VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
9-5-81, Ibrahimbagh, Hyderbad-500031, Telangana State
DEPARTMENT OF INFORMATION TECHNOLOGY
(B.E. Semester - II)

Mathematics Lab (Calculus, Linear Algebra & Differential equations)

Instruction: 2 Hours / week	SEE Marks :50	Course Code: U21BS211MA
Credits : 1	CIE Marks: 30	Duration of SEE : 3 Hrs

Course Objectives	Course Outcomes
The course will enable the students to:	**At the end of the course student will be able to:**
Demonstrate the linear algebra, calculus and differential equation concepts using SciPy.	1. Demonstrate the knowledge of Linear Algebra module of NumPy/SciPy for numerical analysis and visualization. 2. Apply Matrix basic operations and its analysis. 3. Demonstrate the use of matrix decompositions and solving of linear equations. 4. Apply calculus theorems to examine extreme values of a function. 5. Demonstrate the knowledge of solving Differential equations.

1. Introduction to Anaconda & Jupyter Notebook setup and evaluating elementary functions.
2. Basic operations on Matrix & Vector.
3. Matrix analysis: Rank, Determinant, Trace, Orthogonal basis & Inverse of matrices.
4. Eigen values and Eigenvectors of Matrix.
5. Matrix decompositions: SVD, QR, LU, Pseudo Inverse
6. Solve system of linear equations.
7. Data plotting (2D,3D) of various mathematical functions.
8. Test the convergence of infinite series i.e., power, Taylor.
9. Intro to calculus and examine minima, maxima and saddle points of a given function.
10. Application of definite integrals to area & volume calculations.
11. Solving differential equations.

Learning Resources:

1. Kong, Qingkai, Timmy Siauw, and Alexandre Bayen. Python Programming and Numerical Methods: A Guide for Engineers and Scientists. Academic Press, 2020.
2. https://numpy.org/doc/1.21/user/tutorials_index.html
3. https://personal.math.ubc.ca/~pwalls/math-python/linear-algebra/linear-algebra-scipy/

System requirements

- Anaconda/Jupyter (software that you are required to install)

(Dr.C Goverdhan) (OU Nominee)	(Prof.D.Srinivasacharya) (Subject Expert-1)	(Prof.M.A.Srinivas) (Subject Expert-2)	(Dr.T.Sudhar Rao) (Chairman, BOS)