Discrete Mathematics and Optimization Techniques

Course Outcomes:

1. Analyze and apply set theory concepts such as sets, power sets, operations, cardinality, and countability of finite and infinite sets in various problem-solving scenarios. (Understanding)
2. Utilize vector implementations of sets to represent and manipulate sets efficiently in computer algorithms and applications. (Applying)
3. Explore and apply relational structures on sets including relations, equivalence relations, functions, and bijections to establish connections and mappings between different sets. (Applying)
4. Construct and analyze binary relations, posets, lattices, and Hasse diagrams to understand the concepts of ordering and hierarchy within sets. (Analyzing)
5. Apply principles of counting theory such as the Pigeonhole Principle, Principle of Inclusion and Exclusion, mathematical induction, and solving linear recurrence relations using generating functions to solve combinatorial problems effectively. (Applying)
6. Evaluate logical statements using propositional logic, deduction, resolution, predicates, and quantifiers to assess the validity of arguments and logical reasoning. (Evaluating)
7. Analyze algebraic systems including semigroups, groups, subgroups, rings, and fields to understand the structures and properties of these mathematical systems. (Analyzing)

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