

<b>Devi Ahilya University, Indore, India Institute of Engineering &amp; Technology</b>				<b>II Year B.E. (Electronics and Telecommunication Engg.)</b>			
<b>Subject Code &amp; Name</b>	<b>Instructions Hours per Week</b>			<b>Credits</b>			
<b>3ATRC1 APPLIED MATHEMATICS-III</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Total</b>
	<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Duration of Theory Paper: 3 Hours</b>							

**Learning Objectives:**

- To develop an understanding of the underlying mathematics as a preparation for a specialist study of applications areas like electromagnetic and electrostatic field theory, control theory, communication and signal processing, power transmission, design of discrete times Systems, circuit analysis etc.
- Numerical approach enables solution of a complex problem with a great number of very simple operations. It is useful to find the solution with use of computers making calculation easy and fast.

**Prerequisites:**

Basic knowledge of algebra of complex numbers, determinants, matrices, differentiation and integration of functions and probability theory.

## COURSE CONTENTS

**Unit-I**

**Function of Complex variables:** Analytic functions, Cauchy’s integral theorem and integral formulae, Taylor’s and Laurent’ series, Residue theorem, Solution of integrals.

**Unit-II**

Random variables, density function, stochastic process, autocorrelation, Markov chain, Multistep in Markov chain. Basic concepts of reliability, failure laws, components in series and in parallel, Redundancy.

**Unit-III**

**Interpolation:** Finite difference operators, Newton’s and Stirling’s interpolation, Numerical differentiation, Numerical integration using Trapezoidal, Simpson’s 1/3rd, Simpson’s 3/8th and Weddle’s rule.

**Unit-IV**

Numerical solutions of algebraic and transcendental equations-Bisection method, Regula-alsi method, Newton-Raphson method. Solution of system of linear algebraic equation-Iterative methods: Gauss-Seidel and Gauss-Jacobi’s iterative methods. Numerical Solutions of Differential equations - single and multi-step methods.

## Unit-V

Fourier series, sine and cosine series, change of intervals, continuous-time and discrete-time Fourier series, Fourier Integral.

## Learning Outcomes:

Upon completing the course, students will be able to:

- Apply the concept of complex analysis, Fourier analysis and stochastic process in various subjects of engineering like electromagnetic and electrostatic field theory, control theory, signal processing, and power transmission.
- Learn that many problems where analytical methods seem to fail like solving highly nonlinear equation.

## BOOKS RECOMMENDED:

- [1]. B.S.Grewal, “*Engineering Mathematics*”, Khanna Publishers, 42/e, 2015.
- [2]. Erwin. Kreyszig, “*Advanced Engineering Mathematics*”, 8th edition, John Wiley and sons Publications, 1999.
- [3]. Gupta P.P. & Malik G.S., “*Calculus of Finite Differences and Numerical Analysis*”, Krishna Prakashan Mandir, Meerut, 21/e, 2006.
- [4]. Kasana H.S., “*Complex Variables: Theory and Applications*”, Prentice-Hall of India Pvt. Ltd, 2nd edition, 2005.
- [5]. T. Veerarajan, “*Probability, Statistics and Random Processes*”, Tata McGraw – Hill Education, 2002.
- [6]. K. S. Trivedi, “*Probability and Statistics with Reliability, Queuing, and Computer Science Applications*”, John Wiley & Sons, 2006.
- [7]. G. Paria, “*Statistics and Stochastic Processes Part II*”, Scholar’s Publication, Indore.
- [8]. A.R. Vasishtha and R.K. Gupta, “*Integral Transforms*”, Krishna Prakashan Media Ltd, Meerut, India, 2000.
- [9]. Murray R. Spiegel, “*Schaum’s Outline of Fourier Analysis*”, McGraw-Hill, New York, 2004.