Fig: Circuit Diagram of BCD to EXCESS 3 code converter

6. **Procedure:**
   a. Collect the components necessary to accomplish this experiment.
   b. Plug the IC chip into the breadboard.
   c. Connect the supply voltage and ground lines to the chips. PIN7 = Ground and PIN14 = +5V.
   d. Make connections as shown in the respective circuit diagram.
   e. Connect the inputs of the gate to the input switches of the LED.
   f. Connect the output of the gate to the output LEDs.
   g. Once all connections have been done, turn on the power switch of the breadboard
   h. Operate the switches and fill in the truth table (Write "1" if LED is ON and "0" if L1 is OFF apply the various combinations of inputs according to the truth table and observe the condition of Output LEDs.

7. **Observation Table:** Input Variable: A B C D
   Output Variable: W X Y Z
   LED ON: RED Light: Logic 1
   LED OFF: Green Light: Logic 0

INPUTS(LED)				OUTPUTS(LED)			
A	B	C	D	W	X	Y	Z

Calculation:
K-map

Boolean Expression: **W =**
X =
Y =
Z =

8. **Result and Discussions:** Excess-3 code is a 4-bit un-weighted code and can be obtained from the corresponding value of BCD code by adding three to each coded number.Excess-3 code is self complementing in nature because 1's complement of the coded number yields 9's complement of number itself.
9. **Conclusion:** BCD to Excess-3 code converter has been designed using basic logic gates and its truth table verified.

10. **Self assessment:**
    a. Why Excess-3 code is known as self complementary code?
    b. To Design and verify the truth table of code conversion from Excess-3 to BCD using basic Logic Gates.

BCD Codes: Numeric codes represent numeric information i.e. only numbers as a series of 0's and 1's. Numeric codes used to represent decimal digits are called Binary Coded Decimal (BCD) codes. A BCD code is one, in which the digits of a decimal number are encoded-one at a time into group of four binary digits. There are a large number of BCD codes in order to represent decimal digits0, 1, 2 …9, it is necessary to use a sequence of at least four binary digits. Such a sequence of binary digits which represents a decimal digit is called code word.

EXCESS 3 Codes: It is a non-weighted code. It is also a self-complementing BCD code used in decimal arithmetic units. . The Excess-3 code for the decimal number is performed in the same manner as BCD except that decimal number 3 is added to the each decimal unit before encoding it to binary.

Truth Table for BCD to Excess -3 Code Conversion:

INPUTS(BCD)				OUTPUTS(Excess-3)			
A	B	C	D	W	X	Y	Z
0	0	0	0	0	0	1	1
0	0	0	1	0	1	0	0
0	0	1	1	0	1	0	1
0	0	1	0	0	1	1	0
0	1	1	0	0	1	1	1
0	1	1	1	1	0	0	0
0	1	0	1	1	0	0	1
0	1	0	0	1	0	1	0
1	1	0	0	1	0	1	1
1	1	0	1	1	1	0	0

Expression:

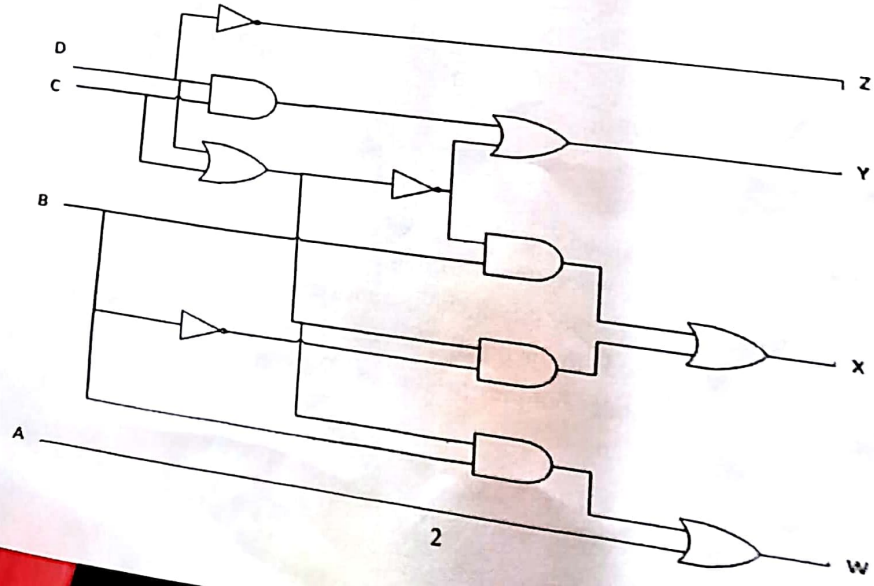
$Z = D$

$Y = CD+C'D'=CD(C+D)'$

$X = B'C+B'D+BC'D'= B'(C+D) +BC'D$

$W = B'(C+D) +B(C+D)'$

5. Circuit Diagram:



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 - 5

1. **TITLE: To Design and verify the truth table of code conversion from BCD to Excess-3 using basic Logic Gates.**
2. **OBJECTIVE:**
   a. Design of different combinational circuits and their applications using basic logic gates.
   b. Creation and observation of the excess 3 code representation sequence
   c. Exercising the design of code conversion logic circuits,
   d. Creating the truth table of conversion functions from BCD to EXCESS 3 code
   e. Developing skills in simplification of specified logical functions
3. **Apparatus Required:**
   a. Prototyping board (breadboard)
   b. DC Power Supply 5V Battery
   c. Light Emitting Diode (LED)
   d. Digital ICs: 7404 :Hex Inverter 7408: Quad 2 input AND 7432: Quad 2 input OR
   e. Connecting Wires
4. **Theory:**

Code Converters: A code converter is a combinational circuit that must be inserted between the two systems, to make them compatible even though each uses different code for same information. It means that a code converter is a code translator from one code to the other. The code converter is used since to systems using two different codes but they need to use the same information. So the code converter is the solution.