

LESSON PLAN

SUB:- ENGINEERING MATHEMATICS-III

BRANCH:- ELECTRICAL ENGG.

SEMESTER:3rd

SESSION:2022-2023

NAME OF FACULTY: -MANAS KUMAR MAHALIK



**GOVERNMENT POLYTECHNIC,
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LESSON PLAN

Discipline: Electrical Engineering	Semester: 3 rd	Name of the teaching faculty: Manas Kumar Mahalik, Lecturer in Mathematics
Subject: Engineering Mathematics-III (Th1)	No. of days/week class allotted: 04 Total no. of weeks: 15 Semester from date: 15.09.2022 To Date: 21.01.2023	
Week	Class Day	• Theory Topics
1 st	1 st	<ul style="list-style-type: none"> • COMPLEX NUMBERS: <ul style="list-style-type: none"> ○ Real and imaginary numbers, definition of a complex number, conjugate of complex numbers, modulus of a complex number with examples
	2 nd	<ul style="list-style-type: none"> ○ Amplitude of a complex number, geometrical representation of a complex number with example
	3 rd	<ul style="list-style-type: none"> ○ Properties of complex numbers with examples
	4 th	<ul style="list-style-type: none"> ○ Determination of three cube roots of unity and their properties
2 nd	1 st	<ul style="list-style-type: none"> ○ De-Moivre's theorem and problem solving
	2 nd	<ul style="list-style-type: none"> ○ QUIZ & ASSIGNMENT-I
	3 rd	<ul style="list-style-type: none"> • MATRICES: • Recap: Definition of Matrix, row, column, order of a matrix, • Types of matrices: a) Row matrix, b) column matrix, c) square matrix, d) unit matrix e) Null matrix f) Lower & Upper triangular matrix
	4 th	<ul style="list-style-type: none"> • Determination of rank of a matrix by elementary transformation, with examples
3 rd	1 st	<ul style="list-style-type: none"> • Some more example of finding rank of a matrix by elementary transformation method, Consistency of linear system of equations, Rouché's Theorem, Procedure to test the consistency of linear system of equations of n unknowns.
	2 nd	<ul style="list-style-type: none"> • Examples on consistency test and solving system of equations, Solving system of linear homogeneous equations
	3 rd	<ul style="list-style-type: none"> • QUIZ & ASSIGNMENT-II
	4 th	<ul style="list-style-type: none"> • LINEAR DIFFERENTIAL EQUATIONS: • Definitions: i) Linear differential equation, ii) Linear differential equation with constant coefficients iii) Homogeneous and non-homogeneous linear differential equation with constant coefficients, Operator D, Concept of C.F. and P.I.
4 th	1 st	<ul style="list-style-type: none"> • General solution $y=CF+PI$. Rules for finding the CF: Case 1:- If roots are real and different, Case 2: if roots are real and repeated, some examples on these two cases
	2 nd	<ul style="list-style-type: none"> • Case 3: If one pair of roots be imaginary, Case 4: If two points of imaginary roots are equal, some examples on these two cases.
	3 rd	<ul style="list-style-type: none"> • Inverse operator, Rules for finding the Particular Integral (PI): • Case 1: When $X=e^{(ax)}$, Case 2: when $X=\sin(ax+b)$ or $\cos(ax+b)$, some examples on these two cases
	4 th	<ul style="list-style-type: none"> • Solving problems on CF and PI

5 th	1 st	<ul style="list-style-type: none"> Case 3: when $X=x^m$, Case 4: when $X=e^{ax}V$, some examples on these two cases
	2 nd	<ul style="list-style-type: none"> Working rule to find the Complete solution $y=CF+PI$, Examples
	3 rd	<ul style="list-style-type: none"> Partial differential equation (PDE), formation of PDE by eliminating arbitrary constants and arbitrary functions.
	4 th	<ul style="list-style-type: none"> Examples on formation of PDEs
6 th	1 st	<ul style="list-style-type: none"> Linear PDE of 1st order, working rule to solve $Pp+Qq=R$, examples
	2 nd	<ul style="list-style-type: none"> QUIZ & ASSIGNMENT-III
	3 rd	<ul style="list-style-type: none"> LAPLACE TRANSFORMS: Definition of Gamma function, reduction formula, example
	4 th	<ul style="list-style-type: none"> Prove $\Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$, Short problems on reduction formula
7 th	1 st	<ul style="list-style-type: none"> Definition of Laplace transform of a function, inverse Laplace transform, existence of Laplace transform
	2 nd	<ul style="list-style-type: none"> Derivation of Laplace transform of standard functions: k, t^n, $\sin ax$, $\cos ax$, $\sinh ax$, $\cosh ax$.
	3 rd	<ul style="list-style-type: none"> Properties of LT: i) Linearity property ii) First shifting property and problems on these properties.
	4 th	<ul style="list-style-type: none"> Change of scale property, examples on it
8 th	1 st	<ul style="list-style-type: none"> Formulation of LT of derivatives and integrals, some problems to solve
	2 nd	<ul style="list-style-type: none"> Formulation of LT multiplication by t^n, division by t, examples
	3 rd	<ul style="list-style-type: none"> Solving problems to find LT
	4 th	<ul style="list-style-type: none"> Derivation of formula of inverse LT and problems on Inverse LT.
9 th	1 st	<ul style="list-style-type: none"> QUIZ & ASSIGNMENT-IV
	2 nd	<ul style="list-style-type: none"> FOURIER SERIES: Definition of periodic function with example. Fourier series, Euler's formulae.
	3 rd	<ul style="list-style-type: none"> Establishment of some formulae: <ul style="list-style-type: none"> $\int_{\alpha}^{\alpha+2\pi} \cos nx \, dx$, $\int_{\alpha}^{\alpha+2\pi} \sin nx \, dx$, $\int_{\alpha}^{\alpha+2\pi} \cos mx \cos nx \, dx$, $\int_{\alpha}^{\alpha+2\pi} \cos^2 nx \, dx$
	4 th	<ul style="list-style-type: none"> Dirichlet's condition for Fourier expansion, example
10 th	1 st	<ul style="list-style-type: none"> Periodic function satisfying Dirichlet's condition as a Fourier series with example
	2 nd	<ul style="list-style-type: none"> Even function and its Fourier series in $0 \leq x \leq 2\pi$ and $-\pi \leq x \leq \pi$. with example
	3 rd	<ul style="list-style-type: none"> Odd function and its Fourier series in $0 \leq x \leq 2\pi$ and $-\pi \leq x \leq \pi$. with example
	4 th	<ul style="list-style-type: none"> Problems on even and odd function and Fourier series expansion
11 th	1 st	<ul style="list-style-type: none"> Fourier series of continuous function in $0 \leq x \leq 2\pi$ and $-\pi \leq x \leq \pi$. and functions having points of discontinuity in $0 \leq x \leq 2\pi$ and $-\pi \leq x \leq \pi$.
	2 nd	<ul style="list-style-type: none"> QUIZ & ASSIGNMENT-V
	3 rd	<ul style="list-style-type: none"> NUMERICAL METHODS: <ul style="list-style-type: none"> Limitation of analytical methods and need of numerical method, iteration formula

12 th	4 th	<ul style="list-style-type: none"> • Bisection method and problem solving by this method
	1 st	<ul style="list-style-type: none"> • Solution by Newton-Raphson method
	2 nd	<ul style="list-style-type: none"> • QUIZ & ASSIGNMENT-VI
	3 rd	<ul style="list-style-type: none"> • FINITE DIFFERENCE AND INTERPOLATION: <ul style="list-style-type: none"> ○ Finite difference , forward and backward difference table
13 th	4 th	<ul style="list-style-type: none"> • Definition of shift operator, relation between operators
	1 st	<ul style="list-style-type: none"> • Newton's forward difference interpolation for equal intervals with examples
	2 nd	<ul style="list-style-type: none"> • Newton's backward difference interpolation for equal intervals with examples
	3 rd	<ul style="list-style-type: none"> • Lagrange's interpolation for unequal intervals with examples
14 th	4 th	<ul style="list-style-type: none"> • Solving problems on Lagrange's interpolation
	1 st	<ul style="list-style-type: none"> • Problems on Lagrange's interpolation and Newton's forward difference interpolation
	2 nd	<ul style="list-style-type: none"> • Newton -Cote's formula, Trapezoidal rule with example
	3 rd	<ul style="list-style-type: none"> • Simpson's 1/3 rd rule with example
15 th	4 th	<ul style="list-style-type: none"> • QUIZ & ASSIGNMENT-VII
	1 st	<ul style="list-style-type: none"> • REVISION
	2 nd	<ul style="list-style-type: none"> • REVISION
	3 rd	<ul style="list-style-type: none"> • PREVIOUS YEAR QUESTIONS DISCUSSION
	4 th	<ul style="list-style-type: none"> • PREVIOUS YEAR QUESTIONS DISCUSSION

LEARNING RESOURCES:

- 1.Text Book of Engineering Mathematics-I By C. R Mallick, Kalyani Publication.
- 2.Text Book of Engineering Mathematics-III By C. R Mallick,Kalyani Publication.
- 3.Higher Mathematics By B.S Grewal ,Khanna Publishers.

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