

IV Semester (2018-19)

18UMAC400	Engineering Mathematics-IV	(3 - 0 - 0) 3 : 39Hrs.
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Contact Hours:39

Course Learning Objectives: To provide an insight into applications of conformal mapping, integration of complex functions and application of probability distributions in Engineering.

Description of the course outcomes: At the end of course the students will be able to

CO-1	Construct and use the concepts of analytic function to solve the problems arising in Engineering field.
CO-2	Utilize conformal transformation and complex integral to transform irregular domain onto a relatively simple domain.
CO-3	Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field.
CO-4	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.
CO-5	Estimate the correlation, covariance using joint probability distributions. Also use student's t-distribution, Chi-square distribution as a test of goodness of fit .

Contents:

Chapter I

Calculus of complex functions: Review of function of a complex variable, limits, continuity, and differentiability. Analytic functions: Cauchy-Riemann equations in Cartesian and polar forms.

Construction of analytic functions: Milne-Thomson method-Problems.

8 hrs

Chapter II

Conformal transformations: Introduction. Discussion of transformations: $w = e^z$; $w = z^2$, $w = z + \frac{1}{z}$, $z \neq 0$. Bilinear transformations- Problems.

Complex integration: Line integral of a complex function, Cauchy's theorem and Cauchy's Integral theorem.

8 hrs

Chapter III

Probability Distributions: Review of basic probability theory. Random variables (discrete and continuous), probability mass/density functions. Binomial, Poisson, exponential and normal distributions-problems (No derivation for mean and standard deviation)-Illustrative examples.

8 hrs

Chapter IV

Statistical Methods: Correlation and regression-Karl Pearson's coefficient of correlation and rank correlation-problems. Regression analysis- lines of regression-problems.

Curve Fitting: Curve fitting by the method of least squares- fitting the curves of the form $y = ax + b$; $y = ax^2 + bx + c$; $y = ax^b$.

8 hrs

Chapter V

Joint probability distribution: Joint Probability distribution for two discrete random variables, expectation and covariance.

Sampling Theory: Introduction to sampling distributions, standard error, Type-I and Type-II errors. Test of hypothesis for means, student's t-distribution, Chi-square distribution as a test of goodness of fit. **8 hrs**

Text Books:

1. E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed.(Reprint) 2016.
2. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 44th Ed., 2017.
3. Srimanta Pal et al: Engineering Mathematics, Oxford University Press, 3rd Edition, 2016.

Reference books:

1. C. Ray Wylie, Louis C. Barrett : "Advanced Engineering Mathematics", 6th Edition, McGraw-Hill Book Co., New York, 1995.
2. S. S. Sastry, Introductory Methods of Numerical Analysis, Prentice Hall of India, 4th Edition 2010.
3. B. V. Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010.
4. N. P. Bali and Manish Goyal : A Text Book of Engineering Mathematics, Laxmi Publishers, 7th Ed., 2014.

Web links and Video Lectures:

1. <http://nptel.ac.in/courses.php?disciplineID=111>.
2. [http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs)).
3. <http://academicearth.org/>.

Course outcomes:

COs	Description of the course outcomes: At the end of course the students will be able to	Mapping to POs (1-12)		
		Mastering 3	Moderate 2	Introductory 1
CO-1	Construct and use the concepts of analytic function to solve the problems arising in Engineering field.			1
CO-2	Utilize conformal transformation and complex integral to transform irregular domain onto a relatively simple domain.		1	
CO-3	Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field.		1	
CO-4	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.		1,2	
CO-5	Estimate the correlation, covariance using joint probability distributions. Also use student's t-distribution, Chi-square distribution as a test of goodness of fit.		1,2	

POs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Mapping Level	1.8	2														

1 -> Introductory (Slight); 2 -> Reinforce (Moderate); 3 -> Mastering (Substantial)