## Course Title: Mathematics-I (Algebra, Trigonometry and Geometry)

**Course Code: 0541-115 [PHY-115]** **Credit Hour: 03**

### (a) Rationale/Course Summary

Algebra, Trigonometry and Geometry are the foundations of mathematics. It plays an important role in engineering, physics and other disciplines. This course is designed to provide some useful and applicable ideas on set theory, Inequalities, Algebraic and trigonometric series, Geometrical problems can be solved by algebra and algebraic problems can be solved by geometry.

### (b) Course content

**Algebra:**

1. **Elements of set theory:** Sets and subsets, Set operations, Cartesian product, Relations, order relation, equivalence relation, functions, images and inverse images, Injective, Surjective and bijective functions, inverse functions.
2. **Theory of equations:** Synthetic division, number of roots of polynomial equations, relations between roots and coefficients, Descarte's rule of signs, symmetric functions of roots.
3. Summation of series, convergence and divergence of series, inequalities.

**Geometry:**

Coordinate geometry of two dimensions, General equations of the second degree, Pair of straight lines, Reduction of standard forms of the equation of circle, Parabola, Ellipse, Hyperbola, Pole and polars.

**Trigonometry:**

De Moivre's theorem and its applications, Hyperbolic functions, Summation of series including hyperbolic series.

### (c) Course Learning Outcomes (CLOs)

After successful completion of the course students will be able to

**CLO-1:** Gather sound knowledge about the image and inverse image of elements of two sets, make comparison between sets and establish relation between two sets.

**CLO-2:** Learn to solve problems related to summation of series, convergence and divergence of series, Inequalities.

**CLO-3:** Description about the coordinate geometry of two dimensions pair of straight lines and identification of Parabola, Ellipse, Hyperbola and pole and polars.

**CLO-4:** Realization and explanation of the nature of trigonometric series and hyperbolic functions to formulate new mathematical ideas.