BTech Preparatory Unit (BPU) in Introductory Engineering Mathematics

Syllabus

1. Fundamental topics – algebra, angles, trigonometric functions and identities, quadratic equations, inequality.

2. Matrices - terminology, addition & subtraction, multiplication, inversion, types of matrices, simultaneous equations.

3. Vectors - terminology, addition & subtraction, components of a vector, scalar product, vector product, vectors in coordinate geometry.

4. Partial Fractions - quadratic denominators with distinct roots, quadratic denominators with repeated roots, cubic denominators.

5. Complex Numbers - definition, addition, subtract, multiplication, division, Argand diagram, polar form, exponential form.

6. Limits and continuity - Limits of functions and sequences, types of limits, the sandwich theorem, evaluation of limits, continuity of functions, property of continuous functions.

7. Derivatives - Derivatives, differentiability, rules and properties. Differentiation of transcendental functions. Higher-order derivatives. Implicit differentiation. Indeterminate form, L'Hopital's rule. Curve sketching, extreme values and points of inflection. Curve tracing and function behavior.

8. Integration - Integration as antidifferentiation. Fundamental theorem of calculus. Basic rules of integration, integration of polynomial, trigonometric, exponential and logarithmic functions. Inverse functions. Integration by substitution, integration by parts.

9. Functions of Several Variables - Geometric interpretation, continuity, partial derivatives, chain rule.