

COURSE NAME: ADVANCED DIFFERENTIAL EQUATION I
COURSE CODE: MAT: 504
SYLLABUS

Existence and nature of solutions

Introduction, order, degree and Exactness of differential Equation, Picard's theorem.

General theory of Linear Differential Equation

Basic Concept, Linear Differential Equation and its Properties, Existence and Uniqueness theorem, Trajectories, Variation of Parameters, Ordinary Points, Regular and Singular points, Two Space System, Autonomous System, Critical points, Limit Cycles. Uniqueness Theorem, Characteristic Equation and Characteristic Values, Boundary Condition and Fourier's Convergence Theorem.

Integral curves and Damped Oscillations

Integral Curves, Singular points, Critical Point, Node, Saddle Point, Damped Oscillation, Fundamental Existence Theorem, Stability, Lyapunov Function, Differential Equations with Periodic Solution, Method of Bogoliubov and Krylov.

Special functions

Chebyshev Polynomials, Legendre Polynomials, Bessel Functions and Hermite Polynomials, Leguerre Polynomials.

REFERENCES

1. Earl A. Coddington (1961). An Introduction to Ordinary Differential Equations, Dover Publications.
2. Lawrence C. Evans (2010). Partial Differential Equations. (2nd edition). American Mathematical Society.
3. Daniel A. Murray (2003). Introductory Course in Differential Equations, Orient.
4. Ian.N.Sneddon, (2006), Elements of Partial Differential Equation, Dover Publications.
5. M.D. Raisinghania,(2021). Ordinary and Partial Differential equation (20th Edition), S. Chand.
6. K.S. Rao, (2011). Introduction to Partial Differential Equations (3rd edition), Prentice Hall India Learning Private Limited,

SUGGESTED READINGS

1. Erwin Kreyszig (2011). Advanced Engineering Mathematics (10th edition). Wiley.
2. Daniel A. Murray (2003). Introductory Course in Differential Equations, Orient.
3. B. Rai, D. P. Choudhury & H. I. Freedman (2013). A Course in Ordinary Differential Equations (2nd edition). Narosa.
4. Shepley L. Ross (2007). Differential Equations (3rd edition), Wiley India.
5. George F. Simmons (2017). Differential Equations with Applications and Historical Notes (3rd edition). CRC Press. Taylor & Francis.