PDA COLLEGE OF ENGINEERING, KALABURGI

SYLLABUS FOR 2024-2025

I Semester M.Tech(Structural Engg, Env. Engg, Thermal Engg, Production Engg & Material sc)

COMPUTATIONAL METHODS

Course Code:24PMAT11A	CIE Marks:50
Contact Hours/week:03	SEE Marks:50
Total Hours:40	Exam Hours:03
Semester: I	Credits:03(3:0:0)

Course Learning Objectives: This course will enable the students:

- To enhance the problem-solving skills of engineering students using an extremely powerful problem-solving tool namely numerical method.
- To understand the system of equations, non-linearities and complicated geometries that are not uncommon in engineering practice and that are often impossible to solve analytically.

Course content:

Module-I

Linear Algebra: Solution of System of Linear Algebraic equations by triangularization method: Crout's method, Cholesky method, Partitions method, Gauss Jacobi, Gauss- Sidel's method and Power method for eigen values and eigen vectors.(RBT Levels:L2&L3)
[8 hours]

Module-II

Roots of equations: Muller method, Graeffe's root squaring method. Numerical solution of ordinary differential equation by Picards method of successive approximation, first order simultaneous equation by Picard and Runge-Kutta method. Second order equation by Picard's method.
.(RBT Levels:L2&L3) [8 hours]

Module-III

Partial Differential Equations: Numerical solution of one dimensional wave equation, Heat equation,(Schmidt's explicit formula) & Laplace equation (Gauss-Seidel process) by finite difference schemes. Illustrative examples on each method.
.(RBT Levels:L2&L3) [8 hours]

Module-IV

Probability distribution: Random variables , probability mass and probability distribution function, Probability distributions: Binomial ,Normal and Gaussian distributions & examples.
.(RBT Levels:L2&L3) [8 hours]

Module-V

Sampling Theory: Testing of hypothesis: t-distribution test, Chi square test and F-test. Analysis of Variance (ANOVA):one way classification, Design of experiments, RBD.
.(RBT Levels:L2&L3) [8 hours]

Course Outcomes:

At the end of this course, students will be able to:

CO1. Acquire the idea of significant figures, types of errors during numerical computation and Solve system of linear equations using direct and iterative methods.

CO2. Learn various numerical methods to solve system of linear deferential equations

CO3. Analyze and solve PDE's related to wave equation arising in vibration analysis

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CO4. Describe the basic notions of discrete and continuous probability distributions

CO5. Understand statistical and probabilistic concepts required to test the hypothesis and designing the experiments using RBD.

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Reference Books:

1.S.S .Shastry, Introductory Methods of Numerical Analysis , PHI, 2005.

2.David C. Lay, "Linear Algebra and its applications", 3rd Edition , Pearson Education, 2002.

3.T.Veerarajan "Probability, Statistics and Random Process", 3rd Edition, Tata Mc-Graw Hill Co.,2016

4.Kenneth Hoffman and Ray Kunze, "Linear Algebra", 2nd Edition,PHI, 2011

5.B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers,44Th Ed,2017

6.E.Kreyszig, "Advanced Engineering Mathematics", 10th edition, Wiley,2015.