PVP-19

COMPUTATIONAL METHODS

Course Code	19ME2501A	**Year**	III	**Semester**	I
Course Category	IDE-I	**Branch**	**ECE**	**Course Type**	Theory
Credits	3	**L-T-P**	3-0-0	**Prerequisites**	Nil
Continuous Internal Evaluation:	30	**Semester End Evaluation**:	70	**Total Marks:**	100

Course Outcomes	
After successful completion of the course, the student will be able to	
CO1	Solve System of equations using direct and iterative methods
CO2	Solve Boundary and characteristic Value Problems
CO3	Approximate linear and nonlinear curve using regression analysis
CO4	Find a numerical solution to partial differential equations
CO5	Apply finite difference scheme to solve parabolic and hyperbolic partial differential equations

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3-High, 2: Medium, 1:Low)

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2										2	2	
CO2	3	2										2	2	
CO3	3	2										2	2	
CO4	3	2										2	2	
CO5	3	2										2	2	
Average* (Rounded to nearest integer)	3	2										2	2	

SYLLABUS

Unit No.	Contents	Mapped CO
I	**Introduction to numerical methods applied to engineering problems:** Examples, solving Sets of equations– Matrix notation– Determinants and inversion– Iterative methods–Relaxation methods– Systems of non-linear equations.	CO1
II	**Boundary value problems and characteristic value problems:** Shooting method– Solution through a set of equations –Derivative boundary conditions– Characteristic value problems.	CO2
III	**Curve fitting and approximation of functions:** Least square approximation fitting of non- linear curves by least squares –regression analysis- multiple linear regression, non-linear regression.	CO3
IV	**Numerical solutions of partial differential equations:** Laplace's equations – Representations as a difference equation – Iterative methods for Laplace's equations – Poisson equation – Examples – Derivative boundary conditions – Irregular and non – rectangular grid.	CO4

V	**Parabolic partial differential equations:** Explicit method– Crank-Nicolson method– Derivative boundary condition–Stability and convergence criteria. **Hyperbolic partial differential equations:** Solving wave equation by finite differences- stability of numerical method–method of characteristics-wave equation in two space dimensions.	CO5

Learning Resources
Text Book(s)
1. Steven C.Chapra, Raymond P.Canale, "Numerical Methods for Engineers", Tata Mc- Graw hill,, Fifth edition. 2. Curtis F.Gerald, Partick.O.Wheatley, "Applied numerical analysis" Pearson Education –Sixth Edition.2002
Reference Book(s)
1. Ward cheney & David Kincaid "Numerical mathematics and computing" Brooks/ cole publishing company 1999, fourth edition. 2.Riley K.F.M.P.Hobson & Bence S.J, "mathematical methods for physics and engineering" Cambridge university press, 1999.
e- Resources & other digital material
1. https://www.nptel.ac.in/courses/111/107/111107105/ 2. https://www.nptel.ac.in/courses/111/105/111105041/ 3. https://www.nptel.ac.in/courses/111/106/111106112/ 4. https://www.nptel.ac.in/courses/111/105/111105090/