

Resolution Number: Res No: AC/II(18-19).2.RUS8

S. P. Mandali's

Ramnarain Ruia Autonomous College

Affiliated to Mumbai University



Syllabus for

Program: T.Y.B.Sc.

Program Code: B.Sc

Subject: Computer Programming and System

Analysis

Academic Year: 2019-20

Semester V
Applied Component
Course : Computer Programming and System Analysis I
Course Code: RUSACMAT501

Unit 1 : Introduction to Python

- i. A brief introduction about Python and installation of anaconda.
- ii. Numerical computations in Python including squareroot, trigonometrical functions using math and cmath module. Different data types in Python such as list, tuple and dictionary.
- iii. If statements, For loop and While loops and simple programmes using these.
- iv. User-defined functions and modules. Various use of lists, tuple and dictionary.
- v. Use of Matplotlib to plot graphs in various format.

Unit 2 : Advanced topics in Python

- i. Classes in Python.
- ii. Use of Numpy and Scipy for solving problems in linear algebra and calculus, differential equations.
- iii. Data handling using Pandas.

Unit 3 : Introduction to SageMath

- i. Sage installation and use in various platforms. Using SageMath as an advanced calculator.
- ii. Defining functions and exploring concept of calculus.
- iii. Finding roots of functions and polynomials.
- iv. Plotting graph of 2D and 3D in SageMath.
- v. Defining vectors and matrices and exploring concepts in linear algebra.

Unit 4 : Programming in SageMath

- i. Basic single and multi-variable calculus with Sage.
- ii. Developing Python programmes in Sage to solve some problems in numerical analysis and linear algebra.
- iii. Exploring concepts in graph theory and number theory.

Semester VI
Applied Component
Course : Computer Programming and System Analysis II
Course Code: RUSACMAT601

Unit 1 : Introduction to SciLab

- i. Basic introduction to SciLab, using SciLab as an advanced calculator.
- ii. Defining vectors and matrices and basic operations.
- iii. Plotting graphs of 2D and 3D in various forms.
- iv. Exploring concept of calculus using SciLab.
- v. Solving ODE in SciLab.

Unit 2 : Programming in SciLab

- i. If -Else conditions, loops, user-defined function, etc.
- ii. Developing programmes to find roots and algebraic and transcendental equation and solving system of linear equations (Gaussian Elimination Method , Gauss-Jacobi Method and Gauss-Siedel Method).
- iii. Exploring applied linear algebra using SciLab (eigenvalues, eigenvectors and various properties, applications to solve ODE, matrix factorization and its applications).

Unit 3 : Introduction to LaTeX

- i. Introduction, document structure - creating title, sections, table of contents, labelling.
- ii. Typesetting text - fonts, text colour, lists.
- iii. Tables, equations.

Unit 4 : Presentation using slides and articles

- i. Layout of page, cross references.
- ii. Footnotes, definitions ?
- iii. Page style, presentation slides.

Reference Books :

- (1) SciLab Textbook Companion For Higher Engineering Mathematics, B. S. Grewal.
- (2) SciLab Textbook Companion For Linear Algebra and Its Applications, D. C. Lay.
- (3) SciLab Textbook Companion For Numerical Methods, E. Balguruswamy.
- (4) Introduction to SciLab, Sandeep Nagar, Apress.