

B. E. MECHANICAL ENGINEERING				
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)				
SEMESTER - III				
ADDITIONAL MATHEMATICS – I				
(Mandatory Learning Course: Common to All Programmes)				
(A Bridge course for Lateral Entry students under Diploma quota to BE/B. Tech. programmes)				
Course Code	18MATDIP31	CIE Marks	40	
Teaching Hours/Week (L:T:P)	(2:1:0)	SEE Marks	60	
Credits	0	Exam Hours	03	
Course Learning Objectives:				
<ul style="list-style-type: none">To provide basic concepts of complex trigonometry, vector algebra, differential and integral calculus.To provide an insight into vector differentiation and first order ODE's.				
Module-1				
Complex Trigonometry: Complex Numbers: Definitions and properties. Modulus and amplitude of a complex number, Argand's diagram, De-Moivre's theorem (without proof).				
Vector Algebra: Scalar and vectors. Addition and subtraction and multiplication of vectors- Dot and Cross products, problems.				
Module-2				
Differential Calculus: Review of elementary differential calculus. Polar curves –angle between the radius vector and the tangent pedal equation- Problems. Maclaurin's series expansions, problems.				
Partial Differentiation: Euler's theorem for homogeneous functions of two variables. Total derivatives - differentiation of composite function. Application to Jacobians of order two.				
Module-3				
Vector Differentiation: Differentiation of vector functions. Velocity and acceleration of a particle moving on a space curve. Scalar and vector point functions. Gradient, Divergence, Curl and Laplacian (Definitions only). Solenoidal and irrotational vector fields-Problems.				
Module-4				
Integral Calculus: Review of elementary integral calculus. Statement of reduction formulae for $\sin^n x$, $\cos^n x$, and $\sin^m x \times \cos^n x$ and evaluation of these with standard limits-Examples. Double and triple integrals, problems.				
Module-5				
Ordinary differential equations (ODE's): Introduction-solutions of first order and first degree differential equations: Variable Separable methods, exact and linear differential equations of order one. Application to Newton's law of cooling.				
Course Outcomes: At the end of the course the student will be able to:				
<ul style="list-style-type: none">CO1: Apply concepts of complex numbers and vector algebra to analyze the problems arising in related area.CO2: Use derivatives and partial derivatives to calculate rate of change of multivariate functions.CO3: Analyze position, velocity and acceleration in two and three dimensions of vector valued functions.CO4: Learn techniques of integration including the evaluation of double and triple integrals.CO5: Identify and solve first order ordinary differential equations.				
Question paper pattern:				
<ul style="list-style-type: none">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
Textbook				
1	Higher Engineering Mathematics	B.S. Grewal	Khanna Publishers	43 rd Edition, 2015

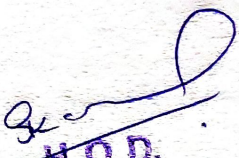
B. E. MECHANICAL ENGINEERING Outcome Based Education (OBE) and Choice Based Credit System (CBCS) SEMESTER - IV			
COMPLEX ANALYSIS, PROBABILITY AND STATISTICAL METHODS (Common to all programmes) [As per Choice Based Credit System (CBCS) scheme]			
Course Code	18MAT41	CIE Marks	40
Teaching Hours/Week (L:T:P)	(2:2:0)	SEE Marks	60
Credits	03	Exam Hours	03
Course Learning Objectives: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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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