Course Title	Numerical Analysis
Course Code	EE3303
No. of Credit Hrs (Lecture + Tutorial + Lab)	3 (2+0+1)
No. of Contact Hrs (Lecture + Tutorial + Lab)	4 (2+0+2)
Level-Year	5-3
Prerequisite (if any)	MATH2301, MATH3301

1) **Course Objectives:**

The primary goal is to provide students in electrical engineering Mids with a basic knowledge of numerical methods including; root-finding, elementary numerical linear algebra, solving systems of linear equations, curve fitting, and numerical solution to ordinary differential equations.

2) **Expected Learning Outcomes:**

Upon completion of this course, student will be able to:

1. Identify and solve engineering problems using appropriate numerical techniques such as matrix methods, iteration, and differential equation solvers. PLO1 [1]
2. Design numerical solutions for complex problems involving nonlinear equations, differential equations, and boundary value problems. PLO2 [2]
3. Create and apply MATLAB-based computational tools to simulate and solve numerical problems. PLO4
4. Investigate numerical results and interpret their accuracy and reliability in solving engineering problems. PLO3 [6]
5. Engage in self-directed learning to explore the limitations and practical considerations of numerical methods in engineering contexts. PLO9 [7]

3) **Course Contents:**
   1. Basics of matrices and solutions of Linear Equations: Direct Methods: Matrix Inversion Method, Gaussian Elimination Method, Gauss - Jordon Method.
   2. Iterative Methods: Gauss - Seidal Method, Relaxation Method.
   3. Solutions of Non-Linear Equations: Method of Chords, Secant Method, Newton-Raphson Method, Fixed Point Iteration Method.
   4. Solution of Ordinary Differential Equations: Taylor Series, Euler Method, Modified Euler Method, Ranga – Kutta Methods.
   5. Systems of O.D. Equations and Higher Order Differential equations.
   6. Root finding, Newton's method, boundary-value problems
   7. Numerical integration and differentiation: Trapezoidal rule, Simpson's and Newton-Cotes rules, Gaussian quadrature. etc.,
   8. MATLAB Applications on the above-mentioned topics

4) **Teaching Methods:**
   - Lectures and Discussion
   - Videos
   - Self-learning
   - Tutorial sheets

5) Mode of Evaluation: Course Assessment Methods
- Quizzes , Assignment, Homeworks, Reports, Presentations etc.
- Mid Exam
- Final Exam

No	Assessment Activities *	Percentage
1.	Assignments/Quizzes/Mini-Projects/Presentations/Reports and Quizzes	15%
2.	Mid Exam	25%
3.	Tutorial work (Homework/Mini-project, Report, Long essay ….)	20%
4.	Final Exam	40%

6) Textbook(s):
- Gerald CF and Wheatly PO, "Applied Numerical Analysis "Addison-Wesley Publishing Company.

7) References:
- Rizwan Bhutt, "Introduction to numerical analysis Using MATLAB" John and Bartlett Publisher. McGraw-Hill.