

Shri G. S. Institute of Technology and Science
 Department of Applied Mathematics and Computational Science
 B.E. II YEAR (4YDC) CIVIL ENGINEERING
 MA 21006 - MATHEMATICS – III

Total No. of Units: 5

Total No. of Lectures:40

LECTURE PLAN

<u>S.No.</u>	<u>Topic</u>	<u>No. of Lectures</u>
<u>UNIT-I</u>		
1	Formation of partial differential equations	02
2	Partial differential equation of first order and first degree, i.e., $Pp+Qq = R$	02
3	Linear homogeneous partial differential equation of nth order with constant coefficient	02
4	Separation of variables, Applications to simple problem	02
<u>UNIT-II</u>		
5	Random Variables of Discrete and Continuous type	01
6	Distribution Function and Density Function	02
7	Functions of two random variables, Bivariate probability with conditional and marginal probability distribution	03
8	General concepts and definition of Random Processes, Classification of Random Process and some problems	02
<u>UNIT-III</u>		
9	Brief idea of sampling, t, F and χ^2 distributions and their applications	02
10	ANOVA	01
11	Statistical Quality Control and Control Charts	02
12	Sampling inspection, Acceptance sampling, Producer's and Consumer's risk, O.C. curve	02
13	Taguchi method	01
<u>UNIT-IV</u>		
14	Difference table, Operators E and Δ	02
15	Newton's forward and backward interpolation formula	02
16	Lagrange's interpolation formula, Differentiation and Integration	02
17	Difference Equations with constant coefficients	02
<u>UNIT-V</u>		
18	Expansion of functions in a Fourier series	02
19	Half range series Sine and Cosine series and change of interval	02
20	Fourier Integral	01
21	Fourier transforms: Sine and Cosine transforms	02
22	Fourier transforms application to solution of Linear Partial Differential Equations	01

Shri G. S. Institute of Technology and Science
 Department of Applied Mathematics and Computational Science
 B.E. II YEAR (4YDC) IPE & Mechanical
 MA 23003/ 26004 - MATHEMATICS – III

Total No. of Units: 5

Total No. of Lectures:40

LECTURE PLAN

<u>S.No.</u>	<u>Topic</u>	<u>No. of Lectures</u>
UNIT-I		
1	Formation of partial differential equations	02
2	Partial differential equation of first order and first degree, i.e., $Pp+Qq = R$	02
3	Linear homogeneous partial differential equation of nth order with constant coefficient	02
4	Separation of variables, Applications to simple problem	02
UNIT-II		
5	Expansion of functions in a Fourier series	02
6	Half range series Sine and Cosine series and change of interval	02
7	Fourier Integral	01
8	Fourier transforms: Sine and Cosine transforms	02
9	Fourier transforms application to solution of Linear Partial Differential Equations	01
UNIT-III		
10	Definition of Laplace Transform, Laplace Transform of elementary and periodic functions	02
11	properties of Laplace Transform including Laplace Transform of derivatives	01
12	Inverse Laplace Transform and its properties, Convolution Theorem	02
13	Application of Laplace Transform to ordinary differential equations with constant and variable coefficients, Simultaneous differential equations	03
UNIT-IV		
14	Difference table, Operators E and Δ	02
15	Newton's forward and backward interpolation formula	02
16	Lagrange's interpolation formula, Differentiation and Integration	02
17	Difference Equations with constant coefficients	02
UNIT-V		
18	Brief idea of sampling, t, F and χ^2 distributions and their applications	02
19	ANOVA	01
20	Statistical Quality Control and Control Charts	02
21	Sampling inspection, Acceptance sampling, Producer's and Consumer's risk, O.C. curve	02
22	Taguchi method	01

Shri G. S. Institute of Technology and Science
 Department of Applied Mathematics and Computational Science
 B.E. II YEAR (4YDC) ELECTRICAL/ELEX &TC/ ELEX &INSTRUMENTATION
 MA 22014 / MA 25014 / MA 27014/MA 2T14/MA 2E24

Total No. of Units: 5

Total No. of Lectures:40

LECTURE PLAN

<u>S.No.</u>	<u>Topic</u>	<u>No. of Lectures</u>
<u>UNIT-I</u>		
1	Formation of Partial Differential Equations	02
2	Partial Differential Equations of first order and first degree i.e., $Pp+Qq=R$	02
3	Linear Homogeneous Partial Differential Equations of nth order with constant coefficient.	02
4	Separation of Variables, Application to Vibration of String and Transmission Line Equation	02
<u>UNIT-II</u>		
5	Definition and Derivations	01
6	Odd and even functions, Half-Range Series, Change of Scale	02
7	Fourier Integral, Numerical Harmonic Analysis., Fourier Transforms, Sine and Cosine Transform	03
8	Applications of Fourier Transforms to solution of Partial Differential Equations.	02
<u>UNIT-III</u>		
9	Definition, Laplace Transform of elementary and periodic functions	02
10	Properties of Laplace Transform and transforms of derivatives	02
11	Inverse Laplace Transform and its properties, Convolution Theorem	02
12	Application of Laplace Transform to solution for linear differential equations with constant and variable coefficients, Simultaneous differential equations.	02
<u>UNIT-IV</u>		
13	Difference table, Operators E and Δ	02
14	Newton's forward and backward interpolation formula, Lagrange's interpolation formula	02
15	Differentiation and integration	02
16	Difference equations with constant coefficients	02
<u>UNIT-V</u>		
17	Solution of Algebraic and Transcendental equations : Bisection method , Regula-falsi method and Newton Raphson method	02
18	Numerical Solution of simultaneous equations: Gauss Elimination method , Gauss Seidel method	02
19	Numerical solution of ordinary differential equations: Taylor's, Picard's methods	02
20	Runge- Kutta method	02

Shri G. S. Institute of Technology and Science
 Department of Applied Mathematics and Computational Science
 B.E. II YEAR (4YDC) Computer Science Engineering
 MA 24003 - MATHEMATICS – III

Total No. of Units: 5

Total No. of Lectures:40

LECTURE PLAN

<u>S.No.</u>	<u>Topic</u>	<u>No. of Lectures</u>
<u>UNIT-I</u>		
1	Formation of partial differential equations	02
2	Partial differential equation of first order and first degree, i.e., $Pp+Qq = R$	02
3	Linear homogeneous partial differential equation of nth order with constant coefficient	02
4	Separation of variables, Applications to simple problem	02
<u>UNIT-II</u>		
5	Expansion of functions in a Fourier series	02
6	Half range series Sine and Cosine series and change of interval	02
7	Fourier Integral	01
8	Fourier transforms: Sine and Cosine transforms	02
9	Fourier transforms application to solution of Linear Partial Differential Equations	01
<u>UNIT-III</u>		
10	Definition of Laplace Transform, Laplace Transform of elementary and periodic functions	02
11	properties of Laplace Transform including Laplace Transform of derivatives	01
12	Inverse Laplace Transform and its properties, Convolution Theorem	02
13	Application of Laplace Transform to ordinary differential equations with constant and variable coefficients, Simultaneous differential equations	03
<u>UNIT-IV</u>		
14	Introduction to Number Theory, Basic properties of Number Theory	02
15	Divisibility Theory, Theorems based on Divisibility Theory	02
16	Congruences, Basic properties of Congruences	02
17	Theorems based on Congruences, Applications of Congruences	02
<u>UNIT-V</u>		
18	Simplex Method for Maximization and Minimization	02
19	Revised Simplex Method and Duality Theorem	02
20	Non-Linear Optimization, Kuhn-Tucker condition	01
21	Fibonacci Search, Quadratic Interpolation	02
22	Combinatorial Optimization	01

Shri G. S. Institute of Technology and Science
 Department of Applied Mathematics and Computational Science
 B.E. II YEAR (4YDC) IT Engineering
 MA 28005 - MATHEMATICS – III

Total No. of Units: 5

Total No. of Lectures:40

LECTURE PLAN

<u>S.No.</u>	<u>Topic</u>	<u>No. of Lectures</u>
<u>UNIT-I</u>		
1	Formation of partial differential equations	02
2	Partial differential equation of first order and first degree, i.e., $Pp+Qq = R$	02
3	Linear homogeneous partial differential equation of nth order with constant coefficient	02
4	Separation of variables, Applications to simple problem	02
<u>UNIT-II</u>		
5	Expansion of functions in a Fourier series	02
6	Half range series Sine and Cosine series and change of interval	02
7	Fourier Integral	01
8	Fourier transforms: Sine and Cosine transforms	02
9	Fourier transforms application to solution of Linear Partial Differential Equations	01
<u>UNIT-III</u>		
10	Definition of Laplace Transform, Laplace Transform of elementary and periodic functions	02
11	properties of Laplace Transform including Laplace Transform of derivatives	01
12	Inverse Laplace Transform and its properties, Convolution Theorem	02
13	Application of Laplace Transform to ordinary differential equations with constant and variable coefficients, Simultaneous differential equations	03
<u>UNIT-IV</u>		
14	Graphs – Definitions and basic properties, Isomorphism, Euler Circuits and Hamiltonian cycle	02
15	Digraphs. Trees- properties, spanning trees, Planer graphs	02
16	Shortest path problem, Dijkstra algorithm, Shortest spanning tree-Kruskal and prim algorithm	02
17	Flowaugmented paths-Ford-Fulkerson algorithm, cut sets. Max. Flow min. cut Method theorem	02
<u>UNIT-V</u>		
18	Simplex Method for Maximization and Minimization	02
19	Revised Simplex Method and Duality Theorem	02
20	Non-Linear Optimization, Kuhn-Tucker condition	01
21	Fibonacci Search, Quadratic Interpolation	02
22	Combinatorial Optimization	01

Shri G. S. Institute of Technology and Science
 Department of Applied Mathematics and Computational Science
 B.E. II YEAR (4YDC) BIO-MEDICAL ENGINEERING
 MA 29024 MATHEMATICS – III

Total No. of Units: 5

Total No. of Lectures:40

LECTURE PLAN

<u>S.No.</u>	<u>Topic</u>	<u>No. of Lectures</u>
<u>UNIT-I</u>		
1	Vector Spaces and Subspaces	02
2	Linear Independence, Basis and Dimension, Four Fundamental Subspaces	02
3	Orthogonal Vector and Subspaces	02
4	Orthogonal Bases and Gram-Schmidt	02
<u>UNIT-II</u>		
5	Difference operator, Shift operator	02
6	Newton's forward & backward interpolation, Lagrange's Interpolation	02
7	Numerical Differentiation and Integration	02
8	Difference equations	02
<u>UNIT-III</u>		
9	Formation of partial differential equations	02
10	Partial differential equation of first order and first degree, i.e., $Pp+Qq = R$	02
11	Linear homogeneous partial differential equation of nth order with constant coefficient	02
12	Separation of variables, Applications to simple problem	02
<u>UNIT-IV</u>		
13	Euler's formula, Dirichlet's condition, Function having point of discontinuity, change of intervals	02
14	Odd and Even functions, Half-Range series	01
15	Fourier integrals, Fourier sine and Cosine integrals, Complex form of Fourier integral	03
16	Fourier transform and its application	02
<u>UNIT-V</u>		
17	Laplace Transform (LT), Laplace Transform of elementary and periodic functions	02
18	Properties of Laplace Transform	02
19	Inverse Laplace transform, Convolution Theorem	02
20	Application of Laplace Transform to the solution of Ordinary Differential equations	02

Shri G. S. Institute of Technology and Science
 Department of Applied Mathematics and Computational Science
 B.E. II YEAR (4YDC) ELECTRICAL/ELEX & TC/ ELEX & INSTRUMENTATION
 MA 22563 / MA 25563 / MA 27563/MA 2E74 – Mathematics IV
 Total No. of Units: 5 Total No. of Lectures:40

LECTURE PLAN

<u>S.No.</u>	<u>Topic</u>	<u>No. of Lectures</u>
<u>UNIT-I</u>		
1	Analytic function, Cauchy-Riemann equations and Harmonic functions: Conjugate functions and their applications	02
2	Complex integrals. Cauchy's integral theorem and integral formula	02
3	Singularities, poles residues, residue theorem, Contour integration for simple cases	02
4	conformal mapping and its application to two-dimensional problems in electric field	02
<u>UNIT-II</u>		
5	Modern definition of probability and Random variables	02
6	Distribution function and Density Function	02
7	Random Variables of Discrete and Continuous type, Functions of two random variables	02
8	Bivariate probability with conditional and marginal probability distribution	02
<u>UNIT-III</u>		
9	General concepts and definition of stochastic processes	02
10	Mean, Auto-correlation and auto-covariance, Classification of Stochastic Process and some problems	02
11	Probability vectors, Stochastic Matrix, Fixed Point of a Matrix,	02
12	Definition of Markov Chain, Transition matrix and Graph, some theorems and applications	02
<u>UNIT-IV</u>		
13	Basic concepts of reliability, Failure law and Bath Tub Curve	02
14	Evaluation of Reliability of a component from Test Data,	02
15	System Reliability, Components in Series and parallel,	02
16	Redundancy, Non-Series Parallel System	02
<u>UNIT-V</u>		
17	Graphs – Definitions and basic properties	02
18	Isomorphism, Euler Circuits and Hamiltonian cycle	02
19	Digraphs. Trees- properties, spanning trees	02
20	Planer graphs. Shortest path problem, Dijkstra algorithm, spanning tree- Kruskal and Prim algorithm	02

Shri G. S. Institute of Technology and Science
 Department of Applied Mathematics and Computational Science
 B.E. II YEAR (4YDC) Computer Engineering
 MA 24554: MATHEMATICS-IV

Total No. of Units: 5

Total No. of Lectures:40

LECTURE PLAN

<u>S.No.</u>	<u>Topic</u>	<u>No. of Lectures</u>
<u>UNIT-I</u>		
1	Numerical Analysis and Difference Equation : Finite Differences Operators	02
2	Interpolation Formulae with equal and unequal Intervals	02
3	Numerical Differentiation and Integration	02
4	Difference Equations : Formation of Difference Equations, Homogeneous and Non-Homogeneous Difference Equations with constant coefficient .	02
<u>UNIT-II</u>		
5	Numerical Solutions of Algebraic and Transcendental Equations : Bisection Method , Regula-falsi Method and Newton-Raphson Method	02
6	Numerical Solution of Simultaneous Equations : Gauss Elimination Method, and Gauss-Seidal Iterative Method	02
7	Numerical Solution of Ordinary Differential Equations : Taylor's Series, Picard's Successive Approximation Method	02
8	Runge-Kutta Method, Predictor Corrector Method : Milne's Method	02
<u>UNIT-III</u>		
9	Stochastic Process: Modern Definition of Probability, Random variables,	02
10	Distribution Function and Density Function,	02
11	Concept of Stochastic Process, Classification of Stochastic Process,	02
12	Mean, Auto Correlation and Covariance	02
<u>UNIT-IV</u>		
13	Markov Chain: Probability Vector, Stochastic Matrix	02
14	Fixed Point of a Matrix, and Definition of Markov Chain	02
15	Transition Matrix	01
16	Some Theorems and problems.	03
<u>UNIT-V</u>		
17	Reliability: Basic Concepts, Failure law, Bath Tub Curve	02
18	Evaluation of Reliability of a component from Test Data, System Reliability	02
19	Components in Series and parallel, Redundancy, Non-Series Parallel System	02

20	A brief idea of Software Reliability - Markovian approach for Reliability Evaluation.	02
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Shri G.S Institute of Technology and Science
Department of Applied Mathematics and Computational Science
B.E. II Year Mechanical Engg.
MA 26556: MATHEMATICS - IV

Total No. of Units: 5

Total No. of Lectures: 40

LECTURE PLAN

<u>S.No.</u>	<u>Topic</u>	<u>No. of Lectures</u>
UNIT-I		
1.	Series Solution of Differential equations by method of Frobenius, Validity of series solution.	03
2.	Bessel's Equation, Series Representation of Bessel's Function.	02
3.	Recurrence Relations of Bessel's Function, Generating function for $J_n(x)$, Orthogonality of Bessel's Function.	03
UNIT-II		
4.	Special Function-II: Legendre's Differential Equations.	02
5.	Rodrigue's Formula, Generating Function for $P_n(x)$ and related examples.	03
6.	Recurrence Relations, Orthogonality of Legendre's Function.	03
UNIT-III		
7.	Functions of Complex Variables-I ,Analytic Functions, Cauchy-Continuity, Analytic Functions.	03
8.	Cauchy Riemann equations in Cartesian and Polar Coordinates, Harmonic and Conjugate Harmonic functions.	02
9.	Complex Integration – Cauchy's Integral Theorem and Cauchy Integral Formula.	03
UNIT-IV		
10.	Functions of Complex Variables-II: Taylor's series (Theorem), Laurent Series (Theorem),	03
11.	Zeros and poles, Residue Theorem, Evaluation of simple Real Integrals.	02
12.	Conformal Mapping-Mapping of Elementary functions $w = z^n, z^2, e^z, \sin z$. Bilinear Transformations.	03
UNIT-V		
13.	Numerical Solution of Ordinary Differential Equations : Taylor's Method, Picard's Method and Runge-Kutta Method.	02
14.	Numerical Solution of Partial Differential Equation:Classification of second order Quasi-Linear Partial Differential Equations and their solutions by Method of Iteration and Method of Crank Nicolson.	06

Shri G. S. Institute of Technology and Science
 Department of Applied Mathematics and Computational Science
 B.E. II YEAR (4YDC) BIO-MEDICAL ENGINEERING
 MA 29501 MATHEMATICS – IV

Total No. of Units: 5

Total No. of Lectures:40

LECTURE PLAN

<u>S.No.</u>	<u>Topic</u>	<u>No. of Lectures</u>
<u>UNIT-I</u>		
1	Vector Spaces and Subspaces	02
2	Linear Independence, Basis and Dimension, Four Fundamental Subspaces	02
3	Orthogonal Vector and Subspaces	02
4	Orthogonal Bases and Gram-Schmidt	02
<u>UNIT-II</u>		
5	Difference operator, Shift operator	02
6	Newton's forward & backward interpolation, Lagrange's Interpolation	02
7	Numerical Differentiation and Integration	02
8	Difference equations	02
<u>UNIT-III</u>		
9	Formation of partial differential equations	02
10	Partial differential equation of first order and first degree, i.e., $Pp+Qq = R$	02
11	Linear homogeneous partial differential equation of nth order with constant coefficient	02
12	Separation of variables, Applications to simple problem	02
<u>UNIT-IV</u>		
13	Euler's formula, Dirichlet's condition, Function having point of discontinuity, change of intervals	02
14	Odd and Even functions, Half-Range series	01
15	Fourier integrals, Fourier sine and Cosine integrals, Complex form of Fourier integral	03
16	Fourier transform and its application	02
<u>UNIT-V</u>		
17	Laplace Transform (LT), Laplace Transform of elementary and periodic functions	02
18	Properties of Laplace Transform	02
19	Inverse Laplace transform, Convolution Theorem	02
20	Application of Laplace Transform to the solution of Ordinary Differential equations	02