ENGINEERING MATHEMATICS –IV (Core Subject)
B.E., IV Semester, Electrical and Electronics Engineering [As per Choice Based Credit System (CBCS) scheme]

Course Code	17MAT41	CIE Marks	40
Number of Lecture Hours/Week	04	SEE Marks	60
Total Number of Lecture Hours	50	Exam Hours	03

Credits - 04

Course Objectives:
The purpose of this course is to make students well 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.■

Module-1	**Teaching Hours**
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 offormulae). ■	**10**
Revised Bloom's Taxonomy Level L_2 – Understanding, L_3 – Applying.	
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, recurrence relations and orthogonality. Series solution of Legendre's differential equation leading to $P_n(x)$-Legendre polynomials. Rodrigue's formula, problems. ■	**10**
Revised Bloom's Taxonomy Level L_2 – Understanding, L_3 – Applying.	
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. **Transformations:** Conformal transformations, discussion of transformations: $w = z^2, w = e^z, w = z + (1/z)(z \neq 0)$ and bilinear transformations-problems.■	**10**
Revised Bloom's Taxonomy Level L_2 – Understanding, L_3 – ApplyingL_4 – Analysing.	
Module-4	
Probability Distributions: Random variables (discrete and continuous),probability mass/density functions. Binomial distribution, Poisson distribution.Exponential and normal distributions, problems. **Joint probability distribution:** Joint Probability distribution for two discrete random variables, expectation, covariance, correlation coefficient. ■	**10**
Revised Bloom's Taxonomy Level L_3 – Applying.	
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-simpleproblems. ■	**10**
Revised Bloom's Taxonomy Level L_3 – ApplyingL_4 – Analysing.	

B.E ELECTRICAL AND ELECTRONICS ENGINEERING (EEE)
CHOICE BASED CREDIT SYSTEM (CBCS)
SEMESTER - IV

17MAT41 ENGINEERING MATHEMATICS – IV (Core Subject) (continued)

Course outcomes:

- Use appropriate single step and multi-step numerical methods to solve first and second order ordinary differential equations arising in flow data design problems.
- Explain the idea of analyticity, potential fields residues and poles of complex potentials in field theory and electromagnetic theory.
- Employ Bessel's functions and Legendre's polynomials for tackling problems arising in continuum mechanics, hydrodynamics and heat conduction.
- Describe random variables and probability distributions using rigorous statistical methods to analyze problems associated with optimization of digital circuits, information, coding theory and stability analysis of systems.
- Apply the knowledge of joint probability distributions and Markov chains in attempting engineering problems for feasible random events.

Graduate Attributes (As per NBA)

Engineering Knowledge, Problem Analysis, Life-Long Learning, Accomplishment of Complex Problems.

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question consisting of 16 marks.
- There will be two full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from eachmodule.

Text Books:

1	Higher Engineering Mathematics	B.S. Grewal	Khanna Publishers	43rd Edition, 2015
2	Advanced Engineering Mathematics	E. Kreyszig	John Wiley & Sons	10th Edition, 2015

Reference books:

3	A Text Book of Engineering Mathematics	N.P.Bali and Manish Goyal	Laxmi Publishers	7th Edition, 2010
4	Higher Engineering Mathematics	B.V.Ramana	McGraw-Hill	2006
5	Higher Engineerig Mathematics	H. K. Dass and Er. RajnishVerma	S.Chand publishing	First Edition, 2011

Web links and Video Lectures

1. http://nptel.ac.in/courses.php?disciplineID=111
2. http://wwww.khanacademy.org/
3. http://www.class-central.com/subject/math