# 19CS42O3 - R PROGRAMMING

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| Course Category: | Open Elective | Credits: | 3 |
| Course Type: | Theory | Lecture-Tutorial-Practical: | 3-0-0 |
| Prerequisite: | Require fundamental knowledge in any programming language, mathematics and statistical techniques | Sessional Evaluation:  Univ. Exam Evaluation:  Total Marks: | 40  60  100 |
| Objectives: | Students undergoing this course are expected to understand:   * Gain a foundational understanding of R Programming basics * Master the R programming and understand how various constructs are implemented in complex problems and applications | | |

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| Course Outcomes | Upon successful completion of the course, the students will be able to: | |
| CO1 | Understand the fundamental building blocks of R programming |
| CO2 | Learn some of the commands and packages to develop simple programs |
| CO3 | Acquire knowledge of Various storage and retrieval techniques and applicability |
| CO4 | Study various types of viewing and forms of data objects for application development |
| CO5 | Adapt different types of testing methodologies and supporting comparative study |
| CO6 | Get the clear view of how to analyze methods using graphical representations based on statistical data |
| Course Content | UNIT-I  **Introduction to R programming:** History of R programming, Reserved words of R, Variables and constants of R, Operators of R, precedence and association of R, data types in R. Decision making statements in R programming. Iterative statements, functions, strings, arrays, vectors, lists, matrices, factors, data frames, data reshaping and data interfacing.  UNIT-II  **R-command packages**: Standard Command Packages, Getting Extra Packages of R Commands-Installing Extra Packages for Windows, Running and Manipulating Packages, Loading Packages, Windows-Specific Package Commands.  UNIT-III  **Simple Math:** Use R Like a Calculator, Storing the Results of Calculations.  **Reading and Getting Data into R:** Using the combine Command for Making Data, Entering Numerical and Text Items as Data, Scan Command for Making Data.  **Reading Bigger Data Files:** read.csv () Command, Other Commands for Reading Data in R, Missing Values in Data Files.  UNIT-IV  **Viewing Named Objects:** Viewing Previously Loaded Named-Objects-Viewing All Objects, Viewing Only Matching Names and Removing Objects from R.  **Manipulating Objects:** Manipulating Vectors, Manipulating Matrix and Data Frames, Manipulating Lists.  **Constructing Data Objects:** Making Lists, Making Data Frames, Making Matrix Objects.  **Forms of Data Objects:** Testing and Converting, Testing to See What Type of Object You have, Converting from One Object Form to Another, convert a Matrix to a Data Frame, convert a Data Frame into a Matrix, convert a Data Frame into a List and Convert a Matrix into a list.  UNIT-V  **Simple Hypothesis Testing:** Using the Student’s t-test, Two-Sample t-Test with Unequal Variance, Two-Sample t-Test with Equal Variance, One-Sample t-Testing, Using Directional Hypothesis Formula, Syntax and Sub setting Samples in the T-Test.  **The Wilcoxon U-Test (Mann-Whitney):** Two-Sample U-Test, One-Sample U-Test, Using Directional Hypotheses, and Formula Syntax and Sub setting Samples in the U-test.  **Paired t- and U-Tests:** Correlation and Covariance, Simple Correlation, Covariance, Significance Testing in Correlation Tests and Formula Syntax  UNIT-VI  **Introduction to Graphical Analysis:**  **Box-whisker Plots:** Basic Box plots, Customizing Box plots, Horizontal Box plots,  Scatter Plots: 2 Basic Scatter Plots, Adding Axis Labels, www. Plotting Symbols, Setting Axis Limits, Using Formula Syntax, Adding Lines of Best-Fit to Scatter Plots.  **Pairs Plots:** (Multiple Correlation Plots) Line Charts, Line Charts Using Numeric Data, Line Charts Using Categorical Data, Pie Charts, Cleveland Dot Charts. Bar Charts: Single-Category Bar Charts and Multiple Category Bar Charts. | |
| Text Books &  References  Books | **TEXT BOOKS**   1. Beginning R, the statistical programming language by Dr Mark Gardener.   **REFERENCE BOOKS**   1. “R Programming for Beginners: Fast and Easy Learning” by Steven Keller,Kindle Edition. 2. “A Handbook of Statistical Analyses Using R” by Brian Everitt and Torsten Hothorn. 3. “R Graphics Cookbook” by Winston Chang. | |
| E-Resources | 1. <https://nptel.ac.in/courses> 2. <https://freevideolectures.com/university/iitm> | |