forward, Backward, Shift (E),	
	Relations between them. Forward & Backward Difference tables.	
	Factorial notation Newton's Forward Difference & Backward	

	Difference			
January	interpolation Formula, Lagrange's formula for interpolation with	6		
(2022)	unequally, Divided Difference, Newton's Divided Difference			
	formula. Numerical Integration Introduction. Numerical			
	Differentiation. Numerical Integration - A General Quadrature			
	formula, The Trapezoidal rule, Simpson's 1/3rd rule, Simpson's 3/8th			
	rule.			
February	Numerical Solutions of Ordinary Differential Equations	9		
(2022)	Introduction. Euler's & Modified Euler's Methods.			
	Runge Kutta Method (First, Second, third and fourth order).			

Class - T.Y.B.Sc. Name:- Prof. Karle S. N.

Subject:- Group Theory Total No. of lectures - 42

Month	Торіс	No. of lecture
October (2021)	Binary Operations, Isomorphic Binary Structures, Groups.	
November (2021)	Exapmles of groups,Subgroups,Cyclic Groups.	12
December (2021)	Cosets, Groups of Permutations, Orbits, Cycles, Alternating Groups,Cosets, the Theorem of Lagrange	
January (2022)	Direct Products,Homomorphism,Factor Groups Factor Group Computations.	8
February (2022)	Simple Groups	4

Class - T.Y.B.Sc.

Subject:- Programming in Python–I

Name:- Pr	of. Karle S. N. Total No. of lectures - 3	35
Month	Торіс	No. of lecture
October (2021)	Installation of Python, Values and types: int, float The Print Function: Print basics, Variables: assignment statements, printing variable values, types of variables.Mathematical Operators, operands and precedence:+, -, /, *, **, % PEMDAS (Rules of precedence)String operations: + : Concatenation, * : Repetition, Boolean operator, Comparison operators: ==, !=, >, =, <=, Logical operators: and, or, not, Mathematical functions from math, cmath modules, random module,Keyboard input: input() statement ,Calculus: Differentiation, Integration, Limit and Series,Strings:Length	15

Total No. of lectures - 35

	(Len function)String traversal: Using while statement, Using for	
	statement,String slice,Comparison operators (>, <, ==),Lists:List	
	operations, Use of range function, Accessing list elements, List	
	membership and for loop,List operations,Updating list: addition,	
	removal or updating of elements of a list, TuplesDefining a tuple,Index	
	operator,Slice operator,Tuple assignment,	
	Tuple as a return value	
November	Unit 3: Iterations and Conditional statements	12
(2021)	3.1 Conditional and alternative statements, Chained and Nested Conditionals:, if-else, if-elif-else, nested if, nested if-else, Looping statements such as while, for sta Tables using while Europic Colling	
	functions: type, Type conversion: int, float, str	
	Composition of functions, Returning values from functions, User	
	defined functions, Parameters and argument, Matrix construct, eye(n),	
	zeros(n,m) matrices, Addition, Subtraction, Multiplication of matrices,	
	powers and inverse of a matrix. Accessing Rows and Columns,	
	Deleting and Inserting Rows and Columns, Determinant, reduced row	
	echelon form, nullspace, columnspace, Rank Solving systems of linear	
	equations (Gauss Elimination Method, Gauss Jordan Method, LU-	
	decomposition Method) Eigenvalues, Eigenvectors, and	
December	Unit 5: Numerical methods in Python	8
(2021)	5.1 Roots of Equations	0
(2021)	5.2 Newton-Raphson Method	
	5.3 False Position (RegulaFalsi) Mehtod	
	5.4 Numerical Integration:	
	5.4.1 Trapezoidal Rule.	
	5.4.2 Simpson's 1/3rd Rule,	
	5.4.3 Simpson's 3/8th Rule	
	Unit 6: 2D and 3D Graphs	
	6.1 Installation of numpy, matplotlib packages	
	6.2 Graphs plotting of functions	
	6.3 Different formats of graphs, PyDotPlus (Scalable Vector Graphics),	
	PyGraphviz.	
	Decorate Graphs with Plot Styles and Types: Markers and line	
	styles, Control colors,	
	specifying styles in multiline plots, Control linestyles, Control marker	
	Styles. Polar charte: Navigation Toolbar with polar plots. Control radial and	
	anoular orids	
	6.4 Three-dimensional Points and Lines	
	6.5 Three-dimensional Contour Plots, Wireframes and Surface Plots.	

6.5 Three-dimensional Contour Plots, Wireframes and Surface Plots.

Class - F.Y.B.Sc. (Comp. Sci.) Name:- Prof. Karle S. N.

Subject:- Matrix Algebra Total No. of lectures - 42

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Month	Торіс	
October (2021)	 Unit 1. Integers 1.1 Division Algorithm (without Proof) 1.2 G.C.D. using division algorithm and expressing it as linear combination 1.3 Euclid's lemma 1.4 Equivalence relation (revision), Congruence relation on set of integers, Equivalence class partition 	6
November (2021)	Unit 2. Groups 2.1 Binary Operation 2.2 Group: Definition and Examples 2.3 Elementary Properties of Groups	6
December (2021)	Unit 3. Finite Groups and Subgroups 3.1 Order of a group, order of an element 3.2 Examples (Zn, +) and (U(n), *) 3.3 Subgroup definition, Finite subgroup test, subgroups of Zn 3.4 Generator, cyclic group, finding generators of Zn(Corollary 3,4) 3.5 Permutation group, definition, composition of two permutations, representation as product of disjoint cycles, inverse and order of a permutation, even/ odd permutation 3.6 Cosets: Definition, Examples and Properties, Lagrange Theorem(without	14
January (2022)	Unit 4. Groups and Coding Theory 4.1 Coding of Binary Information and Error detection 4.2 Decoding and Error Correction 4.3 Public Key Cryptography I	12
(2022)	4.3 Public Key Cryptography II	4

Prof. R. M. Wayal

Head Department of Mathematics Hutatma Rajguru Mahavidyalaya,Rajgurunagar

K.T.S.P.Mandal's

HUTATMA RAJGURU MAHAVIDYALAYA, RAJGURUNAGAR DEPARTMENT OF MATHEMATICS SYLLABUS COMPLETION REPORT ACADEMIC YEAR-2021-22

Sem-II

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

Class - F.Y.B.Sc.

Name:-Prof. Gargote A.M.

Subject:- Analytical Geometry

MONTH	TOPIC	No. of
		lecture
April	Analytical Geometry of Two Dimension:	
_	Change of axes Translation and Rotation.Conic Section: general	12
	equation of second degree in two variables.Reduction to standard form,	
	centre of conic ,nature of conic	
May	Planes: Direction cosines and direction ratios, equation of plane, normal	
	form ,transform to the normal form , plane passing through three non-	12
	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	12
	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	

Class - F.Y.B.Sc.

Subject: Calculus -II

Name:-Prof. Rakshe A.R.

Month	Торіс	No. of
		Lectures
	The Derivatives, Definition of the derivative of a function at a point, every differentiable function is continuous, Rules of differentiation,	
April	Caratheodary's theorem(without proof), The chain rule, Derivative of inverse function (without proof, only examples).	14
	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.	
May	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	12
	and Uniqueness of solutions of nonlinear equations	
	Linear first order equations. Transformation of nonlinear equations to	
June	separable equations.	10
	Exact differential equations, Integrating factors.	

Class: S.Y.B.Sc

Subject: Linear Algebra

Name: Prof. Wayal R.M.

MONTH	TOPIC	No. of
		Lectures
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,	13
	Linear dependence and independence.	
May	Dimension of a vector space, row, column and null space of a	12
	matrix, rank and nullity	
	Definition and example of a linear transformation, kernel and range	
June	of L. T., rank-nullity theorem, matrices and linear transformation,	11
	linear isomorphism.	

Class: S.Y.B.Sc

Subject: Vector Calculus

Name: Prof. Wayal R.M.

MONTH	TOPIC	No. of
		Lectures
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,	15
	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, Flow Integrals and	
May	Circulation for Velocity Fields, Flow across the Simple Closed Plane	
	Curve. Path Independence, Conservative and Potential Functions.	12
	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	09
	Stokes' Theorem.	

Class: T.Y.B.Sc

Subject: Complex Analysis

Name: Prof. Gargote A. M.

MONTH	TOPIC	No. of
		lecture
March	Sums and products, Basic algebraic properties, Further properties,	10
	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,	10
	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,	10
	Trigonometric functions, Hyperbolic functions. Derivatives of	
	functions, Definite integrals of functions, Contours, Contour integral,	
	Examples, Upper bounds for Moduli of contour integrals,	
	Anti-derivatives, Examples, Cauchy-Groursat's Theorem, Simply and	6
June	multiply Collected 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

MONTH	TOPIC	No. of lecture
March	Sets of measure zero definition and theorem .Definition and existence of Riemann integral, properties of Riemann integral, Fundamental theorem of integral calculus.	13
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,	10
May	definition of improper integral of second kind, Cauchy principal value. Point wise and uniform convergence of sequences of functions, consequences of uniform convergence	10
June	convergence and uniform convergence of series of functions, integration and differentiation of series of functions.	03

Class - T.Y.B.Sc.

Subject:- Ring Theory

Name:-Prof. Karle S.N.

No.of Lectures per week :-03

MONTH	TOPIC	No. of
		lecture
March	Definition and examples of Rings and Fields,.	12
	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	14
May	Gaussian Integers and Multiplicative Norms Unique Factorization Domains, Euclidean Domain Euclidean Domains	10

Class: T.Y.B.Sc

Subject: Partial Differential equation

Name: Prof. Wayal R.M.

MONTH	TOPIC	No. of
		Lectures
March	Surface and curves in three dimensions, simultaneous differential	
	equations of the first order and the first degree in three variables.	10
	methods of solution of $dx/P = dy/Q = dz/R$.	

	Pfaffian differential forms and equations. solution of Pfaffian	10
April	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	
May	differential equations with constant coefficients. methods of solving	
	linear partial differential equations, solution of reducible equations	12
	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	04
	equation by separation variables method.	

Class - T.Y.B.Sc. Name:-Prof. Rakshe A.R.

Subject:- Optimization Techniques No. of lectures per week:- 04

MONTH	TOPIC	No. of lecture
March	CPM and PERT, Network representation, Critical Path Computations,	
	Construction of the time schedule, Linear programming formulation of	10
	CPM, PERT calculations, Decision under uncertainty, Game theory	

April	Some basic terminologies, Optimal solution of two person zero sum game, Solution of mixed strategy games, graphical solution of games, linear programming solution of games.	12
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,	10
June	Newton Raphson method, Constrained problems, Equality constraints	04

Class - T.Y.B.Sc.

Subject:- Computational Geometry

Name:-Prof. Gargote A.M.

MONTH	TOPIC	No. of
		lecture
	Introduction, Representation of Points, Transformations and Matrices,	14
	Transformation of Points, Transformation of Straight Lines, Midpoint	
	Transformation, Transformation of Parallel Lines, Transformation of	
	Intersecting Lines, Rotation, Reflection, Scaling, Combined	
March	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, Three	10
	Dimensional Rotation. Three Dimensional Reflection. Three	
April	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,	
May	Oblique Projections, Perspective Transformations. Techniques for	09
	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	03
	of the curve in matrix form (up to $n = 3$).	

Class - F.Y.B.Cs.

Subject:- Graph Theory

Name:-Prof. Rakshe A.R.

Month	Topics	No. of lecture
March	Definition, Elementary terminologies and results, Graphs as Models. Special types of graphs. Isomorphism Adjacency and Incidence	12

	Matrix of a Graph	Subgraphs,	
	induced subgraphs, Vertex delition, Edge delition.		
	Complement of a graph and self-complementary gra	phs.	
	Union, Intersection and Product of graphs. Fusion of	f vertices.	
April	Connected Graphs		
	Walk, Trail, Path, Cycle : Definitions and elementar	y properties.	
	Connected Graphs : definition and properties.		10
	Distance between two vertices, eccentricity, center,	radius and	
	diameter of a graph. Isthmus, Cutvetex : Definition a	nd properties.	
	Cutset, edge-connectivity, vertex connectivity.		
	Weighted Graph and Dijkstra's Algorithm Euleri	an and	
	Hamiltonian Graphs 05 Lectures Seven Bridge Prob	lem, Eulerian	
	Graph : Definition and Examples, Necessary and		
	Sufficient condition. Fleury's Algorithm.		
May			
	Hamiltonian Graphs : Definition and Examples, Nec	essary Condition.	10
	Introduction of Chinese Postman Problem and Trave	lling Salesman	
	Problem. Definition, Properties of trees.		
	Center of a tree. Binary Tree : Definition and proper	ties.	
	Tree Traversal : Ordered rooted Tree, Preorder trave	rsal, inorder	
	traversal and postorder traversal, Prefix Notation.		
	Spanning Tree : Definition, Properties, Shortest Spa	nning Tree,	
	Kruskal's Algorithm.		
June	Definition, Examples Elementary Terminologies and	l properties.	
	Special Types of Digraphs. Connectedness of digrap	bhs.	

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

04

Month	Торіс	No. of
		Lectures
March	Real vector space ,subspace, linear independence ,basis & dimension	12
April	row space, column space & null space, rank & nullity,, Eigen value &	10
	eigen vectors, Diagonalization, quadratic form	
May	general linear transformation ,kernel & range,inverse linear	10
	transformation,,Matrix of general linear transformation,Cyclic	
	group,normal subgroup,Product "ient of group,Coding of binary	
	information & erroe detection, Decoding & error correction	
June	public key cryptology	04

Class - S.Y.B.Cs.

Subject:- Operational Research

Name:-Prof. Udhane R.B.

Month	Торіс	No. of Lectures
March	Graphical method_Two-Variable LP Model, Graphical LP Solution, Linear Programming Applications	12
April	LP Model in Equation Form, Transition from Graphical to Algebraic Solution, The Simplex Method, Artificial Starting Solution, Special Cases in Simplex Method	10
May	Dual problem, Definition of the dual problem, Primal dual relationships, Examples, Transportation problem, Definition of the Transportation problem	10
June	The Transportation Algorithm ,The Assignment Model Optimal solution of two person zero sum games , Solution of mixed strategy games	04

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

Name:-Prof. Karke S.N.

Subject:- Computational Geometry

Month		No. of
	Topics	Lectures
March	Two dimensional transformations, Introduction, Representation of	12
	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 –	12
	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	12
	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.

Month		No. of
	Topics	Lectures
March	Definition of a Matrix, Types of Matrices, Algebra of Matrices,	12
	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	12
	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	10
	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.	
June	Concept of regression, Lines of regression for ungrouped data,	02
	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.

Month	Торіс	No. of
		lecture
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	12
	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	
April	Proportion, Direct, Proportion, Inverse Proportion, Variation, Inverse	14
_	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.	15
June	Problems Meaning of LPP, Formulation of LPP, and solution by graphical methods.	07

	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. 	15
June	Problems Meaning of LPP, Formulation of LPP, and solution by graphical methods.	07

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