Savitribai Phule Pune University

(Formerly University of Pune)

Styaniketan's

Adv. M. N. Deshmukh Arts, Science and Commerce College Rajur

B.Sc. in Mathematics

(Faculty of Science & Technology)

Course Outcomes

S.Y. B. Sc. Mathematics

(As Per National Education Policy-2020)

Course Outcomes
Semester-III

MTS-201-MJ: Calculus of Several Variables

Course type: Major (Theory) No. of Credits: 2

Course Outcomes

After the completion of this course, student will be able to

1. Define and analyze functions of several variables.

2. Evaluate limits and continuity of multivariable functions using various techniques.

3. Compute first and higher-order partial derivatives of multivariable functions.

4. Determine extrema of functions using the second derivative test and Lagrange multipliers.

5. Compute double and triple integrals in Cartesian, polar, cylindrical, and spherical coordinates.

6. Apply multiple integrals to calculate areas, volumes, mass, and density.

MTS-202-MJ: Laplace Transform and its Applications

Course type: Major (Theory) No. of Credits: 2

Course Outcomes

After the completion of this course, student will be able to

1. Define and understand the Laplace transform, its properties, and continuity requirements.

2. Calculate the Laplace transform of various exponential order functions.

3. Find the inverse Laplace transform using techniques like partial fractions and translation theorems.

4. Solve ordinary differential equations using Laplace transforms, including initial and boundary value problems.

5. Apply Laplace transforms to solve real-world problems, including electrical circuits and periodic functions.

6. Explore advanced applications such as the Laplace transform of Gamma, Beta and Error functions.

MTS-203-MJP: Practicals on Calculus of Several Variables and Laplace Transform

Course type: Major (Practical) No. of Credits: 2

MTS-241-MN: (A) Mathematics for Physical Science-I

Course type: Minor (Theory) No. of Credits: 2

Course Outcomes

1. Demonstrate a clear understanding of functions of several variables and apply partial differentiation techniques to solve multivariable problems.

2. Analyse and distinguish between exact and inexact differentials and apply the chain rule and total derivatives in changing variables.

3. Perform operations with vectors, including addition, scalar multiplication, and determination of magnitudes and angles between vectors.

4. Solve geometric problems using vector methods, including finding equations and distances related to lines, planes, and spheres.

5. Apply differentiation and integration techniques to vector functions and interpret physical problems involving vector fields.

6. Evaluate and apply vector calculus operators gradient, divergence, and curl and use related vector identities in solving applied mathematical problems.

MTS-241-MN : (C) Mathematics for Computer Science-I

Course type: Minor (Theory) No. of Credits: 2

Course Outcomes

After the completion of this course, student will be able to

1. Understand and apply numerical methods to solve algebraic and transcendental equations, including bisection, false position, and Newton-Raphson methods, with an emphasis on error analysis and convergence.

2. Develop a strong foundation in finite difference concepts, including forward, backward, central, and other difference operators, and understand their roles in numerical approximation.

3. Apply interpolation techniques for estimating intermediate values, using Newton's Gregory formulas, Lagrange's interpolation, and divided differences.

4. Utilize numerical integration methods such as the trapezoidal rule, Simpson's one-third rule, and Simpson's three-eighth rule to approximate definite integrals.

5. Solve ordinary differential equations numerically using Euler's method, Euler's modified method, and Runge-Kutta methods, understanding their accuracy and applicability.

6. Analyze the efficiency, accuracy, and limitations of various numerical methods, enabling selection of appropriate techniques for solving real-world mathematical problems..

IKS-201-MTS: Indian Knowledge System – Mathematics

Course type: IKS(Theory) No. of Credits: 2

Course Outcomes

After the completion of this course, student will be able to

1: To introduce students to the rich mathematical heritage of ancient India.

2. To explore the contributions of Indian mathematicians and their impact on modern mathematics.

3. To understand key mathematical concepts developed in ancient Indian texts.

4. To understand the proof techniques of Indian Mathematics.

5. To know the contribution to Astronomy.

6. To correlate ancient Indian mathematics to modern mathematics.

MTS-221-VSC: Foundation of Mathematics

Course type: VSC(Theory) No. of Credits: 2

Course Outcomes

After the completion of this course, student will be able to

1. To understand and compute higher-order derivatives.

2. Apply standard methods to solve integrals.

3. Solve first-order ordinary differential equations.

4. Perform operations on complex numbers.

5. To use De-Moivre's theorem to find powers and roots.

6. Represent and analyze regions in the complex plane.

Semester-IV

MTS-251-MJ: Linear Algebra

Course type: Major (Theory) No. of Credits: 2

Course Outcomes

After the completion of this course, student will be able to

1. Understand and analyze vector spaces, subspaces, and basic concepts.

2. Compute null space, column space, and verify orthogonality of vectors.

3. Define linear transformations and apply the Rank-Nullity Theorem.

4. Find eigenvalues, eigenvectors, and diagonalize matrices using Cayley-Hamilton Theorem.
5. Apply eigenvalue methods to Principal Component Analysis (PCA).

6. Use inner product space concepts and perform Gram-Schmidt orthonormalization..

MTS- 252-MJ: Vector Calculus

Course type: Major (Theory) No. of Credits: 2

Course Outcomes

After the completion of this course, student will be able to

1. Vector calculus motivates the study of vector differentiation and integration in two and three dimensional spaces.

2. This course enables students to understand vector differentiation and its applications in various fields

3. Students are well equipped to apply concepts like vector fields, derivatives, integrals, and theorems likes Greens theorems stokes and divergence theorems

4. The students receive knowledge of concepts in directional derivatives, gradients, multiple integrals, line and surface integrals, vector fields, divergence, curls

5. Students will able to learn the concepts of vector fields, Gradients fields

6. Students are aware about the gradient, divergence, curl operator and their applications.

MTS-253-MJP: Practical on Linear Algebra and Vector Calculus

Course type: Major (Practical) No. of Credits: 2

MTS-291-MN: (A) Mathematics for Physical Science-II

Course type: Minor (Theory) No. of Credits: 2

Course Outcomes

1. Understand and classify different types of first-order differential equations and solve them using appropriate analytical techniques such as separable, linear, exact, and homogeneous methods.

2. Apply integrating factors and solve real-world problems modeled by first-order differential equations, including applications in electrical circuits and population dynamics.

3. Analyze and solve second-order linear differential equations with constant coefficients, and determine their general solutions.

4. Interpret and model physical systems such as undamped and damped harmonic oscillators using second-order differential equations.

5. Solve initial value problems numerically using Euler's method, Modified Euler's method, and Runge-Kutta methods.

6. Demonstrate the ability to choose and apply suitable analytical or numerical methods for solving differential equations in applied contexts.

MTS-291- MN: (C) Mathematics for Computer Science-II

Course type: Minor (Theory) No. of Credits: 2

Course Outcomes

After the completion of this course, student will be able to

1. Understand the fundamental concepts and mathematical representations of two-dimensional transformations, including translation, rotation, scaling, reflection, and shearing.

2. Apply transformation matrices to perform and combine 2D geometric transformations on points, lines, and simple shapes using homogeneous coordinates.

3. Analyze three-dimensional transformations such as scaling, shearing, reflection, and rotation about coordinate axes and planes, and their application in object manipulation.

4. Construct and interpret different types of projections, including orthographic, axonometric, and oblique projections, for visualizing 3D objects on 2D planes.

5. Develop parametric representations of common plane curves such as circles and hyperbolas, and generate these curves through mathematical methods.

6. Demonstrate the ability to integrate multiple transformation techniques and projections to solve basic computer graphics problems involving geometric modeling.

SEC-251-MTS: LaTex

Course type: SEC(Practical) No. of Credits: 2

Course Outcomes

After the completion of this course, student will be able to

1: Students will be able to create well-structured, professional documents using LaTeX.

2. Learners will gain the ability to typeset mathematical equations, scientific content, and complex layouts effectively.

3. Students will demonstrate proficiency in incorporating graphics, tables, and multimedia elements into their documents.

4. Students will be able to troubleshoot common issues and extend LaTeX capabilities using custom packages and configurations.

5. Learners will be prepared to use LaTeX for academic writing, publishing, and professional documentation tasks.

6. Students will be able to create well-structured, professional documents using LaTeX.

MTS-271-VSC: R Programming

Course type: VSC(Theory) No. of Credits: 2

Course Outcomes

After the completion of this course, student will be able to

1. Demonstrate how to install R software.

2. Explain the use of data structures and conduct arithmetic operations.

3. Using R, solve complicated differentiation and integration problems.

4. Perform different operations on matrices and test their characteristics.

5. Visualize the data using a diagrammatic form.

6. Import datasets in R and export outputs from R .