KU6SECMAT301: SCILAB

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
VI	SEC	300-399	KU6SECMAT301	2 + 1	60

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
2	2		25	50	75	1.5

Course Description

This course introduces students to the fundamentals of **SciLab**, a powerful open-source platform for numerical computations and mathematical modeling. The course emphasizes hands-on learning and applies SciLab to visualize and solve real-world mathematical problems.

Course Prerequisite

Higher Secondary Level Mathematics.

Course Outcomes

CO No.	Expected Outcome	Learning Domains
CO1	Understand SciLab interface, environment, and basic syntax	Understand
CO2	Apply SciLab commands for basic arithmetic and logical operations	Apply
CO3	Plot 2D and 3D graphs and visualize mathematical functions using SciLab	Apply
CO4	Solve algebraic and matrix problems using SciLab functions	Apply
CO5	Practice mathematical modeling and simple simulations through SciLab scripting	Create

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1					✓		
CO 2						✓	
CO 3					✓		
CO 4		✓					
CO 5			✓				

MODULE	UNIT	DESCRIPTION	HOURS (for theory)
I		**Introduction to SciLab**	7
	1	**Introduction to SciLab software:** Overview of SciLab as an open-source computational platform for mathematical modeling and numerical computation.	
	2	**Installation and software environment:** Installing SciLab and exploring the SciLab interface, command window, editor, and variable browser.	
	3	**Operators and expressions:** Using arithmetic, relational, logical, and trigonometric operations in SciLab.	
	4	**Vectors and matrices:** Creating and manipulating row/column vectors and matrices; performing element-wise and matrix operations.	
II		**Control Structures and Programming**	8
	1	**Conditional statements:** Using if, else, and elseif to perform conditional checks in SciLab scripts.	
	2	**Loops:** Applying for and while loops to automate repetitive tasks; examples on factorial and summation.	
	3	**Input/output functions:** Using input(), disp(), printf(), and write () to interact with users and display results.	
	4	**User-defined functions:** Writing functions for tasks such as: Addition of two numbers Square of a number Checking even or odd Calculating the area of a circle	

III	**Graphics and Visualization**		**8**
	1	**2D Plotting:** Using plot, xlabel, ylabel, title, and legend to display functions like y = sin(x), etc.	
	2	**3D Plotting:** Creating 3D surfaces using plot3d, contour, and surf for functions like $z = x^2 + y^2$.	
	3	**Multiple plots and customization:** Generating comparative plots such as: Multiple function plots (sine, cosine) Bode plots (using control system toolbox) Pie charts and bar charts for data representation	
IV	**Mathematical Computations in SciLab**		**7**
	1	**Solving algebraic equations:** Using built-in SciLab functions (e.g., solve(), roots()) for solving equations and polynomials.	
	2	**Matrix operations:** Performing tasks such as addition, multiplication, transposition, inversion, and solving linear systems using \ operator.	

Teacher specific module

Practical Work: Sample Programmes

Practical Component (30 Hours)

Students are required to perform and submit outputs of at least 12 practical problems, covering:

- Basic SciLab scripting
- Visualizing mathematical functions
- Algebraic manipulations and matrix operations
- Graphical simulations and curve fitting
- Simple numerical methods (e.g., root finding, numerical integration)

Module I: Introduction to SciLab

1. Basic Arithmetic and Variable Assignment

2. Creating Vectors and Matrices

3. Calculate Area of Circle

Module II: Control Structures and Programming

4. Using Conditional Statement (if-else)

5. Using Loops to Calculate Factorial

6. Creating a Function to Find Maximum of Two Numbers

7. Input/output functions

8. User-defined functions

Module III: Graphics and Visualization

9. Plotting a 2D Graph of y = sin(x)

10. Plotting a 3D Surface (z = x^2 + y^2)

11. Plotting Multiple Functions on Same Graph

Module IV: Mathematical Computations

12. Finding Roots of a Polynomial

13. Matrix Addition (3×3)

14. Matrix Multiplication (3×3)

15. Determinant of a 3×3 Matrix

Essential Readings

1. Sandeep Nagar, Introduction to Scilab: For Engineers and Scientists. Apress publisher, New York,USA, 2017.
2. A.S.Nair, SCILAB (A free software to MATLAB), S. Chand Publishing, New Delhi, India, 2012.
3. SciLab – A Free Software to Learn Numerical Methods, Scilab Enterprises.
4. Basic Scilab Manual, FOSSEE, IIT Bombay.
5. Scilab: A Free Software to Learn Numerical Computation – Scilab.in

Suggested Readings

1. https://www.scilab.org/
2. https://onlinecourses.swayam2.ac.in/aic20_sp38/preview
3. https://www.udemy.com/course/scilab-the-first-course-beginners-to-intermediate/mediate/
4. Introduction to Scilab – A Beginner's Approach by S.N. Sivanandam.
5. Computational Methods using Scilab – M. Affouf.
6. Numerical Methods for Engineers – Steven C. Chapra, Raymond P. Canale.

Assessment Rubrics

3 Credit Course (2 credit theory + 1 credit practical)

Evaluation Type			**Marks**	**Evaluation Type**			**Marks**	**Total**
Theory			**50**	**Practical**			**25**	**75**
a)	**ESE**		**35**	a)	**ESE**		**15**	
b)	**CCA**		**15**	b)	**CCA**		**10**	
	i	*Test Paper	8		i	Punctuality	2	
	ii	Assignment	4		ii	Skill	5	
	iii	Seminar/ Viva-Voce	3		iii	Record	3	

* A student has to appear for at least two written tests. Average mark of best two tests is to be considered for internal mark.