23MA807 ADVANCED NUMERICAL METHODS 3-1-0-4

Course objective:

Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems.

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PROGRAM SPECIFIC OUTCOMES: At the end of the program, the student will be able to:

PSO1	Apply the knowledge of mathematical concepts in interdisciplinary fields.
PSO2	Understand the nature of abstract mathematics and explore the concepts in further details.
PSO3	Model the real-world problems in to mathematical equations and draw the inferences by finding appropriate solutions.
PSO4	Identify challenging problems in mathematics and find appropriate solutions.
PSO5	Pursue research in challenging areas of pure/applied mathematics.
PSO6	Employ confidently the knowledge of mathematical software and tools for treating the complex mathematical problems and scientific investigations.
PSO7	Continue to acquire mathematical knowledge and skills appropriate to professional activities and demonstrate highest standards of ethical issues in mathematics.
PSO8	Comprehend and write effective reports and design documentation related to mathematical research and literature, make effective presentations.
PSO9	Qualify national level tests like NET/GATE etc.
PSO10	Effectively communicate and explore ideas of mathematics for propagation of knowledge and popularization of mathematics in society.

Unit I

Approximation and Errors in computing

Approximation and Errors in computing: Introduction, Significant digits, Inherent error, Rounding error, Truncation error, Absolute and relative error, Error propagation.

Unit II

Roots of Non-Linear Equations and solution of system of Linear Equations

Roots of Non-Linear Equations and solution of system of Linear Equations: Bisection method, False position Method, Newton-Raphson Method, fixed – point method, Muller's

method for complex and multiple roots, convergence of Bisection, Newton- Raphson's and False position methods, Gauss Elimination method by pivoting, Gauss – Jordan method, Gauss – Seidel method, Relaxation method, convergence of iteration methods.

Unit III

Difference Operators & Interpolation

Difference Operators & Interpolation: Forward and Backward difference operators and table, Interpolation with equidistant point, Lagrange Interpolation Polynomial, Newton Interpolating Polynomial using divided Difference Table.

Unit IV

Numerical Differentiation and Integration

Numerical Differentiation and Integration: Differentiating continuous functions, differentiating tabulated functions, Higher order derivatives, Richardson's Extrapolation, Newton – cotes integration formula, Trapezoidal rule, Simpson's rule, Boole's rule and Weddle's rule, Romberg's Integration.

Text Books

B.S. Grewal, "Numerical Methods in Engineering & Science", Khanna Publication, Ed. 9th.

E. Balagurusamy , "Numerical Method", Tata McGraw Hill Publication.

S.S. Sastry, "Introductory Methods of Numerical Analysis", PHI learning Pvt. Ltd.

Evaluation Pattern:

Internal Assessment:	Midterm exam:	1 x 30	= 30
	Quizzes, assignments, etc:		= 20
			50
End-semester Examination:			= 50
			100