COURSE INFORMATION SHEET

Course code: MA24202
Course title: Numerical Methods Lab
Pre-requisite(s): NIL
Co- requisite(s): ---NIL
Credits: L: 0 T: 0 P: 2 C:1
Class schedule per week: 2 sessional
Class: BE
Semester / Level: III / UG
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 homogenous and non homogeneous equations in computer
3.	approximate a function by polynomial using various interpolation techniques
4.	compute numerical solution of initial value problems and boundary value problems
5.	handle numerical problems efficiently by programming language like C, C++ on computer

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

CO1	solve algebraic and transcendental equation using an appropriate numerical method arising in various engineering problems efficiently
CO2	solve linear system of equations using an appropriate numerical method arising in computer programming, chemical engineering problems etc efficiently
CO3	Approximate a function using an appropriate numerical method in various research problems up to desired level of accuracy
CO4	evaluate definite integral using an appropriate numerical method in various practical problems
CO5	Solve different types of differential equations numerically

Syllabus

MA 24202 Numerical Methods Lab

(0-0-2-1)

List of Assignments

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. Solution of a system of linear equations using Gauss elimination method.
6. Matrix inversion and solution of a system of linear equations using Gauss-Jordan method.
7. Program to solve a system of linear equation using Jacobi iteration method.
8. Program to solve a system of linear equation using Gauss-Seidel method.
9. Program for Lagrange interpolation.
10. Program for Newton divided difference.
11. Program for Newton's forward and backward interpolation.
12. Program to evaluate the integral using Trapezoidal rule.
13. Program to evaluate the integral using Simpson's rule.
14. Program to solve an IVP, $\frac{dy}{dx} = f(x, y), y(x_0) = y_0$ using Euler method.
15. Program to solve an IVP, $\frac{dy}{dx} = f(x, y), y(x_0) = y_0$ using the classical Runge-Kutta fourth order.

Text Books

1. Jain M.K.: Numerical Methods for Scientific and Engineering Computation, New Age Publication.
2. Sastry S.S.: Introductory Methods of Numerical Analysis, PHI
3. Yashavant Kanetkar: Let Us C, BPB Publications

Reference Books

1. Chapra S.C. and Canale R.P.: Numerical Methods for Engineers, McGraw Hill
2. Hamming R.W.: Numerical Methods for Scientists and Engineers, Dover Publications
3. Herbert Schildt: C++: The Complete Reference, McGraw-Hill Education

Gaps in the Syllabus (to meet Industry/Profession requirements): NA
POs met through Gaps in the Syllabus: 3, 4, 12
Topics beyond syllabus/Advanced topics/Design: NA
POs met through Topics beyond syllabus/Advanced topics/Design: 2, 3, 4, 12
Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	% **Contribution during CO Assessment**
Continuous Internal Assessment	60
Semester End Examination	40

Continuous Internal Assessment	% **Distribution**
Day to day performance & Lab files	30
Quiz (es)	10
Viva	20

Semester End Examination	% **Distribution**
Examination Experiment Performance	30
Quiz	10

Assessment Components	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Continuous Internal Assessment	√	√	√		

Semester End Examination	√	√	√	√	√

Indirect Assessment –

1. Student Feedback on Course Outcome

Mapping of course outcomes onto program outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	1	3	1	1	1	2	1	1	2	2	3	3
CO2	3	2	3	2	2	1	1	1	2	2	3	2	2	3	3
CO3	3	3	2	3	1	1	2	1	2	3	3	2	2	3	3
CO4	2	3	2	3	3	2	1	1	1	3	3	3	2	3	3
CO5	3	2	3	3	3	1	2	1	1	3	3	1	2	3	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

If satisfying< 34%=1, 34-66% =2, > 66% = 3

CD Code	Course delivery methods
CD1	Lecture by use of boards/lcd projectors/ohp projectors

CD2	Tutorials/assignments
CD3	Seminars
CD4	Mini projects/projects
CD5	Laboratory experiments/teaching aids
CD6	Industrial/guest lectures
CD7	Industrial visits/in-plant training
CD8	Self- learning such as use of nptel materials and internets
CD9	Simulation

Mapping Between COs and Course Delivery (CD) methods

Course Outcome	Course Delivery Method Used
CO1	CD1, CD5
CO2	CD1 and CD5
CO3	CD1, CD5 and CD8
CO4	CD1 and CD5
CO5	CD1 and CD5