**2 Propositional and Predicate Logic And Introduction to intelligent agents and environmental properties**

**Slide 1: Title Slide**

**Propositional and Predicate Logic**

* Syntax, Semantics, and Applications
* Proof Systems and Reasoning

**Slide 2: Introduction to Logic**

* **What is Logic?**
  + A framework for reasoning, crucial in AI, computer science, and mathematics.
* **Propositional Logic**:
  + Simple statements (e.g., *p*, *q*).
* **Predicate Logic**:
  + Deals with predicates, terms, and quantifiers (e.g., ∀x P(x), ∃y Q(y)).

**Slide 3: Syntax and Semantics of Propositional Logic**

* **Syntax**:
  + **Propositions**: Statements that are either true or false.
  + **Logical Connectives**: AND (∧), OR (∨), NOT (¬), IMPLIES (→), IF AND ONLY IF (↔).
* **Semantics**:
  + **Truth Tables**: Method for evaluating the truth of logical expressions.

**Slide 4: Syntax and Semantics of Predicate Logic**

* **Syntax**:
  + **Predicates**: Functions returning true or false (e.g., *isEven(x)*).
  + **Quantifiers**: Universal (∀) and Existential (∃).
* **Semantics**:
  + **Interpretation**: Mapping terms and predicates to a domain of discourse.
  + **Truth**: Evaluating whether a formula holds in a given interpretation.

**Slide 5: Applications of Logic**

* **Propositional Logic**:
  + Boolean Algebra, circuit design, AI decision-making.
* **Predicate Logic**:
  + Databases (SQL), AI knowledge representation, automated theorem proving.

**Slide 6: Proof Systems and Reasoning**

* **Propositional Logic**: Natural deduction, truth tables for inference.
* **Predicate Logic**: Quantifier rules, unification, resolution for automated reasoning.
* **Reasoning**: Deductive reasoning in both systems—deriving conclusions based on premises.