MTH265:DISCRETE MATHEMATICS FOR COMPUTING

L:3 T:0 P:0 Credits:3

Course Outcomes: Through this course students should be able to

CO1 :: apply the learned concepts to determine equivalence relations, partitions, and partial ordering.

CO2 :: define key concepts such as ordered sets, Hasse diagrams, supremum, infimum, lattices, distributive lattices, and complemented lattices.

CO3 :: explain the representation of Boolean algebra as lattices, the representation theorem, and the significance of the sum-of-products (SOP) form.

CO4 :: explain the concepts of conditional probability, independence (pairwise and mutual), and the binomial distribution in the context of Bernoulli trials.

CO5 :: apply Bayes' theorem, expected values, variance, geometric distribution, and Bienaymé's formula to solve problems involving random variables and probabilistic models.

CO6 :: analyze regular languages, regular expressions, finite state automata, and grammars to classify and solve problems in formal language theory.

Unit I

Relations : introduction, types of relations, reflexive relations, symmetric relations, antisymmetric relations, transitive relations, Closure properties, equivalence relations, partitions, partial ordering relations

Unit II

Ordered Sets and Lattices : introduction, ordered sets, Hasse diagrams of partial ordered sets, consistent enumeration, supremum and infimum, isomorphic (similar) ordered sets, well-ordered sets, lattices and bounded lattices, distributive lattices, complements and complemented lattices

Unit III

Boolean Algebra : introduction, basics definitions, duality, basic theorems, boolean algebras as lattices, representation theorem, sum-of-products form for boolean algebras, minimal boolean expressions, prime implicants

Unit IV

Discrete Probability-I : finite probability, assigning probabilities, probabilities of complements and unions of events, conditional probability, independence, pairwise and mutual independence, Bernoulli trials and the binomial distribution, random variables

Unit V

Discrete Probability -II : Bayes' theorem and generalized Bayes'theorem, expected values, linearity of expectations, the geometric distribution, independent random variables, variance, Bienaymé's formula.

Unit VI

Languages, Automata, Grammars : introduction, alphabet, words, free semigroup, languages and regular languages, regular expressions, finite state automata, grammars and types of grammars

Text Books:

1. DISCRETE MATHEMATICS AND ITS APPLICATIONS(SIE) by KENNETH H ROSEN, MCGRAW HILL EDUCATION

References:

1. DISCRETE MATHEMATICS (SCHAUM'S OUTLINES) (SIE) by SEYMOUR LIPSCHUTZ, MARC LIPSON, VARSHA H. PATIL, MCGRAW HILL EDUCATION