Objectives

* Understand the concept of Universal Gates (NAND & NOR)
* Implement the basic logic gates using universal gates
* Implement boolean functions using universal gates
* Understand gate level minimization

Equipment List

* Trainer Board
* IC 7400 Quadruple 2-input NAND gates
* IC 7402 Quadruple 2-input NOR gates

Circuit Diagram

*Figure F1: Implementation of XOR and XNOR using NAND gates*

*Figure F2: Implementation of NOT, AND, OR, XOR and XNOR using NOR gates*

Data & Table

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **A** | **B** | **C** | **I1=AC** | **I2=BC’** | **F= I1 + I2** |
| **0** | 0 | 0 | 0 | 0 | 0 |
| **0** | 0 | 1 | 0 | 0 | 0 |
| **0** | 1 | 0 | 0 | 1 | 1 |
| **0** | 1 | 1 | 0 | 0 | 0 |
| **1** | 0 | 0 | 0 | 0 | 0 |
| **1** | 0 | 1 | 1 | 0 | 1 |
| **1** | 1 | 0 | 0 | 1 | 1 |
| **1** | 1 | 1 | 1 | 0 | 1 |

*Table F1: Truth table of combinational circuit in Figure B2*