

# ENGINEERING MATHEMATICS-II

<b>Subject Code</b> <b>00201</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 of 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, which they will come across in their higher classes properly. The course will give them the insight to understand and analyse the engineering problems scientifically based on Mathematics.

The subject is divided into two papers - Engineering Mathematics - I and Engineering Mathematics - II. The Curriculum of Engineering Mathematics - II consists of the following broad topics:

1. Calculus
2. Vector Algebra
3. Differential Equations

The details of the above broad topics have been provided in the curriculum:

**Objectives:**

- By covering the course in Engineering Mathematics - II, the students will be able to:
- Know the basics of Differential and Integral Calculus, the meaning of limit, continuity and derivative of a single variable and their applications to engineering problems, the various methods of integration, how to solve simple ordinary differential equation of 1<sup>st</sup> and 2<sup>nd</sup> order,
- Understand their engineering application
- Solve related simple numerical problems which will help them to understand the subject.

<u>S.No.</u>	<u>Topics</u>	<u>Periods</u>
01	Calculus	(36)
02	Vector	(12)
03	Differential Equations	(12)

**CONTENTS:**

**TOPIC: 01 - CALCULUS:**

		Periods
01.01	Functions: Constants, Variables, Functions, Graphical representation of function, odd & even functions, explicit & implicit functions & other types of functions.	[02]
01.02	Limits: Definition, fundamental Theorem, important formulas. And its important deductions, Simple problems.	[02]
01.03	Continuity of a function: Left hand limit and Right hand limit. Definition of a continuous function. Simple problems to test the continuity of a function.	[02]
01.04	Differentiation of a function: Increment, Differential co-efficient, Derivatives of an algebraic, trigonometric, exponential, logarithmic and inverse functions from first principle, Differentiation of Sum, Difference, Product, Quotient of two functions, Fundamental theorems of differentiation of implicit function, parametric functions & Logarithmic differentiation.	[06]
01.05	Geometric meaning: Significance of derivative and its sign, Geometric interpretation of dy/dx, Equation of tangents and normals to a curve. Angle between two curves.	[02]
01.06	Application of dy/dx: Approximate Calculations and Small Errors interpretation of dy/dx as a rate measure, practical problems, Maximum & Minimum functions of single variable.	[04]
01.07	Successive Differentiation: Definition and Notations, the nth derivatives of some special functions. Leibnitz theorem.	[03]
01.08	Partial Differentiation: Idea of a partial differentiation, partial derivatives, successive partial derivatives, Euler's Theorem on Homogeneous Functions, Partial Differentiation of Implicit Functions, Total Differential.	[03]
01.09	Integration: Integration as inverse process of differentiation, Introduction, Integration by transformation, Integration by Substitution and Integration by parts.	[05]
01.10	The Definite integral, Properties of the definite integral. Problem of area by Integration method.	[05]
01.11	The Definite integrals as the limit of a sum	[02]

**TOPIC: 02 - VECTORS:**

02.01	Introduction to Vectors: Definition of Scalars and Vectors with example, Representation of a vector, type of vectors (Unit vector, Zero vector, negative of a vector and Equality of vectors), Addition and Subtraction of vectors, Multiplication of vectors by a scalar.	[02]
02.02	Position vector: Position vector of a Point Resolution of vectors (coplanar vectors and space vectors) : Point of Division, Centroid of triangle. Test of collinearity, coplanarity and linear dependence of vectors.	[02]
02.03	Product of two vectors: Scalar or Dot Product, Vector or Cross Product. Geometrical interpretation and their properties. Work done as a scalar product.	[04]
02.04	Product of three vectors: Scalar Product of three vectors, Vector Product of three vectors and its geometrical meaning.	[04]

**TOPIC: 03 - DIFFERENTIAL EQUATION:**

03.01	Introduction: Definition of a Differential Equation, Formation of a Differential Equation, Ordinary and Partial Differential Equation, Order and Degree of a Differential Equation.	[01]
03.02	Equation of first Order and first Degree: Solution of different types of equations: (i) Variable separable (ii) Homogeneous Equations (iii) Equation reducible to homogeneous form (iv) Linear Equations (v) Exact Differential Equations.	[07]
03.03	Linear Differential Equations: with constant coefficients of orders two: Definition, complete solution Rules for finding the complementary function. Rules for finding the particular Integral, Simple Problems.	[04]

**Books Recommended:**

Engineering Mathematics - II

1.	Mathematics for Class XI Part I	- NCERT/R. S. Aggawal
2.	Mathematics for Class XI Part II	- NCERT/R. S. Aggawal
3.	Mathematics for Class XII Part I	- NCERT/R. S. Aggawal
4.	Mathematics for Class XII Part II	- NCERT/R. S. Aggawal
5.	Calculus	- Dr. K.C. Sinha/ Laljee Pd./Das & Gupta
6.	Vector	- Dr. K.C. Sinha/ Laljee Pd./Das & Gupta
7.	Differential Equation	- Dr. K.C. Sinha/ Laljee 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.
3.	Solid Geometry	- Dr. K.C. Sinha/ Laljee Pd.

<u>S.No.</u>	<u>Scheme of Examination</u>	<u>Percentage</u>	<u>Marks</u>	<u>Types of Questions</u>
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:

Calculus	60%	48
Vector	20%	16
Differential Equation	20%	16