DM LAB 3 Experiments

**Lab Task 1: Truth Tables for Logical Operators**

1. **Construct the truth tables** for the following logical expressions:

 p∧q (AND)

 p∨q (OR)

 ¬p (NOT)

 p⊕q (XOR)

**Lab Task 2: Implication Operator and Truth Table**

1. **Construct the truth table** for the implication (p⇒q), which is read as "if ( p ), then ( q )".
2. **Verify** the following truth values for the implication operator:
   * ( p = {True}, q = {True} )
   * ( p = {True}, q = {False} )
   * ( p = {False}, q = {True} )
   * ( p = {False}, q = {False} )

**Lab Task 3:** Explore and verify De Morgan’s Laws using truth tables.

1. **State and prove De Morgan’s Laws**:

¬(p∧q)≡(¬p)∨(¬q)

¬(p∨q)≡(¬p)∧(¬q)

**Construct truth tables** for both of the above expressions and show that both sides of the equivalence give the same result.

**Lab Task 4:** Create and evaluate complex logical expressions using combinations of logical operators.

1. **Construct a truth table** for the following complex expression:
2. **Analyze** the truth values for the entire expression based on all possible combinations of truth values for ( p ), ( q ), ( r ), and ( s ).

**Lab Task 5:** Understand logical equivalences and how to prove them using truth tables.

1. **Prove the logical equivalence** between the following pairs of expressions using truth tables:
2. **Construct truth tables** to verify the equivalences. Show the truth values of both sides for all combinations of ( p ) and ( q ).