I Year I Semester	L	T	P	C
Code: 20MA1001	3	0	0	3

CALCULUS

Course Objectives:

1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

Course Outcomes: At the end of the Course, Student will be able to

1. Test the convergence of an infinite series and express a function in terms of power series.
2. Develop the ability to solve linear differential equations of first order and use the knowledge gain to certain engineering problems.
3. Develop the abili1y to solve linear differential equations of higher order and use the knowledge gain to certain engineering problems.
4. Apply techniques of multi variable differential calculus to determine the extreme and series expansions etc. of the functions of several variables.
5. Extend the concept of integration of two and three dimensions and support it through applications in engineering.

UNIT I: Sequences, Series and Mean value theorems:

Sequences and Series: Convergences and divergence-Ratio test-Comparison tests-Integral Test-Cauchy's root Test- Alternate series- Leibnitz's rule.

Mean Value Theorems (without proofs): Rolle'sTheorem-Lagrange's mean value theorem-Cauchy's mean value theorem -Taylor's Method, Maclaurin's theorems with remainders.

UNIT II: Differential equations of first order and first degree:

Linear differential equations - Bernoulli's equations- Exact equations and equations reducible to exact form

Applications: Newton's Law of cooling_- Law of natural growth and decay-Orthogonal trajectories-Electrical circuits

UNIT III: Linear differential equations of higher order:

Non-homogeneous equations of higher order, with constant coefficients -with non-homogeneous term of the type e^{ax},sinax.cosax.polynomialsinx^n,e^{ax}V(x)andx^nV(x)-Method of Variation of parameters.

Applications: LCR circuit, Simple Harmonic motion.

UNIT IV: Partial differentiation:

Introduction - Homogeneous function - Euler's theorem – Total derivative – Chain Rule-Jacobian – Functional dependence - Taylor's and Mc Laurent's series expansion of functions of two variables

Applications: Maxima and Minima of functions of two variables without constraints and Lagrange's method (with constraints).

UNIT V: Multiple Integrals:
Double and Triple Integrals - Change of order of integration - Change of variables. Applications: Finding Areas and Volumes.

Text Books:
1. B.S.Grewal, Higher Engineering Mathematics, 42nd Edition, Khanna Publishers.
2. B.V.Ramana, Higher Engineering Mathematics 2007 Edition. Tata Mc. Graw Hill Education.

Reference Books:
1. Engineering Mathematics-I:S.KelashaVali,GVenkataRao,AVPapaRao
2. Advanced Engineering Mathematics: Erwin Kreyszig, Wiley India Edition.
3. Advanced Engineering Mathematics: Michael Greenberg, Pearson.