ENG202 Engineering Mathematics II (3+0+0 3 Units)

- Partial Differentiation: Functions of several variables, continuity and partial derivatives.

- Total differentials, approximate calculations using differentials.

- Chain rule. Implicit differentiation. Series representation of functions (Maclaurin & Taylor's), Taylor's Theorem. Extremum problems, (analytic method) without and with constraints, Lagrange multipliers, global extremum.

- Ordinary Differential Equations: Definition, degree, order, linear, non-linear, solution. First order equations, separable variables, equations reducible to separable form, exact equations, integrating factors, homogenous differential equations.

- Modeling of engineering systems leading to first order differential equations- electric circuit, mixing/dilution, radioactive decay, bacterial culture.

- 2nd order differential equations with constant coefficients, homogeneous, non-homogeneous, complementary functions, particular integrals, D-operator method. General linear second-order differential equations (without using matrices).Power series solution, Legendre's differential equation.

- Modeling of engineering systems leading to 2nd order differential equations- electric circuit, Mechatronics oscillations-free and forced, resonance.

- Matrices and Determinants: 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.