

# ENGINEERING MATHEMATICS-I

<b>Subject Code</b> <b>00101</b>	<b>Theory</b>			<b>No of Period in one session : 60</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>100</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>80</b>
	<b>06</b>	<b>—</b>	<b>—</b>	<b>Internal Exam.</b>	<b>:</b>	<b>20</b>

**Rationale:**

The Subject Engineering Mathematics is being introduced into the Diploma Course to provide mathematical background to the students so that they can be able to grasp the engineering subjects properly. This course will enable them to analyse and understand the engineering problems scientifically based on Mathematics.

The subject is divided into two papers, viz. Engineering Mathematics - I and Engineering Mathematics - II. The paper Engineering Mathematics - I consists of the following:

1. Algebra
2. Trigonometry
3. Co-ordinate Geometry

The details are given in the curriculum:

**Objectives:**

By covering the course in Engineering Mathematics - I, the students will be able to:

- Know Sequence & Series, Permutations and Combinations, Binomial Theorem, Determinates and Matrices, Properties of Triangles, Solution of Trigonometrical equations, Inverse Circular functions, complex quantities, co-ordinate systems, equations of lines, circles, equations of lines in three dimensions, equation of plane,
- Understand their engineering applications.
- Solve related simple numerical problems which will enable them to understand the subject.

S.No.	Topics	Periods
01	Algebra - Sequence & Series - Principle of Mathematical Induction - Permutation and Combination - Binomial Theorem - Determinants and Their Properties - Matrix Algebra - Complex Number	(30)
02	Trigonometry - Trigonometrical ratios of compound angles up to conditional Trigonometrical Identities - Properties of Triangle - Logarithm - Solution of Triangles & General Value - Inverse Circular Function	(15)
03	Co-ordinate Geometry - Two dimensional : upto equation of circles - Three dimensional: upto straight line	(15)

**CONTENTS:**

**TOPIC: 01 - ALGEBRA:**

		Periods
01.01	Sequence & Series: Arithmetic Progression (A.P.), Simple examples of A.P., Geometrical Progression (G.P.), Sum to infinity of a G.P., Sum of Squares and cubes of a natural, idea of Harmonic Progression (H.P.), Relation between Arithmetic mean, Geometrical Mean and Harmonic mean. Insertions of AMs, GMs & HMs between two numbers.	[08]
01.02	Principle of Mathematical Induction	[02]
01.03	Permutations & Combinations: Introduction, Fundamental Principle of counting; The Factorial; Permutations, Simple practical problems on permutation; Combinations; simple practical problems on combinations.	[04]
01.04	Binomial Theorem: Binomial Theorem for positive Index, Some applications of Binomial Theorem for any Index, Idea of Exponential and Logarithmic Series. (Simple Problem).	[04]
01.05	Determinates: Determinants and their fundamental properties, simple problem, Difference between determinant and a matrix.	[02]
01.06	Matrices: - Different types of Matrices - Algebra of Matrices - Transpose, Adjoint & Inverse of Matrices - Solution of linear simultaneous equations by matrix method	[04]
01.07	Complex Numbers: Idea of a complex number, its geometrical representation, Modulus and Amplitude, Conjugate of a Complex number, Addition & Subtraction of a complex number with geometric notation, Multiplication and Division of one complex number by another with geometric representation. Idea of DeMoivre's Theorem, Roots of a Complex and Cube root of unity.	[04]
01.08	Number System: Binary, octal, Decimal & Hexadecimal system. Radix conversion. Idea of Boolean Algebra	[02]

**TOPIC: 02 - TRIGONOMETRY:**

02.01	Trigonometrical ratios of Compound angles. Trigonometrical ratios of Multiple sub-multiple angles, transformation formulae & conditional Trigonometrical identities.	[04]
02.02	Properties of Triangle: Relations between the side and angles of a triangle. Simple problems based on it.	[04]
02.03	Logarithm: Definition, Fundamental Rules and properties of Logarithms.	[02]
02.04	General Values and Inverse Functions: Formulae for all angles which have a given Sine, Cosine and Tangent. Formulae for angles both equi-sinal and equi-cosinal Inverse Circular Functions, Solution of Equations expressed in inverse notation.	[05]

**TOPIC: 03 - CO-ORDINATE GEOMETRY:**

03.01	Two Dimensional Co-ordinate Geometry	
03.01.01	Idea of cartesian and polar co-ordinate systems. Relations between them.	[01]
03.01.02	Distance between two points, section formula and Area of Triangle. Intelligent questions based on these (cartesian system only), centroid and incentre of a triangle.	[02]
03.01.03	Equations of Locus: Equation of a straight line in different forms. Angle between two straight lines and their deduction, equation of circle, simple problem.	[04]
03.02	Three Dimensional Co-ordinate Geometry	
03.02.01	Co-ordinates of a point, Distance between two points, Section formula (Cartesian system only)	[01]
03.02.02	Direction Cosines, Angle between two lines, Important deductions.	[02]
03.02.03	Plane, Projection of the join of two points on a plane, Equation of plane, Angle between two planes, Important deductions.	[02]
03.02.04	Equation of a straight line as intersection of two planes, Symmetric form of a straight line, simple problem.	[03]

**Books Recommended:**

## Engineering Mathematics - I

1.	Mathematics for Class XI Part I	-	NCERT/R. S. Aggawal/R.D.Sharma
2.	Mathematics for Class XI Part II	-	NCERT/R. S. Aggawal/R.D.Sharma
3.	Mathematics for Class XII Part I	-	NCERT/R. S. Aggawal/R.D.Sharma
4.	Mathematics for Class XII Part II	-	NCERT/R. S. Aggawal/R.D.Sharma
5.	Algebra		Dr. K.C. Sinha/ Lalgi Pd./Das & Gupta
6.	Trigonometry		Dr. K.C. Sinha/ Lalgi Pd./Das & Gupta
7.	Co-ordinate geometry		Dr. K.C. Sinha/ Lalgi Pd./Das & Gupta
8.	Solid geometry		Dr. K.C. Sinha/ Lalgi Pd./Das & Gupta

**Reference Books:**

1.	Engineering Mathematics - Part I & Part II	-	H.K. Dass, S. Chand & Co.	
2.	Polytechnic Mathematics for Diploma level	-	H.K. Dass, S. Chand & Co.	
S.No.	Scheme of Examination	Percentage	Marks	Types of Questions

1.	To test the knowledge of the subject	25%	20	Objective type question covering the entire syllabus.
2.	To test the understanding & Application of the subject	75%	60	Short and/ or long answer type

## Break-up given as under:

Alegebra	50%	40
Trigonometry	25%	20
Co-ordinate Geometry	25%	20