B S 303 MT as per AICTE model

University College of Engineering(A) With effect from the academic year 2019 – 2020

MATHEMATICS-III

(PDE AND NUMERICAL METHODS)

(ECE)

Instruction :	4 Periods per week (3 Theory + 1 Tutorial)
Duration of SEE:	3 Hours
SEE:	70 Marks
CIE:	30 Marks
Credits :	4

Course Objectives :

- Apply general methodology to solve linear first order and second order partial differential equations.
- To study the classification of second order partial differential equations and solve them by using separation of variables methods
- To introduce a few numerical methods to solve non linear equations and system of linear equations
- To provide the necessary basic concepts of numerical differentiation, numerical integration and differential equations

Course Outcomes : After completion of this course the students able to

- find solutions of the heat equation, wave equation, and the Laplace equation subject to boundary conditions.
- solve non linear equations, system of linear equations and differential equations numerically.
- perform numerical differentiation and numerical integration

Unit-I: Definition of Partial Differential Equations, First order partial differential equations, Solutions of first order linear PDEs , Solution to homogenous and non-homogenous linear partial differential equations of second order by complimentary function and particular integral method.

Unit-II: Second-order linear equations and their classification, Initial and boundary conditions, D'Alembert's solution of the wave equation, Heat diffusion and vibration problems, Separation of variables method to Solve simple problems in Cartesian coordinates. The one dimensional diffusion equation and its solution by separation of variables.

Unit III: Bisection method, Newton-Raphson method, Solution of linear system of equations-Gauss elimination method, LU decomposition method, Gauss-Jacobi and Gauss-Seidel iteration methods.

UNIT-IV: Interpolation, Lagrange's interpolation, Newton's divided difference interpolation, Newton's Forward and Backward difference interpolations. Numerical differentiation, Interpolation approach, Numerical integration-Trapezoidal rule,Simpson's 1/3 rule,

UNIT-V: Taylor's series method, Euler's method, Picard's method of successive approximations, Runge-Kutta method of 4th order.

Textbooks/References:

1. R.K.Jain & S.R.K Iyengar, Advanced Engineering Mathematics, Narosa Publications,

   4th Edition 2014.

2. B.S.Grewal, Higher Engineering Mathematics, Khanna Publications, 43rd Edition.

3. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

4. M.K.Jain,S.R.K.Iyengar and R.K.Jain, Numerical methods for scientific and engineering computation ,6th edition , New Age International Limited., 2012.

5 .S.S.Sastry, Introductory Methods of Numerical Analysis, 5th edition , PHI Private Limited, 2012.