ENG301 Engineering Mathematics-III (2+0+0 2 Units)

- Matrices and Determinants: Matrices, some special matrices, matrix operations. Determinants and some useful theorems.

- Laplace's development. Solution of system of linear equations by determinants. Linear dependence and independence, rank of a matrix. General system of linear equations, existence and properties of solution, Gaussian elimination. Matrix inverse by elementary matrices, adjoint, and partitioning methods. Characteristic polynomial, characteristic equation, eigenvalues and eigenvectors. Diagonalization of matrices, application to system of first order linear differential equations.

- Multiple Integrals: Iterated integrals, multiple integrals over elementary regions. Change of variables, Jacobians. Differentiation of integrals involving a parameter, Leibniz's rule.

- Vector Algebra: Vector field, gradient and directional derivative, divergence, curl. Line and surface integrals, Stoke's theorem. Volume integrals, divergence theorem. Orthogonal transformations, scale factors, basis vectors. Cylindrical and spherical polar coordinate systems, gradient, divergence and curl in these systems.

- Fourier Series: periodic functions, trigonometric series. Fourier coefficients, Parsevals theorem, Functions of arbitrary period, even and odd functions. Half range expansion. Complex form of Fourier series. Integral Transform: Derivation of transforms and inverses (Fourier and Laplace). Applications of these transforms in boundary and initial value problems. Z transforms.

- Partial Differential Equations: Elementary properties of Gamma, Beta, Error, Bessel functions and Legendre polynomials. Basic concepts of partial differential equations. Classification of 2nd order linear partial differential equation into basic types. The principle of superposition. The wave, diffusion and Poisson's equations. Boundary and initial-value problems. D'Alembert's solution for wave equation. Method of separation of variables. Bi-harmonic equation.