



## STATISTICS AND PROBABILITY USING R (IC)

Course Code	L:T:P	Credits	Exam marks	Exam Duration	Course Type
18CSM41 18ISM41	3:0:2	4	CIE:50 SEE:50	3 Hours	BS
<b>Course Objectives:</b>					
<p>This course will enable the students to</p> <ul style="list-style-type: none"> <li>• Learn to use the R-software.</li> <li>• Understand the concept of different probability distributions.</li> <li>• Learn the concept of stochastic process.</li> <li>• Gain the knowledge of sampling of large data.</li> </ul>					
<b>Syllabus</b>					
<b>Module – I</b>					
<p><b>Introduction to R-Lab:</b> Introduction to R, Basic Data types, vector operations, matrix construction, lists, data frames, Elementary statistics with R-Qualitative and quantitative data, numerical measures, probability distribution, interval estimation and simple linear regression. <span style="float: right;"><b>07 Hours</b></span></p>					
<b>Module – II</b>					
<p><b>Probability and Distributions:</b> Random variables (Discrete and continuous), probability density function, cumulative density function, probability distributions- Poisson distribution, Geometric distribution, Exponential &amp; Normal distribution -problems. <span style="float: right;"><b>08 Hours</b></span></p>					
<b>Module – III</b>					
<p><b>Joint Probability:</b> Joint probability distribution, discrete and continuous distribution independent random variables, expectation, covariance, correlation coefficient. <span style="float: right;"><b>08 Hours</b></span></p>					
<b>Module – IV</b>					
<p><b>Stochastic Process:</b> Classification of stochastic process, Bernoulli process, Poisson process probability vectors, stochastic matrices, fixed point matrices, regular stochastic matrices, Markov chains, higher transition probabilities, stationary distribution of regular Markov chains and absorbing states. <span style="float: right;"><b>08 Hours.</b></span></p>					
<b>Module – V</b>					
<p><b>Sampling and inference:</b> Sampling distribution, Standard error, testing of hypothesis, level of significance, confidence limits, Test of significance of large samples, comparison of large samples, sampling of variables, central limit theorem, confidence limits for unknown means, students t-distribution. <span style="float: right;"><b>08 Hours</b></span></p>					
<b>Course Outcomes:</b>					
<p>On completion of this course the students are able to</p>					

- Use R software to solve various engineering problems.
- Apply probability distributions to real time problems.
- Apply joint probability to real time problems
- Apply different process models in solving engineering problems
- Analyze the large data using sampling techniques.

**Text Books:**

1. Dr. B.S. Grewal: "Higher Engineering Mathematics", (Chapters: 26, 27), Khanna Publishers, New Delhi, 44<sup>th</sup> Edition, 2017, ISBN.: 978-81-933284-9-1
2. B.V. Ramana: "Higher Engineering Mathematics", (Chapters 26, 27, 28, 29, 31), Tata McGraw-Hill Publishing Company Limited, New Delhi, 11<sup>th</sup> Reprint, 2010, ISBN13: 978-0-07063419-0.

**Reference Books:**

1. N.P. Bali: "Engineering Mathematics", (Chapters: 21), Laxmi Publications, 9<sup>th</sup> Edition, 2017, ISBN.: 978-81-318-0832-0

**E-Resources:**

1. <http://bookboon.com/en/essential-engineering-mathematics-ebook>
2. <https://www.free-ebooks.net/ebook/essential-engineering-mathematics>
3. <https://archive.org/details/AdvancedEngineeringMathematics10thEdition>

**List of Lab Experiments**

- 1 Introduction to R Software and basic commands
- 2 Demonstration and operations of Vectors
- 3 Operations of Matrices
- 4 Demonstration of Lists
- 5 Demonstration of Data Frames
- 6 Qualitative Data Analysis
- 7 Quantitative Data Analysis
- 8 Numerical Measures of Data
- 9 Probability Distribution

## 10 Linear Regressions