BLOW UP SYLLABUS

Course Name: Numerical Methods: CSE Stream

Course Code: 1BMATS201 (Effective from the academic year 2025-26)

Topics	Topics To be Covered	Remarks
Module-1: Introduction to Numerical Methods(8 Hrs Theory) + (4 Hrs Tutorials)		
Errors and their computation: Round off error, Truncation error, Absolute error, Relative error and Percentage error. Solution of algebraic and transcendental equations: Bisection, Regula-Falsi, Secant and Newton-Raphson methods.	No restrictions	No questions on convergence of roots
Module-2: Numerical solutions for system of linear equations (8Hrs Theory) + (4Hrs Tutorials)		
Norms: Vector norms and Matrix norms-L1, L2 and L_∞, Ill conditioned linear system, condition number. Solution of system of linear equations: Gauss Seidel method and LU-decomposition method. Eigenvalues and Eigen vectors: Rayleigh power method, Jacobi's method	No restriction.	No questions on error analysis
Module-3: Interpolation(8Hours Theory) + (4Hours Tutorials)		
Finite differences, interpolation using Newton Gregory forward and Newton Gregory backward difference formulae, Newton's divided difference. Lagrange interpolation formulae, piecewise interpolation-linear and quadratic.	Only problems on mentioned methods without any analysis Inverse Lagrange's interpolation is not a part of the syllabus.	Only numerical problems without analysis.
Module-4: Numerical Methods - 1 (8Hours Theory) + (4Hours Tutorials)		
Linear and Bernoulli`s differential equations. Exact and reducible to exact differential equations with integrating factors on $\frac{1}{N}\left(M_y - N_x\right)$ and	Only introduction of Linear Differential equations. No restriction on other topics.	Problems from linear differential equations should not be asked in SEE as it was already in PUC syllabus.

$\frac{-1}{M}(M_y - N_x)$. Homogeneous and non-homogeneous Differential equations of higher order with constant coefficients. Inverse differential operators - e^{ax}, sin(ax+b), cos(ax+b) and x^n.		
Module-5: Numerical Integration and Numerical Solution of Differential Equations (8Hours Theory + 4Hours Tutorial)		
Numerical integration: Trapezoidal, Simpson's 1/3rd, Simpson's 3/8th rule and Weddle's rule. Numerical solution of ordinary differential equations of first order and first degree - Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor-corrector method.	In Modified Euler's method Two step problems should be covered. In Runge-Kutta method of fourth order, only one step to be covered.	

Suggested Learning Resources: (Textbook/Reference Book):

Textbooks:

1. M.K. Jain, S.R.K. Iyengar and R.K. Jain, *Numerical Methods for Scientific and Engineering Computation*, New Age International Publishers, 8thEd., 2022.
2. David C Lay, *Linear Algebra and its Applications*, Pearson Publishers, 5th Ed., 2023.
3. B. S. Grewal, *Higher Engineering Mathematics*, Khanna Publishers, 44thEd., 2021.

Reference books:

1. V.Ramana, HigherEngineeringMathematics,McGraw-HillEducation,11thEd., 2017
2. N. P.BaliandManishGoyal, ATextbookofEngineeringMathematics,Laxmi Publications, 10th Ed., 2022.
3. S. S. Sastry, Introductory Methods of Numerical Analysis,PHI Learning Private Limited, 5thEd.2012.
4. Steven V. Chapra and Raymond P. Canale, Applied Numerical Methods with Matlab for Engineers and Scientists, McGraw-Hill, 3rd Ed., 2011.
5. Richard L. Burden, Douglas J. Faires, A. M. Burden, Numerical Analysis, 10th Edition.,2010, Cengage Publishers.