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]

Course Code	17MAT31	CIE Marks	40
Number of Lecture Hours/Week	04	SEE Marks	60
Total Number of Lecture Hours	50 (10 Hours per Module)	Exam Hours	03

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.

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.
L3, L4

Calculus of Variations: Variation of function and Functional, variational problems. Euler's equation, Geodesics, hanging chain, Problems.
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.

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

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