| 20MA301E | | | | | Applied Statistics | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Teaching Scheme | | | | | Examination Scheme | | | | | |
| L | T | P | C | Hrs. / Week | Theory | | | Practical | | Total Marks |
| | | | | | MS | ES | IA | LW | LE/Viva | |
| 3 | 0 | 0 | 3 | 3 | 25 | 50 | 25 | -- | -- | 100 |

**COURSE OBJECTIVES**

- To be able to evaluate problems related to probability and distribution.
- To be able to obtain the central measure of various data related to real world problem.
- To be able to Understanding of data collection, its distribution and testing.
- To be able to analyze the data related to various field of science and engineering.

**Prerequisite** – Course on Probability and Statistics **10 Hrs.**

**UNIT 1 PROBABILITY AND DISTRIBUTION**

Sample Space and Events; Axioms, Interpretations and Properties of Probability; Expectation; conditional Probability; Total probability, Bayes' Rule, Random variables; Measures of central tendency and dispersion. Joint distributions and their Mean, Variance and Covariance. Discrete Distributions – Binomial, Poisson Hypergeometric; Continuous Distribution – Normal, t, Exponential, $\chi^2$ and F distributions.

**UNIT 2 PARAMETER ESTIMATION** **08 Hrs.**

The central limit theorem. General concepts of estimation, point estimation. Interval estimation, sampling distributions and the concept of standard error, confidence levels, confidence intervals based on a single sample and two samples. Concepts of maximum likelihood estimators.

**UNIT 3 SAMPLING DISTRIBUTION** **12 Hrs.**

Hypothesis testing: Introduction, Type I and Type II errors, tests concerning the mean and variance based on a single sample and two samples. Use of p-values. Analysis of Variance and the F-test. One way and Two way Models. Covariance and correlation, hypothesis tests for the correlation coefficient. Contingency tables, two-way tables.

**UNIT 4 ANALYSIS OF VARIANCE** **10 Hrs.**

Simple linear regression, estimating model parameters – the method of least squares; inferences about slope parameters, coefficient of determination, predicting Y values, prediction intervals. Introduction to multiple regression and its assumptions, estimating parameters, hypothesis testing for coefficients, ANOVA in regression. Data analysis using computer software.

**40 Hrs.**

**COURSE OUTCOMES**

On completion of the course, student will be able to

CO1 – Identify the use of probability in engineering aspects.
CO2 – Understand the concept of probability distribution and hypothesis test.
CO3 – Develop the ability to apply appropriate tool/method to extract the solutions of engineering problems.
CO4 – Analyze the obtained solution of data analysis in context with theory.
CO5 – Appraise mathematical/statistical problems from real to complex domain.
CO6 – Evaluate problems on analysis of variance.

**TEXT/REFERENCE BOOKS**

1. Jay L. Devore, Probability and Statistics for Engineering and the Sciences, Cengage Learning, 2012.
2. Ronald E. Walpole, Sharon L. Myers and Keying Ye, Probability & Statistics for Engineers & Scientists, 8th ed., Pearson Education, 2006.
3. Sheldon M. Ross, "Introduction to Probability Models", 10th ed., Academic Press, 2019.
4. Sheldon M. Ross, Introduction to Probability and Statistics for Engineers and Scientists, 4th ed., Academic Press, 2014.
5. S.C. Gupta & V.K. Kapoor, "Fundamentals of Mathematical Statistics" 11th ed., Sultan Chand & Sons, 2014.