

**NIRMA UNIVERSITY**  
**Integrated B. Tech. (CSE)-MBA programme**  
**Term - III**

L	T	P	C
3	1	0	4

<b>Course Code</b>	CSI0302
<b>Course Title</b>	Differential Equations

**Course Outcomes:**

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

1. apply techniques of differential equations in modeling to solve engineering problems
2. recognize and use the appropriate method to solve second order ordinary differential equations
3. use power series to solve differential equations related to engineering field
4. classify partial differential equations and apply appropriate analytic method to solve it

**Syllabus:**

**Teaching  
Hours:30**

**Unit I**

12

**Ordinary Differential Equations:** Introduction, Formation of ordinary differential equation, First order and first degree differential equations, Linear differential equations of higher order with constant coefficients, Complementary function, Particular integral, Method of undetermined coefficients, Method of variation of parameters, Higher order linear differential equations with variable coefficients (Cauchy's and Legendre's forms), Simultaneous linear differential equations and related applications,

**Unit II**

10

**Series Solution of Ordinary Differential Equations:** Power series solutions near an ordinary point, Legendre polynomials, Regular singular points, Power series solutions near a Regular singular point, Bessel functions of the first kind and their properties

**Unit III**

8

**Partial Differential Equations:** First order partial differential equations and its formation, solutions of first order linear and non-linear partial differential equations, Method of separation variables and solution of heat equation.

**Tutorials:**

This shall consist 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<sup>^</sup>:**

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

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

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<sup>^</sup>this is not an exhaustive list