

# NATIONAL INSTITUTE OF TECHNOLOGY, JAMSHEDPUR

JHARKHAND-831014

## *Department of Mathematics*

Autumn Semester 2019-2020

<b>SEMESTER-III</b>	<b>Course Handout</b>	<b>Date: 22/07/2019</b>
<b>Course code</b>	<b>: MA1301</b>	
<b>Course title</b>	<b>: Engineering Mathematics-III</b>	<b>Credit-4 (4-0-0)</b>
<b>Instructor In-charge</b>	<b>: Dr. Raj Nandkeolyar</b>	

### **Course Description**

#### **Scope & expected outcome:**

The course is aimed at providing the students with the knowledge of Laplace, Fourier, and Z-transforms as a tool to solve various types of initial and boundary value problems arising science and engineering. Students will also learn the fundamentals of Complex integration, and some basic discrete and continuous probability distributions which they will be able to utilize in industry.

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### **Syllabus:**

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  
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.

### **Textbooks & Reference Books**

- **Advanced Engineering Mathematics by E. Kreyszig, Wiley India**
- **Advance Engineering Mathematics by R. K. Jain & S. R. K. Iyenger, Narosa Publishing**

**Course Plan:**

Sl. No.	Topics	Expected No. of Lectures
1.	Laplace Transform and its properties	4
2.	Unit step functions, Dirac delta function, Periodic functions	3
3.	Inverse Laplace transform, Convolution theorem	3
4.	Evaluation of integrals by L.T., Solution of Boundary value problems.	3
5.	Fourier Series and its convergence, Fourier coefficients, Dirichlet's Condition, Change of interval, Half-range series, Complex form of Fourier Series	6
6.	Fourier integral formula, Fourier Transform, Fourier sine and cosine transform	2
7.	Linearity, Scaling, Frequency shifting and time shifting properties, self-reciprocity of Fourier transform	3
8.	Convolution theorem, Application of F. T. to boundary value problems	3
9.	Line integration, Cauchy theorem, Cauchy Integral formula, Power series, Taylor's and Laurent's series, singularity and residues	10
10.	Discrete and continuous random variables, cumulative distribution function, Probability mass function, Probability density function, Mathematical expectation, mean variance, Moment generating function, Binomial Poisson and Normal Distribution	8
<b>Total No. of Lectures</b>		<b>45</b>

**Evaluation Scheme:**

Evaluation Component	Duration	Weightage	Date and Time	
Mid Sem Exam	2 hour	30	As per Academic Calendar	
End Sem. Exam	3 hour	50	As per Academic Calendar	
Internal Assessment	N/A	20	Quizzes (one before mid-semester and one before end semester exams) <b>MCQs with -ve marking</b>	10
			Assignment	05
			Teachers assessment	05

**Notes:**

1. Assignments will be given on a regular basis during the lecture class and will be asked to submit on a surprise basis. Some assignments will also be uploaded on the Course Website
2. All notices regarding the course will be displayed on the Notice Board of Department of Mathematics.

Instructor In-charge