

**NATIONAL INSTITUTE OF TECHNOLOGY, JAMSHEDPUR
JHARKHAND-831014**

**Department of Mathematics
SPRING SEMESTER 2020-2021**

Date: 04/04/2021

Course Handout

Class: B. Tech (Hons) SEMESTER-II (Electronics and Communications Engg .)

Course No. : MA1202

Course title : Engineering Mathematics-II Credit-4(3-1-0)

Instructor-incharge : DR. SRIPATI JHA

Course description

Linear dependence and independence, rank and inverse of a matrix, solution of algebraic equations - consistency conditions. Eigen values and Eigen vectors, Hermitian and skew Hermitian matrices.

Convergence of improper integrals, test of convergence, Beta and Gamma functions elementary properties, differentiation under the integral sign.

Series solution, Frobenius Method, Legendre's and Bessel's differential equation, Recurrence formula, Generating functions, orthogonality.

Rectification, double and triple integrals, computations of surfaces and volumes, change of variables in double integrals, Jacobians of transformations.

Scalar and vector fields, level surfaces, directional derivative, Gradient, Divergence, Curl, Laplacian, line and surface integrals, theorems of Green, Gauss and Stokes

Finite differences, Newton's forward and backward interpolation formulae, Central difference interpolation. Lagrange's interpolation. Trapezoidal rule and Simpson's $1/3^{rd}$ rule of integration. Solution of polynomial and transcendental equations - bisection method, Newton-Raphson method and Regula falsi method.

Scope:

- To provide a good fundamental concepts in linear algebra
- To provide the concept of multiple integrals
- To provide the concept of vector calculus
- To study the fundamentals of Numerical methods

Objectives:

- At the end of this course the students will be able to understand the great utility for solving Engineering problems related to algebraic and differential equations, mechanics, theory of electrical circuits, electro-magnetic theory, Nuclear Physics etc.
- At the end of this course the students will be able to apply Numerical techniques to get numerical answer to various engineering problems

Text books:

- T1. Higher Engineering Mathematics by Dr. B.S.Grewal.
- T2. Integral Calculus by B.C.Das & B.N.Mukherjee

Reference books:

- R1. Advanced Engineering Mathematics by Erwin Kreyszig, (8th Edition, Wiley Eastern Ltd)
- R2. Differential Calculus and Integral Calculus Vol.I & II by N.Piskunov (Mir Publishers)
- R3. Calculus and Analytical Geometry by Thomas & Finney

Course plan:

Lecture No.	Learning objectives	Topics to be covered	Refer to chapter (see book)
1	Linear dependence and independence	Vectors	2(T1)
2-6	Rank and inverse of a matrix, solution of algebraic equations- consistency conditions.	Matrices	2(T1)
7-8	Eigen values and Eigen vectors,	Matrices	2(T1)
9	Hermitian and skew Hermitian matrices	Matrices	2(T1)
10-12	Convergence of improper integrals, test of convergence,	Improper Integrals	VII(T2) 49 th Edition
13 - 15	Beta and Gamma functions, elementary properties	Beta and Gamma functions	7(T1)
16	Differentiation under the integral sign	Applications to Partial differentiation	5(T1)
17-18	Series solution, Frobenius method	Series solution of differential equations	16(T1)
19-22	Legendre's and Bessel's differential equation, Recurrence formula, Generating functions, orthogonality.	Series solution of differential equations and special functions	16(T1)
23-24	Rectification	Integral calculus	6(T1)
25-29	Double and triple integrals, computations of surfaces and volumes, change of variables in double integrals-	Multiple Integrals and its applications	7(T1)
30	Jacobians of transformations.	Jacobians	5(T1)
31	Scalar and vector fields, level surfaces, directional derivative,	Vector differential Calculus	8(T1)
32-34	Gradient, Curl, Divergence, Laplacian	Vector differential Calculus	8(T1)
35- 38	Line and surface integrals, theorems of Green, Gauss and Stokes,	Vector Integral Calculus	8(T1)
39- 43	Finite differences, Newton's forward and backward interpolation formulae, Central difference interpolation. Lagrange's interpolation.	Finite difference and Interpolation	29(T1)
44	Trapezoidal rule and Simpson's 1/3 rd rule of integration.	Numerical Integration	30(T1)
45-46	Solution of polynomial and transcendental equations-bisection method, Newton-Raphson method and Regula falsi method	Numerical solutions	28(T1)

NB. 1. Examination details: As per the notification of Academic Section

2. Other Instructions will be given time to time .

Dr. S. Jha

Instructor Incharge (MA1202)

For SEMESTER-II, ECE students