SIDDHARTHA
ACADEMY OF HIGHER EDUCATION
An Institution DEEMED TO BE UNIVERSITY
(Under Section 3 of UGC Act, 1956)
Kanuru, Vijayawada - 520 007, AP. www.vrsiddhartha.ac.in

24MA102 - DIFFERENTIAL EQUATIONS AND NUMERICAL METHODS

COMMON TO ALL BRANCHES

(AI&DS/AI&ML/CE/CSE/ECE/EEE/EIE/IT/ME)

COURSE OUTCOMES	
Upon successful completion of the course, the student will be able to:	
CO1	Apply suitable approaches to solve first order and first degree ordinary differential equations with engineering applications [K3]
CO2	Solve higher order ordinary linear differential equations with engineering applications [K3]
CO3	Solve the partial differential equations[K3]
CO4	Use iterative methods for solving algebraic & transcendental equations and compute the functional values by polynomial interpolation[K3]
CO5	Apply numerical methods to solve initial and boundary value problems [K3]

COURSE CONTENT

UNIT I - Differential Equations of First Order **[T1]**

Linear equations, Bernoulli's equation, Exact equations, Equations reducible to exact equations, Newton's Law of cooling, Law of growth and decay

UNIT II - Higher Order Linear Differential Equations with Constant Coefficients **[T1]**

Definitions, Working procedure to solve the equation, Wronskian, Method of variation of parameters, Simultaneous linear equations, Electrical circuits

UNIT III - Partial Differential Equations **[T1]**

Introduction, Formation of partial differential equations, Solutions of a linear equation of the first order using Lagrange's method, Homogeneous linear partial differential equations with constant coefficients: Working procedure to solve the equation.

UNIT IV - Numerical Methods and Interpolation **[T1]**

Root finding methods: Bisection method,Method of Iteration,Newton-Raphson method

Interpolation: Introduction, Finite Differences, relation between the operators, Newton's interpolation formulae: forward and backward differences, Interpolation with unequal intervals: Lagrange's and Newton's divided difference formulae

UNIT V - Initial and Boundary value problems **[T1]**

Numerical Solution of ordinary differential equations: Taylor's series, Euler's, modified Euler's and 4th order Runge-Kutta methods, Elliptic partial differential equations: Laplace's and Poisson's equations

TEXT BOOKS

[1]. Grewal B. S. (2017). Higher Engineering Mathematics. (44th Edition).Khanna Publishers.
[2]. Sankara Rao K (2014). Numerical Methods for Scientists and Engineers.(3rd Edition). PHI Learning Private Limited. .

REFERENCE BOOKS

[1]. Kreyszig Erwin.(2013). Advanced Engineering Mathematics.(9th Edition).Wiley Publishers.
[2]. Ramana B.V.(2007). Higher Engineering Mathematics.Tata Mc.Graw Hill.
[3]. Sastry S.S. (2012). Introductory Methods of Numerical Analysis.(5th Edition). PHI Learning Private Limited.