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: Gajendra Singh	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:

$A_{FEC101.1} = 0.8 * A_{FEC101D} + 0.2 * A_{FEC101.1I}$

CO FEC101.2:

Direct Method

$A_{FEC101.1D} = 0.3 * Test + 0.1 * Assignment + 0.6 * SEE\_Theory$ Final Attainment:

$A_{FEC101.2} = 0.8 * A_{FEC101.2D} + 0.2 * A_{FEC101..2I}$

CO FEC103.3:

Direct Method

$A_{FEC101.3} = 0.2 * Test + 0.2 * Assignment + 0.6 * SEE\_Theory$

Final Attainment:

$A_{FEC101.3} = 0.8 * A_{FEC101.3D} + 0.2 * A_{FEC101.3I}$

CO FEC104.4:

Direct Method

$A_{FEC101.4D} = 0.3 * Test + 0.1 * Assignment + 0.6 * SEE\_Theory$

Final Attainment:

$A_{FEC101.4} = 0.8 * A_{FEC101.4D} + 0.2 * A_{FEC101.4I}$

CO FEC101.5:

Direct Method

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

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: (Theory)

Module	Content	Hours	Planned Date	Actual Date	Content Delivery Method	Remarks
1	Introduction to EM-I & Basics of Complex Numbers	15	15/11/2022	16/11/2022	Traditional	
	Prerequisite-Binomial expansion		16/11/2022	17/11/2022	Traditional	
	Prerequisite – Integration		17/11/2022	18/11/2022	Traditional	
	Prerequisite – Partial fractions		18/11/2022	21/11/2022	Traditional	
	Module 01: Complex Numbers - D' Moivre's theorem		21/11/2022	22/11/2022	Traditional	
	Module 01: Complex Numbers - D' Moivre's theorem		23/11/2022	23/11/2022	Traditional	Orientation Day schedule converted to lecture
	Module 01: Complex Numbers - D'Moivre's theorem (Examples)		24/11/2022	24/11/2022	Traditional	
	Module 01: Complex Numbers - D'Moivre's theorem (Examples)		25/11/2022	25/11/2022	Traditional	
	Module 01: Complex Numbers - D'Moivre's theorem (Examples)		29/11/2022	25/11/2022	Traditional	
	Module 01: Complex Numbers - Roots of a complex number		01/12/2022	28/11/2022	Traditional	Engaged BEE lecture
	Module 01: Complex Numbers - Roots of a complex number		02/12/2022	29/11/2022	Traditional	Engaged EP lecture
	Module 01: Power to multiple and multiple to power of trignometric functions		06/12/2022	29/11/2022	Traditional	Engaged Extra class Workshop period
	Module 01: Power to multiple and multiple to power of		08/12/2022	30/11/2022	Traditional	

	trignometric functions					
	Module 1: Revision		17/01/2023	21/01/2023	Traditional	
	Module 1: Revision		19/01/2023	21/01/2023	Traditional	
2	Module 02: Hyperbolic function and Logarithm of Complex Numbers	11	09/12/2022	01/12/2022	Traditional	Engaged EP lecture
	Module 02: Hyperbolic function and Logarithm of Complex Numbers		13/12/2022	02/12/2022	Traditional	
	Module 02: Inverse Hyperbolic function		15/12/2022	06/12/2022	Traditional	
	Module 02: Inverse Hyperbolic function		16/12/2022	06/12/2022	Traditional	
	Module 02: Inverse Hyperbolic function		20/12/2022	07/12/2022	Traditional	Extra Lecture from Chemistry
	Module 02: Separation into real and imaginary parts		22/12/2022	08/12/2022	Traditional	Extra
	Module 02: Separation into real and imaginary parts		23/12/2022	08/12/2022	Traditional	
	Module 02: Logarithm of a complex number		27/12/2022	08/12/2022	Traditional	Engaged EC lecture
	Module 02: Logarithm of a complex number		29/12/2022	15/12/2022	Traditional	Converted Tutorials to Lecture
	Module 2: Revision		20/01/2023	24/01/2023	Traditional	
	Module 2: Revision		24/01/2023	27/01/2023	Traditional	
3	Module 03: Partial Differentiation	12	17/01/2023	29/12/2022	Traditional	
	Module 03: Partial Differentiation – Examples		19/01/2023	30/12/2022	Traditional	Converted Tutorial to Lecture
	Module 03: Partial Differentiation - Chain Rule		20/01/2023	04/01/2023	Traditional	
	Module 03: Partial Differentiation - Chain Rule		24/01/2023	05/01/2023	Traditional	Engaged EP lecture
	Module 03: Partial Differentiation - Euler's Theorem and Deductions		27/01/2023	05//01/2023	Traditional	
	Module 03: Partial Differentiation – Examples on Euler's Theorem		31/01/2023	06/01/2023	Traditional	Engaged EP lecture

	Module 3: Patial Differentiation-Revision		05/01/2023	12/01/2023	Traditional	
	Module 3: Patial Differentiation-Revision		06/01/2023	13/01/2023	Traditional	Engaged BEE lecture
	Module 3: Patial Differentiation-Revision		10/01/2023	13/01/2023	Traditional	Engaged EP lecture
	Module 3: Revision		27/01/2023	03/02/2023	Traditional	
	Module 3: Revision		02/02/2023	03/02/2023	Traditional	
	Module 3: Revision		31/01/2023	06/02/2023	Traditional	
4	Module 04: Successive Differentiation – Algebraic problems	15	03/01/2023	16/12/2022	Traditional	
	Module 04: Successive Differentiation – Trigonometric problems		05/01/2023	26/12/2022	Traditional	
	Module 04: Successive Differentiation – Problems based on DeMoive's concept		10/01/2023	27/12/2022	Traditional	Engaged EP lecture
	Module 04: Successive Differentiation - Leibnitz Rule with Examples		12/01/2023	27/12/2022	Traditional	Engaged EM lecture of SSR
	Module 04: Successive Differentiation - Examples on the Leibnitz Rule		13/01/2023	29/12/2022	Traditional	
	Module 04: Applications of Partial Differentiation - Maxima/Minima		02/02/2023	07/01/2023	Traditional	
	Module 04: Applications of Partial Differentiation - Maxima/Minima		04/02/2023	07/01/2023	Traditional	Engaged E.Mech lecture
	Module 04: Applications of Partial Differentiation - Maxima/Minima		07/02/2023	09/01/2023	Traditional	Engaged EP lecture
	Module 04: Applications of		09/02/2023	10/01/2023	Traditional	

	Partial Differentiation - Lagrange Function					
	Module 04: Applications of Partial Differentiation - Lagrange Function		03/02/2023	11/01/2023	Traditional	Engaged EP lecture
	Module 04: Applications of Partial Differentiation – Revision		12/01/2023	16/01/2023	Traditional	Engaged EP lecture
	Module 04: Applications of Partial Differentiation – Revision		13/01/2023	17/01/2023	Traditional	
	Module 4: Revision		02/02/2023	06/02/2023	Traditional	
	Module 4: Revision		03/02/2023	07/02/2023	Traditional	
	Module 4: Revision		07/02/2023	07/02/2023	Traditional	

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(17Marks)
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