Lesson Plan

Branch: Computer Engineering

Semester: I Year: 2022-23

Course Title: Engineering Mathematics I	SEE: 3 Hours – Theory
Total Contact Hours: 36 Hours	Duration of SEE: 3 Hours
SEE Marks: 80 (Theory) + 20 (IA)	
Lesson Plan Author: Gauree Jagushte.	Date:
Checked By:	Date:

Prerequisites: Review of complex numbers – Algebra of complex number, Cartesian, Polar and Exponential form of complex number

Syllabus:

1. **Complex Numbers**
   - Statement of D'Moivre's theorem
   - Expansion of sine and cosine function from power to multiple and from multiple
   - to power
   - Powers and roots of complex numbers
2. **Hyperbolic functions and Logarithm of a complex number**
   - Circular and hyperbolic functions, inverse circular and inverse hyperbolic functions, separation into real and imaginary parts
   - Logarithm of a complex numbers, separation of real and imaginary parts of logarithmic functions
3. **Partial Differentiation**
   - Functions of several variables, partial derivatives of first and higher order, differentiation of composite functions
   - Euler's theorem (with proof) and its deductions for homogeneous functions of two Variables
4. **Applications of partial differentiation and successive differentiation**
   - Maxima and minima of functions of two variables and Lagrange multiplier of functions of two variables
   - nth derivative, Leibnitz theorem without proof and problems
5. **Matrices**
   - Types of matrices (symmetric, skew-symmetric, hermitian, skew-hermitian, orthogonal and unitary), Rank of a matrix using row-echelon form, normal form and PAQ form
   - Non-homogeneous and homogeneous system of linear equations and their solutions
6. **Numerical solutions of transcendental equations, system of equations and expansion of functions**
   - Numerical solutions of transcendental equations: Regula-Falsi and Newton, Raphson methods

- Numerical solutions of system of equations: Jacobi method, Gauss-Seidal method
- Expansion of functions: Taylor's series, Maclaurin's series, expansions of exponential, logarithmic functions, circular trigonometric and hyperbolic functions

Course Outcomes (CO):
On successful completion of course learner will be able to:

FEC101.1. Demonstrate the basics of complex numbers, obtain the roots of a complex number using
De Movire's theorem and separate the complex number into real and imaginary parts.
FEC101.2. Obtain the nth derivative of a function using successive differentiation.
FEC101.3. Apply partial differentiation technique to obtain the extremum of the given function
FEC101.4. Apply the concepts of matrices to solve the system of linear equations.
FEC101.5. Apply the concept of Numerical Methods for solving the engineering problems with the
help of SCILAB software

CO-PO Mapping: (BL – Blooms Taxonomy, C – Competency, PI – Performance Indicator)

CO	BL	CO	PI	PO	Mapping
FEC101.1. Demonstrate the basics of complex numbers, obtain the roots of a complex number using De Movire's theorem and separate the complex number into real and imaginary parts.	2	1.1 1.3	1.1.1 1.3.1	PO1	3
		5.3	5.3.1	PO5	1
FEC101.2. Obtain the nth derivative of a function using successive differentiation.	3	1.1 1.3	1.1.1 1.3.1	PO1	3
FEC101.3. Apply partial differentiation technique to obtain the extremum of the given function	3	1.1 1.3	1.1.1 1.3.1	PO1	3
		5.3	5.3.1	PO5	1
FEC101.4. Apply the concepts of matrices to solve the system of linear equations.	3	1.1 1.3	1.1.1 1.3.1	PO1	3
		5.3	5.3.1	PO5	1
FEC101.5. Apply the concept of Numerical Methods for solving the engineering problems with the help of SCILAB software.	2	5.3	5.3.1	PO5	1

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
FEC101.1	3				1							
FEC101.2	3											
FEC101.3	3				1							
FEC101.4	3				1							
FEC101.5					1							

CO-PSO Mapping:

CO	BL	C	PI	PO	Mapping

	PSO1	PSO2

CO Measurement Weightages for Tools:

	Test	Lab	Assignment	SEE (O)	SEE (T)	Course Exit Survey
FEC101.1	30%	---	10%	---	60%	100%
FEC101.2	30%	---	10%	---	60%	100%
FEC101.3	20%	---	20%	---	60%	100%
FEC101.4	30%	---	10%	---	60%	100%
FEC101.5	---	100%	---	---	---	100%

Attainment:

CO FEC101.1:

Direct Method

$$A_{FEC101.1D} = 0.3 * Test + 0.1 * Assignment + 0.6 * SEE\ Theory$$

Final Attainment:

$$A_{FEC101.1D} = 0.8 * A_{FEC101.1D} + 0.2 * AA_{FEC101.1I}$$

CO FEC101.2:

Direct Method

$$A_{FEC101.1D} = 0.3 * Test + 0.1 * Assignment + 0.6 * SEE\ Theory$$

Final Attainment:

$$A_{FEC101.1D} = 0.8 * A_{FEC101.1D} + 0.2 * AA_{FEC101.1I}$$

CO FEC103.3:

Direct Method

$$A_{FEC101.1D} = 0.3 * Test + 0.1 * Assignment + 0.6 * SEE\ Theory$$

Final Attainment:

$$A_{FEC101.1D} = 0.8 * A_{FEC101.1D} + 0.2 * AA_{FEC101.1I}$$

CO FEC104.4:

Direct Method

$$A_{FEC101.1D} = 0.3 * Test + 0.1 * Assignment + 0.6 * SEE\ Theory$$

Final Attainment:

$$A_{FEC101.1D} = 0.8 * A_{FEC101.1D} + 0.2 * AA_{FEC101.1I}$$

CO FEC101.5:

Direct Method

$A_{FEC101.5D} = 1 * \Pr actical$

Final Attainment:

$A_{FEC101.5} = 0.8 * A_{FEC101.5D} + 0.2 * A_{FEC101.5I}$

Course Level Gap (if any): No
Content beyond Syllabus: No

Lecture Plan:

Module	Contents	Hours	Planned date	Actual date	Content Delivery Method	Remark
1	Module 01: Complex Numbers - D' Moivre's theorem	11	14/11/2022	14/11/2022	Traditional	
	Module 01: Complex Numbers - D'Moivre's theorem (Examples)		16/11/2022	16/11/2022	Traditional	
	Module 01: Complex Numbers - D'Moivre's theorem (Examples)		17/11/2022	17/11/2022	Traditional	
	Module 01: Complex Numbers - D'Moivre's theorem (Examples)		18/11/2022	18/11/2022	Traditional	
	Module 01: Complex Numbers - Roots of a complex number		21/11/2022	18/11/2022	Traditional	Extra lecture of Dipak sir as he was not available

	Module 01: Complex Numbers - Roots of a complex number		22/11/2022	21/11/2022	Traditional	
	Module 01: Power to multiple and multiple to power of trigonometric functions		23/11/2022	22/11/2022	Traditional	
	Module 01: Power to multiple and multiple to power of trigonometric functions		24/11/2022	23/11/2022	Traditional	
	Module 01: Power to multiple and multiple to power of trigonometric functions		25/11/2022	24/11/2022	Traditional	
	Module 01: Power to multiple and multiple to power of trigonometric functions		29/11/2022	25/11/2022	Traditional	
2	Module 02: Hyperbolic function and Logarithm of Complex Numbers	10	30/11/2022	-	Traditional	Lecture taken by Dipak sir (exchange 18/11/2022)
	Module 02: Hyperbolic function and Logarithm of Complex Numbers		01/12/2022	29/11/2022	Traditional	
	Module 02: Hyperbolic function and Logarithm of Complex Numbers		06/12/2022	1/12/2022	Traditional	
	Module 02: Hyperbolic function and Logarithm of Complex Numbers		07/12/2022	06/12/2022	Traditional	
	Module 02: Hyperbolic functions		08/12/2022	07/12/2022	Traditional	
	Module 02: Hyperbolic functions		09/12/2022	08/12/2022	Traditional	
	Module 02: Inverse Hyperbolic function		13/12/2022	09/12/2022	Traditional	

	Module 02: Inverse Hyperbolic function		14/12/2022	09/12/2022	Traditional	
	Module 02: Separation into real and imaginary parts		15/12/2022	14/12/2022	Traditional	
	Module 02: Logarithm of a complex number		27/12/2022	15/12/2022	Traditional	
4	Applications of Partial Differentiation and Successive Differentiation	12	28/12/2022	16/12/2022	Traditional	
	Applications of Partial Differentiation and Successive Differentiation		29/12/2022	26/12/2022	Traditional	Extra session
	Applications of Partial Differentiation and Successive Differentiation		30/12/2022	27/12/2022	Traditional	
	Module 04: Successive Differentiation - Examples on the Leibnitz Rule		03/01/2023	27/12/2022	Traditional	Extra session
	Module 04: Successive Differentiation - Examples on the Leibnitz Rule		04/01/23	28/12/2022	Traditional	
	Module 04: Successive Differentiation - Examples on the Leibnitz Rule		05/01/23	29/12/2022	Traditional	
	Module 04: Successive Differentiation - Leibnitz Rule		10/01/23	29/12/2022	Traditional	
	Module 04: Successive Differentiation - Examples on the Leibnitz Rule		11/01/2023	30/12/2022	Traditional	Tutorial conducted as lecture
3	Module 03: Partial Differentiation		12/01/2023	3/1/2023	Traditional	
	Module 03: Partial Differentiation – Examples		17/01/2023	4/1/2023	Traditional	
	Module 03: Partial Differentiation - Chain Rule		18/01/2023	4/1/2023	Traditional	SDP

	Module 03: Partial Differentiation - Chain Rule		19/01/2023	5/1/2023	Traditional	
	Module 03: Partial Differentiation - Euler's Theorem and Deductions		24/01/2023	5/1/2023	Traditional	SDP
4	Module 04: Applications of Partial Differentiation - Maxima/Minima and Lagrange Function	11	25/01/2023	7/1/2023	Traditional	
	Module 04: Applications of Partial Differentiation - Maxima/Minima and Lagrange Function		26/01/2023	10/1/2023	Traditional	
	Module 04: Applications of Partial Differentiation - Maxima/Minima and Lagrange Function		31/01/2023	11/1/2023	Traditional	
	Module 04: Applications of Partial Differentiation - Maxima/Minima and Lagrange Function		01/02/2023	12/1/2023	Traditional	
	Module 04: Applications of Partial Differentiation - Maxima/Minima and Lagrange Function		02/02/2023	17/01/2023	Traditional	
	Module 04: Applications of Partial Differentiation - Maxima/Minima and Lagrange Function		07/02/2023	18/01/2023	Traditional	
	Module 04: Applications of Partial Differentiation - Maxima/Minima and Lagrange Function		08/02/2023	18/01/2023	Traditional	SDP
	Module 04: Applications of Partial Differentiation - Maxima/Minima and Lagrange Function		09/02/2023	19/01/2023	Traditional	

	Module 04: Applications of Partial Differentiation - Maxima/Minima and Lagrange Function			24/01/2023	Traditional	
	Module 04: Applications of Partial Differentiation - Maxima/Minima and Lagrange Function			25/01/2023	Traditional	
	Module 04: Applications of Partial Differentiation - Maxima/Minima and Lagrange Function			03/02/2023	Traditional	RIVISION AND REMEDIAL SESSIONS
				06/02/2023	Traditional	RIVISION AND REMEDIAL SESSIONS
				08/02/2023	Traditional	RIVISION AND REMEDIAL SESSIONS
				10/02/2023	Traditional	RIVISION AND REMEDIAL SESSIONS

Text Books:

1. Engineering Mathematics-I by G.V. Kumbhojkar, J. Jamnadas Publication
2. Engineering Mathematics-I by Dr. N.R. Dasre, TechKnowledge Publication

Reference Books:

1. Advance Engineering Mathematics by H.K. Dass, S.Chand & Company Limited
2. Advance Engineering Mathematics by Peter O' Neil, Cengage Learning

Web References:

1.
2.

Evaluation Scheme

CIE Scheme

Internal Assessment: 20 (Average of two tests)

Internal Assessment Scheme

Module		Lecture Hours	No. of questions in			No. of questions in SEE
			Test 1	Test 2	Test 3*	
1	Complex numbers		02 (10 marks)	---	---	03(17 Marks)
2	Hyperbolic functions and Logarithm of complex numbers		01 (5 Marks)	---	---	04(25 Marks)
3	Partial differentiation		---	02 (7 Marks)	---	04(25 Marks)
4	Applications of partial differentiation and successive differentiation		01 (5 Marks)	01 (3 Marks)	---	03(20 Marks)
5	Matrices		---	2 (10 Marks)	---	05(33 Marks)

Note: Four to six questions will be set in the Test paper

Verified by:	
Programme Coordinator	Subject Expert: GAUREE JAGUSHTE