

DEPARTMENT OF APPLIED MATHEMATICS AND COMPUTATIONAL SCIENCE
B.E. I YEAR (4YDC)
MA 10001: MATHEMATICS-I

PERIOD PER WEEK			CREDITS			MAXIMUM MARKS				
T	P	TU	T	P	TU	THEORY		PRACTICAL		TOTAL MARKS
						CW	END SEM	SW	END SEM	
4	--	1	3	--	--	30	70	--	--	100

COURSE OBJECTIVE

To enable the students to apply the knowledge of Mathematics in various Engineering fields by making them

- Understand the fundamental concepts of differential calculus and their applications in engineering problems.
- Understand the basic concepts of integral calculus and their applications in problems.
- Incorporate the knowledge of differential and integral calculus to support the concurrent and subsequent engineering studies.
- Understand the basic concept of Boolean algebra and its application to circuits.

COURSE OUTCOMES

The students will be able to:

- Apply Taylor series to approximate functions and estimate the error of approximation differential calculus according to certain features.
- Use integrals to formulate and solve application problems in science and engineering.
- Compute a given integral using the most efficient method and construct and plot cartesian and polar curves.
- Simplify and prove boolean expression and compute sum of products and product of sum expansions.

COURSE CONTENTS

- Unit-I Differential Calculus: Partial derivatives: Definition, Euler's theorem of homogeneous function, Differentiation of implicit function, Total differential coefficients, Jacobians, Expansion of functions by Taylor's and Maclaurin's series of one and two variables .
- Unit-II Differential Calculus (Continued): Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers and their applications, Curvature in Cartesian and polar coordinates, Asymptotes (Cartesian coordinates).
- Unit-III Integral Calculus: Detailed study of tracing of curves, Area, Length of curve, Volume and Surface of revolution.

Unit-IV Integral Calculus (Continued): Beta and Gamma functions, Elementary ideas of multiple integrals, Change of order of integration, and change of variables in double integrals using Jacobians.

Unit-V Boolean Algebra: Laws of Boolean algebra, Boolean function and Boolean expression, Principle of Duality, Representation of Boolean function, Sum of product function. Application of Boolean algebra in design of switching circuits.

Text Books

1. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2006.
2. H. K. Dass, Advanced Engineering Mathematics, S. Chand and Company Ltd., New-Delhi, 2009.

Reference books

1. S. S. Sastry, Engineering Mathematics Volume I and Volume II, PHI Learning Private Limited, New Delhi 2008.
2. Tarit Majumder, Engineering Mathematics Volume-I, New Central Book Agency (P) LTD, Kolkata.
3. S Pal and S. C. Bhunia, Engineering Mathematics, Oxford University Press, New Delhi, 2015.

Assessment

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

DEPARTMENT OF APPLIED MATHEMATICS AND COMPUTATIONAL SCIENCE
B.E. II YEAR (4YDC)
MA 10501: MATHEMATICS-II

PERIOD PER WEEK			CREDITS			MAXIMUM MARKS				
T	P	TU	T	P	TU	THEORY		PRACTICAL		TOTAL MARKS
						CW	END SEM	SW	END SEM	
4	--	1	3	--	--	30	70	--	--	100

COURSE OBJECTIVE

To enable the students to apply the knowledge of Mathematics in various Engineering fields by making them

- Able to perform matrix operations and learn to solve systems of linear equations and their application problems.
- Ability to solve linear differential equations and using the concepts of ordinary differential equations to model and solve real-world problems.
- Understand the basic concepts of probability theory and distributions, and apply selected probability distributions to solve problems
- Provide the basic knowledge of complex numbers and their applications.

COURSE OUTCOMES

The students will be able to :

- Use computational techniques and algebraic skill essential for the study of system of linear equations, matrix algebra, eigen values and eigen vectors.
- Classify differential equations according to certain features and solve first order linear equations and nonlinear equations of certain types and interpret the solutions.
- Solve second and higher order linear differential equations with constant coefficients and construct all solutions from the linearly independent solutions.
- Know methods of finding the nth roots of complex number and the solutions of simple polynomial equations.

COURSE CONTENTS

- Unit-I Matrices: Review of matrices, elementary operation on rows and columns, inverse of matrix. Normal forms, Linear dependence, Rank, Application to theory of solutions of system of linear equations, linear transformation. Orthogonal, Unitary and Hermitian matrices. Characteristic equation. Eigen values and Eigen vectors, Cayley-Hamilton theorem.
- Unit-II Ordinary Differential Equations: Formation of differential equations, differential equations of first order and first degree (Variable separable, Homogeneous, Linear and Exact). Linear differential equations with constant coefficients.

- Unit-III Ordinary Differential Equations (continued): Linear differential equations with variable coefficients, Simultaneous differential equations, Method of variation of parameters, Application to simple problems.
- Unit-IV Probability and Statistics: Binomial, Poisson and Normal distributions and their Mean and Variance, Methods of least squares and curve fitting.
- Unit-V Complex Numbers: Algebra of complex numbers, Exponential function of a complex variable, Circular function of a complex variable, Hyperbolic function and inverse hyperbolic functions. Logarithmic function of complex variable. Summation of series by $C+iS$ method.

Text Books

1. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2006.
2. H. K. Dass, Advanced Engineering Mathematics, S. Chand and Company Ltd., New-Delhi, 2009.

Reference Books

1. Zafar Ahsan, Differential Equation and their Applications, Prentice Hall of India Pvt. Ltd., New Delhi, 2004.
2. M. Ray, H. S. Sharma and S Chaudhary, Mathematical Statistics, Ram Prasad and Sons, Agra, 2004.
3. S Pal and S. C. Bhunia, Engineering Mathematics, Oxford University Press, New Delhi, 2015.

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