

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

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

**PRE –REQUISITES: NIL**

### COURSE OBJECTIVES

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

1. understand the fundamental concepts of differential calculus and their applications for functions of several variables in engineering problems.
2. incorporate the knowledge of multiple integral to support the concurrent and subsequent engineering studies.
3. learn the basic concept of Boolean algebra and its applications to circuits.

### COURSE OUTCOMES

The students will be able to

- CO#1** develop competency in applying the ideas of partial derivatives and use Taylor's and Maclaurin's series for series expansions of function and obtain approximate values.
- CO#2** apply the knowledge of Lagrange's multipliers for finding the extreme values of functions and understand the concept of curvature and asymptotes.
- CO#3** understand the concept of Beta and Gamma function and the basic idea of multiple integrals.
- CO#4** use multiple integrals to formulate and solve application problems of area,length and volume .
- CO#5** simplify the Boolean expression in normal form and designing the switching circuits .

### COURSE CONTENTS

#### THEORY

**UNIT 1** 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 2** 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 3	Integral Calculus: Beta and Gamma functions, Elementary ideas of multiple integrals, Change of order of integration and change of variables in double integrals using Jacobians.
UNIT 4	Integral Calculus (Continued): Detailed study of tracing of curves, Area, Length of curve, Volume and Surface of revolution.
UNIT 5	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.

### **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. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2006.
2. H. K. Das, 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.

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

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

**PRE –REQUISITES: NIL**

### COURSE OBJECTIVES

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

1. able to perform elementary operations on matrix and learn to solve systems of linear equations and their application problems.
2. solve first order and first degree ordinary differential equations, higher order linear differential equations and their applications .
3. understand the basic concepts of probability distributions and curve fitting .
4. provide the basic knowledge of functions of complex variable and their applications .

### COURSE OUTCOMES

The students will be able to

- CO#1** understand the various applications of the theory of matrices to a wide variety of problems like system of linear equations, inverse of a matrix , Eigen values and Eigen vectors.
- CO#2** classify differential equations according to certain features and solve first order differential equations .
- CO#3** able to solve higher order linear differential equation with applications to simple problems.
- CO#4** acquire the basic knowledge of probability distributions (Binomial,Poisson and Normal) with their applications and fitting of curves using method of least squares.
- CO#5** understand the concept of various functions of a complex variable with the summation of infinite series as an application

### COURSE CONTENTS

#### THEORY

- UNIT 1** 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 2 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 3 Ordinary Differential Equations (continued): Linear differential equations with variable coefficients, Simultaneous differential equations, Method of variation of parameters, Application to simple problems.
- UNIT 4 Probability and Statistics: Binomial, Poisson and Normal distributions and their Mean and Variance, Methods of least squares and curve fitting.
- UNIT 5 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.

### **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. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2006.
2. H. K. Das, 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.