

**Vivekanand College, Kolhapur (Autonomous)**

Department of mathematics

Academic Year: 2021-2022

**Annual Teaching Plan**

Name of the Teacher: Mr. S. P. Patankar

Programme - B.Sc. I (C)

Semester - I

Subject: Mathematics

Course Title: Algebra and Geometry

Month : October			Module/Unit: I	Sub-units planned
Lectures	Practicals	Total	Theory of equation and complex number	5. Elementary theorem on the roots of equations 6. Synthetic division 7. Relations between the roots and coefficient of polynomial equations 8. Polar representation of complex numbers, De Moivre's theorem
10	01	11		
Month : November			Module/Unit: II	Sub-units planned
Lectures	Practicals	Total	Relations	4. Relation and equivalence relation 5. Functions, Composition of function 6. Finite sets, Countable and Uncountable sets
08	01	09		
Month : December			Module/Unit: III	Sub-units planned
Lectures	Practicals	Total	Matrix algebra	6. System of linear equations 7. Row reduction and Echelon Form 8. Rank of matrix 9. Determinant and Inverse of matrix 10. Cayley-Hamilton theorem
08	02	10		
Month : January			Module/Unit: IV	Sub-units planned
Lectures	Practicals	Total	Spheres	5. Different forms of Spheres 6. Intersection of spheres 7. Tangents and Normal 8. Radical planes and line, Coaxial System
10	01	11		

Name and Signature of Teacher

(Prof. S.P. Patankar)



(S.P. Patankar)  
**HEAD**

Department of Mathematics  
Vivekanand College, Kolhapur

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Department of mathematics

Academic Year: 2021-2022

**Annual Teaching Plan**

Name of the Teacher: Prof. S. P. Patankar

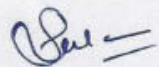
Programme - B.Sc. I

Semester - II

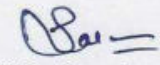
Subject: Mathematics

Course Title: Multivariable Calculus

Month : March			Module/Unit: I	Sub-units planned
Lectures	Practicals	Total	Partial Differentiation	1. Functions of several variables 2. Level curves and surfaces 3. Partial Differentiation Chain Rule 4. Direction Derivatives 5. Tangent plans and normal lines
08	01	09		
Month : April			Module/Unit: II	Sub-units planned
Lectures	Practicals	Total	Jacobian	1. Higher order partial derivatives 2. Jacobians, Change of variables 3. Euler's Theorem 4. Taylor's Theorem for functions of two variables and more variables
10	01	11		

  
Name and Signature of Teacher  
(Prof) S.P. Patankar



  
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Department of Mathematics  
Vivekanand College, Kolhapur

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Department of mathematics

Academic Year: 2021-2022

**Annual Teaching Plan**

Name of the Teacher: Mr. S.P. Patankar

Programme - B.Sc. I (Div- C)

Semester - II

Subject: Mathematics

Course Title: Ordinary Differential Equation

Month: March			Module/Unit: I	Sub-units planned
Lectures	Practicals	Total	Differential Equation of first order and first degree	1)Differential Equation of first order and first degree 2)equation reducible to linear form 3)First order higher degree 4)Clairaut's Form 5)Picard's method and theorem for existence and uniqueness
10	01	11		
Month : April			Module/Unit: II	Sub-units planned
Lectures	Practicals	Total	Linear Differential Equations with constant coefficient	1)Linear Differential Equations with constant coefficient 2)Complex and distinct roots and complex repeated roots 3)Mixed roots 4)Types of complimentary functions 5)Particular integrals of different functions
10	02	12		
Month : May			Module/Unit: III	Sub-units planned
Lectures	Practicals	Total	Homogeneous linear Differential Equations	1) Homogeneous linear Differential Equations 2)Cauchy – Euler's Equation and methods of solving 3)Legendre's linear equations
08	01	09		
Month : June			Module/Unit: IV	Sub-units planned
Lectures	Practicals	Total	Differential equations with variable coefficient	1) General theory of linear differential equations with variable coefficient 2)Transformation of Equations 3)Bessel's equation 4) Bessel's functions and properties
08	01	09		

Name and Signature of Teacher

prof. S.P. Patankar



( S.P. Patankar)

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Vivekanand College, Kolhapur

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Academic Year: 2021-2022

**Annual Teaching Plan**

Name of the Teacher: Mr. S. P. Patankar

Programme - B.Sc. II

Semester - III

Subject: Mathematics

Course Title: Integral Calculus

Month October			Module/Unit: I	Sub-units planned
Lectures	Practicals	Total	Beta and Gamma functions	<ol style="list-style-type: none"><li>1. Definition of Beta function</li><li>2. Basic Properties of Beta function and Examples on Beta functions</li><li>3. Definition of Gamma function</li><li>4. Basic Properties of Gamma function and Examples on Gamma functions</li><li>5. Relation between Beta and Gamma function</li></ol>
10	02	12		
Month November			Module/Unit: II	Sub-units planned
Lectures	Practicals	Total	Multiple integrals	<ol style="list-style-type: none"><li>1. Integration Method of Evaluation</li><li>2. Related Double examples Cartesian and Polar Form</li><li>3. Change of order of integration</li><li>4. Change of Variable, Examples on Triple Integral.</li></ol>
12	02	14		

Name and Signature of Teacher

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Academic Year: 2021-2022

**Annual Teaching Plan**

Name of the Teacher: Mr. S. P. Patankar


Programme - B.Sc. III

Semester - V

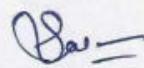
Subject: Mathematics

Course Title: Matrix Algebra

Month October			Module/Unit: I	Sub-units planned
Lectures	Practicals	Total	Linear Transformation	1. Translation, Dilation, Rotation 2. Reflection in a point, line and plans. 3. Mauris form of basic geometric transformations.
12		12		
Month November			Module/Unit: I	Sub-units planned
Lectures	Practicals	Total	Linear Transformation	1. Interpretation of eigen values and eigen vectors for such transformations and eigen spaces 2. Invariant subspaces. 3. Types of matrices. 4. Rank of a matrix. Invariance of rank under elementary transformations
12		12		
Month : December			Module/Unit: II	Sub-units planned
Lectures	Practicals	Total	System of Linear Equations	1. Reduction to normal form, 2. Solutions of linear homogeneous and non homogeneous equations with number of equations and unknowna upto four. 3. Matrices in diagonal form. Reduction to diagonal form upto matrices of order 3.
12		12		
Month : January			Module/Unit: II	Sub-units planned
Lectures	Practicals	Total	System of Linear Equations	1. Computation of matrix inverses using elementary row operations. Rank of matrix. 2. Solutions of a system of linear equations using matrices, Illustrative examples of above concepts from Geometry, Physics, Chemistry, Combinatorics and Statistics
12		12		

  
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**Annual Teaching Plan**

Name of the Teacher: Mr. S.P. Patankar


Programme - B.Sc. III

Semester - V

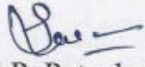
Subject: Mathematics

Course Title: Numerical Method - I

Month October			Module/Unit: I	Sub-units planned
Lectures	Practicals	Total	Solution of algebraic equation	1. Introduction: Polynomial equation, algebraic equation and their roots 2. iterative methods, Bisection method, algorithm, examples 3. Secant algebraic method: iterative sequence of secant method, examples 4. Regula-Falsi method: algorithm, graphical representation, examples. 5. Newton's method: algorithm, examples.
12		12		
Month November			Module/Unit: I	Sub-units planned
Lectures	Practicals	Total	Solution of algebraic equation	1. Introduction: System of linear equations as a vector equation $Ax = b$ , Augmented matrix. 2. Direct methods: Gauss elimination method: Procedure, Examples 3. Gauss-Jordan method: Procedure, examples. 4. Iterative method, General iterative rule
12		12		
Month : December			Module/Unit: II	Sub-units planned
Lectures	Practicals	Total	Iterative Methods	1. Jacobi iteration scheme, examples. 2. Gauss-Seidel method: Formula, examples. 3. Eigen values and eigenvectors of a real matrix
12		12		
Month : January			Module/Unit: II	Sub-units planned
Lectures	Practicals	Total	Iterative Methods	1. Power method for finding an eigen value of greatest modulus, the case of matrix whose "dominant eigen value is not repeated", examples. 2. Method of exhaustion, examples, Method of reduction, examples. Shifting of the eigen value, examples
12		12		

  
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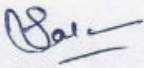
Programme - B.Sc. III

Semester - VI

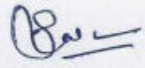
Subject: Mathematics

Course Title: Complex Analysis

Month March			Module/Unit: I	Sub-units planned
Lectures	Practicals	Total	Analytic Functions	<ol style="list-style-type: none"><li>1. Basic algebraic and geometric properties of complex numbers</li><li>2. Function of complex variable, Limits, continuity and differentiation</li><li>3. Cauchy Riemann equations, Analytic functions and examples of analytic functions.</li></ol>
12		12		
Month April			Module/Unit: I	Sub-units planned
Lectures	Practicals	Total	Analytic Functions	<ol style="list-style-type: none"><li>1. Exponential function, Logarithmic function, Trigonometric function,</li><li>2. Definite integrals of functions, Contours, Contour integrals and its examples, upper bounds for moduli of contour integrals,</li><li>3. Cauchy integral formula and examples.</li></ol>
12		12		

  
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# Vivekanand College, Kolhapur (Autonomous)

Department of mathematics  
Academic Year: 2021-2022

## Annual Teaching Plan

Name of the Teacher: Mr. S. P. Patankar

Programme - B.Sc. III

Semester - VI

Subject: Mathematics

Course Title: Numerical Method - II

Month: March			Module/Unit: I	Sub-units planned
Lectures	Practicals	Total	Interpolation	1. Forward interpolation: Newton's forward differences, forward difference table. Newton's forward form of interpolating polynomial (formula only) examples 2. Backward interpolation: Newton's backward differences, backward difference table, Newton's backward form of interpolating polynomial (formula only).
12		12		
Month April			Module/Unit: I	Sub-units planned
Lectures	Practicals	Total	Interpolation	1. Introduction, Lagrangian interpolating polynomial (formula only), examples 2. Divided difference interpolation: Newton's divided differences, divided difference table, examples finding divided (differences of given data) 3. Newton's divided difference form of interpolating polynomial, examples
12		12		
Month : May			Module/Unit: II	Sub-units planned
Lectures	Practicals	Total	Numerical Differentiation and Integration	1. Numerical differentiation based on interpolation polynomial. 2. Numerical integration: Newton-Cotes formula (statement only) 3. composite Trapezoidal rule 4. composite Simpson's 1/3rd rule, examples 5. composite Simpson's 3/8th rule, examples.
12		12		
Month : June			Module/Unit: II	Sub-units planned
Lectures	Practicals	Total	Numerical Differentiation and Integration	1. Euler's Method, Examples, 2. Second order Runge-Kutta method (formula only). Examples 3. Fourth order Runge-Kutta method(formula only), examples
12		12		

Name and Signature of Teacher

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Academic Year: 2021-2022

**Annual Teaching Plan**

Name of the teacher: Mr. S.P. Patankar

Programme - B. Com I

Semester - I

Subject: Mathematics

Course Title: Business Mathematics Paper I

Month: October			Module/Unit: I/II	Sub-units planned
Lectures	Practicals	Total		
15	00	15	1. Arithmetic and geometric progression 2. Compound interest, ratio, percentage, proportion and partnership	1. Definitions of A.P. 2. Definitions of G.P. 3. Formulae for nth term and sum to n terms of A.P. and G.P. 4. Simple examples. 5. Different types of interest rates 6. Simple examples on simple interest and compound interest.
Month : November			Module/Unit: II	Sub-units planned
Lectures	Practicals	Total		
16	00	16	Compound interest, ratio, percentage, proportion and partnership	1. Introduction to ratio and percentage 2. simple problems on ratio and percentage 3. Concept of proportion 4. Simple problems on proportion 5. Applications to division into proportional part and partnership
Month : December			Module/Unit: III	Sub-units planned
Lectures	Practicals	Total		
17	00	17	Matrices and Determinants	1. Definition of a matrix, types of matrices 2. Algebra of matrices 3. Adjoint of a matrix, Finding inverse of a matrix by using adjoint matrix. 4. Properties of determinants (without proofs) 5. Solutions of system of linear equations by Cramer's Rule.
Month : January			Module/Unit: IV	Sub-units planned
Lectures	Practicals	Total		
12	00	12	Linear programming problems (L.P.P.) and Transportation problems -	1. Formation of L.P.P. Graphical method of solution 2. Problems relating to two variables including the case of mixed constraints, cases having no solution, multiple solutions, unbounded solutions. 3. Definition of Transportation model 4. Formulation and solution of transportation model, North-West Corner rule

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**Annual Teaching Plan**

Name of the teacher: Mr. S. P. Patankar

Programme - B. Com I

Semester - II

Subject: Mathematics

Course Title: Business Mathematics Paper II

Month : March			Module/Unit: I	Sub-units planned
Lectures	Practicals	Total	Functions of real variable, Limit of function and continuity	1. Linear, Quadratic, exponential (of type $y = a^x$ ) 2. Inverse functions and their graphs. illustrative examples. 3. Limits of a functions- Theorems on limit (without proof) 4. simple examples. 5. Continuity of a functions at a point, discontinuity of a function 6. Algebra of continuous functions, continuity at domain of a function, continuity of some standard function and related examples.
18	00	18		
Month : April			Module/Unit: II	Sub-units planned
Lectures	Practicals	Total	Differentiation	1. Definition, derivative using first principle 2. Method of differentiation of sum, difference, product and quotient of two functions 3. Derivative of composite, inverse, exponential, logarithmic, parametric and implicit functions 4. Second order derivative
13	00	13		
Month : May			Module/Unit: III	Sub-units planned
Lectures	Practicals	Total	Applications of differentiation	1. Maxima and minima 2. Case of one variable involving second order derivative 3. Average cost, average revenue functions 4. Marginal cost, marginal revenue 5. Elasticity of demand
14	00	14		
Month : June			Module/Unit: IV	Sub-units planned
Lectures	Practicals	Total	Integrations and its applications	1. Integration-An Anti-derivative process 2. Method of integration by substitution and by parts. 3. Definite integral And their properties.
15	00	15		

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Vivekanand College, Kolhapur

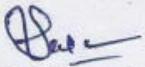
**Vivekanand College, Kolhapur (Autonomous)**  
**Department of Mathematics**  
**Academic Year: 2021-22**

**ANNUAL TEACHING PLAN**


Name of the teacher: Mr. S. P. Patankar  
 Programme: M. Sc. I  
 Subject: Mathematics

Semester: III  
 Course Title: Operational Research- I

Month: October			Module/Unit:	Sub-units planned
Lectures	Practical	Total	Convex Set and LPP:	1) Convex set and their properties. 2) Lines, hyperplanes and polyhedral convex set and its theorems. 3) Convex combination of vectors, convex hull. Simplex and convex function. 2) General form of linear programming and Matrix form of linear programming. 3) Definition of standard LPP and theorems of it.
15	00	15		
Month: November			Module/Unit:	Sub-units planned
Lectures	Practical	Total	Simplex Method:	1) Computational procedure of simplex method. Problem of degeneracy, revised simplex method in standard form- I 2) Duality in linear programming and duality theorems. 3) Integer linear programming: Gomory's cutting plane method, Branch and Bound method.
18	00	18		
Month: December			Module/Unit:	Sub-units planned
Lectures	Practical	Total	Dynamic Programming:	1) Bellman's Principle of Optimality 2) Application of Dynamic Programming in production 3) Inventory control and linear programming.
15	00	15		
Month: January			Module/Unit:	Sub-units planned
Lectures	Practical	Total	Non linear Programming:	1) Unconstrained problems of maximum and minimum 2) Lagrangian method Kuhn Tucker necessary and sufficient conditions 3) Wolfe's method and Beale's method
16	00	16		

  
 Name And Sign of Faculty  
 [ Mr. S. P. Patankar ]



  
 ( S. P. Patankar )  
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 Vivekanand College, Kolhapur

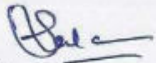
**Vivekanand College, Kolhapur (Autonomous)**  
**Department of Mathematics**  
**Academic Year: 2021-22**

**ANNUAL TEACHING PLAN**

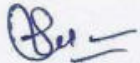
Name of the teacher: Mr. S. P. Patankar  
 Programme: M. Sc. I  
 Subject: Mathematics

Semester: IV  
 Course Title: Measure and Integration

Month: March			Module/Unit:	Sub-units planned
Lectures	Practical	Total		
17	00	17	3. Lebesgue Integral,	1) The General Lebesgue Integral, 2) Characterization of Riemann and Lebesgue Integrability, 3) Differentiability of Monotone Functions, Lebesgue's Theorem, 4) Functions of Bounded Variations: Jordan's Theorem
Month: April			Module/Unit:	Sub-units planned
Lectures	Practical	Total		
16	00	16	4. Absolutely Continuous Functions	1) Absolutely Continuous Functions, 2) Integrating Derivatives: Differentiating Indefinite Integrals, 3) Normed Linear Spaces, Inequalities of Young, Holder and Minkowski, 4) The Riesz-Fischer Theorem.
Month: May			Module/Unit:	Sub-units planned
Lectures	Practical	Total		
18	00	18	1. Lebesgue Outer Measure	1) Open Sets, Closed Sets and Borel Sets 2) Lebesgue Outer Measure, The sigma algebra of Lebesgue Measurable Sets, Countable Additivity 3) Continuity and Borel-Cantelli Lemma 4) nonmeasurable set.
Month: June			Module/Unit:	Sub-units planned
Lectures	Practical	Total		
15	00	15	2. Measurable Functions	1) Sums, Product and Composition of Measurable Functions, 2) Sequential Pointwise limits and Simple Approximation. Littlewood's Three Principles 3) Egoroff's Theorem and Lusin's Theorem, Lebesgue 4) Integration of a Bounded Measurable Function, Lebesgue Integration of a Non-negative Measurable Function.

  
 Name And Sign of Faculty  
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 Department of Mathematics  
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Department of mathematics

Academic Year: 2021-2022

**Annual Teaching Plan**

Name of the Teacher: Prof. S.P. Thorat

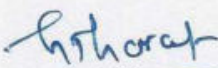
Programme - B.Sc. I (A, C)

Semester - I

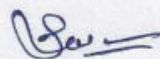
Subject: Mathematics

Course Title: Calculus

Month: October			Module/Unit: I	Sub-units planned
Lectures	Practicals	Total	1. Limit and Continuity	1) $\epsilon - \delta$ definition of limit of real valued function 2) Infinite limits 3) properties of continuous function 4) Types of discontinuity 5) Uniform continuity
08	01	09		
Month: November			Module/Unit: II	Sub-units planned
Lectures	Practicals	Total	2. Mean value theorem and successive differential	1) Differentiability of real valued function 2) Relation between differentiability and continuity 3) Lagrange's mean value theorem 4) Successive differential equation 5) Leibnitz's theorem
10	01	11		
Month : December			Module/Unit: III	Sub-units planned
Lectures	Practicals	Total	3. Higher mean value theorem and indeterminate form	1) Maclaurin's and Taylor's theorems 2) Taylor's theorem infinite form with Lagrange and Cauchy forms of remainder 3) Indetermined Form
08	02	10		
Month : January			Module/Unit: IV	Sub-units planned
Lectures	Practicals	Total	4. Asymptotes	1) Asymptotes of general algebraic curves 2) Asymptotes parallel to axes 3) Tangent at origin 4) Position and nature of double points
10	01	11		

  
Name and Signature of Teacher  
(S.P. Thorat)



  
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Academic Year: 2021-2022

**Annual Teaching Plan**

Name of the Teacher: Mr. S.P. Thorat

Programme - B.Sc. I (Div- A)

Semester - II

Subject: Mathematics

Course Title: Ordinary Differential Equation

Month: March			Module/Unit: I	Sub-units planned
Lectures	Practicals	Total	Differential Equation of first order and first degree	1)Differential Equation of first order and first degree 2)equation reducible to linear form 3)First order higher degree 4)Clairaut's Form 5)Picard's method and theorem for existence and uniqueness
10	01	11		
Month : April			Module/Unit: II	Sub-units planned
Lectures	Practicals	Total	Linear Differential Equations with constant coefficient	1)Linear Differential Equations with constant coefficient 2)Complex and distinct roots and complex repeated roots 3)Mixed roots 4)Types of complimentary functions 5)Particular integrals of different functions
10	02	12		
Month : May			Module/Unit: III	Sub-units planned
Lectures	Practicals	Total	Homogeneous linear Differential Equations	1) Homogeneous linear Differential Equations 2)Cauchy – Euler's Equation and methods of solving 3)Legendre's linear equations
08	01	09		
Month : June			Module/Unit: IV	Sub-units planned
Lectures	Practicals	Total	Differential equations with variable coefficient	1) General theory of linear differential equations with variable coefficient 2)Transformation of Equations 3)Bessel's equation 4) Bessel's functions and properties
08	01	09		

Name and Signature of Teacher

(S.P. Thorat)



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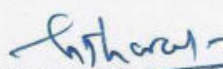
Programme - B.Sc. II

Semester - III

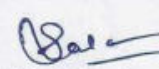
Subject: Mathematics

Course Title: Differential calculus

Month : December			Module/Unit: III	Sub-units planned
Lectures	Practicals	Total	Asymptotes and singular points	
15	02	17		1. Definition and Working rule to determine asymptote by inspection 2. Intersection of curve with Asymptote 3. asymptote by expansion Position of curve with respect to an Asymptote. 4. Definitions of Cups, Nodes and Conjugate Points 5. Definitions Tangents at Origin, Types of Cups 6. Radii of curvature at multiple points
Month : January			Module/Unit: IV	Sub-units planned
Lectures	Practicals	Total	Vector differentiation	
10	02	12		1. Definition of Vector differential operator Del. Divergence, Gradient and curl of vector 2. Properties of Divergence, Curl and Gradient of Vector 3. directional derivative of a vector and Related examples 4. Solenoidal, irrotational and conservative fields Scalar potential, Vector identities

  
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**Annual Teaching Plan**

Name of the Teacher: Mr. S.P.Thorat

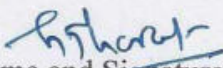
Programme - B.Sc. II

Semester - IV

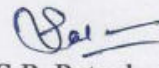
Subject: Mathematics

Course Title: Integral transformation

Month: March			Module/Unit: I	Sub-units planned
Lectures	Practicals	Total	Laplace Transformation	1)Function of an exponential order 2)General Integral transform and its Kernel, Laplace transform 3)Linearity property, Laplace transform of some standard functions. 4)Properties of Laplace Transform
12	02	14		
Month : April			Module/Unit: II	Sub-units planned
Lectures	Practicals	Total	Inverse Laplace Transformation	1) Definition ,basic properties and examples of Inverse Laplace Transform 2)Convolution theorem 3)Application to solve ordinary, partial differential equations 4)Initial value problems.
12	02	14		

  
Name and Signature of Teacher  
(S.P.Thorat)



  
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**Vivekanand College, Kolhapur (Autonomous)**

Department of mathematics

Academic Year: 2021-2022

**Annual Teaching Plan**

Name of the Teacher: Mr. S. P. Thorat

Programme - B.Sc. III Semester - V

Subject: Mathematics

Course Title: Real Analysis

Month October			Module/Unit: I	Sub-units planned
Lectures	Practicals	Total	Sequence and Series	<ol style="list-style-type: none"><li>1. The algebraic and ordered properties of <math>\mathbb{R}</math></li><li>2. Absolute value and real line, The completeness property of <math>\mathbb{R}</math></li><li>3. Application of supremum property, Intervals.</li><li>4. Sequence, Limit of Sequence Monotone Sequences,</li></ol>
12		12		
Month November			Module/Unit: I	Sub-units planned
Lectures	Practicals	Total	Sequence and Series	<ol style="list-style-type: none"><li>1. Subsequences and The Bolzano-Weierstrass Theorem</li><li>2. The Cauchy Criterion, Property of Divergent Sequences</li><li>3. Series: Definition and examples, <math>n^{\text{th}}</math> term Test, Cauchy Criterion for the series</li><li>4. Comparison Tests Cauchy Condensation Test.</li></ol>
12		12		
Month : December			Module/Unit: II	Sub-units planned
Lectures	Practicals	Total	Riemann Integral and Improper Integral	<ol style="list-style-type: none"><li>1. The Riemann integral and properties</li><li>2. Riemann integrable functions</li><li>3. The squeeze Theorem, Classes of Riemann integrable functions</li><li>4. The fundamental Theorem.</li></ol>
12		12		
Month : January			Module/Unit: II	Sub-units planned
Lectures	Practicals	Total	Riemann Integral and Improper Integral	<ol style="list-style-type: none"><li>1. Improper integral of first kind, Comparison test, - test for Convergence</li><li>2. convergence, Integral test for convergence of series Improper integral of second kind</li></ol>
12		12		

Name and Signature of Teacher

*S.P. Thorat*  
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(S.P. Patankar)  
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**Vivekanand College, Kolhapur (Autonomous)**

Department of mathematics

Academic Year: 2021-2022

**Annual Teaching Plan**

Name of the Teacher: Mr. S.P. Thorat

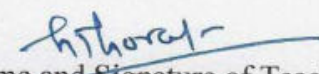
Programme - B.Sc. III

Semester - VI

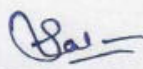
Subject: Mathematics

Course Title: Metric Space

Month March			Module/Unit: I	Sub-units planned
Lectures	Practicals	Total	Basic concepts of Metric Space	1. Definition and examples of metric spaces. 2. Open ball. Open set. Closed set as complement of open set, 3. Interior point and interior of a set. 4. Limit point and closure of a set. 5. Boundary point and boundary of a set. Properties of interior, closure and boundary. 6. Bounded set and diameter of a set. Distance between two sets. Subspace of a metric space.
12		12		
Month April			Module/Unit: I	Sub-units planned
Lectures	Practicals	Total	Basic concepts of Metric Space	1. Convergent sequence. Cauchy sequence. 2. Every convergent sequence is Cauchy and bounded, but the converse is not true. 3. Completeness. Cantor's intersection theorem. $\mathbb{R}$ is a complete metric space. $\mathbb{Q}$ is not complete
12		12		
Month : May			Module/Unit: II	Sub-units planned
Lectures	Practicals	Total	Compactness and connectedness of Metric Space	1. Continuous mappings, sequential criterion of continuity. 2. Uniform continuity. 3. Compactness, Sequential compactness, Heine-Borel theorem in $\mathbb{R}$ . Finite intersection property, continuous functions on compact sets.
12		12		
Month : June			Module/Unit: II	Sub-units planned
Lectures	Practicals	Total	Compactness and connectedness of Metric Space	1. Concept of connectedness and some examples of connected metric space, 2. connected subsets of $\mathbb{R}$ , $\mathbb{C}$ . 3. Contraction mappings, 4. Banach Fixed point Theorem and its application to ordinary differential equations.
12		12		

  
 Name and Signature of Teacher  
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Department of mathematics

Academic Year: 2021-2022

**Annual Teaching Plan**

Name of Teacher: Mr. S. P. Thorat

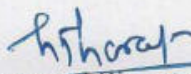
Program: B.Sc. III

Subject: Mathematics

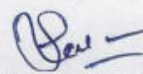
Semester: V

Course Title: CCPM-IV

Month: October			Unit I	Subunits Planed
Lectures	Practical	Total	Introduction to LPP	1) Graphical method for Linear Programming Problem 2) Transportation Problems (North west corner rule)
00	02	02		
Month: November			Unit II	Subunits Planed
Lectures	Practical	Total	Transportation and Assignment-I	1) Transportation Problems (Lowest Cost Entry Method) 2) Transportation Problems (Vogel Approximation Method)
00	02	02		
Month: December			Unit III	Subunits Planed
Lectures	Practical	Total	Transportation and Assignment-II	1) Transportation Problems (Test For Optimality MODI Method) 2) Transportation Problems (Hungarian Method)
00	02	02		
Month: January			Unit IV	Subunits Planed
Lectures	Practical	Total	Transportation and Assignment-III	1) Assignment Problems (Maximization Case) 2) Assignment Problems (Traveling Salesman Problem)
00	02	02		

  
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Department of mathematics

Academic Year: 2021-2022

**Annual Teaching Plan**

Name of Teacher: Mr. S. P. Thorat

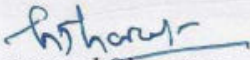
Program: B.Sc. III

Semester: VI

Subject: Mathematics

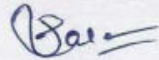
Course Title: CCPM-IV

Month: March			Unit I	Subunits Planed
Lectures	Practical	Total	2× 2 Games	1) Assignment problems (Unbalanced Problems)  2) Two by Two (2× 2) (Games without saddle point)
00	02	02		
Month: April			Unit II	Subunits Planed
Lectures	Practical	Total	Algebraic and Assignment Problems	1) Algebraic method of Two By two (2× 2) Games  2) Arithmetic method of Two By two (2× 2) Games
00	02	02		
Month: May			Unit III	Subunits Planed
Lectures	Practical	Total	Assignment Problems	1) Graphical method for $2 \times n$ games $m \times 2$ Games  2) Processing n jobs through 2 machines
00	02	02		
Month: June			Unit IV	Subunits Planed
Lectures	Practical	Total	Assignment Problems	1) Processing n jobs through 3 machines  2) Processing 2 jobs through m machines  3) Processing n jobs through 2 machines
00	02	02		

  
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Department of mathematics

Academic Year: 2021-2022

**Annual Teaching Plan**

Name of the Teacher: Mr. G.B. Kolhe

Programme - B.Sc. I (A)

Semester - I

Subject: Mathematics

Course Title: Algebra and Geometry

Month : October			Module/Unit: I	Sub-units planned
Lectures	Practicals	Total	Theory of equation and complex number	1. Elementary theorem on the roots of equations 2. Synthetic division 3. Relations between the roots and coefficient of polynomial equations 4. Polar representation of complex numbers, De Moivre's theorem
10	01	11		
Month : November			Module/Unit: II	Sub-units planned
Lectures	Practicals	Total	Relations	1. Relation and equivalence relation 2. Functions, Composition of function 3. Finite sets, Countable and Uncountable sets
08	01	09		
Month : December			Module/Unit: III	Sub-units planned
Lectures	Practicals	Total	Matrix algebra	1. System of linear equations 2. Row reduction and Echelon Form 3. Rank of matrix 4. Determinant and Inverse of matrix 5. Cayley-Hamilton theorem
08	02	10		
Month : January			Module/Unit: IV	Sub-units planned
Lectures	Practicals	Total	Spheres	1. Different forms of Spheres 2. Intersection of spheres 3. Tangents and Normal 4. Radical planes and line, Coaxial System
10	01	11		

G.B. Kolhe  
Name and Signature of Teacher  
(Mr. Geaurav B. Kolhe)



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Department of mathematics

Academic Year: 2021-2022

**Annual Teaching Plan**

Name of the Teacher: Mr. G.B. Kolhe

Programme - B.Sc. II

Semester - III

Subject: Mathematics

Course Title: Differential calculus

Month : October			Module/Unit: I	Sub-units planned
Lectures	Practicals	Total	Jacobian	1. Definition of Jacobian of transformation 2. Examples and Various properties of Jacobian 3. Examples related on the properties 4. Application of Jacobian.
10	02	12		
Month: November			Module/Unit: II	Sub-units planned
Lectures	Practicals	Total	Curvature	1. Definitions of Curve, Curvature of Curve, 2. Definition of Radius of Curvature and Curves with constant curvature 3. Formulas for Radius of curvature for curves in Cartesian 4. Formulas for Radius of curvature for Parametric and Polar forms 5. Related examples of curvature
10	02	12		

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Department of mathematics

Academic Year: 2021-2022

**Annual Teaching Plan**

Name of the Teacher: Mr. G.B. Kolhe

Programme - B.Sc. II

Semester - IV

Subject: Mathematics

Course Title: Discrete Mathematics

Month: March			Module/Unit: I	Sub-units planned
Lectures	Practicals	Total	Sets and relations	<ol style="list-style-type: none"><li>1. Algebra of Sets, Duality, finite sets and Counting Principle, classes of Sets</li><li>2. Power set and partition, Mathematical Induction, product of sets</li><li>3. Relations, Pictorial representation of relations, composition of relations, Types of relations, Closure properties</li><li>4. equivalence relations and partial order relations.</li></ol>
10	02	12		
Month: April			Module/Unit: II	Sub-units planned
Lectures	Practicals	Total	Generating Functions and Recurrence relation	<ol style="list-style-type: none"><li>1. Ordinary and exponential generating functions and Basic properties of generating functions</li><li>2. enumerators, Applications to partitions, Ferrer's graph</li><li>3. Applications to solving recurrence relations</li><li>4. linear recurrence relation with constant coefficients</li><li>5. homogeneous solutions and total solutions, particular solutions and total solutions.</li></ol>
13	02	15		

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**Vivekanand College, Kolhapur (Autonomous)**

Department of mathematics

Academic Year: 2021-2022

**Annual Teaching Plan**

Name of the Teacher: Mr. G. B. Kolhe

Programme - B.Sc III

Semester - V

Subject: Mathematics

Course Title: Modern algebra

Month October			Module/Unit: I	Sub-units planned
Lectures	Practicals	Total	Groups	
12		12		1. Definition and Binary operations 2. Definitions and properties, Groups elementary properties. 3. Finite groups and composition tables. 4. Subgroups and its properties. 5. Generators and cyclic groups. 6. Permutations Functions and permutations cycles and cyclic notation, even, odd, permutations, Symmetric group, Alternating groups.
Month November			Module/Unit: I	Sub-units planned
Lectures	Practicals	Total	Groups	
12		12		1. Cyclic groups- elementary properties 2. The classification of cyclic groups 3. Isomorphisms -Definition and elementary properties. 4. Cayley's theorem, Groups of cosets, Applications. 5. Normal subgroups Factor groups, Criteria for existing of a coset group Inner automorphism and Dormal subgroups Simple groups 6. The fundamental theorems of isomorphisms, applications
Month : December			Module/Unit: II	Sub-units planned
Lectures	Practicals	Total	Field	
12		12		1. Definition and basic properties 2. Fields, Integral domains, divisors of zero and cancellation laws 3. The characteristic of a ring, some non commutative rings Examples
Month : January			Module/Unit: II	Sub-units planned
Lectures	Practicals	Total	Field	
12		12		1. matrices over a field, The real quaternions 2. Homomorphism of rings Definition and elementary properties 3. Maximal and Prime ideals, Prime fields

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Department of mathematics

Academic Year: 2021-2022

**Annual Teaching Plan**

Name of the Teacher: Mr. G. B. Kolhe

Programme - B.Sc III

Semester - VI

Subject: Mathematics

Course Title: Linear algebra

Month March			Module/Unit: I	Sub-units planned
Lectures	Practicals	Total	Vector Space	1. Vector spaces, General properties of vector spaces, 2. Vector subspaces, Algebra of subspaces 3. linear combination of vectors, Linear span, linear sum of two subspaces 4. Linear dependence and independence of vectors 5. Basis of vector space Finite dimensional vector space, Dimension of a vector space, Dimension of subspace
12		12		
Month April			Module/Unit: I	Sub-units planned
Lectures	Practicals	Total	Vector Space	1. Linear transformations, linear operators 2. Range and null space of linear transformation 3. Rank and nullity of linear transformation 4. Linear transformations as vectors product of linear transformations, Invertible linear transformation.
12		12		
Month : May			Module/Unit: II	Sub-units planned
Lectures	Practicals	Total	Inner product space	1. The adjoint or transpose of a linear transformation 2. Sylvester's law of nullity, characteristic values and vectors of linear transformation 3. Cayley Hamilton theorem, Diagonalisable operators,
12		12		
Month : June			Module/Unit: II	Sub-units planned
Lectures	Practicals	Total	Inner product space	1. Inner product spaces, Euclidean and unitary. 2. Norm or length of vector, Schwartz inequality, 3. Orthogonality, Orthonormal set, complete orthonormal set 4. Gram-Schmidt orthogonalisation process.
12		12		

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**Vivekanand College, Kolhapur (Autonomous)**

Department of mathematics

Academic Year: 2021-2022

**Annual Teaching Plan**

Name of Teacher: Mr. G. B. Kolhe

Program: B.Sc. III

Subject: Mathematics

Semester: V

Course Title: CCPM-VI

Month: October			Unit I	Subunits Planed
Lectures	Practical	Total	Introduction	1) Introduction to Python
00	16	16		
Month: November			Unit II	Subunits Planed
Lectures	Practical	Total	Conditional statement	2) Expression and operators 3) Conditional statement
00	15	15		
Month: December			Unit III	Subunits Planed
Lectures	Practical	Total	Conditional statement	4) Looping and control statement
00	17	17		
Month: January			Unit IV	Subunits Planed
Lectures	Practical	Total	Functions	5) Functions

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Department of mathematics

Academic Year: 2021-2022

**Annual Teaching Plan**

Name of Teacher: Mr. G. B. Kolhe

Program: B.Sc. III

Subject: Mathematics

Semester: VI

Course Title: CCPM-VI

Month: March			Unit I	Subunits Planed
Lectures	Practical	Total	System of linear algebraic equations	1) System of linear algebraic equations 2) Roots of equations
00	02	02		
Month: April			Unit II	Subunits Planed
Lectures	Practical	Total	Initial value problem	1) Initial value problem 2) Magic square and area calculation without measurement
00	02	02		
Month: May			Unit III	Subunits Planed
Lectures	Practical	Total	Graph Theory	1) Graph Theory: Network 2) Collaz conjuncture and monte Hall problem
00	02	02		
Month: June			Unit IV	Subunits Planed
Lectures	Practical	Total	Data visualization in Python	1) Data compressing using NumPy 2) Data visualization in Python
00	02	02		

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**Vivekanand College, Kolhapur (Autonomous)**

Department of mathematics

Academic Year: 2021-2022

**Annual Teaching Plan**

Name of Teacher: Mr. G. B. Kolhe

Program: B.Sc. II

Subject: Mathematics

Semester: IV

Course Title: CCPM-III

Month: March			Unit I	Subunits Planned
Lectures	Practical	Total	Interpolation	1) Numerical method to find the root of the given function 2) Interpolation
00	02	02		
Month: April			Unit II	Subunits Planned
Lectures	Practical	Total	Euler and Runge Kutta method	1) Numerical solution of Ordinary Differential Equation-I Euler's and Euler's Modified method 2) Numerical solution of Ordinary Differential Equation-II Runge Kutta Method
00	02	02		
Month: May			Unit III	Subunits Planned
Lectures	Practical	Total	Numerical Integration	1) Numerical Integration-I Trapezoidal rule 2) Numerical Integration-II Simpson's Rule
00	02	02		
Month: June			Unit IV	Subunits Planned
Lectures	Practical	Total	Numerical Method	1) Numerical Method for solution of system of linear equations-I Guass-Jordan 2) Numerical Method for solution of system of linear equations-I Guass-Seidel
00	02	02		

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# Vivekanand College, Kolhapur (Autonomous)

Department of Mathematics

Academic Year: 2021-22

## ANNUAL TEACHING PLAN

Name of the teacher: Mr. G. B. Kolhe

Programme: M. Sc. I

Subject: Mathematics

Semester: I

Course Title: Algebra

Month: October			Module/Unit:	Sub-units planned
Lectures	Practical	Total	Simple Groups	1) Permutation group, Group of symmetry, Dihedral group, Commutator subgroups Simple groups, simplicity of $A_n$ , 2) Normal and subnormal series, Jordan-Holder theorem 3) Solvable groups, Nilpotent group, isomorphism theorems (Statement only) 4) Zassenhaus Lemma, Schreier refinement theorem.
18	00	18		
Month: November			Module/Unit:	Sub-units planned
Lectures	Practical	Total	Group Action	1) Group action on a set, isometry subgroups, Burnside theorem 2) Direct product and semidirect product of groups, Sylow theorems, p-subgroups, 3) Group of order and pq, 4) Class equation and applications
15	00	15		
Month: December			Module/Unit:	Sub-units planned
Lectures	Practical	Total	Rings of Polynomial	1) Ring of Polynomials, Factorization of polynomials over fields, 2) Irreducible polynomials, Eisenstein criterion, ideals in $F[x]$ , unique 3) factorization domain, principal ideal domain 4) Gauss lemma, Euclidean Domain
17	00	17		
Month: January			Module/Unit:	Sub-units planned
Lectures	Practical	Total	Module	1) Modules, sub-modules, quotient modules, 2) homomorphism and isomorphism theorems, fundamental theorem for modules 3) completely reducible modules, free modules.
16	00	16		

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Name And Sign of Faculty

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Vivekanand College, Kolhapur (Autonomous)

Department of Mathematics

Academic Year: 2021-22

ANNUAL TEACHING PLAN

Name of the teacher: Mr. G. B. Kolhe  
 Programme: M. Sc. I  
 Subject: Mathematics

Semester: I  
 Course Title: Advanced Calculus

Month: October			Module/Unit:	Sub-units planned
Lectures	Practical	Total	Sequences and series of functions	1. Sequences and series of functions - Pointwise convergence of sequences of functions, uniform convergence, Uniform convergence and continuity, Cauchy condition for uniform convergence, 2. Uniform convergence and Riemann integration, , uniform convergence and double sequences, mean convergence. Multiplication of series, 3. Power series, multiplication of power series, substitution theorem, reciprocal of power series, Real power series, 4. The Taylor series generated by function, Bernstein's theorem, Binomial series,
17	00	17		

Month: November			Module/Unit:	Sub-units planned
Lectures	Practical	Total	.Multivariable differential Calculus:	1. Multivariable differential Calculus: The Directional derivatives, directional derivatives and total derivative 2. Total derivatives expressed in terms of partial derivatives, The matrix of linear function, Jacobin matrix, Chain rule, mean value theorem for differentiable functions, 3. A sufficient condition for differentiability, Taylor's formula for functions from R. to R. The inverse function theorem Implicit Functions The implicit function theorem (Statement only) and their applications. 4. Extrema of real valued functions of one variable, Extrema of real valued functions of several
16	00	16		

G. B. Kolhe

Name And Sign of Faculty  
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Vivekanand College, Kolhapur (Autonomous)

Department of Mathematics

Academic Year: 2021-22

ANNUAL TEACHING PLAN

Name of the teacher: Mr. G. B. Kolhe

Programme: M. Sc. II

Subject: Mathematics

Semester: III

Course Title: Functional Analysis

Month: October			Module/Unit:	Sub-units planned
Lectures	Practical	Total	Normed Linear Spaces	Normed linear spaces, Banach spaces, Quotient spaces, Continuous linear transformations, Equivalent norms, Finite dimensional normed spaces and properties, Conjugate space and separability, The Hahn-Banach theorem and its consequences
18	00	18		
Month: November			Module/Unit:	Sub-units planned
Lectures	Practical	Total	Second conjugate space	Second conjugate space, the natural embedding of the normed linear space in its second conjugate space, Reflexivity of normed spaces, Weak * topology on the conjugate space. The open mapping theorem, Projection on Banach space, the closed graph theorem, the conjugate of an operator, the uniform boundedness principle
15	00	15		
Month: December			Module/Unit:	Sub-units planned
Lectures	Practical	Total	Hilbert spaces	Hilbert spaces: examples and elementary properties, Orthogonal complements, The projection theorem, Orthogonal sets, The Bessel's inequality, Fourier expansion and Parseval's equation, separable Hilbert spaces, The conjugate of Hilbert space, Riesz's theorem, The adjoint of an operator.
17	00	17		
Month: January			Module/Unit:	Sub-units planned
Lectures	Practical	Total	Self adjoint operators	Self adjoint operators, Normal and Unitary operators, Projections, Eigen values and eigenvectors of an operator on a Hilbert space, The determinants and spectrum of an operator, The spectral theorem on a finite dimensional Hilbert space.
16	00	16		

G. B. Kolhe

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Department of Mathematics  
Vivekanand College, Kolhapur

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Department of Mathematics

Academic Year: 2021-22

## ANNUAL TEACHING PLAN

Name of the teacher: Mr. A. A. Patil

Programme: M. Sc. I

Subject: Mathematics

Semester: I

Course Title: Classical Mechanics

Month: October			Module/Unit:	Sub-units planned
Lectures	Practical	Total	1 Mechanics of a particle,	1. Mechanics of a particle, Mechanics of a system of particles, conservation theorems, constra 2. Generalised coordinates, D' Alembert's Principle, Lagrange's equations of motion, sin applications of Lagrangian formulation 3. Kinetic energy as a homogeneous function generalised velocities, Non-conservation of total energy due to the existence of non-conserva forces. 4. Cyclic co-ordinates and generalised momentum, conservation theorems
18	00	18		
Month: November			Module/Unit:	Sub-units planned
Lectures	Practical	Total	2. Euler-Lagrange's equations	1. Functionals, basic lemma in calculus of variations, Euler-Lagrange's equations, first integral Euler- Lagrange's equations, the case of several dependent variables 2. Undetermined conditions, Geodesics in a plane and space, the minimum surface of revolution, the problem Brachistochrone 3. Isoperimetric problems, problem of maximum enclosed area. Hamilto Principle, Derivation of Hamilton's principle from D'Alembert's principle, Lagrange's equati of motion from Hamilton's principle. 4. Lagrange's equations of motion for nonconserva systems (Method of Langrange's undetermined multipliers)
15	00	15		
Month: December			Module/Unit:	Sub-units planned
Lectures	Practical	Total	3. Hamiltonian function	1. Hamiltonian function, Hamilton's canonical equations of motion, Derivation of Hamilt equations from variational principle 2. Physical significance of Hamiltonian, the principle of 1 action 3. cyclic co-ordinates and Routh's procedure. Orthogonal transformations 4. Properties transformation matrix, infinitesimal rotations
17	00	17		
Month: January			Module/Unit:	Sub-units planned
Lectures	Practical	Total	4. The Kinematics of rigid body motion	1. The Kinematics of rigid body motion: The independent co-ordinates of a rigid body, the Eule angles 2. Euler's theorem on motion of rigid body, Angular momentum and kinetic energy rigid body with one point fixed 3. the inertia tensor and moment of inertia, Euler's equations motion, Cayley- Klein parameters 4. Matrix of transformation in Cayley- Klein paramet Relations between Eulerian angles and Cayley- Klein parameters
16	00	16		

Name And Sign of Faculty

(Mr. A. A. Patil)



(S. P. Patankar)

HEAD

Department of Mathematics  
Vivekanand College, Kolhapur



# Vivekanand College, Kolhapur (Autonomous)

Department of Mathematics

Academic Year: 2021-22

## ANNUAL TEACHING PLAN

Name of the teacher: Mr. A. A. Patil

Programme: M. Sc. I

Subject: Mathematics

Semester: II

Course Title: Numerical Analysis

Month: March			Module/Unit:	Sub-units planned
Lectures	Practical	Total	1. Iterative solutions	1. Iterative solutions of Transcendental & polynomial equations: Bisection method, 2. Iteration methods based on First degree equation 3. Secant method, Regula Falsi method Newton Raphson
18	00	18		
Month: April			Module/Unit:	Sub-units planned
Lectures	Practical	Total	2. linear System of algebraic equations and Eigenvalue problems	1. linear System of algebraic equations and Eigenvalue problems: Iteration methods (Jacobi iteration method, Gauss seidel iteration method) 2. convergence analysis, Matrix factorization methods (Doo little reduction, Crout reduction), 3. Eigen values and eigenvectors, Gerschgorin theorem, Brauer theorem, Jacobi method for symmetric matrices 4. Householder's method for symmetric matrices, power method.
15	00	15		
Month: May			Module/Unit:	Sub-units planned
Lectures	Practical	Total	3. Interpolation	1. Interpolation, differentiation and integration: Lagrange and Newton interpolation, Truncation error bounds, 2. Newtons divided difference interpolation, finite difference operators, Hermites interpolation, 3. Cubic spline interpolation, numerical differentiation, methods based on interpolation, numerical integration 4. Error analysis, methods based on interpolation Newton cotes methods, Error estimates for trapezoidal and Simpson's rule.
17	00	17		
Month: June			Module/Unit:	Sub-units planned
Lectures	Practical	Total	4. Numerical solution of ordinary differential equations	1. Numerical solution of ordinary differential equations: Euler's method, analysis of Euler's method, 2. Backward Euler's method, order of Euler's method, Explicit Runge -Kutta method of order two and four, midpoint method 3. Taylor series method, convergence and stability of numerical methods 4. Truncation error, error analysis.
16	00	16		

Name And Sign of Faculty

(Mr. A. A. Patil)



(S. P. Patankar)

HEAD

Department of Mathematics  
Vivekanand College, Kolhapur

**Vivekanand College, Kolhapur (Autonomous)**

Department of Mathematics

Academic Year: 2021-22

**ANNUAL TEACHING PLAN**

Name of the teacher: Mr. A. A. Patil

Programme - M.Sc.-II

Semester-III

Subject: Mathematics

Course Title: Number Theory

Month October			Module/Unit: I	Sub-units planned
Lectures	Practicals	Total	Divisibility	1. Review of Divisibility: The division algorithm, G.C.D., 2. Euclidean algorithm, Diophantine equation $ax + by = c$ , Primes and their distribution 3. Fundamental theorem of arithmetic
16		16		
Month November			Module/Unit: II	Sub-units planned
Lectures	Practicals	Total	Congruence	1. Congruences: Properties of congruences, 2. Linear congruences, Chinese Remainder Theorem 3. Special divisibility tests, Fermat's theorem, Wilson's theorem and applications.
17		17		
Month : December			Module/Unit: III	Sub-units planned
Lectures	Practicals	Total	Number Theoretic function	1. Number Theoretic Functions: Euler's phi function, Euler's theorem 2. Greatest integer function, the functions $\tau$ and $\sigma$ , Mobius function and Mobius inversion formula, Properties of these functions
19		19		
Month : January			Module/Unit: IV	Sub-units planned
Lectures	Practicals	Total	Primitive roots	1. Primitive roots: The order of an integer modulo $n$ , Primitive roots of primes, composite numbers having primitive roots, 2. The theory of indices, The quadratic reciprocity law: Eulerian criteria 3. The Legendre symbol and its properties, quadratic reciprocity, quadratic reciprocity with composite moduli
16		16		



Department of Mathematics  
Vivekanand College, Kolhapur

*(Signature)*

Name And Sign of Faculty

(Mr. A. A. Patil)

Vivekanand College, Kolhapur (Autonomous)

Department of Mathematics

Academic Year: 2021-22

ANNUAL TEACHING PLAN

Name of the teacher: Mr. A. A. Patil

Programme - M.Sc.-II

Semester-IV

Subject: Mathematics

Course Title: Combinatorics

Month: March			Module/Unit: I	Sub-units planned
Lectures	Practicals	Total	Permutations and combinations	1. The sum Rule and product Rule 2. Permutations and combinations 3. The Pigeonhole Principle 4. Ramsey Numbers, Catalan Numbers & Stirling Numbers
16		16		
Month: April			Module/Unit: II	Sub-units planned
Lectures	Practicals	Total	Inclusion-Exclusion principle	1. Generalized Permutations & combinations 2. Inclusion - Exclusion principle 3. Derangements 4. Combinatorial Number theory
17		17		
Month: May			Module/Unit: III	Sub-units planned
Lectures	Practicals	Total	Generating functions	1. Rook- Polynomial 2. Ordinary and Exponential generating functions 3. Recurrence Relations 4. Fibonacci sequence
19		19		
Month: June			Module/Unit: IV	Sub-units planned
Lectures	Practicals	Total	Group Theory in Combinatorics	1. Group Theory in Combinatorics 2. The Burnside Frobenius Theorem 3. Permutation Groups and Their Cycle Indices
16		16		

Name and Signature of Teacher

(Mr. A. A. Patil)



(S. P. Patankar)  
HEAD

Department of Mathematics  
Vivekanand College, Kolhapur

**Vivekanand College, Kolhapur (Autonomous)**

Department of mathematics

Academic Year: 2021-2022

**Annual Teaching Plan**

Name of the Teacher: Ms. Shital Malvi


Programme - B.Sc II

Semester - IV

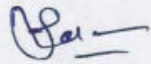
Subject: Mathematics

Course Title: Discrete Mathematics

Month: May			Module/Unit: III	Sub-units planned
Lectures	Boolean algebra	Total	Boolean algebra	1. Duality, Basic Theorems, Boolean algebra as Lattices Representation Theorem 2. Sum-of-Products Form for Sets, Sum-of-Products Form for Boolean Algebras, Minimal Boolean Expressions, Prime Implicants 3. Logic Gates and Circuits, Truth Tables, SC Boolean Functions, Karnaugh Maps
10	02	12		
Month : June			Module/Unit: IV	
Lectures	Practicals	Total	Graph theory	1. Homeomorphism Graphs, Paths, Connectivity 2. Traversable and Eulerian Graphs, Bridges of Konigsberg 3. Labelled and Weighted Graphs 4. Complete, Regular graph Bipartite Graphs, Tree Graphs 5. Planar Graphs, Graph Colorings
11	02	13		

  
(C.S.M. Malavi)  
Name and Signature of Teacher



  
( S.P. Patankar )  
**HEAD**  
Department of Mathematics  
Vivekanand College, Kolhapur

**Vivekanand College, Kolhapur (Autonomous)**

Department of mathematics

Academic Year: 2021-2022

**Annual Teaching Plan**

Name of the Teacher: Ms. Shital Malavi

Programme - B.Sc II

Semester - IV

Subject: Mathematics

Course Title: Integral transformation

Month: May			Module/Unit: III	Sub-units planned
Lectures	Practicals	Total	Fourier Transformation	1. Fourier Integral theorem 2. Fourier Transform Fourier Sine and Cosine Transform 3. Inverse Fourier Transform
08	02	10		
Month : June			Module/Unit: IV	Sub-units planned
Lectures	Practicals	Total	Finite Fourier Transform, Fourier Integral	1. Introductory definitions of the Hankel Transform 2. Connection with the Fourier transform Applications, the Finite Hankel Transform
08	02	10		

*Malavi*

(S.M. Malavi)

Name and Signature of Teacher



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Department of Mathematics  
Vivekanand College, Kolhapur

**Vivekanand College, Kolhapur (Autonomous)**

Department of mathematics

Academic Year: 2021-2022

**Annual Teaching Plan**

Name of Teacher: Ms. S. M. Malvi

Program: B.Sc. II

Semester: IV

Subject: Mathematics

Course Title: CCPM-II

Month: March			Unit I	Subunits Planed
Lectures	Practical	Total		1) Laplace Transform
00	02	02		2) Fourier Transform
Month: April			Unit II	Subunits Planed
Lectures	Practical	Total		1) Hankel Transform
00	02	02		2) Fourier Series
Month: May			Unit III	Subunits Planed
Lectures	Practical	Total		1) Set And Relations
00	02	02		2) Recurrences Relation
Month: June			Unit IV	Subunits Planed
Lectures	Practical	Total		1) Boolean Algebra
00	02	02		2) Graph Theory

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Department of Mathematics  
Vivekanand College, Kolhapur

**Vivekanand College, Kolhapur (Autonomous)**

Department of mathematics

Academic Year: 2021-2022

**Annual Teaching Plan**

Name of Teacher: Ms. S. M. Malvi

Program: B.Sc. III

Subject: Mathematics

Semester: V

Coarse Title: CCPM-V

Month: October			Unit I	Subunits Planned
Lectures	Practical	Total	Numerical Differentiation	1) Newton's forward differentiation for tabular value
00	10	10		
Month: November			Unit II	Subunits Planned
Lectures	Practical	Total	Numerical Differentiation	2) Newton's forward differentiation for Non - tabular value
00	09	09		
Month: December			Unit III	Subunits Planned
Lectures	Practical	Total	Numerical Differentiation	3) Newton's backward differentiation for tabular value
00	10	10		
Month: January			Unit IV	Subunits Planned
Lectures	Practical	Total	Numerical Differentiation	4) Newton's backward differentiation for Non - tabular value
00	09	09		

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Name and Signature of Teacher



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Vivekanand College, Kolhapur

**Vivekanand College, Kolhapur (Autonomous)**

Department of mathematics

Academic Year: 2021-2022

**Annual Teaching Plan**

Name of Teacher: Ms. S. M. Malvi

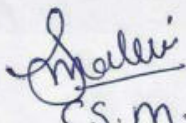
Program: B.Sc. III

Semester: VI

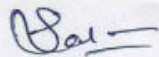
Month: March			Unit I	Subunits Planed
Lectures	Practical	Total	Interpolation	1) Newton's forward interpolation 2) Newton's backward interpolation
00	02	02		
Month: April			Unit II	Subunits Planed
Lectures	Practical	Total	Interpolation	1) Lagrangian interpolation 2) Divided difference interpolation
00	02	02		
Month: May			Unit III	Subunits Planed
Lectures	Practical	Total	Numerical integration	1) Trapezoidal rule 2) Simpson's 1/3ed rule
00	02	02		
Month: June			Unit IV	Subunits Planed
Lectures	Practical	Total	Runge-Kutta Method	1) Second order Runge-Kutta method 2) Fourth order Runge-Kutta method
00	02	02		

Subject: Mathematics

Course Title: CCPM-V

  
(S. M. Malvi)  
Name and Signature of Teacher



  
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Department of Mathematics  
Vivekanand College, Kolhapur



# Vivekanand College, Kolhapur (Autonomous)

Department of Mathematics

Academic Year: 2021-22

## ANNUAL TEACHING PLAN

Name of the teacher: Ms. S. M. Malvi

Programme: M. Sc. I

Subject: Mathematics

Semester: II

Course Title: General Topology

Month: March			Module/Unit:	Sub-units planned
Lectures	Practical	Total	1. Topological spaces	1. Topological spaces, Examples 2. Limit points, closed set and closure 3. Interior, Exterior, neighbourhood 4. Different ways of defining topology. 5. Bases, Subbases, subbases of topological subspaces 6. Hereditary Properties
18	00	18		
Month: April			Module/Unit:	Sub-units planned
Lectures	Practical	Total	2. Connected spaces,	1 Connected spaces, components 2 connected subspaces of real line, compact space one point compactification, 3 continuous function 4. Homeomorphisms 5. Topological Properties
15	00	15		
Month: May			Module/Unit:	Sub-units planned
Lectures	Practical	Total	3. Separable spaces	1. Separation Axioms: spaces 2. First and second axiom spaces 3. Separable spaces 4. Lindelof spaces 5. Regular and spaces 6. Normal and space
17	00	17		
Month: June			Module/Unit:	Sub-units planned
Lectures	Practical	Total	4. Completely regular spaces	1. Completely regular spaces 2. Completely normal and spaces 3. Product spaces
16	00	16		

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(S. M. Malvi)

Name And Sign of Faculty



*Bas*

(S. P. Patankar)

HEAD

Department of Mathematics  
Vivekanand College, Kolhapur

Vivekanand College, Kolhapur (Autonomous)

Department of Mathematics

Academic Year: 2021-22

ANNUAL TEACHING PLAN

Name of the teacher: Ms. S.M. Malvi

Programme: M. Sc. II

Subject: Mathematics

Semester: II

Course Title: Integral Equation

Month: March			Module/Unit:	Sub-units planned
Lectures	Practical	Total	Integral equations	Classification of linear integral equations, Conversion of initial value problem to Volterra integral equation, Conversion of boundary value problem to Fredholm integral equation, Separable kernel, Fredholm integral equation with separable kernel, Fredholm alternative. Homogeneous Fredholm equations and eigenfunctions.
18	00	18		
Month: April			Module/Unit:	Sub-units planned
Lectures	Practical	Total	Fredholm integral equations	Solutions of Fredholm integral equations by: Successive approximations Method, Successive substitution Method, Adomian decomposition method, Modified decomposition method, Resolvent kernel of Fredholm equations and its properties, Solutions of Volterra integral equations: Successive approximations method, Neumann series, Successive substitution Method.
15	00	15		

Name And Sign of Faculty

*Malvi*

(S.M. Malvi)



*S. P. Patankar*

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Department of Mathematics  
Vivekanand College, Kolhapur

# Vivekanand College, Kolhapur (Autonomous)

Department of Mathematics

Academic Year: 2021-22

## ANNUAL TEACHING PLAN

Name of the teacher: Ms. S. M. Malvi

Programme - M. Sc II

Subject: Mathematics

Semester - IV

Course Title: Operation Research II

Month March			Module/Unit: I	Sub-units planned
Lectures	Practicals	Total	Replacement Policy	<ol style="list-style-type: none"> <li>1. Replacement Problems</li> <li>2. Failure mechanism of items</li> <li>3. Replacement policy for items whose maintenance cost increases with time and money values is constant</li> <li>4. Group replacement of items that fail completely</li> </ol>
16		16		
Month April			Module/Unit: II	Sub-units planned
Lectures	Practicals	Total	Inventory Models	<ol style="list-style-type: none"> <li>1. Inventory - Cost involved in inventory problems</li> <li>2. variables in inventory problem, symbols in inventory concept of EOQ,</li> <li>3. Methods with calculus method</li> <li>4. Model I (a) The economic lot size system with uniform demand</li> <li>5. Model I (b) Economic lot size with different rates of demand in different cycles.</li> <li>6. Model I (c) Economic lot size with finite Rate of Replenishment, (EOQ production model)</li> <li>7. EOQ model with shortages</li> </ol>
16		16		
Month : May			Module/Unit: II,III	Sub-units planned
Lectures	Practicals	Total	Inventory Models	<ol style="list-style-type: none"> <li>1. Model II(a) The EOQ with constant rate of demand, scheduling, time constant.</li> </ol>
16		16	Queuing Theory	
				<ol style="list-style-type: none"> <li>1. Queuing Theory</li> <li>2. Queuing systems</li> <li>3. Queuing Problems: transient and steady states, traffic intensity, Probability distributions in Queuing systems</li> <li>4. Poisson process, Properties, Exponential process,</li> <li>5. Classification of Queuing Models</li> </ol>
Month : June			Module/Unit: III, IV	Sub-units planned
Lectures	Practicals	Total	Queuing Theory	<ol style="list-style-type: none"> <li>1. Model I:(M/M/I): (<math>\infty</math>/FCFS), Model II (a): General Erlang queuing model.</li> </ol>
15		15	Information Theory	
				<ol style="list-style-type: none"> <li>1. Information Theory: Communication process, Quantitative measure of information</li> <li>2. Uniqueness theorem, Chanel capacity, efficiency and redundancy Encoding, Shannon Fano encoding procedure</li> <li>3. PERT / CPM: Applications of PERT /CPM techniques,</li> <li>4. Network diagram, representations. Rules for constructing the Network diagram</li> <li>5. determination of the critical path.</li> </ol>

Name And Sign of Faculty

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S. M. Malvi



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**HEAD**

Department of Mathematics  
Vivekanand College, Kolhapur

# Vivekanand College, Kolhapur (Autonomous)

Department of Mathematics

Academic Year: 2021-22

## ANNUAL TEACHING PLAN

Name of the teacher: Ms. P. P. Kulkarni

Programme: M. Sc. I

Subject: Mathematics

Semester: II

Course Title: Linear Algebra

Month: March			Module/Unit:	Sub-units planned
Lectures	Practical	Total	Vector Space	1) Direct sum of a vector space 2) Dual Spaces, Annihilator of a subspace, 3) Quotient Spaces 4) Algebra of Linear transformations.
18	00	18		
Month: April			Module/Unit:	Sub-units planned
Lectures	Practical	Total	Inner product space	1) Adjoint of a linear transformation, Inner product spaces 2) Eigen values Eigen vectors of a linear transformation 3) Diagonalization 4) Invariant subspaces
15	00	15		
Month: May			Module/Unit:	Sub-units planned
Lectures	Practical	Total	Canonical forms	1) Canonical forms, Similarity of linear transformations 2) Reduction to triangular forms, Nilpotent transformations 3) Primary decomposition theorem, Jordan blocks and Jordan forms 4) variants of linear transformations
17	00	17		
Month: June			Module/Unit:	Sub-units planned
Lectures	Practical	Total	Symmetric bilinear formss	1) Hermitian, Self adjoint, Unitary and normal linear transformation 2) Symmetric bilinear forms 3) skew symmetric bilinear forms 4) Group preserving bilinear forms
16	00	16		

*P.P. Kulkarni*

Name And Sign of Faculty  
(Ms. P. P. Kulkarni)



*S. P. Patankar*

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HEAD

Department of Mathematics  
Vivekanand College, Kolhapur

Vivekanand College, Kolhapur (Autonomous)

Department of Mathematics

Academic Year: 2021-22

ANNUAL TEACHING PLAN

Name of the teacher: Ms. P. P. Kulkarni

Programme: M. Sc. II

Subject: Mathematics

Semester: II

Course Title: Integral Equation

Month: May			Module/Unit:	Sub-units planned
Lectures	Practical	Total		
17	00	17	Volterra integral equations	Solution of Volterra integral equations by Adomian decomposition method, and the modified decomposition method, Resolvent kernel of Volterra equations and its properties, Convolution type kernels, Applications of Laplace and Fourier transforms to solutions of Volterra integral equations, Symmetric Kernels: Fundamental properties of eigenvalues and eigenfunctions for symmetric kernels, expansion in eigenfunctions and bilinear form
Month: June			Module/Unit:	Sub-units planned
Lectures	Practical	Total		
16	00	16	symmetric integral equations	Hilbert Schmidt Theorem and its consequences, Solution of symmetric integral equations, Operator method in the theory of integral equations, Solution of Volterra and Fredholm integrodifferential equations by Adomian decomposition method, Green's function: Definition, Construction of Green's function and its use in solving boundary value problems.

*P. P. Kulkarni,*

[Ms. P. P. Kulkarni]



*[Signature]*

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Department of Mathematics  
Vivekanand College, Kolhapur

**Vivekanand College, Kolhapur (Autonomous)**  
**Department of Mathematics**  
**Academic Year: 2021-22**

**ANNUAL TEACHING PLAN**

Name of the teacher: Ms. P. P. Kulkarni  
 Programme: M. Sc. II  
 Subject: Mathematics

Semester: IV  
 Course Title: Field Theory

Month: March			Module/Unit:	Sub-units planned
Lectures	Practical	Total	1. Field Extensions	Extension of a field, Algebraic extensions, Algebraically closed fields, Derivatives and multiple roots, Finite Fields..
18	00	18		
Month: April			Module/Unit:	Sub-units planned
Lectures	Practical	Total	2. Galois Theory	Separable and normal extensions, Automorphism groups and fixed fields, Fundamental theorem of Galois theory.
15	00	15		
Month: May			Module/Unit:	Sub-units planned
Lectures	Practical	Total	3. Finite Fields	Finite Fields Prime fields, Fundamental theorem of algebra, Cyclic extensions, Cyclotomic extensions.
17	00	17		
Month: June			Module/Unit:	Sub-units planned
Lectures	Practical	Total	4. Applications of Galois theory	Constructions by ruler and compass, Solvable groups, Polynomials solvable by radical.
16	00	16		

*P. P. Kulkarni*  
 Name And Sign of Faculty  
 [Ms, P. P. Kulkarni]



*S. P. Patankar*  
 ( S. P. Patankar )  
**HEAD**  
 Department of Mathematics  
 Vivekanand College, Kolhapur

**Vivekanand College, Kolhapur (Autonomous)**

Department of mathematics

Academic Year: 2021-2022

**Annual Teaching Plan**

Name of Teacher: Ms. P. V. Patil

Program: B.Sc. II

Semester: III

Subject: Mathematics

Coarse Title: CCPM-II

Month: October			Unit I	Subunits Planed
Lectures	Practical	Total		
00	02	02		1) Jacobian 2) Radius Of curvature(Cartesian Form)
Month: November			Unit II	Subunits Planed
Lectures	Practical	Total		
00	02	02		1) Radius Of curvature(Polar Form) 2) Radius Of curvature(Parametric Form)
Month: December			Unit III	Subunits Planed
Lectures	Practical	Total		
00	02	02		1) Asymptotes 2) Singular Points
Month: January			Unit IV	Subunits Planed
Lectures	Practical	Total		
00	02	02		1) Beta and Gamma Function 2) Double Integration

*P. v. Patil*

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Name and Signature of Teacher



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**HEAD**

Department of Mathematics  
Vivekanand College, Kolhapur

# Vivekanand College, Kolhapur (Autonomous)

Department of Mathematics

Academic Year: 2021-22

## ANNUAL TEACHING PLAN

Name of the teacher: Ms. M. P. Patil

Programme: M. Sc. I

Subject: Mathematics

Semester: I

Course Title: Advanced Calculus

Month: December			Module/Unit:	Sub-units planned
Lectures	Practical	Total	Functions of Bounded Variations	1. Functions of Bounded Variation & Rectifiable Curves - Introduction, Properties of monotonic functions 2. functions of Bounded Variation (B.V.), Total Variation (T.V.), additive property of TV, TV on $[a, x]$ as function of $x$ , 3. function of B.V. expressed as the difference of increasing functions, continuous functions of B.V. 4. curves & paths, rectifiable paths, line integral,
18	00	18		
Month: January			Module/Unit:	Sub-units planned
Lectures	Practical	Total	Riemann Stieltje's Integral	1. The Riemann-Stieltje's (R.S.) Integral Introduction, notation, definition, linear property, integration by parts, 2. change of variable, reduction to Riemann integration, Step functions as integrator, reduction to finite sum, Euler's summation formula, 3. additive & linearity property of upper & lower integrals, Riemann's condition, Comparison theorem, 4. Integration of B.V. Necessary condition for existence of RS integrals,
15	00	15		

*M. P. Patil*

Name And Sign of Faculty

( Ms. M. P. Patil )



*S. P. Patankar*

( S. P. Patankar )

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Department of Mathematics  
Vivekanand College, Kolhapur



**Vivekanand College, Kolhapur (Autonomous)**  
**Department of Mathematics**  
**Academic Year: 2021-22**

**ANNUAL TEACHING PLAN**

Name of the teacher: Ms. M. P. Patil  
 Programme: M. Sc. I  
 Subject: Mathematics

Semester: I  
 Course Title: Complex Analysis

Month: October			Module/Unit:	Sub-units planned
Lectures	Practical	Total		
18	00	18	1. Analytic Functions	1. Power series, radius of convergence, 2. Analytic functions, zeros of an analytic function, 4. Cauchy-Riemann equations, 5. Harmonic functions, 6. Mobius transformations
Month: November			Module/Unit:	Sub-units planned
Lectures	Practical	Total		
15	00	15	2. Cauchy Integral	1. Power series representation of analytical function. 2. Liouville's theorem, Fundamental theorem of algebra, 3. Maximum modulus theorem, the index of closed curve, 4. Cauchy's theorem and integral formula, Morera's theorem.
Month: December			Module/Unit:	Sub-units planned
Lectures	Practical	Total		
17	00	17	3. Singularities	1. Counting zero's, The open mapping theorem, Goursat's Theorem. 2. Classification of singularities, Laurent series development. 3. Casorati- weierstrass theorem.
Month: January			Module/Unit:	Sub-units planned
Lectures	Practical	Total		
16	00	16	4. Residues	1. The argument principle, Rouche's theorem, the maximum principle. Schwarz's lemma 2. Residues, residues and its applications to characterize conformal maps.

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Name And Sign of Faculty

(Ms. m.p. Patil)



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Department of Mathematics  
 Vivekanand College, Kolhapur

**Vivekanand College, Kolhapur (Autonomous)**  
**Department of Mathematics**  
**Academic Year: 2021-22**

**ANNUAL TEACHING PLAN**

Name of the teacher: Ms. M. P. Patil  
 Programme: M. Sc. II  
 Subject: Mathematics

Semester: III  
 Course Title: Advanced Discrete Mathematics

Month: October			Module/Unit:	Sub-units planned
Lectures	Practical	Total		
18	00	18	Graph Theory	Graph Theory: Definition, examples and properties, Simple graph, Graph isomorphism, Bipartite graphs, Complete Bipartite graph, regular graph, sub-graphs spanning sub-graph, Edge deleted sub-graph, Vertex deleted sub-graph, Union and intersection of two graphs, complements of a graph, self complementary graph, paths and cycles in a graph, Eccentricity, radius and diameter of a connected graph, Peterson graph, Wheel graph. Isomorphism of Graphs. First theorem of graph theory
Month: November			Module/Unit:	Sub-units planned
Lectures	Practical	Total		
15	00	15	Adjacency matrix	The Matrix representation of a graph, Adjacency matrix and Incidence matrix of a graph, Definition and simple properties of a tree, bridges, spanning trees, Inclusion exclusion principle. Simple examples on Inclusion exclusion principle Pigeonhole principle, examples on Pigeonhole principle
Month: December			Module/Unit:	Sub-units planned
Lectures	Practical	Total		
17	00	17	Recurrence Relation	Discrete numeric functions and sum and product of two numeric functions, generating functions, Linear recurrence relations with constant coefficients Particular solutions of linear recurrence relations, Total solutions.
Month: January			Module/Unit:	Sub-units planned
Lectures	Practical	Total		
16	00	16	Lattices	Ordered sets and lattices Hasse diagrams of posets ,Supremum and infimum ,Isomorphic ordered sets, well-ordered sets,Lattices, Bounded lattices , Distributive lattices, Complements complemented lattices , Boolean algebra, Basic definitions, Basic theorems, duality, Boolean algebras as lattices

*M.P. Patil*

Name And Sign of Faculty

[Ms. M. P. Patil]



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 Department of Mathematics  
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**Vivekanand College, Kolhapur (Autonomous)**  
**Department of Mathematics**  
**Academic Year: 2021-22**

**ANNUAL TEACHING PLAN**

Name of the teacher: Ms. S. S. Patil  
 Programme: M. Sc. I  
 Subject: Mathematics

Semester: I  
 Course Title: Ordinary Differential Equations

Month: October			Module/Unit:	Sub-units planned
Lectures	Practical	Total		
18	00	18	1. Second order homogeneous Equations	1. Second order homogeneous Equations 2. Linear dependence & dependence 3. Non-homogeneous equations of order two 4. Homogeneous equations of order n
Month: November			Module/Unit:	Sub-units planned
Lectures	Practical	Total		
15	00	15	2. The non-homogeneous equation of n th order	1. The non-homogeneous equation of n th order 2. Linear Equations with variable Coefficients 3. Wronskian and linear dependence 4. Reduction of order of homogeneous equation
Month: December			Module/Unit:	Sub-units planned
Lectures	Practical	Total		
17	00	17	3. The legendre equations	1. Sturm Liouville theory 2. Homogeneous equations with analytic coefficients 3. The legendre equations 4. Linear Equations with regular singular points 5. The Euler equations
Month: January			Module/Unit:	Sub-units planned
Lectures	Practical	Total		
16	00	16	4. The Bessel equation	1. The Bessel equation 2. Regular singular points at infinity 3. Existence and uniqueness of solutions: The method of successive approximations 4. The Lipschitz condition

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**Vivekanand College, Kolhapur (Autonomous)**

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Academic Year: 2021-22

**ANNUAL TEACHING PLAN**

Name of the teacher: Ms. S.S. Patil

Programme: M. Sc. I

Subject: Mathematics

Semester: II

Course Title: Partial Differential Equation

Month: March			Module/Unit:	Sub-units planned
Lectures	Practical	Total	1. Partial Differential Equations	1. First order Partial Differential Equations 2. Linear equations of first order. 3. Pfaffian differential equations 4. Compatible systems of first order partial differential equations. 5. Compatible systems of first order partial differential equations.
18	00	18		
Month: April			Module/Unit:	Sub-units planned
Lectures	Practical	Total	2. Cauchy Problem	1. Charpits method, 2. Jacobi method of solving partial differential equations, 3. Cauchy Problem, 4. Method of characteristics to find the integral surface of a quasi linear
15	00	15		
Month: May			Module/Unit:	Sub-units planned
Lectures	Practical	Total	3. Method of separation of variables	1. Second order Partial Differential Equations. 2. Classification of second order partial differential equation. 3. Vibration of an infinite string 4. Method of separation of variables Uniqueness of solution of wave equation
17	00	17		
Month: June			Module/Unit:	Sub-units planned
Lectures	Practical	Total	4. Laplace equation	1. Laplace equation, Solution of Laplace equation, 2. Dirichlets problems and Neumann problems. 3. maximum and minimum principles 4. Stability theorem.
16	00	16		

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**Academic Year: 2021-22**

**ANNUAL TEACHING PLAN**

Name of the teacher: Ms. S. S. Patil  
 Programme: M. Sc. II  
 Subject: Mathematics

Semester: III  
 Course Title: Lattice Theory

Month: October			Module/Unit:	Sub-units planned
Lectures	Practical	Total	Basic concepts	1. Posets, Definition and examples of posets. 2. Two definitions of lattices and their equivalence, examples of lattices. 3. Description of Lattices, some algebraic concepts. 4. Duality principle, Specialelements. 5. Homomorphism, Isomorphism and isotone maps.
18	00	18		
Month: November			Module/Unit:	Sub-units planned
Lectures	Practical	Total	Special types of Lattices	1. Distributive lattices – Properties and characterizations. 2. Modular lattices – Properties and characterizations. 3. Congruence relations. 4. Boolean algebras – Properties and characterizations.
15	00	15		
Month: December			Module/Unit:	Sub-units planned
Lectures	Practical	Total	Ideal theory	1. Ideals and filters in lattices. 2. Lattice of all ideals $I(L)$ . 3. Properties and characterizations of $I(L)$ . 4. Stone's theorem and its consequences.
17	00	17		
Month: January			Module/Unit:	Sub-units planned
Lectures	Practical	Total	Stone algebra	1. Pseudo complemented lattices. 2. $S(L)$ and $D(L)$ – special subsets of pseudo complemented lattices. 3. Distributive pseudo complemented lattice. 4. Stone lattices – properties and characterizations
16	00	16		

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**Department of Mathematics**  
**Academic Year: 2021-22**

**ANNUAL TEACHING PLAN**

Name of the teacher: Ms. S. S. Patil  
 Programme: M. Sc. II  
 Subject: Mathematics

Semester: IV  
 Course Title: Algebraic Number Theory

Month: March			Module/Unit:	Sub-units planned
Lectures	Practical	Total		
18	00	18	1. Revision of basic module theory	, Fundamental concepts and results, Free modules and matrices, Direct sums of modules, Finitely generated modules over a P.I.D., Equivalence of matrices with entries in a P.I.D., Structure theorem for finitely generated modules over a P.I.D., Applications to abelian groups, Algebraic Numbers, Quadratic and cyclotomic fields.
Month: April			Module/Unit:	Sub-units planned
Lectures	Practical	Total		
15	00	15	2. , Euclidean quadratic fields	Factorization into irreducible , Euclidean quadratic fields
Month: May			Module/Unit:	Sub-units planned
Lectures	Practical	Total		
17	00	17	3.Lattices	Prime factorization of ideals, Lattices, Minkowski's theorem.
Month: June			Module/Unit:	Sub-units planned
Lectures	Practical	Total		
16	00	16	4. Computational methods	Geometric Representation of algebraic numbers, class groups and class numbers, computational methods.

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Department of mathematics

Academic Year: 2021-2022

**Annual Teaching Plan**

Name of the Teacher: Ms. N. S. Tamgave

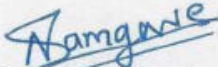
Programme - B.Sc. I

Semester - II

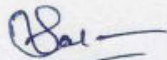
Subject: Mathematics

Course Title: Multivariable Calculus

Month : May			Module/Unit: III	Sub-units planned
Lectures	Practicals	Total	Extreme values	1. Extreme values 2. Necessary condition for extreme values 3. Sufficient condition for extreme values 4. Lagrange's method
06	02	08		
Month : June			Module/Unit: IV	Sub-units planned
Lectures	Practicals	Total	Vector Calculus	1. Differential of vectors 2. tangent line to curves gradient and divergence and curl 3. Solenoidal and irrotational vector 4. vector identities
11	01	12		

  
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**Annual Teaching Plan**

Name of the Teacher: Ms. N.S. Tamgave

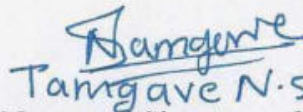
Programme - B.Sc. III

Semester - VI

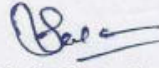
Subject: Mathematics

Course Title: Complex Analysis

Month : May			Module/Unit: II	Sub-units planned
Lectures	Practicals	Total	Singularities	
12		12		1. Convergence of sequences and series of complex variables 2. Taylor series and its examples, Laurent series and its examples, absolute and uniform convergence of power series. 3. Isolated singular points
Month : June			Module/Unit: II	Sub-units planned
Lectures	Practicals	Total	Singularities	
12		12		1. Residues, Cauchy's residue theorem, Residue at infinity, The three types of isolated singularities, Residues at poles and examples 2. Zeros of analytic functions, Zeros and poles 3. Application of residue theorem to evaluate real integrals

  
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Academic Year: 2021-2022

**Annual Teaching Plan**

Name of Teacher: Ms. N. S. Tamgave

Program: B.Sc. II

Semester: III

Subject: Mathematics

Coarse Title: CCPM-III

Month: October			Unit I	Subunits Planed
Lectures	Practical	Total	Introduction	1) Introduction to Scilab 2) Matrix
00	02	02		
Month: November			Unit II	Subunits Planed
Lectures	Practical	Total	Matrices	1) Accessing elements of matrices 2) Submatrix
00	02	02		
Month: December			Unit III	Subunits Planed
Lectures	Practical	Total	Matrices and Polynomials	1) Advanced Matrix operation 2) Polynomial
00	02	02		
Month: January			Unit IV	Subunits Planed
Lectures	Practical	Total	Graph	1) Plotting graphs 2) Introduction to Scilab Programming
00	02	02		

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Department of mathematics

Academic Year: 2021-2022

**Annual Teaching Plan**

Name of the Teacher: Ms. Shital Chavan

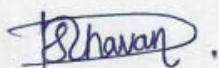
Programme - B.Sc. II

Semester - III

Subject: Mathematics

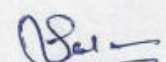
Course Title: Integral Calculus

Month : December			Module/Unit: III	Sub-units planned
Lectures	Lectures	Lectures	Centre of gravity and moment of inertia	1. Introduction of Centre of Gravity and Moment of Inertia 2. Centre of Gravity 3. Moment of Inertia 4. Mass and Lamina,
08	02	10		
Month : January			Module/Unit: IV	Sub-units planned
Lectures	Lectures	Lectures	Fourier Series	1. Periodic functions, Even and Odd functions 2. Fourier Series Expansion of elementary functions Over ranges $[0,2]$ 3. Expansions Over range $[-c, c]$ , $[0,2c]$ 4. Fourier Sine and Cosine series expansion Half Range series expansion
11	02	13		



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