

Growth of Functions: asymptotic notations, summation formulas and properties, bounding summations, approximation by integrals.

UNIT-III: 15 mark

Recurrence: recurrence relations, generating functions, linear recurrence relations with constant coefficients and their solution, recursion trees, Master Theorem

UNIT-IV: 15 mark

Graph Theory: basic terminology, models and types, multi-graphs and weighted graphs, graph representation, graph isomorphism, connectivity, Euler and Hamiltonian Paths and Circuits, planar graphs, graph coloring, Trees, basic terminology and properties of Trees, introduction to spanning trees.

UNIT-V: 15 mark

Propositional Logic: logical connectives, well-formed formulas, tautologies, equivalences, Inference Theory

Text book:

1. Mohapatra, & Liu, C. L. (2012). *Elements of Discrete mathematics*. 4th edition. McGraw Hill Education.
2. Rosen, K. H. (2011). *Discrete Mathematics and Its Applications*. 7th edition. Tata McGraw Hill Education.
3. C.L.Liu, *Elements of Discrete Mathematics*, Second Edition, Tata Mc-Graw-Hill.

References:

1. Albertson, M. O., & Hutchinson, J.P., (1988). *Discrete Mathematics with Algorithms*. John Wiley and Sons.
2. Cormen, T. H., Leiserson, C. E., & Rivest, R. L. (2009). *Introduction to algorithms*. 3rd edition. MIT Press.
3. Hein, J. L. (2015). *Discrete Structures, Logic, and Computability*. 4th edition. Jones and Bartlett Learning.
4. Hunter, D. J. (2011). *Essentials of Discrete Mathematics*. 2nd edition. Jones and Bartlett Learning

BCA408: Probability and Statistics (Discipline Specific Core Course)

Core Credit: 06

Total Marks: 100 Marks (Theory: 75 Marks, Internal Assessment: 25 Marks)

Workload: 5 Lecturers (Per Week), 2 Tutorials (Per Week)

Course Objectives: To make the students familiar with the basic statistical concepts and tools which are needed to study situations involving uncertainty or randomness. The course intends to render the students to several examples and exercises that blend their everyday experiences with their scientific interests.

Course Learning Outcomes: This course will enable the students to learn:

1. Distributions to study the joint behavior of two random variables.
2. To establish a formulation helping to predict one variable in terms of the other, i.e., correlation and linear regression.

3. Central limit theorem, which helps to understand the remarkable fact that the empirical frequencies of so many natural populations, exhibit a bell shaped curve.

Detailed Syllabus

UNIT-I: 15 mark

Probability Functions and Moment Generating Function: Sample space, Probability set function, Real random variables - Discrete and continuous, Cumulative distribution function, Probability mass/density functions, Transformations, Mathematical expectation, Moments, Moment generating function, Characteristic function.

UNIT-II: 20 mark

Univariate Discrete and Continuous Distributions: Discrete distributions: Uniform, Bernoulli, Binomial, Negative binomial, Geometric and Poisson; Continuous distributions: Uniform, Gamma, Exponential, Chi-square, Beta and normal; Normal approximation to the binomial distribution.

UNIT-III: 20 mark

Bivariate Distribution: Joint cumulative distribution function and its properties, Joint probability density function, Marginal distributions, Expectation of function of two random variables, Joint moment generating function, Conditional distributions and expectations.

UNIT-IV: 20 mark

Correlation, Regression and Central Limit Theorem: The Correlation coefficient, Covariance, Calculation of covariance from joint moment generating function, Independent random variables, Linear regression for two variables, The method of least squares, Bivariate normal distribution, Chebyshev's theorem, Strong law of large numbers, Central limit theorem and weak law of large numbers.

Text Books:

1. Hogg, Robert V., McKean, Joseph W., & Craig, Allen T. (2013). *Introduction to Mathematical Statistics* (7th ed.). Pearson Education, Inc.
2. Basic Statistics –Agarwal B.L, New age international, 6th edition, 2013
3. Miller, Irwin & Miller, Marylees. (2014). John E. Freund's *Mathematical Statistics wit Applications* (8th ed.). Pearson. Dorling Kindersley (India).

References:

1. Medhi J – Statistical methods, New age International, Second edition, Reprint 2013
2. Walpole, Myers et al. –Probability and statistics for scientists and engineers., Pearson Education, Ninth edition, 2013
3. Applied Statistics and probability for Engineers, Runger and Montgomery, Wiley, 6th Edition
4. Ross, Sheldon M. (2014). *Introduction to Probability Models* (11th ed.). Elsevier Inc. AP.

BCA409: Database Management Systems (Discipline Specific Core Course)

Credit: 06

Total Marks: 100 Marks (Theory: 75 Marks, Internal Assessment: 25 Marks)