

## **BTech Bridging Unit (BBU) in Introductory Engineering Mathematics**

### **Objectives**

- Introduce Matrices, Vectors and Complex Numbers with Engineering Applications.
- Introduce Limits, Differentiation and Integration with Engineering Applications.

### **Description**

- Fundamental topics – algebra, angles, trigonometric functions and identities, quadratic equations, inequality.
- Matrices – terminology, addition & subtraction, multiplication, inversion, types of matrices, simultaneous equations
- Vectors – terminology, addition & subtraction, components of a vector, scalar product, vector product, vectors in coordinate geometry.
- Partial Fractions – quadratic denominators with distinct roots, quadratic denominators with repeated roots, cubic denominators.
- Complex Numbers – definition, addition, subtract, multiplication, division, Argand diagram, polar form, exponential form.
- Limits and continuity – Limits of functions and sequences, types of limits, the sandwich theorem, evaluation of limits, continuity of functions, property of continuous functions.
- 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.
- 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.
- Functions of Several Variables – Geometric interpretation, continuity, partial derivatives, chain rule.
- Engineering applications.

### **Assessments**

- Four Assignments: 20%
- Final Examination: 80%