

NATIONAL INSTITUTE OF TECHNOLOGY, JAMSHEDPUR
JHARKHAND-831014
Department of Mathematics
Autumn Semester 2020-2021

SEMESTER-III		Course Handout	
Course No	:	MA1301	
Course title	:	Engineering Mathematics-III	Credit-4(3-1-0)
Instructor In-charge	:	Dr. Ratnesh Kumar Mishra	

Course Description

Laplace Transform and its properties, Unit step functions, Dirac delta function, Periodic functions, Inverse Laplace transform, Convolution theorem, Evaluation of integrals by L.T., Solution of Boundary value problems
Differentiation and integration of Transform, Convolution Theorem, Inversion, Periodic functions, Evaluation of integrals by L.T., Solution of Boundary value problems.

Fourier Series and its convergence, Fourier coefficients, Dirichlet's Condition, Change of interval, Half-range series, Complex form of Fourier Series.

Fourier integral, Formula, Fourier Transform, Fourier sine and cosine transform, Linearity, Scaling, Frequency shifting and time shifting properties, self reciprocity of Fourier transform, Convolution theorem, Application to boundary value problems.

Z-Transform and its properties, initial and final value theorem, Convolution theorem, Evaluation of Inverse Z-transform, Difference equation and its application.

Line integration, Cauchy theorem, Cauchy Integral formula, Power series, Taylor's and Laurent's series, singularity and residues.

Discrete and continuous random variable, cumulative distribution function, Probability mass function, Probability density function, Mathematical expectation, Mean variance, Moment generating function, Binomial Poisson and Normal Distribution.

Scope:

- ❖ To study Laplace transform, inverse Laplace transform, Fourier series and Fourier transform, sine and cosine Fourier transform.
- ❖ To provide basic concepts of Z-transform.
- ❖ To provide basic concept of Complex analysis, Probability and Probability distribution

Objectives

- The key role of transform techniques is to facilitate the method for solving initial and boundary value problems.
- To the end of the course, the students will be able to solve initial and boundary value problems in Engineering problems
- At the end of the course, the students will be able to apply concept of complex analysis in the field of engineering.
- To the end of the course, the students will be able to apply concept of probability in different engineering fields.

Text Books

- Advanced Engineering Mathematics by Jain and Iynger (Narosa)

Reference Books

- Advanced Engineering Mathematics by Erwin Kreyszig (Wiley)

Course Plan:

Lecture No	Learning objectives	Topics to be covered
1-3	Definition of Laplace transform, Linearity Property, Condition of Laplace transform, First & Second Shifting properties	Laplace Transform
4-8	Laplace transform of derivatives, of integrals, Unit step functions, Dirac delta function	Laplace Transform
9-12	Evaluation of integrals by L.T., Solution of Boundary value problems	Laplace Transform
13-14	Fourier Series and its convergence, Fourier coefficients.	Fourier Series
15-17	Dirichlet's Condition, Change of interval, Half-range series, Complex form of Fourier Series.	Fourier Series
18-21	Fourier integral, Formula, Fourier Transform, Fourier sine and cosine transform, Linearity, Scaling, Frequency shifting and time shifting properties	Fourier Transform
22-25	self reciprocity of Fourier transform, Convolution theorem, Application to boundary value problems	Fourier Transform
26-29	Definition of Z transform and its properties, initial and final value theorem, Convolution theorem	Z-Transform
30-33	Evaluation of Inverse Z transform, Difference equation and its application,	Z- Transform
34-37	Line integration, Cauchy theorem, Cauchy Integral formula.	Complex Analysis
38-41	Power series, Taylor's and Laurent's series, singularity and residues.	Complex Analysis
42-45	Discrete and continuous random variable, cumulative distribution function, Probability mass function.	Probability
46-50	Probability density function, Mathematical expectation, Mean variance, Moment generating function, Binomial Poisson and Normal Distribution.	Probability

Evaluation Scheme:

Sl. No	Evaluation Component	Duration	Weightage	Date and Time	Nature of Component
1	Mid-Sem. Exam	2 hours	30%	Announced by Examination Cell	Open book
2	End Sem. Exam	3 hours	50%	Announced by Examination Cell	Open book
3	Class Test (Quiz) & Performance in Class		10%	Regular monetarization in Class	During Class time
4	Attendance		10%		

Consultation hour: 5.00 pm to 6.00 pm (Monday to Saturday)

Notices: All notices regarding the course will be displayed/updated/announced only on my home page.

Instructor In-charge