College of Engineering Pune
(An Autonomous Institute of Government of Maharashtra)
Department of Mathematics
(MA- 21001) Probability and Statistics for Engineers

T.Y. B. Tech. Semester V(Computer, Electrical, E and TC, Instru, Mech)

Teaching Scheme	Examination Scheme
Lectures :2 hrs / week	Internal Test 1: 20 marks
Tutorial : 1 hr / week	Internal Test 2: 20 marks
	End Sem. Exam: 60 marks

UnitI: Descriptivestatistics: Measures of location and variation. Visualization of data :Frequency tables, bar diagrams, histograms, heat maps, other visualization tools.
Review on introduction to combinatorics and probability theory. **[5 Hrs]**

Unit II : Some of the basic probability distributions : Binomial, Poisson, Exponential, and Normal. Central limit theorem.**[5 Hrs]**

Unit III : Introduction to 'R':Introductory R language fundamentals and basic syntax, major R data structures, Using R to perform data analysis, creating visualizations using R.**[4Hrs]**

Unit IV : Basic statistical inference and hypothesis testing : Estimation, basic tests such as t-test, z-test, F-test, χ^2 –test, Non parametric tests: Sign test, Wilcoxon signed rank test. **[6 Hrs]**

Unit V : Regression methods : Simple linear regression and multiple regression.**[4 Hrs]**

Unit VI : Engineering applications of statistics(Branch Specific (any 2)) : Discussion on reliability and quality control. Introduction to random processes, stochastic processes, Markov chains. Machine learning and data science.**[4 Hrs]**

Text Books:

- Ronald E, Walpole, Sharon L. Myers, Keying Ye, Probability and Statistics for Engineers and Scientists (8^{th} Edition), Pearson Prentice Hall, 2007.
- Tilman M. Davies, The book of R: A first course in Programming and Statistics (1^{st} Edition), No Starch Press, USA, 2016.

Reference Books:

- Ross S.M., Introduction to probability and statistics for Engineers and Scientists (8^{th} Edition), Elsevier Academic press, 2014.
- S. P. Gupta, Statistical Methods, S. Chand & Sons, 37^{th} revised edition, 2008.

- Kishor S. Trivedi, Probability and Statistics with Reliability, Queuing and Computer Science Applications (2nd Edition), Wiley Student edition, 2008.
- Stephens L.J., Schaum's outline of statistics for Engineers, Latest edition, 2019.
- The practice of Business Statistics by Manish Sharma and Amit Gupta, Khanna Publishing Company Private Limited, New Delhi, 2014.

References for R Software :

- Norman Matloff, The Art of R Programming - A Tour of Statistical Software Design, (1st Edition), No Starch Press, USA, 2011.
- Sudha Purohit, Sharad Gore, Shailaja Deshmukh, Statistics using R (2nd Edition), Narosa Publications, 2019.
- Randall Pruim, Foundations and Applications of Statistics - An introduction using R (2nd Edition), American Mathematical Society, 2018.
- Hadley Wickham and Garrett Grolemund, R for Data Science: Import, Tidy, transform, Visualize and Model Data, (1st Edition), O'Reilly Publications, 2017.

Outcomes : Students will be able to

1. **demonstrate** number of methods of summarizing and visualizing data sets, **evaluate** probabilities of events.
2. **make useof**concepts of random variables and associated probability distributions to solve problems,**illustrate**the central limit theorem.
3. **testfor** basic statistical inference (t-test,z-test, F-test, χ^2 –test, confidence interval, non parametric tests).
4. **explain** basic principles of regression analysis and perform the same.
5. **demonstrate** use of R software for all the above.