DEPARTMENT OF APPLIED MATHEMATICS AND COMPUTATIONAL SCIENCE
B. Tech. II YEAR (4YDC) CIVIL ENGINEERING
MA 21006: MATHEMATICS-III

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
T	P	Tu	T	P	Tu	THEORY		PRACTICAL		TOTAL MARKS
						CW	END SEM	SW	END SEM	
3	--	1	3	--	1	30	70	--	--	100

PRE –REQUISITES: Mathematics-I and Mathematics-II

COURSE OBJECTIVES

Enable the students to apply the knowledge of Mathematics in various engineering fields by making them

1. understand the concept of partial differential equation with its application.
2. apply the basic idea of random variables and various distributions to solve related problems. Also they learn sampling theory and statistical quality control.
3. solve the problems related to algebra, differential calculus and integral calculus using numerical analysis.

COURSE OUTCOMES

On completion of the course, students will be able to

CO#1 solve linear homogeneous partial differential equations of n-th order and their applications.
CO#2 understand the concept of random variables and various distributions like marginal, conditional and bivariate.
CO#3 learn the fundamentals of quality control and define principle concepts about sampling and its advantages and also categorized the sampling methods.
CO#4 solve the problems based on interpolation, numerical differentiation and integration.
CO#5 solve algebraic, transcendental and simultaneous equations using various numerical methods.

COURSE CONTENTS

THEORY

UNIT 1 Partial Differential Equations: Formation of Partial Differential equations, partial differential equations of first order and first degree i.e., Pp + Qq = R, Linear homogeneous partial differential equation of nth order with constant coefficient, separation of variables, Application to simple problems of vibrations of strings and beam and heat conduction equation.

UNIT 2 Statistics I: Random Variables, Distribution Function and Density Function, Random Variables of Discrete and Continuous type, Functions of two random variables, Bivariate probability with conditional and marginal probability distribution, General concepts and definition of Random Processes, Classification of Random Process and some problems.

UNIT 3 Statistics II : Brief idea of sampling, t, F and χ^2 distributions and their applications, ANOVA, Statistical Quality Control (SQC), Control Charts, Sampling inspection, Acceptance sampling, Producer's and Consumer's risk, O.C. curve, Taguchi method

UNIT 4 Calculus of Finite Differences: Difference table, Operators E and Δ, Newton's forward and backward interpolation formula, Lagrange's interpolation formula, Differentiation and Integration, Difference Equations with constant coefficients.

UNIT 5 Numerical Methods: Solution of Algebraic and Transcendental equations using Bisection method, Regula-Falsi method and Newton Raphson method. Numerical Solution of simultaneous equations: Direct Methods – Gauss Elimination method, Gauss Jordon method; Iterative methods: Jacobi's method, Gauss Seidel method.

ASSESSMENT

1. Internal Assessment for continuous evaluation, mid-term tests, tutorials, class performance, etc. (30%).
2. End semester Theory Exam (70%).

TEXT BOOKS RECOMMENDED

1. Ramana B V, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2006.
2. Das H. K, Higher Engineering Mathematics, S. Chand New Delhi, 2011.
3. Balagurusamy E., Numerical Methods, Tata McGraw-Hill Publishing Company Ltd, New Delhi, 1999.

REFERENCE BOOKS

1. Kreyszig Erwin, Advanced Engineering Mathematics, 8th edition, John Willy and sons Publications, 1999.
2. Jain, R.K. and S.K. Iyengar, Advanced Engineering Mathematics, Narosa Publishing House, New-Delhi,2006.
3. Vedamurthy V.N. andIyengar S.N., Numerical Methods, Vikas Publishing, 2008.
4. Veerarajan T, Statistics, Probability and Random Process, 2nd Edition, Tata McGraw Hill Publishing Company Ltd., New Delhi 2003.

DEPARTMENT OF APPLIED MATHEMATICS AND COMPUTATIONAL SCIENCE

B. Tech. II YEAR (4YDC) IPE-MECHANICAL
MA 23003/MA 26004: MATHEMATICS-III

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
T	P	Tu	T	P	Tu	THEORY		PRACTICAL		TOTAL MARKS
						CW	END SEM	SW	END SEM	
3	--	1	3	--	1	30	70	--	--	100

PRE –REQUISITES: Mathematics-I and Mathematics-II

COURSE OBJECTIVES

Enable the students to apply the knowledge of Mathematics in various engineering fields by making them

1. understand the concept of partial differential equation with its application.
2. introduce the concept of Fourier series and Fourier transform with their applications.
3. introduce the concept of Laplace Transform and its application in solving ordinary differential equations.
4. solve the problems related to differential calculus and integral calculus using numerical analysis.
5. learn the fundamentals of quality control and define principle concepts about sampling and its advantages and also categorized the sampling methods.

COURSE OUTCOMES

On completion of the course, students will be able to

CO#1 solve linear homogeneous partial differential equations of nth order and their applications.

CO#2 obtain the Fourier series expansion of functions satisfying Dirichlet conditions and the Fourier transform of elementary functions. Also, they learn the application of Fourier transform in solving linear partial differential equations.

CO#3 understand the concept of Laplace transform and its techniques to solve second-order ordinary differential equations involving the Dirac delta (or unit impulse).

CO#4 solve the problems based on interpolation, numerical differentiation and integration.

CO#5 define principal concepts about sampling, explain the advantages of sampling, lists the stages of sampling process and categorizes the sampling methods.

COURSE CONTENTS

THEORY

UNIT 1 Partial Differential Equations: Formation of partial differential equations, partial differential equations of first order and first degree i.e., Pp + Qq = R, Linear homogeneous partial differential equation of nth order with constant coefficient, separation of variables, Application to simple problems of heat, Wave and Laplace equations.

UNIT 2 Fourier Series and Fourier Transformation : Expansion of functions in a Fourier series, Half range series, Sine and Cosine series and change of interval. Fourier Integral. Fourier transforms: sine and cosine transforms and their application to solution of linear Partial

Differential Equations.

UNIT 3 Laplace Transform : Definition of Laplace Transform, Laplace Transform of elementary and periodic functions, properties of Laplace Transform including Laplace Transform of derivatives, Inverse Laplace Transform and its properties, Convolution Theorem, Application of Laplace Transform to ordinary differential equations with constant and variable coefficients.

UNIT 4 Calculus of Finite Differences : Difference table, Operators E and Δ, Newton's forward and backward interpolation formula for equal intervals, Lagrange's interpolation formula and divided difference method for unequal intervals, Numerical Differentiation and Integration (Trapezoidal rule, Simpson's 1/3 rule ,Simpson's 3/8 rule and Weddle's rule).

UNIT 5 Statistics: Brief idea of Sampling, t, F and χ^2 distributions and their applications, ANOVA, Statistical Quality Control (SQC), Control Charts, Sampling inspection, Acceptance sampling, Producer's and Consumer's risk, O. C. curve, Taguchi method.

ASSESSMENT

1. Internal Assessment for continuous evaluation, mid-term tests, tutorials, class performance, etc. (30%).
2. End semester Theory Exam (70%).

TEXT BOOKS RECOMMENDED

1. Ramana B V, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2006.
2. Das H. K, Higher Engineering Mathematics, S. Chand New Delhi, 2011.
3. Balagurusamy E., Numerical Methods, Tata McGraw-Hill Publishing Company Ltd. , New Delhi, 1999.

REFERENCE BOOKS

1. Kreyszig Erwin, Advanced Engineering Mathematics, 8th edition, John Willy and sons Publications, 1999.
2. Jain, R.K. and S.K. Iyengar, Advanced Engineering Mathematics, Narosa Publishing House, New-Delhi,2006.
3. Vedamurthy V.N. andIyengar S.N., Numerical Methods, Vikas Publishing, 2008.

DEPARTMENT OF APPLIED MATHEMATICS AND COMPUTATIONAL SCIENCE
B. Tech. II YEAR (4YDC) ELECTRICAL/ELEX &TC/ ELEX &INSTRUMENTATION
MA 22014 / MA 25014 / MA 27014/MA 2T14/MA 2E24
MATHEMATICS – III

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
T	P	Tu	T	P	Tu	THEORY		PRACTICAL		TOTAL MARKS
						CW	END SEM	SW	END SEM	
3	--	1	3	--	1	30	70	--	--	100

PRE –REQUISITES: Mathematics-I and Mathematics-II

COURSE OBJECTIVES

Enable the students to apply the knowledge of Mathematics in various engineering fields by making them

1. understand the concept of partial differential equation with its application.
2. introduce the concept of Fourier series and Fourier Transform with their applications.
3. introduce the concept of Laplace Transform and its application in solving ordinary differential equations.
4. solve the problems related to Algebra, differential calculus and integral calculus using numerical analysis.

COURSE OUTCOMES

On completion of the course, students will be able to

CO#1 solve linear homogeneous partial differential equations of nth order and their applications.

CO#2 obtain the Fourier series expansion of functions satisfying Dirichlet conditions and the Fourier transform of elementary functions. Also, they learn the application of Fourier transform in solving linear partial differential equations.

CO#3 understand the concept of Laplace transform and its techniques to solve second-order ordinary differential equations involving the Dirac delta (or unit impulse).

CO#4 solve the problems based on interpolation, numerical differentiation and integration.

CO#5 solve the algebraic, transcendental and simultaneous equations using various numerical methods.

COURSE CONTENTS

THEORY

UNIT 1 Partial Differential Equations :Formation of Partial Differential Equations, Partial Differential Equations of first order and first degree i.e., Pp+Qq=R, Linear Homogeneous Partial Differential Equations of nth order with constant coefficient, Separation of Variables, Applications to Vibration of String and Transmission Line Equation

UNIT 2 Fourier Series and Fourier Transform: Definition and Derivations, Odd and Even functions, Half-Range Series, Change of Scale, Fourier Integral, Numerical Harmonic Analysis. Fourier Transforms: Sine and Cosine Transform, Applications of Fourier Transforms to solution of Partial Differential Equations.

UNIT 3 Laplace Transform : Definition, Laplace Transform of elementary and periodic functions, properties of Laplace Transform and Transforms of derivatives, Inverse Laplace Transform and its properties, Convolution Theorem, Applications of Laplace Transform to solution of linear differential equations with constant and variable coefficients, Simultaneous differential equations.

UNIT 4 Calculus of Finite Differences: Difference table, Operators E and Δ, Newton's forward and backward interpolation formula, Lagrange's interpolation formula, Differentiation and Integration, Difference Equations with constant coefficients.

UNIT 5 Numerical Methods: Solution of Algebraic and Transcendental equations using Bisection method, Regular-Falsi method and Newton Raphson method. Numerical solution of simultaneous equations: Gauss Elimination method, Gauss Seidel method. Numerical solution of ordinary differential equations: Taylor's, Picard's and Runge- Kutta method.

ASSESSMENT

1. Internal Assessment for continuous evaluation, mid-term tests, tutorials, class performance, etc. (30%).
2. End semester Theory Exam (70%).

TEXT BOOKS RECOMMENDED

1. Ramana B V, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2006.
2. Das H. K, Higher Engineering Mathematics, S. Chand New Delhi, 2011.
3. Balagurusamy E., Numerical Methods, Tata McGraw-Hill Publishing Company Ltd. , New Delhi, 1999.

REFERENCE BOOKS

1. Kreyszig Erwin, Advanced Engineering Mathematics, 8th edition, John Willy and sons Publications, 1999.
2. Jain, R.K. and S.K. Iyengar, Advanced Engineering Mathematics, Narosa Publishing House, New-Delhi,2006.
3. Vedamurthy V.N. andIyengar S.N., Numerical Methods, Vikas Publishing, 2008.
4. Veerarajan T, Statistics, Probability and Random Process, 2nd Edition, Tata McGraw Hill Publishing Company Ltd., New Delhi 2003.

DEPARTMENT OF APPLIED MATHEMATICS AND COMPUTATIONAL SCIENCE

B. Tech. II YEAR (4YDC) COMPUTER SCIENCE ENGINEERING
MA 24003: MATHEMATICS – III

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
T	P	TU	T	P	TU	THEORY		PRACTICAL		TOTAL MARKS
						CW	END SEM	SW	END SEM	
3	--	1	3	--	1	30	70	--	--	100

PRE –REQUISITES: Mathematics-I and Mathematics-II

COURSE OBJECTIVES

Enable the students to apply the knowledge of Mathematics in various engineering fields by making them

1. understand the concept of partial differential equation with its application.
2. introduce the concept of Fourier series and Fourier transform with their applications.
3. introduce the concept of Laplace Transform and its application in solving ordinary differential equations.
4. understand the basic concept of Number theory.
5. study the basic of mathematical programming technique and their applications.

COURSE OUTCOMES

On completion of the course, students will be able to

CO#1 solve linear homogeneous partial differential equations of nth order and their application.

CO#2 obtain the Fourier series expansion of functions satisfying Dirichlet conditions and the Fourier transform of elementary functions. Also, they learn the application of Fourier transform in solving linear partial differential equations.

CO#3 understand the concept of Laplace transform and its techniques to solve second-order ordinary differential equations involving the Dirac delta (or unit impulse).

CO#4 understand the concept of system of linear congruence's, and its application.

CO#5 solve the problems based on linear and non-linear programming.

COURSE CONTENTS

THEORY

UNIT 1 Partial Differential Equations :Formation of Partial Differential Equations, Partial Differential Equations of first order and first degree i.e., Pp + Qq = R, Linear Homogeneous Partial Differential Equation of nth order with constant coefficient, Separation of Variables, Application to simple problems of vibrations of strings, beam and heat conduction equations.

UNIT 2 Fourier Series and Fourier Transformation :Expansion of functions in a Fourier series, Half range series, Sine and Cosine series and change of interval. Fourier Integral. Fourier Transforms: Sine and Cosine Transforms and their application to solution of Linear Partial Differential Equations.

UNIT 3 Laplace and Z Transforms : Definition of Laplace Transform, Laplace Transform of elementary and periodic functions, properties of Laplace Transform including Laplace Transform of derivatives, Inverse Laplace Transform and its properties, Convolution Theorem, Application of Laplace Transform to Ordinary Differential Equations with constant and variable coefficients, Simultaneous Differential Equations. Z transform and its simple properties.

UNIT 4 Number Theory: Introduction to Number Theory, Basic properties of Number Theory, Divisibility Theory, Theorems based on Divisibility Theory, Congruences, Basic properties of Congruences, Theorems based on Congruences, Applications of Congruences

UNIT 5 Mathematical Programming Techniques: Simplex Method for Maximization and Minimization, Revised Simplex Method and Duality Theorem, Non-Linear Optimization, Kuhn-Tucker condition, Fibonacci Search, Quadratic Interpolation and Combinatorial Optimization.

ASSESSMENT

1. Internal Assessment for continuous evaluation, mid-term tests, tutorials, class performance, etc. (30%).
2. End semester Theory Exam (70%).

TEXT BOOKS RECOMMENDED

1. Ramana B V, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2006.
2. SwarupKanti, Gupta P.K. and ManMohan, Operations research, S Chand & Sons, Educational publishers, New Delhi, 2004 .
3. Sarkar S. K., A text Book of Discrete Mathematics, S. Chand & Company Ltd. 2016.

REFERENCE BOOKS

1. Kreyszig Erwin., Advanced Engineering Mathematics, 8th edition, John Willy and sons Publications, 1999.
2. Jain, R.K. and Iyengar S.K., Advanced Engineering Mathematics, Narosa Publishing House, New-Delhi, 2006.
3. Pannerselvam R , Operations Research , Prentice Hall of India Pvt. Ltd. , New Delhi , 2004.
4. Das H. K, Higher Engineering Mathematics, S. Chand New Delhi, 2011.

DEPARTMENT OF APPLIED MATHEMATICS AND COMPUTATIONAL SCIENCE
B. Tech. II YEAR (4YDC) IT ENGINEERING
MA 28005: MATTHEMATICS – III

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
T	P	TU	T	P	TU	THEORY		PRACTICAL		TOTAL MARKS
						CW	END SEM	SW	END SEM	
3	--	1	3	--	1	30	70	--	--	100

PRE –REQUISITES: Mathematics-I & Mathematics-II

COURSE OBJECTIVES

Enable the students to apply the knowledge of mathematics in various engineering fields by making them

1. understand the concept of partial differential equation with its application.
2. introduce the concept of Fourier series and Fourier Transform with their applications.
3. introduce the concept of Laplace Transform and its application in solving ordinary differential equations.
4. learn about various graphs and their application.
5. study the basic of mathematical programming technique and their application.

COURSE OUTCOMES

On completion of the course, students will be able to

CO#1 solve linear homogeneous partial differential equations of nth order and their application.

CO#2 obtain the Fourier series expansion of functions satisfying Dirichlet conditions and the Fourier transform of elementary functions. Also, they learn the application of Fourier transform in solving linear partial differential equations.

CO#3 understand the concept of Laplace transform and its techniques to solve second-order ordinary differential equations involving the Dirac delta (or unit impulse).

CO#4 understand various graphs, solving minimal weight problems and shortest path problems using suitable algorithms in graph theory.

CO#5 solve the problems based on linear and non-linear programming.

COURSE CONTENTS

THEORY

UNIT I Partial Differential Equations: Formation of partial differential equations, partial differential equations of first order and first degree i.e., $Pp + Qq = R$, Linear homogeneous partial differential equation of nth order with constant coefficient, separation of variables, Application to simple problems of vibrations of strings and beam and heat conduction equation.

UNIT II Fourier Series and Fourier Transformation: Expansion of functions in a Fourier series, Half range series Sine and Cosine series and change of interval. Fourier Integral. Fourier transforms: sine and cosine transforms and their application to solution of linear Partial

Differential Equations.

UNIT III Laplace and Z Transforms: Definition of Laplace Transform, Laplace Transform of elementary and periodic functions, properties of Laplace Transform including Laplace Transform of derivatives, Inverse Laplace Transform and its properties. Convolution Theorem. Application of Laplace Transform to ordinary differential equations with constant and variable coefficients, Simultaneous differential equations. Z transform and its simple properties.

UNIT IV Graph Theory and Combinatorial Optimization:Graphs – Definitions and basic properties.Isomorphism, Euler Circuits and Hamiltonian cycle. Digraphs. Trees-properties, spanning trees, Planer graphs. Shortest path problem, Dijkstra algorithm, Shortest spanning tree-Kruskal and prim algorithm, Flowaugmented paths-Ford-Fulkerson algorithm, cut sets. Max. Flow min. cut Method theorem.

UNIT V Mathematical Programming Techniques: Simplex Method for Maximization and Minimization. Revised Simplex Method and Duality Theorem. Non-linear Optimization. Kuhn-Tucker condition, Fibonacci Search. Quadratic interpolation and Combinatorial Optimization.

ASSESSMENT

1. Internal Assessment for continuous evaluation, mid-term tests, tutorials, class performance, etc. (30%).
2. End semester Theory Exam (70%).

TEXT BOOKS RECOMMENDED

1. Ramana B V, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2006.
2. E.G. Goodaire and Michael M. Permexter, Discrete Mathematics with Graph Theory
3. KantiSwarup , P.K. Gupta and Man Mohan , Operations research , Sultan Chand & Sons , Educational publishers , New Delhi

REFERENCE BOOKS

1. E.G. Goodaire and Michael M. Permexter, Discrete Mathematics with Graph Theory
2. BalaguruswamyE.,Numerical Methods , Tata McGraw-Hill Publishing Company Ltd., New Delhi .
3. H.K.Das, Higher Engineering Mathematics, S.Chand New Delhi.
4. Erwin. Kreyszig, Advanced Engineering Mathematics, 8th edition, John Willy and sons Publications, 1999.

DEPARTMENT OF APPLIED MATHEMATICS AND COMPUTATIONAL SCIENCE

B. Tech. II YEAR (4YDC) BIO-MEDICAL ENGINEERING
MA 29024 MATHEMATICS – III

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
T	P	TU	T	P	TU	THEORY		PRACTICAL		TOTAL MARKS
						CW	END SEM	SW	END SEM	
3	--	1	3	--	1	30	70	--	--	100

PRE –REQUISITES: Mathematics-I & Mathematics-II

COURSE OBJECTIVES

Enable the students to apply the knowledge of Mathematics in various engineering fields by making them

1. understand the concept of linear algebra.
2. solve the problems related to differential calculus and integral calculus using numerical analysis.
3. understand the concept of partial differential equation with its application.
4. introduce the concept of Fourier series and Fourier Transform with their applications.
5. introduce the concept of Laplace Transform and its application in solving ordinary differential equations.

COURSE OUTCOMES

On completion of the course, students will be able to

CO#1 understand the basic concepts of vector spaces, subspace and their orthonormal bases.
CO#2 solve the problems based on interpolation, numerical differentiation and integration..
CO#3 solve linear homogeneous partial differential equations of nth order and their applications.
CO#4 obtain the Fourier series expansion of functions satisfying Dirichlet conditions and the Fourier transform of elementary functions. Also, they learn the application of Fourier transform in solving linear partial differential equations.
CO#5 understand the concept of Laplace transform and its techniques to solve second-order ordinary differential equations involving the Dirac delta (or unit impulse).

COURSE CONTENTS

THEORY

UNIT 1 Introduction to Linear Algebra: Vector Spaces and Subspaces, Linear Independence, Basis and Dimension, Four Fundamental Subspaces, Orthogonal Vector and Subspaces, Orthogonal Bases and Gram-Schmidt.

UNIT 2 Calculus of Finite Differences and Difference Equations :Difference Operator, Shift Operator, Newton's forward & backward Interpolation, Lagrange's Interpolation, Numerical Differentiation and Integration, Difference equations.

UNIT 3 Elements of Partial Differential Equations:Formation of Partial Differential Equations, Partial Differential Equations of first order and first degree, i.e., Pp+Qq = R, Linear Homogeneous Partial Differential Equations of nth order with constant coefficient, Separation of Variables, Applications to simple problem.

UNIT 4 Fourier Analysis :Euler's Formula, Drichlet's Condition, Function having point of Discontinuity, Change of Intervals, Odd and Even functions, Half-Range series. Fourier integrals. Fourier Sine and Cosine Integrals, Complex form of Fourier integral, Fourier Transform and its Applications.

UNIT 5 Laplace Transform: Laplace Transform, Laplace Transform of elementary and periodic functions, properties of Laplace Transform, Inverse Laplace transform, Convolution Theorem, Application of Laplace Transform to the solution of Ordinary Differential equations.

ASSESSMENT

1. Internal Assessment for continuous evaluation, mid-term tests, tutorials, class performance, etc. (30%).
2. End semester Theory Exam (70%).

TEXT BOOKS RECOMMENDED

1. Ramana B V, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2006.
2. Herstein I. N., Topics in Algebra, Wiley, 2006.
3. Balaguruswamy E. , Numerical Methods , Tata McGraw-Hill Publishing Company Ltd. , New Delhi, 1999.

REFERENCE BOOKS

1. Jain, R.K. and Iyengar S.K., Advanced Engineering Mathematics, Narosa Publishing House, New-Delhi,2006.
2. Vedamurthy V.N. andIyengar S.N., Numerical Methods, Vikas Publishing, 2008.
3. Sarkar S. K., A text Book of Discrete Mathematics, S. Chand & Company Ltd. 2016.
Das H. K, Higher Engineering Mathematics, S. Chand New Delhi, 2011.

DEPARTMENT OF APPLIED MATHEMATICS AND COMPUTATIONAL SCIENCE
B. Tech. II YEAR (4YDC) ELECTRICAL/ELEX &TC/ ELEX &INSTRUMENTATION
MA 22563 / MA 25563 / MA 27563/MA 2E74: MATHEMATICS-IV

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
T	P	Tu	T	P	Tu	THEORY		PRACTICAL		TOTAL MARKS
						CW	END SEM	SW	END SEM	
3	--	1	3	--	1	30	70	--	--	100

PRE –REQUISITES: Mathematics – I and Mathematics – II

COURSE OBJECTIVES

Enable the students to apply the knowledge of Mathematics in various engineering fields by making them

1. introduce the basic theory of complex variables and its applications.
2. incorporate knowledge of random variables, its distributions and stochastic process with Markov chain.
3. introduce the concept of reliability to improve the quality of manufacturing components.
4. acquire the knowledge of different types of graphs and concepts of graph theory.

COURSE OUTCOMES

On completion of this course, students are able to

CO#1 solve engineering problems using complex variable techniques such as analyticity, contour integral and transformation.

CO#2 understand the concept of random variables in one and two dimensions and its distributions.

CO#3 apply the concepts of stochastic process, Markov chain and their applications.

CO#4 acquire the knowledge of concepts of Reliability and maintainability for quality improvement of manufactured products and components.

CO#5 understand various graphs, solving minimal weight problems and shortest path problems using suitable algorithms.

COURSE CONTENTS

THEORY

UNIT 1 Functions of Complex Variables: Analytic function, Cauchy-Riemann Equations and Harmonic Functions, Conjugate Functions and their Applications, Complex Integrals, Cauchy's Integral Theorem and Integral Formula, Singularities, Poles, Residues, Residue Theorem, Contour Integration for simple cases, Conformal mapping and its Application to two-dimensional problems in electric field.

UNIT 2 Statistics: Modern view of Probability theory, Random Variables, Distribution Function and Density Function, Random Variables of Discrete and Continuous type, Functions of two random variables, Bivariate Probability with Conditional and Marginal Probability Distribution.

UNIT 3 Stochastic Process and Markov Chain: General Concepts and Definition of Stochastic Processes, Mean, Auto-correlation and Auto-Covariance, Classification of Stochastic Process and Some Problems. Probability Vectors, Stochastic Matrix, Fixed Point of a Matrix, Definition of Markov Chain, Transition Matrix and Graph, Some Theorems and Applications.

UNIT 4 Reliability: Basic concepts, Failure law, Bath Tub Curve, Evaluation of Reliability of a Component from Test Data, System Reliability, Components in Series and Parallel, Redundancy, Non-Series Parallel System.

UNIT 5 Graph Theory and Combinatorial Optimization: Graphs – Definitions and Basic Properties, Isomorphism, Euler Circuits and Hamiltonian Cycle, Digraphs, Trees-Properties, Spanning Trees, Planer graphs, Shortest Path Problem, Dijkstra Algorithm, Spanning Tree-Kruskal and Prim Algorithm.

ASSESSMENT

1. Internal Assessment for continuous evaluation, mid-term tests, tutorials, class performance, etc. (30%)
2. End semester Theory Exam (70%)

TEXT BOOKS RECOMMENDED

1. Ramana B V, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2006.
2. Das H. K, Higher Engineering Mathematics, S. Chand New Delhi, 2011.
3. Baisnab A, and Jas M, Elements of Probability and Statistics, Tata McGraw Hill Book Company, New Delhi, 1993.

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Reference books

1. Jain, R.K. and Iyengar S.K, Advanced Engineering Mathematics, Narosa Publishing House, New-Delhi , 2006 .
2. Veerarajan T, Statistics, Probability and Random Process, 2nd Edition, Tata McGraw Hill Publishing Company Ltd., New Delhi 2003.
3. Balagurusamy E., Reliability Engineering, Tata McGraw-Hill Education Pvt. Ltd., New Delhi, 2012.
4. Goodaire E.G. and Michael M. Permenter, Discrete Mathematics with Graph Theory.

DEPARTMENT OF APPLIED MATHEMATICS AND COMPUTATIONAL SCIENCE

B.Tech. II YEAR (4YDC) COMPUTER ENGINEERING
MA 24554: MATHEMATICS-IV

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
T	P	Tu	T	P	Tu	THEORY		PRACTICAL		TOTAL MARKS
						CW	END SEM	SW	END SEM	
3	--	1	3	--	1	30	70	--	--	100

PRE – REQUISITES: Mathematics – I and Mathematics - II

COURSE OBJECTIVES

Enable the students to apply the knowledge of Mathematics in various engineering fields by making them

1. introduce numerical operators and numerical methods to solve differential and integral problems.
2. incorporate knowledge of random variables, its distributions and stochastic process.
3. understand the concept of Markov chain and its applications
4. introduce the concept of reliability to improve the quality of manufacturing components.

COURSE OUTCOMES

On completion of this course, students are able to

CO#1 be familiar with the problems based on interpolation, numerical differentiation and integration.

CO#2 solve algebraic and transcendental equations and simultaneous equations using various numerical methods.

CO#3 understand the concept of random variables in one dimensions, its distributions and the concepts of stochastic process.

CO#4 understand the concept of Markov chain, fundamental theorems and its applications

CO#5 acquire the knowledge of concepts of Reliability and maintainability for quality improvement of manufactured products and components.

COURSE CONTENTS

THEORY

UNIT 1 Numerical Analysis and Difference Equation : Finite Differences Operators, Interpolation Formulae with equal and unequal Intervals, Numerical Differentiation and Integration. Difference Equations : Formation of Difference Equations, Homogeneous and Non-Homogeneous Difference Equations with constant coefficient .

UNIT 2 Numerical Solutions of Algebraic and Transcendental Equations: Bisection Method ,Regula-falsi Method and Newton-Raphson Method. Numerical Solution of Simultaneous Equations : Gauss Elimination Method, and Gauss-Seidal Iterative Method. Numerical Solution of Ordinary Differential Equations : Taylor's Series, Picard's Successive Approximation Method, Runge-Kutta Method, Predictor Corrector Method : Milne's Method .

UNIT 3 Stochastic Process: Modern Definition of Probability, Random variables, Distribution Function and Density Function, Concept of Stochastic Process, Classification of Stochastic Process, Mean, Auto Correlation and Covariance.

UNIT 4 Markov Chain: Probability Vector, Stochastic Matrix, Fixed Point of a Matrix, and Definition of Markov Chain, Transition Matrix, Some Theorems and problems.

UNIT 5 Reliability: Basic Concepts, Failure law, Bath Tub Curve, Evaluation of Reliability of a component from Test Data, System Reliability, Components in Series and parallel, Redundancy, Non-Series Parallel System. A brief idea of Software Reliability - Markovian approach for Reliability Evaluation.

ASSESMENT

1. Internal Assessment for continuous evaluation, mid-term tests, tutorials, class performance, etc. (30%)
2. End semester Theory Exam (70%)

TEXT BOOKS RECOMMENDED

1. Ramana B V, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2006.
2. Das H. K, Higher Engineering Mathematics, S. Chand New Delhi, 2011.
3. Baisnab A, and Jas M, Elements of Probability and Statistics, Tata McGraw Hill Book Company, New Delhi, 1993.

REFERENCE BOOKS

1. Jain, R.K. and S.K. Iyengar, Advanced Engineering Mathematics, Narosa Publishing House, New-Delhi , 2006 .
2. Veerarajan T, Statistics, Probability and Random Process, 2nd Edition, Tata McGraw Hill Publishing Company Ltd., New Delhi 2003.
3. Vedamurthy V.N. andIyengar S.N., Numerical Methods, Vikas Publishing, 2008.
4. Balagurusamy E., Reliability Engineering, Tata McGraw-Hill Education Pvt. Ltd., New Delhi, 2012.

DEPARTMENT OF APPLIED MATHEMATICS AND COMPUTATIONAL SCIENCE

B.Tech. II YEAR (4YDC) MECHANICAL ENGINEERING
MA 26556: MATHEMATICS-IV

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
T	P	Tu	T	P	Tu	THEORY		PRACTICAL		TOTAL MARKS
						CW	END SEM	SW	END SEM	
3	--	1	3	--	1	30	70	--	--	100

PRE – REQUISITES: Mathematics-I and Mathematics-II

COURSE OBJECTIVES

Enable the students to apply the knowledge of Mathematics in various engineering fields by making them

1. introduce the concept of special functions.
2. introduce the concepts of vector calculus.
3. understand the basic theory of complex variables, contour integral, conformal mappings and applications.
4. introduce numerical methods for solving linear and nonlinear algebraic equations, simultaneous equations and ordinary differential equations.

COURSE OUTCOMES

On completion of this course, students are able to

CO#1 understand the series solution of Bessel's and Legendre's differential equations by using Frobenius method.

CO#2 apply the knowledge of derivatives and integral problems of vector calculus.

CO#3 solve complex engineering problems using complex variable techniques such as analyticity, contour integral and transformation.

CO#4 solve algebraic and transcendental equations and simultaneous equations using various numerical methods.

COURSE CONTENTS

THEORY

UNIT 1 Special Functions: Method of Frobenius series solution for Bessel and Legendre's Differential Equations, Recurrence relation, Generating functions and Orthogonality of Bessel's function and Legendre's function.

UNIT 2 Vector Calculus: Gradient, Divergence and Curl, Vector Identities, Directional derivative, line, surface and volume integrals, Applications to Gauss, Stokes and Green's theorem.

UNIT 3 Functions of Complex Variables-I : Analytic Functions, Cauchy-Continuity, Analytic Functions, Cauchy Riemann equations in Cartesian and Polar Coordinates, Harmonic and Conjugate Harmonic functions, Complex Integration – Cauchy's Integral Theorem and Cauchy Integral Formula

UNIT 4 Functions of Complex Variables-II: Taylor's series (Theorem), Laurent Series (Theorem), Zeros and poles, Residue Theorem, Evaluation of simple Real Integrals. Conformal Mapping-Mapping of Elementary functions $w = z^n$, z^2, e^2, sinz, Bilinear Transformations.

UNIT 5 Numerical solution of linear and non-linear algebraic equations: Bisection (or Bolzano) method, method of false position, Newton Raphson method. Solution of Simultaneous algebraic equations: Direct method- Gauss Elimination method, Gauss Jordan method, Iterative method-Jacobi's method, Gauss Seidal method. Numerical Solution of Ordinary Differential Equations: Taylor's Method, Picard's Method and Runge-Kutta Method.

ASSESMENT

1. Internal Assessment for continuous evaluation, mid-term tests, tutorials, class performance, etc. (30%)
2. End semester Theory Exam (70%)

TEXT BOOKS RECOMMENDED

1. Ramana B V, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2006.
2. Das H. K, Higher Engineering Mathematics, S. Chand New Delhi, 2011.
3. Balaguruswamy E., Numerical Methods, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 1999.

REFERENCE BOOKS

1. Jain, R.K. and. Iyengar S.K, Advanced Engineering Mathematics, Narosa Publishing House, New-Delhi , 2006
2. Sastry S.S., Engineering Mathematics, Prentice Hall of India private limited, New Delhi.
3. Vedamurthy V.N. andIyengar S.N., Numerical Methods, Vikas Publishing, 2008.

DEPARTMENT OF APPLIED MATHEMATICS AND COMPUTATIONAL SCIENCE
B.Tech. II YEAR (4YDC) BIO-MEDICAL ENGINEERING
MA 29501: MATHEMATICS-IV

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
T	P	Tu	T	P	Tu	THEORY		PRACTICAL		TOTAL MARKS
						CW	END SEM	SW	END SEM	
3	--	1	3	--	1	30	70	--	--	100

PRE – REQUISITES: Mathematics-I and Mathematics-II

COURSE OBJECTIVES

Enable the students to apply the knowledge of Mathematics in various engineering fields by making them

1. solve ordinary differential equations for biomedical engineering problems with the help of mathematical models.
2. incorporate knowledge of random variables, its distributions and stochastic process.
3. understand the concept of Markov chain, queuing theory and their applications.
4. introduce the concept of reliability to improve the quality of manufacturing components.
5. acquire the knowledge of different types of graphs and concepts of graph theory.

COURSE OUTCOMES

On completion of this course, students are able to

CO#1 apply the knowledge of ordinary differential equations for solving biomedical engineering problems using mathematical modelling.

CO#2 understand the concept of random variables in one dimensions, its distributions and the concepts of stochastic process.

CO#3 understand the concept of Markov chain, fundamental theorems, queuing theory and their applications

CO#4 acquire the knowledge of concepts of Reliability and maintainability for quality improvement of manufactured products and components.

CO#5 understand various graphs, solving minimal weight problems and shortest path problems using suitable algorithms.

COURSE CONTENTS

THEORY

UNIT 1 Modeling of Biological Systems through Ordinary Differential Equations:Growth and Decay, Dynamics of Tumor Growth, Radioactivity and Carbon Data, Temperature Rate of Change, Biological Growth, A problem in Epidemiology, Detection of Diabetes .

UNIT 2 Stochastic Process: Modern Definition of Probability, Random Experiments, Sample Space, Random variables, Distribution Function and Density Function, Concept of stochastic process, Mean, Auto Correlation and Covariance, Classification of Stochastic Process.

UNIT 3 Markov Chain: Probability Vector, Stochastic Matrix, Fixed Point of a Matrix, and Definition of Markov Chain, Transition Matrix, Some Theorems and problems. Queuing Theory, Birth and Death Process.

UNIT 4 Reliability: Basic Concepts, Failure law, Bath Tub Curve, Evaluation of Reliability of a component from test data, System Reliability, Components in Series and Parallel, Redundancy, Non-Series Parallel system. A brief idea of Software Reliability.

UNIT 5 Graph Theory and Combinatorial Optimization:Graphs : Definitions and basic properties, Isomorphism, Euler Circuits and Hamiltonian cycle, Digraphs. Trees- properties, Spanning Trees, Planer graphs, Shortest Path Problem, Dijkstra Algorithm, Spanning Tree-Kruskal and Prim Algorithm.

ASSESSMENT

1. Internal Assessment for continuous evaluation, mid-term tests, tutorials, class performance, etc. (30%)
2. End semester Theory Exam (70%)

TEXT BOOKS RECOMMENDED

1. Ramana B V, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2006.
2. ZafarAhsan, Differential Equation and their Applications, Prentice Hall of India Pvt. Ltd., New Delhi, 2004.
3. Baisnab A, and Jas M., Elements of Probability and Statistics, Tata McGraw Hill Book Company, New Delhi, 1993.

REFERENCE BOOKS

1. Jain R.K. and S.K. Iyengar, Advanced Engineering Mathematics, Narosa Publishing House, New-Delhi, 2006.
2. Veerarajan T, Statistics, Probability and Random Process, 2nd Edition, Tata McGraw Hill Publishing Company Ltd., New Delhi 2003.
3. Balagurusamy E., Reliability Engineering, Tata McGraw-Hill Education Pvt. Ltd., New Delhi, 2012.
4. Veerarajan T., Discrete Mathematics with Graph Theory and Combinatorics, Tata McGraw Hill Publishing Company Ltd., New Delhi 2008.
5. Goodaire E.G., and. Permenter M. M., Discrete Mathematics with Graph Theory