Lesson Plan

Branch: COMP
Semester IV Year: 2022-23

Course Title: CSC401	SEE: 3 Hours – Theory
Total Contact Hours: 37 Hours	Duration of SEE: 3 Hrs
SEE Marks: 80 (Theory) + 20 (IA)	
Lesson Plan Author: Gauree Jagushte.	Date: 09/01/2023
Checked By:	Date: 22/04/2023

Prerequisites:
Pre-requisite:
Engineering Mathematics - I, Engineering Mathematics - II, Engineering Mathematics - III, Binomial Distribution
Syllabus:

Syllabus:

1. **Linear Algebra (Theory of Matrices)**
   - Characteristic Equation, Eigenvalues and Eigenvectors and properties (without proof)
   - Cayley-Hamilton Theorem (without proof), verification and reduction of higher degree polynomials
   - Similarity of matrices, diagonalizable and non-diagonalizable matrices
2. **Complex Integration**
   - Line Integral, Cauchy's Integral theorem for simple connected and multiply connected regions (without proof), Cauchy's Integral formula (without proof).
   - Taylor's and Laurent's series (without proof)
   - Definition of Singularity, Zeroes, poles of f(z), Residues, Cauchy's Residue Theorem (without proof)
3. **Linear Programming Problems**
   - Types of solutions, Standard and Canonical of LPP, Basic and Feasible solutions, slack variables, surplus variables, Simplex method.
   - Artificial variables, Big-M method (Method of penalty)
   - Duality, Dual of LPP and Dual Simplex Method
4. **Nonlinear Programming Problems**
   - NLPP with one equality constraint (two or three variables) using the method of Lagrange's multipliers
   - NLPP with two equality constraints
   - NLPP with inequality constraint: Kuhn-Tucker conditions
5. **Probability Distribution and Sampling Theory**
   - Probability Distribution: Poisson and Normal distribution
   - Sampling distribution, Test of Hypothesis, Level of Significance, Critical region, One-tailed, and two-tailed test, Degree of freedom
   - Students' t-distribution (Small sample). Test the significance of mean and Difference between the means of two samples. Chi-Square Test: Test of goodness of fit and independence of attributes, Contingency table

6. Z Transform

- Definition and Region of Convergence, Transform of Standard Functions: . $\{k^n a^k\}, \{a^{|k|}\}, \{^{k+n}C_n a^k\}, \{c^k \sin(\alpha k + \beta)\}, \{c^k \sinh \alpha k\}, \{c^k \cosh \alpha k\}$.
- Properties of Z Transform: Change of Scale, Shifting Property, Multiplication, and Division by k, Convolution theorem
- Inverse Z transform: Partial Fraction Method, Convolution Method.

Course Outcomes (CO):

On successful completion of course learner will be able to:

CSC401.1	Apply the concepts of eigen values and eigen vectors in engineering problems.
CSC401.2	Use the concepts of Complex Integration for evaluating integrals, computing residues & evaluate various contour integrals.
CSC401.3	Apply the concept of Z- transformation and its inverse in engineering problems.
CSC401.4	Use the concept of probability distribution and sampling theory to engineering problems.
CSC401.5	Apply the concept of Linear Programming Problems of optimization
CSC401.6	Solve Non-Linear Programming Problems to engineering problems of optimization.

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

CO	BL	C	PO	Mapping
CSC401.1	2	1.6 1.7	PO 1	2
		2.1 2.5 2.7 2.8	PO 2	1
CSC401.2	4	1.2 1.7	PO 1	1
		2.5 2.6 2.8	PO 2	1
		3.6 3.7	PO 1	1
		4.4 4.5 4.6	PO 1	1
CSC401.3	3	1.2 1.7	PO 1	1

		2.5 2.6 2.8	PO 1	1
		3.6 3.7	PO 1	1
		4.4 4.5	PO 1	1
CSC401.4	3	1.2 1.7	PO 1	2
		2.5 2.6 2.8	PO 1	2
		3.6 3.7	PO 1	2
		4.4	PO 1	2
CSC401.5	3	1.2 1.7	PO 1	2
		2.5 2.6 2.8	PO 2	1
		3.6 3.7	PO 1	2
		4.4	PO 1	2
CSC401.6	3	1.2 1.7	PO 1	2
		2.5 2.6 2.8	PO 2	1
		3.6 3.7	PO 1	2
		4.4	PO 1	2

Justification:

Above CO's are mapped to the following PO's as explained below:

PO1: provide the complete basic mathematical knowledge required for

- diagonalization of a matrix.
- evaluating complex integral
- evaluate Z and inverse Z transform.
- probability theory and testing of hypothesis.
- solving linear programming problem (LPP).
- solving non-linear programming problem (NLPP).

Course	PO1	PO 2
CSC401.1	2	1

CSC401.2	1	1
CSC401.3	1	1
CSC401.4	2	1
CSC401.5	2	1
CSC401.6	2	1
TOTAL	10	6
Direct Attainment	1.67 (M)	1

CO-PSO Mapping:

CO	BL	C	PI	PO	Mapping
CSC401.1	2	1.6 1.7	1.5.1 1.7.1	PSO 1	2
		2.1 2.5	2.5.2 2.5.3	PSO 2	3

	PSO 1	PSO 2
CSC401.1	3	
CSC401.2	3	
CSC401.3	3	
CSC401.4	3	2
CSC401.5	3	3
CSC401.6	3	

CO Measurement Weightages for Tools:

	Test	Lab	Assignment	SEE (O)	SEE (T)	Course Exit Survey
CSC401.1	20%		20%		60%	100%
CSC401.2	20%		20%		60%	100%
CSC401.3	20%		20%		60%	100%
CSC401.4	20%		20%		60%	100%
CSC401.5	20%		20%		60%	100%
CSC401.6	20%		20%		60%	100%

Attainment:

CO CSC401.1:

Direct Method

$A_{ECC401.1D} = 0.2 * Test + 0.2 * Assignment + 0.6 * SEE\_Theory$ Final Attainment:

$A_{ECC401.1} = 0.8 * A_{ECC401.1D} + 0.2 * A_{ECC401.1I}$

CO CSC401.2:

Direct Method

$A_{ECC401D} = 0.2 * Test + 0.2 * Assignment + 0.6 * SEE\_Theory$ Final Attainment:

$A_{ECC401.2} = 0.8 * A_{ECC401.2D} + 0.2 * A_{ECC401.2I}$

CO CSC401.3:
Direct Method
$A_{\text{ECC401.3}} = 0.2 * Test + 0.2 * Assignment + 0.6 * SEE\_Theory$
Final Attainment:
$A_{\text{ECC401.4}} = 0.8 * A_{\text{CSC703.2}D} + 0.2 * A_{\text{CSC703.2}I}$
CO CSC401.4:
Direct Method
$A_{\text{CSC704.2}D} = 0.2 * Test + 0.2 * Assignment + 0.6 * SEE\_Theory$
Final Attainment:
$A_{\text{CSC704.2}} = 0.8 * A_{\text{CSC704.2}D} + 0.2 * A_{\text{CSC704.2}I}$
CO CSC401.5:
Direct Method
$A_{\text{ECC401.3}} = 0.2 * Test + 0.2 * Assignment + 0.6 * SEE\_Theory$
Final Attainment:
$A_{\text{ECC401.4}} = 0.8 * A_{\text{CSC703.2}D} + 0.2 * A_{\text{CSC703.2}I}$
CO CSC401.6:
Direct Method
$A_{\text{ECC401.3}} = 0.2 * Test + 0.2 * Assignment + 0.6 * SEE\_Theory$
Final Attainment:
$A_{\text{ECC401.4}} = 0.8 * A_{\text{CSC703.2}D} + 0.2 * A_{\text{CSC703.2}I}$

Course Level Gap (if any):
Content beyond Syllabus:

Lecture Plan: (Theory)

Sr. no	Module	Contents	Hours	Planned date	Actual date	Content Delivery Method	Remark
1	1	Linear Algebra (Theory of Matrices): Characteristic Equation,		09/01/2023	09/01/2023	Traditional	
2		Eigenvalues and Eigenvectors		11/01/2023	11/01/2023	Traditional	
3		Properties of Eigenvalues and Eigenvectors (without proof)		13/01/2023	13/01/2023	Traditional	
4		Cayley-Hamilton Theorem (without proof), verification		16/01/2023	16/01/2023	Traditional	
5		Reduction of higher degree polynomials	7	18/01/2023	18/01/2023	Traditional	
6		Similarity of matrices		20/01/2023	20/01/2023	Traditional	Lecture exchange with Jagruti Nagoankar
7		diagonalizable and non-diagonalizable matrices		23/01/2023	23/01/2023	Traditional	

8	2	Complex Integration: Line Integral	7	25/01/2023	25/01/2023		
9		Cauchy's Integral theorem for simple connected and multiply connected regions (without proof)		27/01/2023	27/01/2023		
10		Cauchy's Integral formula (without proof).		01/02/2023	01/02/2023		
11		Taylor's and Laurent's series (without proof)		02/02/2023	02/02/2023		
12		Definition of Singularity, Zeroes, poles of f(z)		03/02/2023	03/02/2023		
13		Residues		06/02/2023	06/02/2023		
14		Cauchy's Residue Theorem (without proof)		08/02/2023	08/02/2023		
15	5	Types of solutions, Standard and Canonical of LPP, Basic and Feasible solutions, slack variables, surplus variables	6	09/02/2023	09/02/2023		
16		Simplex method		10/02/2023	10/02/2023		
17		Artificial variables, Big-M method (Method of penalty)		15/02/2023	13/02/2023		Tutorial conducted as lecture
18		Duality		16/02/2023	15/02/2023		
19		Dual of LPP		17/02/2023	16/02/2023		17/2/23 Lecture cancelled due to Python workshop
20		Dual Simplex Method		22/02/2023	22/02/2023		
21	6	NLPP with one equality constraint (two or three variables) using the method of Lagrange's multipliers-I	7	23/02/2023	23/02/2023		
22		NLPP with one equality constraint (two or three variables) using the method of Lagrange's multipliers-II		24/02/2023	24/02/2023		
23		NLPP with two equality constraints-I		15/03/2023	13/03/2023		
24		NLPP with two equality constraints-II		16/03/2023	15/03/2023		
25		NLPP with inequality constraint: Kuhn-Tucker conditions-I		17/03/2023	16/03/2023		

26		NLPP with inequality constraint: Kuhn-Tucker conditions-II		23/03/2023	17/03/2023		
27		NLPP with inequality constraint: Kuhn-Tucker conditions-III		24/03/2023	23/03/2023		
28	4	Probability Distribution: Poisson distribution	5	29/03/2023	24/03/2023		PARIDHAN
29		Probability Distribution: Normal distribution		30/03/2023	03/04/2023		RAMNAVMI
30		Sampling distribution, Test of Hypothesis, Level of Significance, Critical region, One-tailed, and two-tailed test, Degree of freedom.		31/03/2023	05/04/2023		ANNUAL DAY
31		Students' t-distribution (Small sample). Test the significance of mean		05/04/2023	06/04/2023		
32		Students' t-distribution (Small sample). Test the Difference between the means of two samples.		06/04/2023	10/04/2023		
33		Chi-Square Test: Test of goodness of fit		07/04/2023	13/04/2023		
34		Chi-Square Test: Independence of attributes, Contingency table-II		06/04/2023	15/04/2023		EXTRA SESSION
35	3	Definition and Region of Convergence, Transform of Standard Functions: $\{k^n a^k\}, \{a^{|k|}\}, \{{}^{k+n}C_n . a^k\}, \{c^k \sin(ak+\beta)\}, \{c^k \sinh ak\}, \{c^k \cosh ak\}.$	5	10/04/2023	20/04/2023		EXTRA SESSION
36		Properties of Z Transform: Change of Scale, Shifting Property, Multiplication, and Division by k, Convolution theorem.		12/04/2023	21/04/2023		EXTRA SESSION
37		. Inverse Z transform: Partial Fraction Method, Inverse Z transform: Convolution Method.		13/04/2023	22/4/2023		EXTRA SESSION

Tutorial Plan: (Theory)

Tutorial No.	Contents	Hours	Planned date	Actual date	Remark
1	**Linear Algebra**	**1**	30/01/2023	30/01/2023	

2	**Complex Integration**	**1**	16/02/2023	20/02/2023	
3	**LPP**	**1**	20/03/2023	20/03/2023	
4	**NLPP**	**1**	15/04/2023	15/04/2023	Home Assignment
5	**Probability**	**1**	17/04/2023	17/04/2023	Home Assignment
6	**Z transform**	**1**	20/04/2023	20/04/2023	Home Assignment

Text Books:

1. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons.
2. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Narosa

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Web References:

1.
2.

Evaluation Scheme

CIE Scheme

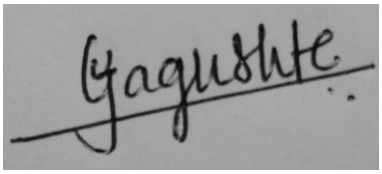
Internal Assessment: 20 (Average of two tests)

Internal Assessment Scheme

Module		Lecture Hours	No. of questions in			No. of questions in SEE
			Test 1	Test 2	Test 3*	
1	Linear Algebra	7	01 (5 marks)	-	--	--
2	Comp;ex Integration	7	02 (10 Marks)	-	--	--
3	Z Transform:	5		01 (5 marks)	--	--
4	Probability Distribution	7		02 (10 Marks)	--	--
5	Linear Programming Problems	6	01 (5 marks)	01 (5 marks)	--	--
6	Nonlinear Programming Problems:	7	-		--	--

Note: Four questions will be set in the Test paper

Verified by:



Programme Coordinator

Subject Expert: Gauree Jagushte.