B.E E&C FOURTH SEMESTER SYLLABUS

ENGINEERING MATHEMATICS-IV
B.E., IV Semester, Common to all Branches
[As per Choice Based Credit System (CBCS) scheme]

Subject Code	15MAT41	IA Marks	20
Number of Lecture Hours/Week	04	Exam marks	80
Total Number of Lecture Hours	50 (10 Hours per Module)		

Credits – 04

Course Objectives: This course will enable students to:

- Conversant with numerical methods to solve ordinary differential equations, complex analysis, sampling theory and joint probability distribution and stochastic processes arising in science and engineering.

Modules	RBT Level
Module-1	
Numerical Methods: Numerical solution of ordinary differential equations of first order and first degree, Taylor's series method, modified Euler's method, Runge - Kutta method of fourth order. Milne's and Adams-Bashforth predictor and corrector methods (No derivations of formulae).	L1, L3
Module-2	
Numerical Methods: Numerical solution of second order ordinary differential equations, Runge-Kutta method and Milne's method. **Special Functions:** Series solution-Frobenious method. Series solution of Bessel's differential equation leading to $J_n(x)$-Bessel's function of first kind. Basic properties and orthogonality. Series solution of Legendre's differential equation leading to $P_n(x)$-Legendre polynomials. Rodrigue's formula, problems.	L3
Module-3	
Complex Variables: Review of a function of a complex variable, limits, continuity, differentiability. Analytic functions-Cauchy-Riemann equations in cartesian and polar forms. Properties and construction of analytic functions. Complex line integrals-Cauchy's theorem and Cauchy's integral formula, Residue, poles, Cauchy's Residue theorem (without proof) and problems.	L1, L3,
Transformations: Conformal transformations, discussion of transformations: $w=z^2$, $w=e^z$, $w=z+(1/z)(z\neq 0)$ and bilinear transformations-problems.	L3
Module-4	
Probability Distributions: Random variables (discrete and continuous), probability mass/density functions. Binomial distribution, Poisson distribution. Exponential and normal distributions, problems.	L3

Joint probability distribution: Joint Probability distribution for two discrete random variables, expectation, covariance, correlation coefficient.	
Module-5	
Sampling Theory: Sampling, Sampling distributions, standard error, test of hypothesis for means and proportions, confidence limits for means, student's t-distribution, Chi-square distribution as a test of goodness of fit. **Stochastic process:** Stochastic processes, probability vector, stochastic matrices, fixed points, regular stochastic matrices, Markov chains, higher transition probability-simple problems.	L3 L1
Course Outcomes: On completion of this course, students are able to: • Solve first and second order ordinary differential equations arising in flow problems using single step and multistep numerical methods. • Understand the analyticity, potential fields, residues and poles of complex potentials in field theory and electromagnetic theory. • Describe conformal and bilinear transformation arising in aerofoil theory, fluid flow visualization and image processing. • Solve problems of quantum mechanics, hydrodynamics and heat conduction by employing Bessel's function relating to cylindrical polar coordinate systems and Legendre's polynomials relating to spherical polar coordinate systems. • Solve problems on probability distributions relating to digital signal processing, information theory and optimization concepts of stability of design and structural engineering. • Draw the validity of the hypothesis proposed for the given sampling distribution in accepting or rejecting the hypothesis. • Determine joint probability distributions and stochastic matrix connected with the multivariable correlation problems for feasible random events. • Define transition probability matrix of a Markov chain and solve problems related to discrete parameter random process.	
Question paper pattern: • The question paper will have ten questions. • Each full Question consisting of 16 marks • There will be 2 full questions (with a maximum of four sub questions) from each module. • Each full question will have sub questions covering all the topics under a module. • The students will have to answer 5 full questions, selecting one full question from each module.	
Text Books: *1. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Ed., 2015.*	

2. *E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed., 2015.*	
Reference Books: 1. *N.P.Bali and Manish Goyal: A Text Book of Engineering Mathematics, Laxmi Publishers, 7th Ed., 2010.* 2. *B.V.Ramana: "Higher Engineering Mathematics" Tata McGraw-Hill, 2006.* 3. *H. K. Dass and Er. Rajnish Verma: "Higher Engineering Mathematics", S. Chand publishing, 1st edition, 2011.*	
Web Link and Video Lectures: 1. *http://nptel.ac.in/courses.php?disciplineID=111* **2.** *http://www.khanacademy.org/* **3.** *http://www.class-central.com/subject/math*	

H. O. D.
Dept. Of Electronics & Communication
Alva's Institute of Engg. & Technology
Mijar, MOODBIDRI - 574 225