DAYALBAGH EDUCATIONAL INSTITUTE FACULTY OF SCIENCE **DEPARTMENT OF MATHEMATICS**				
Course Type	Course Code	Name of Course	Lectures/Week (of 55Min each)	Credits
Major	**MAM 181**	**Engineering Mathematics I**	**3**	**3**

Introduction:

This course provides foundational knowledge in *Calculus and Linear Algebra*, essential for students pursuing advanced studies in mathematics, engineering, and applied sciences. It covers key concepts such as linear independence, matrix rank, limits, derivatives, and vector calculus. The course emphasizes understanding and applying mathematical principles effectively, preparing students for future coursework and professional challenges.

Objectives:

1. To develop a strong grasp of essential concepts in linear algebra and calculus, including vector spaces, limits, derivatives, and integrals.
2. To apply theoretical knowledge of linear independence, matrix rank, and the Cayley-Hamilton theorem in solving systems of linear equations.
3. To enhance skills in differentiation, including partial, directional, and total derivatives, and to apply these concepts in practical scenarios involving functions of several variables.
4. To introduce students to vector calculus concepts, including gradient, divergence, and curl, and to understand their significance in physical applications.
5. To foster problem-solving abilities through the application of calculus and linear algebra techniques to real-world problems in physics, engineering, and other fields.

Course Outcomes (CO):

This course is aimed at

CO1: Understand linear independence, calculate matrix rank, solve linear systems, and apply the Cayley-Hamilton theorem to matrices.

CO2: Gain proficiency with limits, differentiation, and Mean Value Theorems, and apply Leibnitz theorem for higher-order differentiation.

CO3: Analyze limits, compute partial and directional derivatives, use Euler's theorem, apply Taylor series expansions, and find maxima/minima of multivariable functions.

CO4:. Develop skills to handle vector-valued functions, calculate arc length, and apply double/triple integrals for calculating area and volume.

CO5: Understand and compute vector field operations (gradient, divergence, curl), evaluate line and surface integrals, and apply major vector calculus theorems in simple scenarios.

Unit No	Topics to be Covered	Learning outcomes	Bloom's Taxonomy
1.	Linear independence of vectors, Rank of a matrix, Solution of system of linear simultaneous equations, Eigen values and vectors, LU decomposition, Cayley-Hamilton theorem.	CO1	
2.	Functions of one variable: $\epsilon - \delta$ definition of limit, continuity and differentiability, Mean value theorems, indeterminate forms, successive differentiation, Leibnitz theorem.	CO2	
3.	Functions of several variables: Limit of real valued functions of several variables, Partial, directional and total derivative, Euler's theorem, Taylor Series (in one and two variables), Maxima and Minima, Jacobians	CO3	
4.	Limit of vector valued functions of one variable, Differentiation and Integration of vector valued functions, arc length, Double and Triple Integrals and their applications to area and volume.	CO4	

5.	Gradient, Divergence and curl. Line and Surface Integrals, Gauss, Green's and Stroke's Theorem (without proof). Simple Applications.		CO5	

Text Books and Reference Books:

S. No.	Title	Author(s)	Edition, Year, Publisher	Place
1.	Advanced Engineering Mathematics	Erwin Kreyszig	10th Edition, 2011, Wiley	USA
2.	Thomas' Calculus	George B. Thomas, Maurice D. Weir, Joel Hass	14th Edition, 2018, Pearson Education	USA

DAYALBAGH EDUCATIONAL INSTITUTE FACULTY OF SCIENCE **DEPARTMENT OF MATHEMATICS**				
Course Type	Course Code	Name of Course	Lectures/Week (of 55Min each)	Credits
Major	**MAM 281**	**Engineering Mathematics II**	**3**	**3**

Introduction:

The study of differential equations and complex analysis forms the backbone of applied mathematics and engineering. This course equips students with tools to model, analyze, and solve dynamic systems, exploring differential equations and complex function theory for real-world applications.

Objectives:

1. Develop an understanding of fundamental concepts in ordinary and partial differential equations.
2. Equip students with techniques to solve first-order and higher-order linear differential equations.
3. Introduce methods to solve partial differential equations with applications in heat transfer, wave motion, and potential theory.
4. Familiarize students with the basics of complex analysis and its applications.
5. Provide tools to analyze and solve problems involving singularities and residues using Cauchy's Residue Theorem.

Course Outcomes (CO):

Upon successful completion of this course, students will be able to:

- **CO1:** Understand and solve first-order ordinary differential equations, including orthogonal trajectories and singular solutions.
- **CO2:** Analyze and solve second-order ordinary differential equations using methods like variation of parameters, transformation of variables, and removal of the first derivative.
- **CO3:** Formulate and solve partial differential equations of the first and second order with applications to wave, heat, and Laplace equations.
- **CO4:** Understand and apply fundamental concepts of analytic functions, including the Cauchy-Riemann equations and Cauchy's Integral Formula.
- **CO5:** Analyze singularities, expand functions using Taylor's and Laurent's series, and apply the Cauchy Residue Theorem to evaluate integrals.

Unit No	Topics to be Covered	Learning outcomes	Bloom's Taxonomy
1	Differential equations of first order: Linear and non-linear equations, singular solutions, and orthogonal trajectories.	CO1	Understanding, Applying
2	Second-order ordinary differential equations: Solutions with one known integral, removal of the first derivative, transformations, and variation of parameters.	CO2	Applying, Analyzing
3	Partial differential equations: First-order PDEs, homogeneous and non-homogeneous PDEs with constant coefficients, and solutions of diffusion, wave, and Laplace equations.	CO3	Applying, Analyzing
4	Complex analysis: Analytic functions, Cauchy-Riemann equations, conjugate harmonic functions, and Cauchy's Integral Formula.	CO4	Understanding, Applying
5	Singularities and residue theorem: Taylor's and Laurent's expansions, zeros, poles, essential singularities, and evaluation of integrals using Cauchy's Residue Theorem.	CO5	Applying, Evaluating

Text Books and Reference Books:

S. No.	Title	Author(s)	Edition, Year, Publisher	Place
1	Advanced Engineering Mathematics	Erwin Kreyszig	10th Edition, 2011, Wiley India	New Delhi, India

2	Higher Engineering Mathematics	B.V. Ramana	1st Edition, Tata McGraw-Hill Education	New Delhi, India
3	Textbook of Differential Calculus	Gorakh Prasad	Latest Edition, Pothishala Pvt. Ltd.	Allahabad, India
4	Differential Equations	Ray and Sharma	Latest Edition	New Delhi, India

DAYALBAGH EDUCATIONAL INSTITUTE FACULTY OF SCIENCE **DEPARTMENT OF MATHEMATICS**				
Course Type	Course Code	Name of Course	Lectures/Week (of 55Min each)	Credits
Major	**MAM 381**	Engineering Mathematics III	**3**	**3**

Introduction:

The Present course provides strong foundations of Laplace, Fourier and Z-Transformation enabling students to understand and apply the basic concepts required for advanced studies.

Objectives:

1. To develop a good understanding of important concepts in Integral Transform.
2. To understand the Laplace transform and its applications.
3. To enhance the skills of applications of Fourier, Laplace and Z transform (Discrete-time systems, control theory, and digital signal processing)..
4. To create the interest to solve problems and engage in discussions and work with peers to solve problems and deepen understanding.
5. To develop skills for mathematical credibility.

Course Outcomes (CO):

This course is aimed at

CO1: Know about Fourier series initial conditions and its applications to different engineering models

CO2: Gain knowledge of Finite and Infinite Fourier Transforms and its applications.

CO3: Students learn about the how to solve mathematical model with Laplace Transform and error functions and their applications.

CO4: Familiarize with the concept of Z transform, inverse Z transform and its properties

CO5: Learn about applications of Laplace and Z transform to differential equations and Partial differential equations

Unit No	Topics to be Covered	Learning outcomes	Bloom's Taxonomy
1.	FOURIER SERIES Dirichlet's conditions, Half range series, Harmonic analysis.	CO1	
2.	FOURIER TRANSFORMS Finite and Infinite Fourier Transforms, Fourier Integral Theorem, Inversion Theorem, Applications of Fourier Transforms.	CO2	
3.	LAPLACE TRANSFORMS Standard Forms, Shifting and Convolution Theorems, Transforms of derivatives. Inverse Laplace Transforms, Laplace transforms of error function, Heavyside Direct Delta Functions.	CO3	
4.	Z TRANSFORMS Standard Forms of Z- Transform, Shifting and Convolution Theorems, Transforms of derivatives. Inverse of Z-Transforms, Z- transforms of standard Functions.	CO4	
5.	APPLICATIONS OF LAPLACE AND Z-TRANSFROMS Solutions of ODE's and PDE's, Solve initial and boundary value problems, Solution of one-dimensional diffusion equation, first and second order one-dimensional wave equation and two-dimensional Laplace equations.	CO5	

Text Books and Reference Books:

S. No.	Title	Author(s)	Edition, Year, Publisher	Place

	INTEGRAL TRANSFORM AND THEIR APPLICATIONS	Lokenath Debnath, Dambaru Bhatta	3rd edition, 2015 ,Taylor and Francis Group	USA

DAYALBAGH EDUCATIONAL INSTITUTE FACULTY OF SCIENCE **DEPARTMENT OF MATHEMATICS**				
Course Type	Course Code	Name of Course	Lectures/Week (of 55Min each)	Credits
MAJOR	**MAM 481**	ENGINEERING MATHEMATICS IV	**3**	**3**

Introduction:

Probability and Statistics are foundational disciplines in mathematics that are essential for understanding and analyzing uncertainty and data. This course introduces the fundamental principles of probability theory and statistical methods, providing students with the tools to model randomness, make informed decisions, and draw conclusions from data. It bridges the gap between theoretical concepts and real-world applications in fields such as science, engineering, economics, medicine, and social sciences.

Objectives:

1. To develop an understanding of basic concepts in probability, including random variables, probability distributions, and expected values.
2. To introduce key statistical methods for summarizing, analyzing, and interpreting data.
3. To apply probability and statistical models to solve practical problems in various domains.
4. Students will explore various probabilistic models, such as binomial, Poisson, and normal distributions.
5. To provide a foundation for more advanced topics in probability theory, inferential statistics, and data science.

Course Outcomes (CO):

After completion of the course, students will be able to:

1. Gain proficiency in solving problems involving probability distributions and random processes.
2. Be able to apply statistical methods to analyze and interpret real-world data.
3. Develop a strong foundation in stochastic processes and Markov models, enabling them to model, analyze and solve problems in fields such as engineering, economics, biology and computer science.
4. Be able to apply the principles and methods of statistical estimation to derive estimators, providing a strong foundation for advanced studies in statistical inference and data analysis.
5. Calculate and interpret the strength and direction of relationships between variables using correlation coefficients (e.g., Pearson’s correlation coefficient).

Unit No	Topics to be Covered	Learning outcomes	Bloom’s Taxonomy
1.	Conditional Probability, Baye’s Theorem; Measure of central Tendency and dispersion in terms of moments. Mathematical expectations.	CO1	
2.	Random Variables: Discrete and continuous, Probability mass/ density function, cumulative mass/ density function. Binomial, Poisson and Normal distributions and their applications.	CO2	
3.	Stochastic Processes Stationary processes, Markov process, Memoryless random variable, Markov chains with finite and countable state space, classification of states, Markov processes in continuous time.	CO3	
4.	Theory of Estimation Point and Interval Estimation, Criterion of unbiasedness, Consistency, Efficiency, sufficiency, Methods of estimation: maximum likelihood moments	CO4	

5.	Curve fitting (Method of least square) correlation analysis. Linear regression analysis.		CO5	

Text Books and Reference Books:				
S. No.	Title	Author(s)	Edition, Year, Publisher	Place
1-	Probability and Statistics for engineers and scientists	Walpole, R.E., Mayers, R.L., Myers, S.L., and Ye K.		
2.	Probability and statistics for Engineers	Johnson, R.A.		
3.	Mathematical Statistics	Kapoor and Saxena		

DAYALBAGH EDUCATIONAL INSTITUTE
FACULTY OF ENGINEERING
DEPARTMENT OF MATHEMATICS

Course Type	Course Code	Name of Course	Lectures/Week (of 55Min each)	Credits
Major	**MAM 581**	**DISCRETE MATHEMATICS**	3	3

Introduction:

This course covers the foundational concepts of discrete mathematics that are pivotal in computer science, logic, and combinatorics. It introduces students to mathematical reasoning, structures, and techniques that are useful in designing algorithms and solving problems in computer science, engineering, and related fields.

Objectives:

1. To develop an understanding of mathematical logic and proof techniques.
2. To introduce fundamental algebraic structures, set theory, and combinatorics.
3. To build skills in solving recurrence relations and analyzing discrete functions.
4. To enhance problem-solving abilities through practical applications of discrete mathematics in computer science.

Course Outcomes (CO):

This course is aimed at
CO1: Understand and apply principles of mathematical logic, including truth tables, predicates, and inference rules.
CO2: Analyze set relations, partitions, and partially ordered sets, applying concepts like the Axiom of Choice and Zorn's Lemma.
CO3: Study algebraic structures such as groups, semigroups, and Boolean algebra, and apply them to problems in computer science.
CO4: Solve combinatorics problems using counting principles, permutations, combinations, and binomial expansions.
CO5: Solve recurrence relations and generate functions for discrete numeric functions

Unit No	Topics to be Covered	Learning outcomes	Bloom's Taxonomy
1.	Mathematical Logic: Truth tables, equivalence of formulas, tautological implications, normal forms (disjunctive and conjunctive); Theory of inference for propositional calculus; Predicate calculus: predicates, variables and quantifiers, free and bound variables, universe of discourse, nested quantifiers, rules of inference for predicate calculus. Proof strategies and methods.	CO1: Understand and apply principles of logical reasoning and inference.	Apply, Analyze
2.	Set theory & relations: equivalence relations, partition of a set, finite sets, countable and uncountable sets, axiom of choice, partially ordered set, ordered set, upper bound/lower bound, maximal/minimal element, supremum, infimum, lattice, zorn's lemma, well-ordering principle.	CO2: Understand and apply set theory concepts and relations in discrete structures.	Understand, Apply
3.	Algebraic Structures & Graph Theory: Groupoid, monoid, semigroups, groups, subgroups; Graphs: connectivity, matching, coloring; Boolean Algebra: combinational and sequential circuits, minimization; Number representations and computer arithmetic (fixed and floating point).	CO3: Study algebraic structures and their applications in computer science and mathematics.	Apply, Analyze
4.	Combinatorics: Fundamental laws of counting, pigeonhole principle, permutations, combinations, binomial theorem, multinomial theorem, principle of exclusion and inclusion.	CO4: Apply combinatorial techniques to solve problems in discrete mathematics.	Apply, Analyze
5.	Discrete Numeric Functions & Recurrence Relations: Discrete numeric functions, generating functions, recurrence relations.	CO5: Solve recurrence relations and generate functions for discrete functions.	Apply, Analyze

Text Books and Reference Books:

S. No.	Title	Author(s)	Edition, Year, Publisher	Place

1.	Discrete Mathematical Structures with Applications to Computer Science	J.P. Tremblay, R. Manohar	McGraw-Hill Publication, 1997	USA
2.	Discrete Mathematics	Chris R. Pope, Tingting Liu	C.L. Lee	India
3.	Discrete Mathematical Structures	Kolman, Busby, Ross	Prentice Hall Publication, 2004	USA
4.	Digital Principles and Applications	Leach Malvino	McGraw-Hill Publication, 2002	USA

DAYALBAGH EDUCATIONAL INSTITUTE
FACULTY OF SCIENCE
DEPARTMENT OF MATHEMATICS

Course Type	Course Code	Name of Course	Lectures/Week (of 55Min each)	Credits
MAJOR	**MAM 582**	Numerical Analysis	**3**	**3**

Introduction:

This course provides an understanding of numerical methods for solving algebraic and transcendental equations, linear systems, interpolation, numerical differentiation and integration, and differential equations. It equips students with computational techniques necessary for engineering applications.

Objectives:

1. To introduce numerical methods for solving algebraic and transcendental equations with accuracy and efficiency.
2. To develop techniques for solving linear simultaneous algebraic equations and computing eigenvalues and eigenvectors.
3. To provide an understanding of interpolation methods and their applications in numerical analysis.
4. To introduce numerical differentiation and integration methods for solving complex mathematical problems.
5. To enable students to apply numerical methods for solving ordinary and partial differential equations relevant to engineering problems.

Course Outcomes (CO):

By the end of the course, students will be able to:
CO1: To introduce numerical methods for solving algebraic and transcendental equations with accuracy and efficiency.
CO2: To develop techniques for solving linear simultaneous algebraic equations and computing eigenvalues and eigenvectors.
CO3: To provide an understanding of interpolation methods and their applications in numerical analysis.
CO4: To introduce numerical differentiation and integration methods for solving complex mathematical problems.
CO5: To enable students to apply numerical methods for solving ordinary and partial differential equations relevant to engineering problems.

Unit No	Topics to be Covered	Learning outcomes	Bloom's Taxonomy
1.	ALGEBRAIC AND TRANSCENDENTAL EQUATION Numerical solution, Method of bisection, Newton-Raphson Iteration, Acceleration of Convergence by Aitken Triangle Square Process.	CO1	Understand, Analyze
2.	Linear simultaneous algebraic equation Solution by Cholesky's, Jacobi's and Gauss-Seidel methods. Largest Eigen Value and corresponding Eigen Vector, Power method	CO2	Analyze, Apply
3.	INTERPOLATION Difference Table. Forward, Backward, Central and Shift operators. Gregory-Newton, Sterling, Everett's and Bessel's Formulae. Lagrange's formula. Inverse interpolation.	CO3	Evaluate, Apply
4.	Numerical differentiation and integration Newton-Cotes Formula. Gaussian Quadrature Formula, Extension of trapezoidal and Simpsons rule to multiple integrals.	CO4	Apply, Analyze
5.	ORDINARY DIFFERENTIAL EQUATIONS &Partial Differential Equations Numerical Solution, Methods of Taylor, Picard, Euler, Range-Kutta, Adams-Bashforth and Milne's method. Simultaneous differential equations. Numerical Solution. Laplace and one-dimensional heat conduction equation.	CO5	Apply, Create

Text Books and Reference Books:

S. No.	Title	Author(s)	Edition, Year, Publisher	Place

1.	Numerical Analysis	Conte and De Boor	MacGraw Hill, 2005	International Edition
2.	Numerical Analysis	Hildebrand	1987, Dover Publications	USA
3.	Numerical Analysis	S S Sastry	2012, PHI Learning	Indian Edition
4.	Numerical Analysis for Scientista & Engineers	R G Stanton	2003, Dover Publications	USA

DAYALBAGH EDUCATIONAL INSTITUTE FACULTY OF SCIENCE **DEPARTMENT OF MATHEMATICS**				
Course Type	Course Code	Name of Course	Lectures/Week (of 55Min each)	Credits
MAJOR	**MAM 681**	Advanced Optimization Techniques	**3**	**3**

Introduction:

MAM 681 introduces the foundational and advanced concepts of mathematical programming and optimization, emphasizing their theoretical underpinnings and practical applications. The course covers a range of topics, from linear and non-linear programming to dynamic and quadratic programming. It equips students with analytical tools and techniques, such as convex analysis, duality, and optimization algorithms, to solve complex mathematical models. Additionally, the course integrates computational tools like MATLAB and CPLEX, enabling students to apply these methods to real-world decision-making and problem-solving scenarios in mathematics, engineering, and related fields.

Objectives:

1. To introduce the foundational concepts and principles of mathematical programming and optimization.
2. To explore the geometry and analysis of models and solutions in linear and non-linear programming problems.
3. To develop a strong understanding of convex and concave functions, duality concepts, and their applications in optimization problems.
4. To equip students with advanced methods for solving linear programming problems, including graphical, simplex, Big-M, and two-phase methods.
5. To provide a deep understanding of optimization techniques for non-linear problems, including single and multi-variable cases, and introduce methods such as Lagrange's method and KKT conditions.
6. To familiarize students with dynamic programming principles and their application to multistage decision processes and optimization problems.
7. To enable the practical application of optimization techniques using advanced tools like MATLAB and CPLEX solver.

Course Outcomes (CO):

By the end of the course, students will be able to:

- **CO1**: Understand the foundational concepts of mathematical programming, including convex polyhedra, convex and concave functions, and their applications to solving linear programming problems using graphical, simplex, Big-M, and two-phase methods.
- **CO2**: Analyze and apply duality principles, dual-simplex methods, and transportation problem-solving techniques to optimize linear models.
- **CO3**: Evaluate and solve non-linear programming problems for single and multi-variable functions using methods such as Lagrange's method, KKT conditions, and search methods like Fibonacci, Golden section, and steepest descent.
- **CO4**: Demonstrate the use of dynamic programming principles, including sub-optimality, principle optimality, and the calculus and tabular methods, with applications to multistage decision processes and linear programming problems.
- **CO5**: Apply advanced optimization techniques in quadratic programming and utilize tools like MATLAB's optimization toolbox and the CPLEX solver for practical problem-solving in mathematical programming.

Unit No	Topics to be Covered	Learning outcomes	Bloom's Taxonomy
1.	Introduction to mathematical programming problems and models, Geometry and Analysis of models/solutions. Convex polyhedron, Concave and convex functions, Related theorems, Linear Models and representations, Definitions and Theorems, solution of l.p.p. graphical, simplex, two-phases of simplex, Big-M method.	CO1: Understand the foundational concepts of mathematical programming, including convex polyhedra, concave and convex functions, and	Understand, Analyze

		solution techniques like simplex and Big-M methods.	
2.	Concept of Duality, Theorems, Dual-simplex, Transportation problem.	CO2: Analyze and apply duality principles, dual-simplex methods, and techniques to optimize transportation problems in linear models.	Analyze, Apply
3.	Non-linear programming problems: Single and multi variable optimization problems (with and without constraints)-Definitions and related theorems. Lagrange's method, KKT conditions. Unimodal function, Fibonacci and Golden section search, Steepest descent method, Conjugate metric method.	CO3: Evaluate and solve non-linear optimization problems using advanced methods such as Lagrange's method, KKT conditions, and search techniques like Fibonacci and steepest descent methods.	Evaluate, Apply
4.	Dynamic Programming: Multistage decision processes, Concept of sub-optimality, Principle optimality, Calculus method of solution, Tabular method of solution, L.p.p. as a case of Dynamic programming.	CO4: Demonstrate dynamic programming including sub-optimality and optimality conc solve problems using calculus and tabular with real-world applications.	Apply, Analyze
5.	Quadratic Programming, use of optimization toolbox in Matlab and CPLEX solver in optimization.	CO5: Apply quadratic programming technic solving complex mathematical programming	Apply, Create

Text Books and Reference Books:

S. No.	Title	Author(s)	Edition, Year, Publisher	Place
1	Linear Programming	G Hadley	4th, 2002, Addison-Wesley	USA
2	Optimization Techniques	SS Rao	4th, 2009, New Age International	India
3	Mathematical Programming Techniques	NS Kambo	1st, 2013, Khanna Publishers	India

DAYALBAGH EDUCATIONAL INSTITUTE FACULTY OF SCIENCE **DEPARTMENT OF MATHEMATICS**				
Course Type	Course Code	Name of Course	Lectures/Week (of 55Min each)	Credits
	PMA101	**Computational Methods**	**4**	**4**

Introduction:

This course provides a comprehensive study of partial differential equations, integral transforms, integral equations, statistical methods, and linear programming. Each unit addresses mathematical techniques essential for applications in engineering and physics.

Objectives:

- Develop proficiency in solving second-order partial differential equations.
- Apply Laplace and Fourier transforms to solve differential equations and boundary value problems.
- Understand and solve integral equations, and analyze statistical distributions and hypothesis testing.
- Solve optimization problems using linear programming techniques.

Course Outcomes (CO):

- **CO1:** Solve second-order partial differential equations using various methods, including Lagrange's and Monge’s methods.
- **CO2:** Utilize Laplace and Fourier transforms to solve differential equations and apply them in boundary value problems.
- **CO3:** Convert differential equations into integral equations and apply classification and solution techniques.
- **CO4:** Apply statistical concepts, including correlation, regression, and hypothesis testing, in engineering contexts.
- **CO5:** Formulate and solve optimization problems using graphical and simplex methods in linear programming.

Unit No	Topics to be Covered	Learning outcomes	Bloom’s Taxonomy
1.	Equation that can be integrated by inspection, equation reducible to linear form, equation integrable by Lagrange’s method, solution of equation under given geometrical conditions, Monge’s method to solve the equation of the type $Rr+Ss+Tt=v$ and $Rr+Ss+Tt+U(rt-s^2)=v,$ canonical forms.	CO1	**Remembering:** Recall forms and methods for solving second-order PDEs. **Understanding:** Explain different techniques (e.g., Lagrange’s and Monge’s methods). **Applying:** Apply these techniques to solve specific PDEs.
2.	Standard forms, Shifting and convolution theorems, Transforms of derivatives, inverse Laplace transforms, Applications to the solution of linear and simultaneous differential equations, Finite and infinite Fourier transforms, Applications to boundary value problems	CO2	**Remembering:** Recall key theorems and properties of Laplace and Fourier transforms. **Understanding:** Explain the application of transforms to differential equations. **Applying:** Use transforms to solve linear, simultaneous, and boundary value problems.

3.	Conversion of ordinary differential equations into integral equation, classification of linear integral equation and methods of their solution using Laplace transforms.	CO3	**Understanding:** Describe the process of converting ODEs to integral equations. **Applying:** Apply Laplace transforms to solve integral equations. **Analyzing:** Differentiate between types of linear integral equations and methods for solving them.
4.	Correlation and Regression, Binomial, Poisson and Normal distributions. Theory of testing of Hypothesis: Null and alternate hypotheses, simple and composite hypotheses, Type I & Type II errors, Critical region, Most powerful Critical region, Analysis of Variance.	CO4	**Remembering:** Recall statistical distributions and hypothesis testing terms. **Understanding:** Explain correlation, regression, and distribution applications. **Applying:** Conduct hypothesis testing and variance analysis in real-world scenarios.
5.	Graphical Method, Simplex method.	CO5	**Understanding:** Describe graphical and simplex methods for linear programming. **Applying:** Formulate optimization problems in standard form. **Evaluating:** Solve and assess optimal solutions using the simplex method.

Text Books and Reference Books:

S. No.	Title	Author(s)	Edition, Year, Publisher	Place
1	**Advanced Mathematics for Engineers,**	Raddick & Miller	2nd Edition, 1970, Wiley	USA
2.	**Integral Transforms in Mathematical Physics**	C.J. Tranter	Reprint Edition,1966, Methuen & Co. Ltd	London