CDSA - 102 Programming for Data Science

Total Credit- 06 **Max. Marks- 100**

Block 1-

Unit 1- Understanding Programming- I

What is Programming? Basic Programming Concepts, why should you learn Computer Programming? Essentials of a Programming Language.

Unit 2- Understanding Programming- II

Types of Computer Programming Languages, Various programming approaches, Skills Required for Programming, How to Start Programming? Career options for Programmers.

Unit 3- Qualitative Variables (Creating and using categorical variables in R)

[The Function factor(), Visualizing Qualitative Variables, How Factors are Stored in R, Changing Factor Levels, Hypothesis Testing for Factors]

Unit 4- Quantitative Variables (Creating and using continuous variables in R)

[Working with Numeric Data, Hypothesis Testing, Resistant measures of center and spread, Visualizing Quantitative Data, Converting Quantitative Data to Qualitative, Fitting and Modeling Distributions]

Block 2-

Unit 5- Bivariate Data in R

[Basic approaches to dealing with two variables, Two Qualitative Variables, Two Quantitative Variables, Qualitative and Quantitative Variables]

Unit 6- The Data Frame in R

[The R equivalent of the spreadsheet, Data Frames, attaching data, Changing Data Frames]

Unit 7- Importing and Exporting Data in R

[Getting your data into R, Importing Data, Exporting Data, Importing Other Data Types, Some Typical Problems]

Unit 8- Manipulating Data in R

[An introduction to data wrangling, Summarizing Data, Reformatting Data, Reshape, Merging Data Sets, more about Loops]

Block 3-

Unit 9- Working with multiple variables in R

[Some basic tools for multivariate data, Working with Multivariate Data, PCA, Clustering]

Unit 10- Linear Models in R

[Linear regression, Violation of Assumptions and Transformation of Data, Hypothesis Testing, Predictions and Confidence Intervals from Regression Models]

Unit 11- Visualizing Data in R

[Enhancing scatter plots, Basic Scatter Plots, Multi-Panel Plots I: Layout, Adding a Secondary y-axis, Summary]

Unit 12- Visualizing Data II

[Error bars and polygons, Scatter Plot with Error Bars, Scatter Plots with Confidence Ribbons, Error Bars in 2 Dimensions]

Block 4- Programming with Python

Unit 13- Programming with Python (Variables, expressions, and statements)

[Values and types, Variables, Variable names and keywords, Statements, Operators and operands, Expressions, Order of operations, Modulus operator, String operations, Asking the user for input, Comments, Choosing mnemonic variable names]

Unit 14- Conditional execution in Python

[Boolean expressions, Logical operators, Conditional execution, Alternative execution, Chained conditionals, Nested conditionals, catching exceptions using try and except, Short-circuit evaluation of logical expressions]

Unit 15- Iteration in Python

[Updating variables, the while statement, Infinite loops, finishing iterations with continue, Definite loops using for, Loop patterns, Counting and summing loops, Maximum and minimum loops]

Unit 16- Functions in Python

[Function calls, Built-in functions, Type conversion functions, Math functions, Random numbers, adding new functions, Definitions and uses, Flow of execution, Parameters and arguments, Fruitful functions and void functions, why functions?]

Block 5-

Unit 17- Strings in Python

[Getting started with string, Traversal through a string with a loop, Looping and counting, The in operator, String comparison, String methods, Parsing strings, Format operator]

Unit 18- Lists in Python

[Getting started with List, List operations, List methods, deleting elements, Lists and functions, Lists and strings]

Unit 19- Dictionaries in Python

[Getting started with Dictionaries, Dictionaries and files, Looping and dictionaries]

Unit 20- Tuples in Python

[Comparing tuples, Tuple assignment, Dictionaries and tuples, Multiple assignment with dictionaries, Using tuples as keys in dictionaries]