Course Code	Course Name	Load Distribution	(L	T	P	C)
TMA-101	ENGINEERING MATHEMATICS-I		3	1	0	4

Pre-requisite: Basic Knowledge of Mathematics

Learning Outcomes:: After completion of the course students will be able to

1. Understand the concept of matrices.
2. Solve the system of linear equations.
3. Understand the concept of differential calculus and apply to various discipline of Engineering.
4. Analyze the maximum / minimum values of functions of two or more variables with its application to engineering systems.
5. Solve the multiple integrals and apply to find the area and volumes.
6. Utilize the vector calculus in different engineering systems.

UNIT-I: Matrices **(09 Hrs)**

Elementary row and column transformations. Rank of a matrix, linear dependency and independency, Consistency of a system of linear equations, Hermitian, Skew-Hermitian, Unitary matrices, Characteristic equation, Cayley-Hamilton theorem, Eigen values and Eigen vectors, Diagonalization.

UNIT-II: Calculus **(09 Hrs)**

Leibnitz test, Cauchy Root test and Ratio test, Introduction of differential calculus, higher order derivatives, Successive Differentiation, Leibnitz's theorem, Limits, Continuity and Differentiability of two variables, Partial Differentiation, homogeneous function, Euler's theorem, Taylor's and Maclaurin's expansions of one and two variables.

UNIT-III: Differential Calculus **(09 Hrs)**

Extrema (Maxima/ Minima) of functions of two variables, method of Lagrange's multipliers. Introduction of Jacobian, properties of Jacobian, Jacobian of implicit and explicit functions, functional dependence.

UNIT-IV: Vector Calculus **(09Hrs)**

Introduction to Vectors, Gradient, Divergence and Curl of a vector and their physical interpretation, Line, Surface and Volume integrals, Green's, Stoke's and Gauss's divergence theorem (without proof).

UNIT-V: Multiple Integrals **(09Hrs)**

Introduction to integration, Double and triple integrals, Change of order of integration, Beta and Gamma functions. Applications to area, volume, Dirichlet's integral.

Reference Books:

- Ramana, B. V., "Higher Engineering Mathematics", Tata McGraw Hill publications, 2007
- C. B. Gupta, S. R. Singh and Mukesh Kumar, "Engineering Mathematics for Semesters I and II" McGraw Hill Education, First edition 2015.
- R. K. Jain, S. R. K. Iyengar, Advanced Engineering Mathematics, Narosa Publication, 2004.
- Kreyszig, Erwin., "Advanced Engineering Mathematics", 9e, Wiley Publications, 2006.