

COMPLEX ANALYSIS AND PROBABILITY DISTRIBUTION

II Semester: ECE IV Semester: AE / EEE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
AHS004	Foundation	L	T	P	C	CIA	SEE	Total
		3	1	-	4	30	70	100
Contact Classes: 45		Tutorial Classes: 15		Practical Classes: Nil			Total Classes: 60	
OBJECTIVES:								
The course should enable the students to:								
I. Understand the basic theory of complex functions to express the power series.								
II. Evaluate the contour integration using Cauchy residue theorem.								
III. Enrich the knowledge of probability on single random variables and probability distributions.								
COURSE LEARNING OUTCOMES (CLOs):								
1. Define continuity, differentiability, analyticity of a function using limits.								
2. Understand the conditions for a complex variable to be analytic and/or entire function.								
3. Understand the concepts of Cauchy-Riemann relations and harmonic functions.								
4. Understand the concept of complex differentiation to the real-world problems of signals modulated by electromagnetic waves.								
5. Evaluate the area under a curve using the concepts of indefinite integration								
6. Understand the concepts of the Cauchy's integral formula and the generalized Cauchy's integral formula.								
7. Evaluate complex functions as power series and radius of convergence of power series								
8. Understand the concept of complex integration to the real-world problems of flow with circulation around a cylinder.								
9. Solve the Taylor's and Laurent series expansion of complex functions								
10. Understand the concept of different types of singularities for analytic function..								
11. Evaluate poles, residues and solve integrals using Cauchy's residue theorem.								
12. Evaluate bilinear transformation by cross ratio property.								
13. Identify the conditions of fixed and critical point of Bilinear Transformation.								
14. Understand the concept of Cauchy's residue theorem to the real-world problems of Quantum Mechanical scattering and Quantum theory of atomic collisions.								
15. Demonstrate an understanding of the basic concepts of probability and random variables.								
16. Classify the types of random variables and calculate mean, variance.								
17. Finding moment about origin, central moments, moment generating function of probability distribution.								
18. Understand the concept of random variables to the real-world problems like graph theory, machine learning and natural language processing.								
19. Recognize where the binomial distribution and poisson distribution could be appropriate model and find mean, variance of the distributions.								
20. Apply the inferential methods relating to the means of normal distributions.								
21. Understand binomial distribution to the phenomena of real-world problem like sick versus healthy.								
22. Understand the mapping of normal distribution in real-world problem to analyze the stock market.								
23. Use poisson distribution in real-world problem to predict soccer scores.								
24. Possess the knowledge and skills for employability and to succeed in national and international level competitive examinations.								

Unit-I	COMPLEX FUNCTIONS AND DIFFERENTIATION	Classes: 10
Complex functions differentiation and integration: Complex functions and its representation on argand plane, concepts of limit, continuity, differentiability, analyticity, Cauchy-Riemann conditions and harmonic functions; Milne-Thomson method.		
Unit -II	COMPLEX INTEGRATION	Classes: 08
Line integral: Evaluation along a path and by indefinite integration; Cauchy's integral theorem; Cauchy's integral formula; Generalized integral formula; Power series expansions of complex functions and contour Integration: Radius of convergence.		
Unit -III	POWER SERIES EXPANSION OF COMPLEX FUNCTION	Classes: 10
Expansion in Taylor's series, Maclaurin's series and Laurent series. Singular point; Isolated singular point; Pole of order m; Essential singularity; Residue: Cauchy Residue Theorem. Evaluation of Residue by Laurent Series and Residue Theorem. Evaluation of integrals of the type $\int_0^{2\pi} f(\cos \theta, \sin \theta) d\theta$ and $\int_{-\infty}^{\infty} f(x) dx$ Bilinear Transformation		
Unit -IV	SINGLE RANDOM VARIABLES	Classes: 09
Random variables: Discrete and continuous, probability distributions, mass function-density function of a probability distribution. Mathematical expectation. Moment about origin, central moments, moment generating function of probability distribution.		
Unit -V	PROBABILITY DISTRIBUTIONS	Classes: 08
Binomial, Poisson and normal distributions and their properties.		
Text Books:		
1. Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons Publishers, 10 th Edition, 2010 2. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 43 rd Edition, 2015.		
Reference Books:		
1. T.K.V Iyengar, B.Krishna Gandhi, "Engineering Mathematics - III", S. Chand & Co., 12 th Edition, 2015. 2. T.K.V Iyengar, B.Krishna Gandhi, "Probability and Statistics", S. Chand & Co., 7 th Edition, 2015. 3. Churchill, R.V. and Brown, J.W, "Complex Variables and Applications", Tata Mc Graw-Hill, 8 th Edition, 2012.		
Web References:		
1. http://www.efunda.com/math/math_home/math.cfm 2. http://www.ocw.mit.edu/resources/#Mathematics 3. http://www.sosmath.com 4. http://www.mathworld.wolfram.com		
E-Text Books:		
1. http://www.keralatechnologicaluniversity.blogspot.in/2015/06/erwin-kreyszig-advanced-engineering-mathematics-ktu-ebook-download.html 2. http://www.faadooengineers.com/threads/13449-Engineering-Maths-II-eBooks		

