Complex Variables and Distributions

UG – IV Semester (Common to EC, TC, EE, ML, EI, IS)

Course code: 18MA4GCCVD **Credits: 03**

L: P: T: S: 3:0:0:0 **CIE Marks: 50**

Exam Hours: 03 **SEE Marks: 50**

Course Objectives:

1. To introduce the topics of vector space and graph theory
2. To understand theory of complex variables
3. To provide the foundations of probabilistic and statistical analysis mostly used in varied applications in engineering and science

Course Outcomes: At the end of the course, student will be able to:

CO1	Acquire an overview of the concepts and simple techniques in Graph Theory and vector spaces
CO2	Understand the significance of analytical functions and contour integration.
CO3	Understand the basic concepts of random variables and probability distributions
CO4	Explain sampling distributions and test the hypothesis for a given sample
CO5	Understand the basic concepts of Joint Probability distribution
CO6	Specify a given discrete time Markov chain in terms of a transition matrix and a transition diagram

Mapping of Course outcomes to Program outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**1**	**1**								
CO2	**3**	**3**	**2**	**1**								
CO3	**3**	**3**	**1**	**1**								
CO4	**3**	**3**	**2**	**1**								
CO5	**3**	**3**	**2**	**1**								
CO6	**3**	**3**	**2**	**1**								

Module	Contents of the Module	Hours	CO's
1	**Linear Algebra & Graph Theory** **Linear Algebra:** Vector space, Linear dependence, Dimension & basis, Linear transformations, Matrix representation of linear transformation. Definition, Types of graph, Circuits, Hamilton graph, Matrix representation. Application Problems	08	CO1
2	**Complex Variable** Basic definitions**,** Elementary function, Analytic function, Cauchy-Riemann equations in Cartesian and polar coordinates , Analyticity of given function, Harmonic function , Construction of analytic functions (with application problem), Milne-Thompson method. Application Problems	08	CO2
3	**Probability Distributions** Types of variables, Probability mass & density function, Expectation or Mean & variance of random and continuous variable, Probability Distribution**:** Geometric distribution, Poisson distribution & Poisson or Random processes, Exponential and Normal distributions. Application Problems	08	CO3
4	**Sampling Distribution** Sampling, sampling distribution, central limit theorem, Sampling with & without replacement, Confidence limits for means, Student's t distribution, Chi- Square distribution as a test of goodness of fit. Application Problems	08	CO4
5	**Joint Probability Distribution & Markov Chains** Concept of joint probability, joint probability distribution, Expectation, variance, covariance and correlation, Stochastic or random processes, Transition and Regular stochastic matrix, Markov chain, Transition probabilities matrix, Higher transition probabilities. Application Problems	08	CO5, CO6

Text Books:

1. B.S. Grewal, "Higher Engineering Mathematics" Khanna Publishers, 43rd Edition, 2014 June, ISBN: 9788174091956.
2. Erwin Kreyszig; Advanced Engineering Mathematics; John Wiley & Sons, 9th Edition, 2007, ISBN: 9788126531356.
3. Gilbert Strang, Linear Algebra and its Applications, 4th edition ,Cengage Publishers , 2014, ISBN: 9788131501726,

References:

1. B.V.Ramana, "Higher Engineering Mathematics", Tata Mc Graw-Hill, 2006; ISBN:9780070634190.
2. M. K. Jain, S. R. K. Iyengar and R. K. Jain "Numerical Methods: For Scientific and Engineering Computation", New Age International Publications, 6th Edition, 2012, ISBN: 9788122433234.
3. Murray Speigel, Schaum's Outline of "Advanced Mathematics for Engineers and Scientists"McGraw-Hill, 1971; ISBN: 9780070602168.
4. Schaum's Outline: Introduction to Probability and Statistics**,** McGraw Hill Education (India) Private Limited (1 September 2005); ISBN-13: 978-0070605015.
5. David C Lay, "Linear Algebra and Application", Pearson Education, ISBN-9788177583335

Self-study component:

Unit 1: Inner product space
Unit 2: Cauchy's Integral formula and Cauchy's theorem
Unit 3: Binomial distribution
Unit 4: Hypothesis testing for proportions and difference of means
Unit 5: Markov chain