Program : **Diploma in Engineering and Technology**	
Course Code : **1002**	Course Title: **Mathematics I**
Semester : **1**	Credits: **5**
Course Category: **Basic Science**	
Periods per week: **5 (L: 5 T: 0 P: 0)**	Periods per semester: **75**

Course Objectives:

- To provide a comprehensive coverage at an introductory level to the subject of Trigonometry, Differential Calculus and Basic elements of Algebra.

Course Prerequisites:

Topic	**Program / Course Name**
Basic concepts of Mathematics	Secondary School

Course Outcomes:

On completion of the course, the student will be able to:

COn	**Description**	**Duration (Hours)**	**Cognitive Level**
CO1	Make use of complex numbers to solve mathematical problems. Extend the use of different forms of equations of straight lines in co-ordinate geometry	20	Applying
CO2	Solve mathematical problems related to trigonometry	18	Applying
CO3	Utilize the concepts related to limits and derivatives to solve problems	20	Applying
CO4	Apply the concepts of differentiation of composite function, parametric equation, implicit function and successive differentiation to solve mathematical problems.	15	Applying
	Series Test	2	

CO--PO Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3						
CO2	3						
CO3	3						
CO4	3						

3-Strongly mapped, 2-Moderately mapped, 1-Weakly mapped

Course Outline

Module Outcomes	Description	Duration (Hours)	Cognitive Level
CO1	**Make use of complex numbers to solve mathematical problems. Extend the use of different forms of equations of straight lines in co-ordinate geometry.**		
M1.01	Outline the concepts of complex numbers and its operations.	8	Understanding.
M1.02	Classify the equation of straight lines in various forms	5	Understanding
M1.03	Explain the concept of Intersection of two lines, angle between two lines	4	Understanding
M1.04	Extend the Concept of parallel and perpendicular lines	3	Applying
Contents: **Complex Numbers:** Definition of a Complex number, conjugate of a complex number, modulus and amplitude of a complex number, polar and Cartesian representation of a complex number (Conversion from one form to another is excluded). Algebra of complex numbers (equality, Addition, Subtraction and multiplication-Simple problems only) **Co-ordinate Geometry**: Equation of straight line in various standard forms, intersection of two straight lines, angle between two lines. Parallel and perpendicular lines, perpendicular distance formula (All derivations are excluded)			
CO2	**Solve mathematical problems related to trigonometry.**		
M2.01	Explain the Concepts of angles, its units and measurements	4	Understanding
M2.02	Outline the Trigonometric Ratios of any angle	6	Understanding

M2.03	Utilize the concept of compound angles, sum, difference, product formulae and apply them in different problems.	8	Applying
	Series Test – I	1	

Contents:

Trigonometry. Concept of angles, measurement of angles in degrees and radians and their conversions. Definition of Trigonometric ratios, Trigonometric identities, Trigonometric ratios of standard angles. T-Ratios of Allied angles (without proof), Compound angles, Sum, difference formulae and their applications (without proof). T- Ratios of multiple angles (2A, 3A) (without proof) simple problems. Product formulae (Transformation of product to sum, difference and vice versa).

CO3	**Utilize the concepts related to limits and derivatives to solve problems**		
M3.01	Illustrate the Concept of Limit of a function	4	Understanding
M3.02	Explain Algebraic and Trigonometric limits	4	Understanding
M3.03	Outline the concept of Differentiation by definition and learn the derivatives of some standard functions.	5	Understanding
M3.04	Apply the Rules of differentiation in different engineering problems	7	Applying

Contents:

Limits and Differentiation I: Definition of function; Concept of limits. Limits by substitution, Algebraic and Trigonometric Limits.: $\lim_{x \to a} \frac{x^n - a^n}{x - a}$ and $\lim_{\theta \to 0} \frac{\sin\theta}{\theta}$ (simple problems only)

Differentiation by definition, x^n, sinx and cosx. List of standard derivatives (Trigonometric functions, $\sin^{-1}x$, $\cos^{-1}x$, $\tan^{-1}x$, e^x and log x)

Rules of differentiation: sum, difference, scalar multiplication, product and quotient of functions. Simple problems based on these rules.

CO4	**Apply the concepts of differentiation of composite function, parametric equation, implicit function and successive differentiation to solve mathematical problems.**		
M4.01	Explain the concept of differentiation of function of a function	6	Understanding
M4.02	Outline the concept of differentiation of parametric equations and implicit functions and apply them in related problems.	6	Applying

M4.03	Utilize the concept of differentiation in problems of Successive Differentiation upto second order.	3	Applying
	Series Test – II	1	

Contents:
Differentiation II: Differentiation of function of a function (chain rule), simple problems based on chain rule (functions of the type f[g{(h(x)}] is excluded),differentiation of implicit functions and parametric equations, simple problems on differentiation of implicit function and parametric equations. successive differentiation up to second order. Simple problems on second order differentiation.

Text / Reference:

T/R	Book Title/Author
T1	B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 40th Edition, 2007.
R1	G. B. Thomas, R. L. Finney, Calculus and Analytic Geometry, Addison Wesley, 9th Edition, 1995
R2	Reena Garg, Engineering Mathematics, Khanna Publishing House, New Delhi (Revised Ed. 2018)