15.3 Semester III

Code: BCA-3001 T	CC-VI	Probability and Statistics	3L+T:0P	3 Credits (45 hours theory)

Max Marks: 100; Theory: 100 (Int: 25; Ext: 75)

Course Outcomes: Upon competition of the course, students will be able to

CO1: Understand fundamental concepts of statistics, apply measures of central tendency, and analyze data using measures of dispersion, develop practical data analysis skills.

CO2: Understand the concept of correlation, compute and interpret correlation measures and understand the concept of regression.

CO3: Understand fundamental concepts of probability, analyze random variables and their distributions, and apply standard probability distributions.

CO4: Understand the concept of sampling and sampling distribution, apply concepts of statistical inference, perform hypothesis testing, chi square test and develop data-driven decision-making skills

Unit	Topics	Proposed Lecture
I	**Basic Concepts of Statistics**: Qualitative and Quantitative Data, Classification of Data, Construction of Frequency Distribution, Diagrammatic Representation of Data. **Measures of Central Tendency:** Arithmetic Mean, Median and Mode Their Properties. **Measures of Dispersion**: Range, Coefficient of Range, Quartiles, Quartile Deviations, Mean Deviations, Coefficient of Mean Deviations, Standard Deviation and Variance for All Types of Frequency Distribution.	12
II	**Correlation**: Definition, Scatter Diagram, Types of Correlation, Measures—Karl Pearson's Correlation Coefficient and Spearman's Rank Correlation Coefficient. **Regression:** Definition of Regression, Regression Lines, Regression Coefficients	10
III	**Concepts of Probability:** Experiment and Sample Space, Events and Operations with Events, Probability of an Event, Basic Probability Rules, Applications of Probability Rules, Conditional Probability. **Random Variables:** Discrete and Continuous Random Variable, Probability Distribution of a Random Variable, Probability Mass Function, Probability Density Function, Expectation and Variance of a Random Variable. **Standard Probability Distributions:** Binomial Distribution, Poisson Distribution, Mean and Variance of Binomial and Poisson Distribution, Normal Distribution. Exponential Distribution.	12
IV	**Sampling Distribution:** Concept of Population and Sample, Parameter and Statistic, Sampling Distribution of Sample Mean and Sample Proportion. **Statistical Inference:** Estimation and Hypothesis Testing (Only Concept). **Hypothesis Testing for a Single Population:** Concept of a Hypothesis Testing, Tests Involving a Population Mean and Population Proportion (Z Test and T Test). **Chi Square Test for Independence of Attributes and Goodness of fit.**	11

Text Books:

1. Das N.G., Statistical Methods, Combined Edition, Tata McGraw Hill,2010.
2. RossSheldon M., Introduction to Probability and Statistics for Engineers and Scientists, 6th Edition Elsevier, 2021.
3. Miller Irwin and Miller Marylees, Mathematical Statistics with Applications, Seventh Edition, Pearson Education, 2005
4. Statistical Methods by S. P. Gupta, Sultan Chand Publication

Reference Books:

1. Pa INabendu and SarkarSahadeb, Statistics: Concepts and Applications, Second Edition, PHI, 2013.
2. Montgomery Douglas and Runger GeorgeC., Applied Statistics and Probability for Engineers, Wiley 2016.
3. Fundamental of Applied Statistic by S.C. Gupta & V.K. Kapoor , Sultan Chand Publication.
4. Probability, random variables and stochastic processes by A. Papoulis and S.U. Pillai, TMH.