

## 2MCAAC1: PROBABILITY AND STATISTICS

**Total No. of Hours: 52**

**Hours/Week: 04**

**Course Objective:** To equip with statistical concepts used in computer software development.

**Course Outcome:** Students will be able to

**CO1:** Understand basic statistical concepts and analyse summary diagrams and charts

**CO2:** Understand probabilities of events and expectations of random variables for elementary problems such as games of chance.

**CO3:** Identify and analyse random variables and theoretical distribution

**CO4:** Understand statistical inference and formulate hypothesis and apply appropriate tests to checks its acceptability

**CO5:** Understand the meaning of research and analyse its various types

Unit I	<b>Introduction and Data Analysis:</b> Basic statistical concepts: Population, sample variable, attribute. Types of data. Construction of a frequency distribution. Diagrams (bar, pie) and graphs (histogram, frequency curve and Ogives). Measures of central tendency – mean, median, mode. Statement of properties. Graphical location of median and mode. Measures of dispersion: range, quartile deviation, standard deviation. Relative measures. Correlation and regression – fitting of linear, quadratic to the given data by the principle of least squares (no derivations). Product moment correlation coefficient and its properties, Spearman's rank correlation coefficient. Linear regression ( $Y=a+bX$ )	12 hrs
Unit II	<b>Probability:</b> Basic Concepts – random experiment, trial, event, sample space. Definition of exhaustive, mutually exclusive, equally likely, complementary, favorable, simple and composite events. Definition of probability. Addition and multiplication theorems of probability(Statements only). Conditional probability and independent events. Bayes theorem (Statement only).	8 hrs
Unit III	<b>Random variables &amp; Theoretical distributions:</b> Random variables – Definition, discrete and continuous random variables, probability mass and density functions, distribution function. Mathematical expectation, variance and their properties. Bivariate probability distributions – joint, marginal and conditional probability functions for discrete and continuous random variables, covariance and correlation coefficient. Independence of random variables. Additional and multiplication theorems of expectation (Statement only). Bernoulli, binomial, Poisson, normal distributions– definition through their p.m.f's / p.d.f's, statement of their mean and variance and important properties. Sampling distributions – definition of chi-square, t and F distributions.	12 hrs

Unit IV	<b>Statistical Inference:</b> Statistical hypotheses – null, alternative, simple and composite, type I and type II errors, level of significance. Tests for <ol style="list-style-type: none"> <li>1. Population mean, equality of two population means (large and small samples)</li> <li>2. Population proportion and equality of two population proportions.</li> </ol> Chi-square test for independence of two attributes. Analysis of one-way and two-way classified data.	10 hrs
Unit V	<b>Research Methodology:</b> An introduction - meaning of research, motivation in research, types of research, research methodology.	10 hrs

## REFERENCE BOOKS

- [1] Ronald E Walpole, Raymond H Myers, Sharon L Myers, “*Probability & Statistics for Engineers and scientists*”, Pearson Education, Ninth Edition.
- [2] Kothari C R, “*Research Methodology- Methods and Techniques*”, New Age International Publishers, Third Edition.
- [3] Trivedi et al, “*Probability & Statistics with Computer Applications*”, Tata McGraw-Hill, Second Edition.
- [4] Richard A Johnson, C.B. Gupta, Miller and Freund’s, “*Probability and Statistics for Engineers*”, Pearson Education, Fourth Edition.
- [5] Gupta.S.C., Kapoor .V.K., “*Fundamentals of Mathematical Statistics*”, Sultan Chand & Co., 2014
- [6] R.Pannerselvam, “*Research methodology*”, Prentice Hall of India. Second Edition.