COURSE INFORMATION SHEET

Course code: MA24202
Course title: Numerical Methods Lab.
Pre-requisite(s): MA24201 Numerical Methods
Co- requisite(s): ---
Credits: L: 0 T: 0 P: 2 C:1
Class schedule per week: 2 Sessional
Class: BTech
Semester / Level: III-IV / 2
Branch: All
Name of Teacher:

Course Objectives: This course enables the students to

1.	execute appropriate numerical methods to solve algebraic and transcendental equations correct up to some certain level of significance
2.	solve linear system of equations using direct and iterative methods
3.	approximate a function by polynomial using various interpolation techniques along with computation of derivatives and integrals
4.	compute numerical solutions of initial value problems
5.	handle numerical problems efficiently through programming languages like C, C++ etc. on computer

Course Outcomes: After the completion of this course, students will be able to

CO1	employ numerical techniques to solve algebraic and transcendental equations
CO2	analyze and implement numerical methods for solving systems of linear equations
CO3	construct numerical approximations of functions using interpolation techniques
CO4	compute derivatives and definite integrals using numerical differentiation and integration methods
CO5	develop solutions of ordinary differential equations using appropriate numerical schemes

MA 24202 **Syllabus**
Numerical Methods Lab. **(0-0-2-1)**

List of Assignments

Write a program to

1. find a simple root of $f(x) = 0$ using Bisection method. Read the end points of the interval in which the root lies, maximum number of iterations and error tolerance eps.
2. find a simple root of $f(x) = 0$ using Regula-Falsi method. Read the end points of the interval in which the root lies, maximum number of iterations and error tolerance eps.
3. find a simple root of $f(x) = 0$ using Secant method. Read the end points of the interval in which the root lies, maximum number of iterations and error tolerance eps.
4. find a simple root of $f(x) = 0$ using Newton Raphson method. Read any initial approximation, maximum number of iterations and error tolerance eps.
5. find the solution of a system of linear equations using Gauss elimination method.
6. find the solution of a system of linear equations using Gauss-Jordan method.
7. find the solution of a system of linear equations using Jacobi method.
8. find the solution of a system of linear equations using Gauss-Seidel method.
9. approximate the function using Lagrange interpolation formula.
10. approximate the function using Newton divided difference formula.
11. approximate the function using Newton's forward and backward interpolation formulae.
12. evaluate the integral using Trapezoidal rule.
13. evaluate the integral using Simpson's one-third and three-eighth rules.
14. solve an IVP, $\frac{dy}{dx} = f(x, y), y(x_0) = y_0$ using Euler method.
15. solve an IVP, $\frac{dy}{dx} = f(x, y), y(x_0) = y_0$ using the classical Runge-Kutta fourth order method.

Textbooks

1. Jain M.K, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age Publications, 2004.
2. S.S. Sastry, Introductory Methods of Numerical Analysis, PHI, Fourth Edition, 2005.
3. Y. Kanetkar, Let Us C, BPB Publications, Fifteenth Edition, 2016.

Reference Books

1. S.C. Chapra and R. P. Canale, Numerical Methods for Engineers, McGraw Hill, Seventh Edition, 2014.
2. R. W. Hamming, Numerical Methods for Scientists and Engineers, Second Edition, Dover Publications Inc. 1987.
3. H. Schildt, C++: The Complete Reference, McGraw-Hill Education, Fourth Edition, 2017.