B.E., III Semester, Electronics & Communication Engineering /Telecommunication Engineering

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

Subject Code	15MAT31	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:

- Introduce most commonly used analytical and numerical methods in the different engineering fields.
- Learn Fourier series, Fourier transforms and Z-transforms, statistical methods, numerical methods.
- Solve algebraic and transcendental equations, vector integration and calculus of variations.

Modules	RBT Level
Module-1	
Fourier Series: Periodic functions, Dirichlet's condition, Fourier Series of periodic functions with period 2π and with arbitrary period $2c$. Fourier series of even and odd functions. Half range Fourier Series, practical harmonic analysis-Illustrative examples from engineering field.	L1, L2, L4
Module-2	
Fourier Transforms: Infinite Fourier transforms, Fourier sine and cosine transforms. Inverse Fourier transform. **Z-transform:** Difference equations, basic definition, z-transform-definition, Standard z-transforms, Damping rule, Shifting rule, Initial value and final value theorems (without proof) and problems, Inverse z-transform. Applications of z-transforms to solve difference equations.	L2, L3, L4
Module-3	
Statistical Methods: Review of measures of central tendency and dispersion. Correlation-Karl Pearson's coefficient of correlation-problems. Regression analysis- lines of regression (without proof) –Problems **Curve Fitting:** Curve fitting by the method of least squares- fitting of the curves of the form, $y = ax + b$, $y = ax^2 + bx + c$ *and* $y = ae^{bx}$. **Numerical Methods:** Numerical solution of algebraic and transcendental equations by Regula- Falsi Method and Newton-Raphson method.	L3
Module-4	
Finite differences: Forward and backward differences, Newton's forward and backward interpolation formulae. Divided differences- Newton's divided difference formula. Lagrange's interpolation formula and inverse interpolation formula (all formulae without proof)-Problems. **Numerical integration:** Simpson's $(1/3)^{th}$ and $(3/8)^{th}$ rules, Weddle's rule (without proof)–Problems.	L3

Module-5	
Vector integration: Line integrals-definition and problems, surface and volume integrals-definition, Green's theorem in a plane, Stokes and Gauss-divergence theorem(without proof) and problems. **Calculus of Variations:** Variation of function and Functional, variational problems. Euler's equation, Geodesics, hanging chain, Problems.	L3, L4 L2, L4
Course outcomes: On completion of this course, students are able to: • Know the use of periodic signals and Fourier series to analyze circuits and system communications. • Explain the general linear system theory for continuous-time signals and digital signal processing using the Fourier Transform and z-transform. • Employ appropriate numerical methods to solve algebraic and transcendental equations. • Apply Green's Theorem, Divergence Theorem and Stokes' theorem in various applications in the field of electro-magnetic and gravitational fields and fluid flow problems. • Determine the extremals of functionals and solve the simple problems of the calculus of variations.	
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