Nirma University
School of Technology, Institute of Technology
B. Tech (Instrumentation and Control Engineering)

Semester VII

L	T	P	C
2	0	2	3

Course Code	2ICDE64
Course Title	Introduction to R programming

Course Outcomes (CO):
At the end of the course, students will be able to -

1. explain various constructs of R language
2. formulate various statistical functions using R language
3. evaluate models using R language
4. analyze and plot the time series data

Syllabus:

Teaching Hours

UNIT 1: Introduction   02
Overview of R , Basic syntax, script files, R data types and objects , operators and variables

UNIT 2: Decision making and loops   03
If statement, If else statement, switch statement, Repeat loop, for loop ,while loop, break and next statement

UNIT 3: Function and Strings   03
Function definitions, function components, Built in functions, User defined functions, Introduction to strings, Strings manipulation.

UNIT 4: Vectors, list , matrices and arrays   03
Vector creation, Vector manipulation, creating list , naming ,accessing and manipulating list components, merging list, matrix computations, manipulating array elements, calculation using array elements

UNIT 5: Factors and data manipulation   03
Concept of data frame, Factors in data frame, generating factor levels , Extract data from data frame, expand data frame ,merging data frames, casting and melting.

UNIT 6: Files managements in R   03
CSV files, reading and analysing CSV file, R- Excel file, xlsx package, reading excel files, R binary files, R-XML files, XML to data frame , R-JSON file , input data in JSON file, Convert JSON to data frame

UNIT 7: Charts and Graphs   03
Pie charts, bar charts , box plots, histogram, line plots ,scatter plots

UNIT 8: Statistics examples and case studies   10
Linear regression, Multiple regression , nonlinear least square , decision tree , random forests , chi square test, time series analysis, case studies related to electronics and instrumentation applications.

Self-Study:
The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

Laboratory Work:
Laboratory work will consist of minimum 10 experiments based on the above syllabus.

References:
1. Nina Zumel , John Mount, Jim Porzak , Practical Data science with R , Manning Publications
2. Robert Cabacoff, R in action : Data analysis and graphics in R , Manning Publication.
3. Richard Cotton, Learning R: A Step-by-Step Function Guide to Data Analysis,O' Relly Pubications.
4. Norman Matloff, The art of R programming , No starch Press.
5. Mark Gardener, Beginning R, O' Relly Publications

L= Lecture, T= Tutorial, P= Practical, C = Credit