

UNIVERSITY OF MADRAS
M.Sc. DEGREE PROGRAMME IN MATHEMATICS
SYLLABUS WITH EFFECT FROM 2023-2024

Titleofthecourse		NUMERICAL METHODS WITH C++ PRACTICALS					
PaperNumber							
Category	Elective	Year	I	Credits	3	Course Code	428E2F
		Semester	II				
CourseOutline		<p>UNIT-I: The solution of Nonlinear Equations $f(x)=0$ Iteration for solving $x=g(x)$ – Bracketing methods for locating a root – Initial approximations and convergence criteria – Newton-Raphson and secant methods- Aitken’s and Steffensen’s and Muller’s methods</p>					
		<p>UNIT -II : The solution of Linear systems $AX= B$ Upper triangular linear systems-Gaussian elimination and pivoting-Matrix inversion- Triangular factorization- Interpolation-Lagrange approximation – Newton polynomials</p>					
		<p>UNIT-III: Numerical Differentiation, Integration and optimization Approximating a derivative – Numerical differentiation formulae – quadrature – Composite trapezoidal and Simpson’s rule – recursive rules – Romberg Integration – Minimisation of a function.</p>					
		<p>UNIT – IV :Solution of Differential Equations Differential Equations – Euler’s method – Heun method- Taylor series method – Runge-Kutta methods – Predictor-Corrector methods.</p>					
		<p>UNIT-V:Solution to Partial differential methods Hyperbolic equations – Parabolic equations – Elliptic equations.</p>					
Recommended Text		John H.Mathews, Numerical Methods for Mathematics, Science and Engineering (2 nd Edn.), Prentice Hall, New Delhi, 2000					
ReferenceBooks		<p>1.Gerald, C.F. and Wheatley, P.O. (1994) : Applied Numerical Analysis, Addison Wesley, New York, 5th Ed. 2.Press, W.B., Flannery, S. Teuddsky and Vetterling, W. (1989) : Numerical Recipes in C : The art of Scientific computing. Rev. 1st ed., Cambridge University Press. 3.Rice, John, R. (1983) : Numerical Methods, Software and Analysis McGraw Hill, New York. 4.Atkinson, K.E. (1978) : An introduction to Numerical Analysis, Wiley & Sons, New York. 5.Sastry, S.S. (1987) : Introductory methods of numerical analysis, Prentice Hall of India, New Delhi, (10th printing).</p>					