

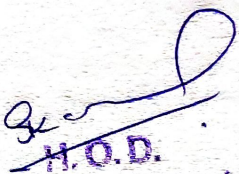
B. E. MECHANICAL ENGINEERING Outcome Based Education (OBE) and Choice Based Credit System (CBCS) SEMESTER - IV			
COMPLEX ANALYSIS, PROBABILITY AND STATISTICAL METHODS (Common to all programmes) [As per Choice Based Credit System (CBCS) scheme]			
Course Code	18MAT41	CIE Marks	40
Teaching Hours/Week (L:T:P)	(2:2:0)	SEE Marks	60
Credits	03	Exam Hours	03
Course Learning Objectives: - To provide an insight into applications of complex variables, conformal mapping and special functions arising in potential theory, quantum mechanics, heat conduction and field theory. - To develop probability distribution of discrete, continuous random variables and joint probability distribution occurring in digital signal processing, design engineering and microwave engineering.			
Module-1			
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 and consequences. Construction of analytic functions: Milne-Thomson method-Problems.			
Module-2			
Conformal transformations: Introduction. Discussion of transformations: $w = Z^2$, $w = e^z$, $w = z + \frac{1}{z}$, ($z \neq 0$). Bilinear transformations- Problems. Complex integration: Line integral of a complex function-Cauchy's theorem and Cauchy's integral formula and problems.			
Module-3			
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.			
Module-4			
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- $y = ax + b$, $y = ax^b$ and $y = ax^2 + bx + c$.			
Module-5			
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.			
Course Outcomes: At the end of the course the student will be able to: - Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory. - Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing. - Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field. - Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data. - Construct joint probability distributions and demonstrate the validity of testing the hypothesis.			
Question paper pattern:			

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- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub- questions) from each module.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Advanced Engineering Mathematics	E. Kreyszig	John Wiley & Sons	10 th Edition, 2016
2	Higher Engineering Mathematics	B. S. Grewal	Khanna Publishers	44 th Edition, 2017
3	Engineering Mathematics	Srimanta Pal et al	Oxford University Press	3 rd Edition, 2016
Reference Books				
1	Advanced Engineering Mathematics	C. Ray Wylie, Louis C. Barrett	McGraw-Hill	6 th Edition 1995
2	Introductory Methods of Numerical Analysis	S.S. Sastry	Prentice Hall of India	4 th Edition 2010
3	Higher Engineering Mathematics	B. V. Ramana	McGraw-Hill	11 th Edition, 2010
4	A Text Book of Engineering Mathematics	N. P. Bali and Manish Goyal	Laxmi Publications	2014
Web links and Video Lectures:				
1. http://nptel.ac.in/courses.php?disciplineID=111				
2. http://www.class-central.com/subject/math(MOOCs)				
3. http://academicearth.org/				
4. VTU EDUSAT PROGRAMME - 20				


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