II Year I Semester **L T P C**

Code: 20MA3009 **3 0 0 3**

NUMERICAL AND TRANSFORMATION TECHNIQUES

Course Objectives:

1. The course is designed to equip the students with necessary mathematical skills and techniques that are essential for an engineering course.
2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

Course Outcomes:

At the end of the semester/course, the student will be able to have a clear knowledge on the following:

	COURSE OUTCOMES	BT
CO1	Determine the numerical solution of the algebraic and transcendental equations.	1, 2, 3
CO2	Determine interpolation techniques for data analysis.	1, 2, 3
CO3	Determining the numerical solutions of the ordinary differential equations.	1, 2, 3
CO4	Find the Fourier series and Fourier transforms for certain functions.	1, 2, 3
CO5	Develop to ability to compute Z-transforms and Inverse Z transforms	1, 2, 3

CO – PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	3	3	-	3	-	-	-	-	2	-	-	1
2	2	2	-	2	-	-	-	-	2	-	-	1
3	2	3	-	-	-	-	-	-	-	-	-	1
4	1	2	-	1	-	-	-	-	-	-	-	1
5	1	2	-	1	-	1	-	-	-	-	-	1

CO –PSO Mapping

	ECE		**EEE**		
CO	**PSO1**	**PSO2**	**PSO1**	**PSO2**	**PSO3**
1	2	-	1	-	-
2	2	-	1	-	-
3	2	-	1	-	-
4	2	-	1	-	-
5	2	-	1	-	-

UNIT I: Iterative methods:

Introduction – Bisection method – Secant method – Method of false position – Iteration method – Newton-Raphson method

UNIT II: Interpolation:
Introduction– Finite differences – Forward differences – Backward differences – Central differences – Relations between operators – Newton's forward and backward formulae for interpolation – Interpolation with unequal intervals – Lagrange's interpolation formula

UNIT III: Numerical integration and solution of ordinary differential equations:
Trapezoidal rule – Simpson's 1/3rd and 3/8th rule – Solution of ordinary differential equations by Taylor's series – Picard's method of successive approximations – Euler's method – Runge-Kutta method (second and fourth order).

Unit –IV: Fourier series and Fourier Transforms:
Fourier Series: Introduction – Periodic functions – Fourier series of periodic function – Dirichlet's conditions – Even and odd functions – Change of interval – Half-range sine and cosine series.
Fourier Transforms: Fourier integral theorem (without proof) – Fourier sine and cosine integrals – Sine and cosine transforms – Properties – inverse transforms – Finite Fourier transforms.

UNIT V: Z Transforms: (10 hrs)
Z-transform – properties –Damping rule – Shifting rule – Initial and Final value theorems – Inverse z- transform – Convolution theorem – Solution of Difference equation by Z-transforms.

Text Books:

1. **B. S. Grewal,** Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. **B. V. Ramana,** Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.

Reference Books

1. Advanced Engineering Mathematics: Erwin Kreyszig, Wiley India Edition.
2. Advanced Engineering Mathematics: Michael Greenberg, Pearson.

Web Link:
- https://nptel.ac.in/courses/111/107/111107105/
- https://nptel.ac.in/courses/111/106/111106111
- https://nptel.ac.in/content/storage2/courses/108104100/W6A1