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

ADDITIONAL MATHEMATICS - I

B.E., III Semester, Common to all Branches

(A Bridge course for Lateral Entry students of III Sem. B. E.)

[As per Choice Based Credit System (CBCS) Scheme]

Course Code	**17MATDIP31**	**CIE Marks**	**--**
Number of Lecture Hours/Week	**03**	**SEE Marks**	**60**
Total Number of Lecture Hours	**40 (08 Hours per Module)**	**Exam Hours**	**03**

Credits – 00

Course Objectives: This course will enable students to:

- Acquire basic concepts of complex trigonometry, vector algebra, differential & integral calculus and vector differentiation.
- Solve first order differential equations.

Module-1

Complex Trigonometry: Complex Numbers: Definitions & properties. Modulus and amplitude of a complex number, Argand's diagram, De-Moivre's theorem (without proof).

Vector Algebra: Scalar and vectors. Vectors addition and subtraction. Multiplication of vectors (Dot and Cross products). Scalar and vector triple products-simple problems. **L1**

Module-2

Differential Calculus: Review of successive differentiation. Formulae for n^{th} derivatives of standard functions- Liebnitz's theorem (without proof). Polar curves– angle between the radius vector and the tangent pedal equation- Problems. Maclaurin's series expansions- Illustrative examples. Partial Differentiation : Euler's theorem for homogeneous functions of two variables. Total derivatives-differentiation of composite and implicit function. Application to Jacobians. **L1, L2**

Module-3

Integral Calculus: Statement of reduction formulae for $sin^n x$, $cos^n x$, *and* $sin^m x\, cos^n x$ and evaluation of these with standard limits-Examples. Double and triple integrals-Simple examples. **L1, L2**

Module-4

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. **L1, L2**

Module-5

Ordinary differential equations (ODE's): Introduction-solutions of first order and first degree differential equations: homogeneous**,** exact, linear differential equations of order one and equations reducible to above types. **L1, L2**

Course outcomes: On completion of the course, students are able to:

- Understand the fundamental concepts of complex numbers and vector algebra to analyze the problems arising in related area.

- Use derivatives and partial derivatives to calculate rates of change of multivariate functions.
- Learn techniques of integration including double and triple integrals to find area, volume, mass and moment of inertia of plane and solid region.
- Analyze position, velocity and acceleration in two or three dimensions using the calculus of vector valued functions.
- Recognize and solve first-order ordinary differential equations occurring in different branches of engineering.

Text Book:

B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, New Delhi, 43rd Ed., 2015.

Reference Books:

1. E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed., 2015.

2. N.P.Bali and Manish Goyal: Engineering Mathematics, Laxmi Publishers, 7th Ed., 2007.