

(Proposed from A.Y 2018-2019)

NIRMA UNIVERSITY
Institute of Technology
(B. Tech. All Programmes)
(Semester I)

L	T	P	C
3	1	0	4

Course Code	MA102
Course Title	Calculus and Differential Equations

Course Learning Outcomes (CLO)

At the end of the course, students will be able to-

1. apply differential and integral calculus to solve engineering problems,
2. use power series to solve differential equations appears in engineering filed,
3. deal with functions of several variables that are essential in engineering.

Syllabus:

Unit 1 Calculus

Teaching hours:

7

Evaluation of definite and improper integrals, Beta and Gamma functions and their properties, Applications of definite integrals to evaluate surface areas and volumes of revolutions

Unit 2 Infinite Series

Teaching hours: 7

Convergence of series, tests for convergence, power series, Taylor's and Maclaurin's series. Series for exponential, trigonometric and logarithmic functions

Unit 3 Multivariable Calculus: Differentiation

Teaching hours:

7

Limit, continuity and partial derivatives, total derivative and chain rule, Euler's theorem, Taylor's series in two variables, Tangent plane and normal line, Maxima, minima and saddle points Method of Lagrange multipliers

Unit 4 Multivariable Calculus: Integration

Teaching hours:

9

Multiple Integration: double and triple integrals (Cartesian and polar), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes by (double integration) Center of mass and Gravity (constant and variable densities).

Unit 5 Ordinary Differential Equations

Teaching hours:

10

Second order linear differential equations with constant coefficients, Cauchy-Euler

equation; Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties

**Unit 6 Partial Differential Equations: First Order
5**

Teaching hours:

First order partial differential equations, solutions of first order linear and non-linear PDEs

Tutorials:

This shall consist of at least 8 tutorials based on the syllabus.

Self-Study:

Self-study contents will be declared at the commencement of the semester. Around 10% of the questions will be asked from the self-study contents.

Suggested Readings:

1. G B Thomas and R L Finney, Calculus and Analytic geometry; Pearson
2. T Veerarajan, Engineering Mathematics; McGraw-Hill
3. B V Ramana, Higher Engineering Mathematics; McGraw-Hill
4. N P Bali and M Goyal, A text book of Engineering Mathematics; Laxmi Publications
5. B S Grewal, Higher Engineering Mathematics; Khanna Publishers
6. E Kreyszig, Advanced Engineering Mathematics; John Wiley & Sons
7. W E Boyce and R C DiPrima, Elementary Differential Equations and Boundary Value Problems; Wiley India
8. S L Ross, Differential Equations; Wiley India
9. E A Coddington, An Introduction to Ordinary Differential Equations; Prentice Hall India
10. E L Ince, Ordinary Differential Equations; Dover Publications
11. G F Simmons and S G Krantz, Differential Equations; McGraw Hill

L = Lecture, T = Tutorial, P = Practical, C = Credit