Computational Methods

Course Code	19IT2501C	**Year**	III	**Semester**	I
Course Category	Inter Disciplinary Elective-I	**Branch**	EEE	**Course Type**	Theory
Credits	3	**L-T-P**	3-0-0	**Prerequisites**	C Language
Continuous Internal Evaluation :	30	**Semester End Evaluation:**	70	**Total Marks:**	100

Course Outcomes		
Upon Successful completion of course, the student will be able to		**BloomsTaxonomy Level**
CO1	Solve System of equations using direct and iterative methods	L2
CO2	Solve Boundary and characteristic Value Problems	L2
CO3	Approximate linear and nonlinear curve using regression analysis	L2
CO4	Find a numerical solution to partial differential equations	L3
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)														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO 9**	**PO1 0**	**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	

UNIT No.	Contents	Mapped COs
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:**	CO5

	Solving wave equation by finite differences- stability of numerical method– method of characteristics-wave equation in two space dimensions.	

Learning Recourse(s)
Text Book(s)
1.StevenC.Chapra,RaymondP.Canale"NumericalMethodsforEngineers"TataMc- Grawhill,,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/colepublishingcompany1999,fourthedition. 2. Riley K.F.M.P.Hobson &BenceS.J," mathematical methods for physics and engineering" Cambridgeuniversitypress,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/