

**National University of Computer and Emerging sciences**

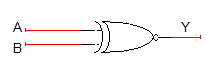
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| --- | --- | --- |
| **Course: Digital Logic and Design Lab** | **Lab Instructor: ZummarSaad** |  |
| **Course Instructor: Ms. NazishSaleem** | **Lab 6** |
| **Section:J** | **Total Marks:30** |

**Objectives:**

* To learn and understand how to design a multiple output combinational circuit

**Exclusive-OR & Exclusive-NOR gates:**

The figure given below shows the symbol of Exclusive-OR (XOR) and Exclusive-NOR (XNOR) gates.



XNOR gate XOR gate

Boolean expression of XNOR gate isand Boolean expression of XOR is. Boolean expression of XNOR gate can be implemented using XOR gate as shown in figure below:

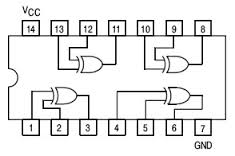
**Function Table:**

|  |  |  |
| --- | --- | --- |
| **Inputs** | | **Output** |
| **A** | **B** | **Y** |
| L | L | L |
| L | H | H |
| H | L | H |
| H | H | L |

H= Logic High, L= Logic Low

**Connection Diagram:**

**74LS86 IC** will be used for implementation of XOR gate function. **74LS86 IC** contains four 2-input XOR gates. The function table and connection diagram for this IC are shown below:



**Implementations on Logic Trainer and LogicWorks**

**BCD - to – Gray code Converter**

Design a circuit which takes binary of a BCD digit and displays its Gray code on output

**4 bit parity Checker**

A circuit that receives 4-bit message and outputs Error (E=1) if its parity is ODD

**(Implement it using XOR and XNOR gates)**

**Design a combinational circuit that compares two 2-bit unsigned numbers and generates the comparison result. The result consists of three outputs let us say L, E and G, such that**

**L=1 if A<B**

**E=1 if A=B**

**G=1 if A>B**

**Draw truth table find the optimized SOP expressions and implement the circuit.**

**Steps for designing a circuit on trainer:**

1- Make a Truth Table

2- Derive the optimized equations (Use k-maps)

3- Draw circuit on paper

4- Implement the circuit on trainer