DEPARTMENT OF MATHEMATICS
VALUE ADDED COURSE

Semester	Course Code	Course Title	Hours
III	21UMAVAC1	SAGE MATH	30

Course Outcome

At the end of the course, the student will be able to:
CO.1. Using SageMath as a calculator.
CO.2. Implement and illustrate 2-D graphs and 3-D graphs.
CO.3. Solving mathematical problems and to plot using SageMath.
CO.4. Implement SageMath using templates and exceptional and handling concepts.
CO.5. Make use of theoretical concepts to solve problems and visualize the output.

List of Practical

1. Finding all local extrema and inflection points of a function.

2. Creating and plotting 2-D graphs and 3-D graphs.

3. Finding the minimum surface area of given surface using package.

4. Finding the approximate roots using Newton's method.

5. Plotting and finding area between curves using integrals.

6. Finding the average of a function.

7. Finding the volume of solid of revolution.

8. Finding the solution for a system of linear equations.

9. Finding the divergence and curl of vector valued functions.

10. Using differential calculus to analyse a quintic polynomials features, for finding the optimal graphing window.

Books for Reference:

1. Razvan A. Mezei, An Introduction to SAGE Programming: With Applications to SAGE, Wiley, 2016

2. https://doc.sagemath.org/pdf/en/tutorial/SageTutorial.pdf

Semester	Course Code	Course Title	Hours
V	21UMAVAC2	SCILAB	30

Course Outcome

At the end of the course, the student will be able to:

CO.1. Evaluate, analyse and plot results.

CO.2. Develop programs in SciLab

CO.3. Understanding of linear algebra and numerical methods

CO.4. Analyse various SciLab commands

CO.5. Implement and illustrate 2-D graphs and 3-D graphs.

List of Practical

1. Check whether the following Boolean statements are true or false based on the values of a, b, c, x, and y given above.

    (i) $a > c$ (ii) $a = b$ (iii) $(2a+b)/x^2 < 1$ (iv) $x^2 + 2ab + b^2 \leq 23$ (v) $2ac = 2cb$

2. Determine the result of the following calculations if $a = 2.3$, $b = -2.3$, $c = \pi/2$, $x = 2/\pi$, and $y = \sqrt{3}$:

    (i) $(a^2 + bc + x)$ (ii) $\sin(c) + y/c$ (iii) $(a+c)/(x+y)$ (iv) $1/(\cos(c) + \ln(x))$

    (v) $(a+c)^3 /b$

3. For the vectors u and v, calculate the following:

    (i) $w = u+v$ (ii) $r = u/.v$ (iii) $z = v*u$ (iv) $t = v*.u$

4. Write a program for the following operations of the matrices A, B and C :

    (i) Sum of two matrices (ii) Product of two matrices (iii) Product of Three matrices

5. Verify whether the given matrix is singular or non-singular and compute its inverse if exists.

6. Write a programme for Cramer's rule to solve the simultaneous equations (maximum of three unknowns).

7. Write a programme for Gauss Jacobi iteration Method to solve the system of linear equations.

8. Solving the ordinary differential equations with initial condition and solving the system of ordinary differential equations.

9. Creating and plotting 2-D graphs.

10. Creating and plotting 3-D graphs.

Book for Reference:

1. Er. Hema Ramachandran and Dr.Achutsankar Nair, SCILAB , S. Chand Publishers, 2011.
2. Stephen L. Campbell, Jean-Philippe Chancelier, and Ramine, Modelling and Simulation in Scilab/Scicos, 1 st Edition, Springer Publication, 2005.