

NATIONAL INSTITUTE OF TECHNOLOGY, JAMSHEDPUR

JHARKHAND-831014

Department of Mathematics

Autumn Semester-2020-2021

Date: 25.08.2020

Course Handout

CLASS- B.Tech(H)

SEMESTER-III

Course No. : MA1301

Course Title : Engineering Mathematics-III Credit-4(4-0-0)

Instructor-Incharge : Dr. R. Singh

Course description:

Laplace Transform : Laplace Transform & 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: Fourier series and its convergence, Fourier coefficients, Dirichlet's condition, Change of interval, Half range series, Complex form of Fourier series.

Fourier Transform: Fourier Integral Theorem, formula, Fourier Transform, Fourier sine and cosine transforms. Linearity, Scaling, frequency shifting and time shifting properties, Self-reciprocity of Fourier Transform. Convolution theorem. Application to boundary value problems.

Z- Transform: Z-Transform and its properties, Initial and Final Value theorem, Convolution theorem, Evaluation of Inverse Z- Transform, Difference equation and its application.

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

Probability and distributions:- 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.

Scope:

- To provide a good concepts in Integral Transform and Z-transform.
- To provide the concept of Calculus of Complex functions.
- To provide concept of Probability and probability distribution.

Objectives:

- At the end of this course the students will be able to understand the great utility for solving boundary value problems and other Engineering problems using transform Calculus.
- At the end of this course the students will be able to understand the great utility for solving problems of discrete analysis.
- At the end of this course the students will be able to study fluid dynamics, thermodynamics and electric fields
- At the end of this course the students will be able to use probability and statistics in the field of engineering.

Text books: 1. Higher Engineering Mathematics by Dr. B.S. Grewal

Reference book: Advanced Engineering Mathematics by Erwin Kreyszig
(8th Edition, Wiley Eastern Ltd.)

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Course plan: Lecture No	Learning Objectives	Topic to be covered	Refer to chapter(see book) Text - 1
1 -3	Concept of Laplace Transform & its properties, Linearity property, condition for existence of Laplace Transform; First & Second Shifting properties	Laplace Transform	21
4	Unit Step functions Dirac delta function	Laplace Transform	21
5	Periodic functions	Laplace Transform	21
6-7	Inverse Laplace transforms,	Laplace Transform	21
8	Convolution Theorem	Laplace Transform	21
9	Laplace Transform of derivatives and integrals	Laplace Transform	21
10	Evaluation of integrals by L.T	Laplace Transform	21
11-12	Solution of boundary value problems.	Laplace Transform	21
13-14	Fourier series and its convergence, Euler's coefficients, Drichlet's condition	Fourier Series	10
15	Change of interval	Fourier Series	10
16	Half range series	Fourier Series	10
17	Complex form of Fourier series	Fourier Series	10
18	Fourier Integral theorem ,formula,	Fourier Transform	22
19-20	Fourier Transform	Fourier Transform	22
21-22	Fourier sine and cosine transforms.	Fourier Transform	22
23-24	Linearity, Scaling, frequency shifting and time shifting properties	Fourier Transform	22
25	Self-reciprocity of Fourier Transform	Fourier Transform	22
26	Convolution theorem	Fourier Transform	22
27-28	Application to boundary value problems.	Fourier Transform	22
29-30	Z-transform and its properties	Z-transform	23
31-32	Initial and final value theorem	Z-transform	23
33	Convolution theorem	Z-transform	23
34	Evaluation of inverse Z- transform	Z-transform	23
35-36	Difference equation and its application	Z-transform	23
37	Line integration	Calculus of Complex functions	20
38-39	Cauchy integral theorem , Cauchy integral formula	Calculus of Complex functions	20
40-41	Power series, Taylor's and Laurent's series	Calculus of Complex functions	20
42-43	Singularity and residues	Calculus of Complex functions	20
44	Discrete and Continuous random variables,	Probability & Distributions	26
45	cumulative distribution function, probability mass function, probability density function	Probability & Distributions	26
46	Mathematical expectation, mean variance, moment generating function	Probability & Distributions	26
47-48	Binomial and Poisson distribution.	Probability & Distributions	26
49-50	Normal distribution	Probability & Distributions	26

N.B. 1.Examination Details: As per the notification of Academic Section.

2. Other instructions will be given time to time.

Dr. R. Singh
Instructor-In-charge (MA1301)
For Civil Engg. Students