

Name of Institute	ULKA, TORBILLO, OF ENJ. A Techno- logy Institute.
Department	ELECTRICAL, E.T.C
Semester	3rd
Subject Name with code	Engineering Mathematics
Total Period	60
Theory Periods:	40/week
Faculty Name	Susanta Kumar Parida

### 1. Complex Numbers.

- Real and Imaginary numbers.
- Complex numbers, conjugate complex numbers, Modulus and Amplitude of a complex number.
- Geometrical Representation of complex numbers.
- Properties of complex numbers.
- Determination of three cube roots of unity and their properties.
- De Moivre's theorem
- Solve problems on

### 2. Matrices

- Define rank of a matrix
- Perform elementary row transformations to determine the rank of a matrix.
- State Rouché's theorem for consistency of a system of linear equations in unknowns.
- Solve equations in three unknowns testing consistency.
- Solve problems on.

### 3. Linear Differential Equations.

- Define Homogeneous and Non-Homogeneous Linear Differential Equations with constant coefficients with examples.
- Find general solution of linear differential equations in terms of C.F. and P.I.
- Derive rules for finding C.F. and P.I. in terms of operator  $D$ , excluding  $\frac{1}{D}$ ,  $x$ .

- Define partial differential equation (P.D.E)
- Form partial differential equations by eliminating arbitrary constants and arbitrary functions.
- Solve partial differential equations of the form  $Pp + Qq = R$
- Solve problems on

#### 4. LAPLACE TRANSFORMS.

- Define Gamma function and  $\Gamma(n+1) = n!$  and find  $\Gamma(\frac{1}{2}) = \sqrt{\pi}$ .
- Define Laplace Transform of a function  $f(x)$  and Inverse Laplace Transform.
- Derive L.T. of standard functions and explain existence conditions of L.T.
- Explain linear shifting property of L.T.
- Formulate L.T. of derivatives, integrals, multiplication by  $t^n$  and division by  $t$ .
- Derive formulae of inverse L.T. and explain method of partial fractions.
- Solve problem on.

#### 5. FOURIER SERIES

- Define periodic functions.
- State Dirichlet's Condition for the Fourier expansion of a function and its convergence.
- Express periodic function  $f(x)$  satisfying Dirichlet's conditions as a Fourier series.
- State Euler's formulae.
- Define Even and odd functions and

Find Fourier series in  
 $(0 \leq x \leq 2\pi)$  and  $(-\pi \leq x \leq \pi)$ .

→ Obtain FS of continuous functions  
and functions having points of  
discontinuity in  
 $(0 \leq x \leq 2\pi)$  and  $(-\pi \leq x \leq \pi)$

→ Solve problems on 5.1-

## 6. Numerical Methods

→ Appraise limitation of analytical  
methods of solution of Algebraic  
Equations.

→ Derive iterative formula for finding  
the solutions of Algebraic equations by

→ Bisection method

→ Newton-Raphson method.

→ Solve problems on.

## 7. Finite difference and Interpolation.

→ Explain finite difference and for  
table of forward and backward  
difference.

→ Define shift operator (E) and  
establish relation between E & difference  
operator ( $\Delta$ )

→ Derive Newton's Forward and backward  
Interpolation formula for equal  
intervals.

→ State Lagrange's interpolation formula  
for unequal intervals.

→ Explain numerical integration and state

→ Newton's rule's formula.

→ Trapezoidal rule

→ Simpson's 1/3rd rule.

→ Solve problems on.

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