MEDI-CAPS UNIVERSITY, INDORE			
Department of Electronics & Communication		Lab Session No.	Page No.
Digital Electronics	Enrol. No.		Batch No.

Performance Evaluation:

Name					
Performing on		First Submission	Second Submission		
Extra	regular				
Grade and Remarks by the Tutor					
1.	Clarity about the objective of the experiment				
2.	Clarity about the problem statement				
3.	Submitted the work in desired format				
4.	Shown capability to solve the problem				
5.	Contribution to the team work.				
Others:					
Grade	A	B	C	D	F

signature

EXPERIMENT: 6

1. **TITLE: Implement the logic circuit to convert Binary to Gray & Gray to Binary codes.**
2. **AIM:**
   - **a.** To understand the implementation of Gray to binary conversion.
   - **b.** To understand the implementation of binary to gray conversion.
   - **c.** To gain knowledge about the utility of different codes.
3. **OBJECTIVES:** Design & Verify code converter.
4. **PROBLEM STATEMENT:**
   - **a.** To Design & Verify Binary to Gray and Gray to Binary code converter.
   - **b.** To design truth table for circuits stated in point 1.
5. **PREREQISITE:**
   - **a.** Knowledge of Gray code.
   - **b.** K-Map method for circuit design.
6. **APPARATUS REQUIRED:**
   - **a.** Prototyping board (Bread board).
   - **b.** DC power supply 5V battery.
   - **c.** Light Emitting Diodes (LED's).
   - **d.** 7486 Quad 2 input XOR gate.
   - **e.** Connecting wires.
7. **THEORY:** Code is the symbolic representation of discrete information, which may be present in the form of numbers, letters or physical quantities. The symbols used are the binary digits 0 & 1 which are arranged to the rules of codes. These codes are used to communicate information to a digital computer & to retrieve messages from it. A code is use to enable an operator to feed data into a computer directly in the form of decimal numbers, alphabets & special characters. The computer converts

these data into binary codes & after computation transform the data into its original format.

Gray code: The gray code is non-weighted and is not an arithmetic code; that is, there is no specific weights assigned to the bit positions. The important feature of the gray code is that *it exhibits only a single bit change from one code number to next. Due to* this property Gray codes are also called as Unit Distance code & reflective codes. This property is important in many applications, such as shaft position encoders, where error susceptibility increases with the number of bit changes between adjacent numbers in a sequence.

Conversion of a binary code to gray code:

a. The first bit (MSB) of the gray code is the same as the first bit of the binary no.
b. The second bit of the gray code equals the EX-OR of the first & second bits of the binary no. i.e. it will be 1 if these binary code bits are different & 0 if they are same.
c. The third gray code bit equals the EX-OR of the second & third bits of the binary no. & so on.

Conversion of gray code to Binary code:

a. The first bit (MSB) of the binary code is the same as the first bit of the gray code bit.
b. If the second gray bit is 0, the second binary bit is same as that of the first binary; if the second gray bit is 1, the second binary bit is the inverse of the first binary bit.
c. Step 2 is repeated for each successive bit.

8. TRUTH TABLES:

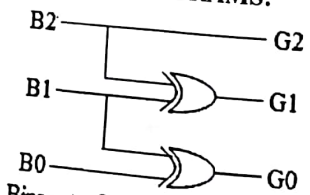
Binary to Gray Converter:

Binary			Gray		
B2	B1	B0	G2	G1	G0
0	0	0	0	0	0
0	0	1	0	0	1
0	1	0	0	1	1
0	1	1	0	1	0
1	0	0	1	1	0
1	0	1	1	1	1
1	1	0	1	0	1
1	1	1	1	0	0

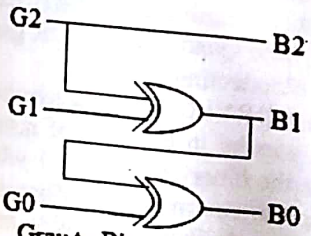
Gray to Binary Converter:

Gray			Binary		
G2	G1	G0	B2	B1	B0
0	0	0	0	0	0
0	0	1	0	0	1
0	1	0	0	1	1
0	1	1	0	1	0
1	0	0	1	1	1
1	0	1	1	1	0
1	1	0	1	0	0
1	1	1	1	0	1

9. CIRCUIT DIAGRAMS:



Binary to Gray code converter



Gray to Binary converter

10. TEST PROCEDURE:

a. Prepare the circuit diagram required for both the logic conversions.
b. Make connections as per the obtained circuit diagram for binary to Gray code conversion.
c. Switch on the power supply.
d. Give logic inputs to pin1, pin2, pin4& pin 5 of XOR gates. Verify the result on pin3, pin6, & pin8.
e. Check the result for Binary code 0000 to 1111 & obtain its corresponding Gray code.
f. Prepare the Truth Table.
g. Follow the same procedure to obtain the logic conversion for the Gray to Binary code conversion also.

11. RESULT: (students have to write the result by their own what result occurs).

12. SELF ASSESSMENT

a. Give a list of various types of codes.
b. Give application of gray codes?
c. Why the gray codes are called reflective codes?
d. Explain the use of codes in digital computer.
e. Convert into gray code : (100111101)
f. Convert the following to binary code: (11110001)

Prepared by	Date	Modified on