

COMPLEX ANALYSIS AND PROBABILITY DISTRIBUTIONS

IV Semester: EEE																				
Course Code	Category	Hours / Week			Credits	Maximum Marks														
AHSC11	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													
Prerequisite: Linear Algebra and Calculus, Mathematical Transform Techniques																				
<p>I. COURSE OVERVIEW: The course focuses on more Advanced Engineering Mathematics which provide with the relevant mathematical tools required in the analysis of engineering problems and scientific professions. The course includes complex functions and differentiation, complex integration, power series expansion of complex function and Probability of single random variables with its distributions. The mathematical skills derived from this course form a necessary base to analytical and design concepts encountered in the program.</p> <p>II. COURSE OBJECTIVES: The students will try to learn:</p> <ul style="list-style-type: none"> I The applications of complex variable and conformal mapping in two dimensional complex potential theories. II The fundamental calculus theorems and criteria for the independent path on contour integral used in problems of engineering III Enrich the knowledge of probability on single random variables and probability distributions <p>III. COURSE OUTCOMES: After successful completion of the course, students should be able to:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">CO 1 Identify the fundamental concepts of analyticity and differentiability for finding complex conjugates, conformal mapping of complex transformations.</td> <td style="width: 20%; text-align: right; vertical-align: top;">Apply</td> </tr> <tr> <td>CO 2 Apply integral theorems of complex analysis and its consequences for the analytic function with derivatives of all orders in simple connected region.</td> <td style="text-align: right; vertical-align: top;">Apply</td> </tr> <tr> <td>CO 3 Extend the Taylor and Laurent series for expressing the function in terms of complex power series.</td> <td style="text-align: right; vertical-align: top;">Apply</td> </tr> <tr> <td>CO 4 Apply Residue theorem for computing definite integrals by using the singularities and poles of real and complex analytic functions over closed curves.</td> <td style="text-align: right; vertical-align: top;">Apply</td> </tr> <tr> <td>CO 5 Explain the concept of random variables and types of random variables by using suitable real time examples.</td> <td style="text-align: right; vertical-align: top;">Understand</td> </tr> <tr> <td>CO 6 Interpret the parameters of random variety Probability distributions by using their probability functions, expectation and variance.</td> <td style="text-align: right; vertical-align: top;">Understand</td> </tr> </table> <p>IV. SYLLABUS:</p> <p>MODULE-I: COMPLEX FUNCTIONS AND DIFFERENTIATION (09) 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. Bilinear Transformation.</p> <p>MODULE-II: COMPLEX INTEGRATION (09) 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.</p> <p>MODULE-III: POWER SERIES EXPANSION OF COMPLEX FUNCTION (09) 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.</p>									CO 1 Identify the fundamental concepts of analyticity and differentiability for finding complex conjugates, conformal mapping of complex transformations.	Apply	CO 2 Apply integral theorems of complex analysis and its consequences for the analytic function with derivatives of all orders in simple connected region.	Apply	CO 3 Extend the Taylor and Laurent series for expressing the function in terms of complex power series.	Apply	CO 4 Apply Residue theorem for computing definite integrals by using the singularities and poles of real and complex analytic functions over closed curves.	Apply	CO 5 Explain the concept of random variables and types of random variables by using suitable real time examples.	Understand	CO 6 Interpret the parameters of random variety Probability distributions by using their probability functions, expectation and variance.	Understand
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Evaluation of Residue by Laurent Series and Residue Theorem. Evaluation of integrals of the type $\int_0^{2\pi} f(\cos\theta, \sin\theta)d\theta, \int_{-\infty}^{\infty} f(x)dx$

MODULE-IV: SINGLE RANDOM VARIABLES (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.

MODULE-V: PROBABILITY DISTRIBUTIONS (09)

Binomial, Poisson and normal distributions and their properties.

V. TEXT BOOKS:

1. Erwin Kreyszig, “Advanced Engineering Mathematics”, John Wiley & Sons Publishers, 10th Edition, 2014.
2. B S Grewal, “Higher Engineering Mathematics”, Khanna Publishers, 42nd Edition, 2012.

VI. REFERENCE BOOKS:

1. Churchill, RV and Brown, J W, “Complex Variables and Applications”, Tata McGraw-Hill, 8th Edition, 2012.
2. A K Kapoor, “Complex Variables Principles and Problem Sessions”, World Scientific Publishers, 1st Edition, 2011.
3. Murray Spiegel, John Schiller, “Probability and Statistics”, Schaum’s Outline Series, 3rd Edition, 2010.

VII. WEB REFERENCES:

1. http://www.efunda.com/math/math_home/math.cfm
2. <http://www.ocw.mit.edu/resourcs/#Mathematics>
3. <http://www.sosmath.com>
4. <http://www.mathworld.wolfram.com>

VIII. E-TEXT BOOKS:

1. <http://www.keralatechnologicaluniversity.blogspot.in/2015/06/erwin-kreyszig-advanced-engineering-mathematics-ktu-ebook-download.html>
2. <http://www.faadoengineers.com/threads/13449-Engineering-Maths-II-eBooks>