RAGHU ENGINEERING COLLEGE(Autonomous)
(Approved by AICTE, New Delhi & Permanently Affiliated to JNTUK, Kakinada)
NBA and NAAC 'A+' grade accredited Institute.
Dakamarri, Bheemili Mandal, Visakhapatnam – 531162, A.P.
Phone: 08922-248001 / 002, www.raghuenggcollege.com

II Year – I Semester   **Subject Code: 23BS107**

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	3	0	0	3

NUMERICAL AND TRANSFORMATION TECHNIQUES
(common to EEE, ME & ECE)

Learning 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:
1. Apply the Laplace transform technique and use it to solve various engineering problems.
2. Find the Fourier series and Fourier transforms for certain functions.
3. Develop to ability to compute Z-transforms and Inverse Z transforms
4. Determine the numerical solution of the algebraic and transcendental equations and determine interpolation techniques for data analysis.
5. Determining the numerical solutions of the ordinary differential equations.

CO – PO Mapping

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

Syllabus:

UNIT I : Laplace Transforms

Laplace transforms of standard functions-Shifting theorems - Transforms of derivatives and integrals Unit step function –Dirac's delta function- Inverse Laplace transforms–Convolution theorem (with out proof).
Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms

Unit –II: 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.

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UNIT III: 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.

UNIT IV: Iterative methods:

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

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 V: 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 (Fourth order).

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:
3. https://nptel.ac.in/courses/111/107/111107105/
4. https://nptel.ac.in/courses/111/106/111106111
5. https://nptel.ac.in/content/storage2/courses/108104100/W6A1