	AIR UNIVERSITY
	DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
	EXPERIMENT NO 7

Lab Title: _____

Student Name: _____ **Reg. No:** _____

Objective: _____

_____

LAB ASSESSMENT:

Attributes	Excellent (5)	Good (4)	Average (3)	Satisfactory (2)	Unsatisfactory (1)
Ability to Conduct Experiment					
Ability to assimilate the results					
Effective use of lab equipment and follows the lab safety rules					

Total Marks: _____ Obtained Marks: _____

LAB REPORT ASSESSMENT:

Attributes	Excellent (5)	Good (4)	Average (3)	Satisfactory (2)	Unsatisfactory (1)
Data presentation					
Experimental results					
Conclusion					

Total Marks: _____ Obtained Marks: _____

Date: _____ Signature: _____

Experiment 7

Seven Segment Display

OBJECTIVES:

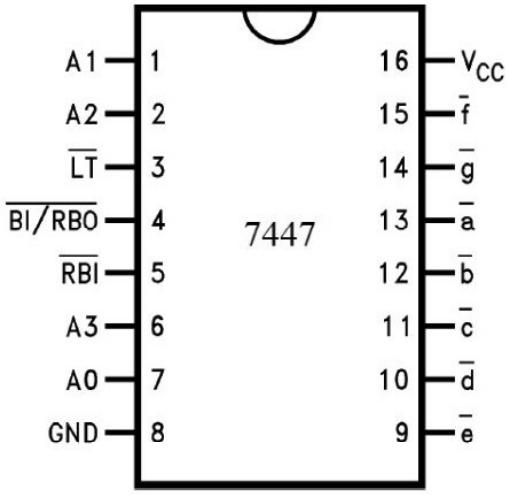
- To experimentally check the operation of 7-segment display using BCD to 7-segment decoder 7447.

Required Components and Equipment's:

ICs as required, Digital Electronics trainer.

Overview:

A BCD to seven-segment decoder is a logic circuit often used for the visual display of digital information. The seven outputs of the decoder will drive the seven segments on a corresponding display. BCD is the acronym for Binary Coded Decimal. The BCD system is used to represent the decimal numbers from 0 to 9 in a binary format suitable for digital devices. A four-bit code is required with the decimal characters 0 through 9 represented by the binary numbers 0000 through 1001. The combinations 1010 through 1111 are not used. A BCD to seven-segment decoder will allow the display of a binary coded decimal on a seven- segment display. The input to the decoder is a number from 0 through 9 in BCD and the output provides the seven inputs required to drive the seven-segment display.

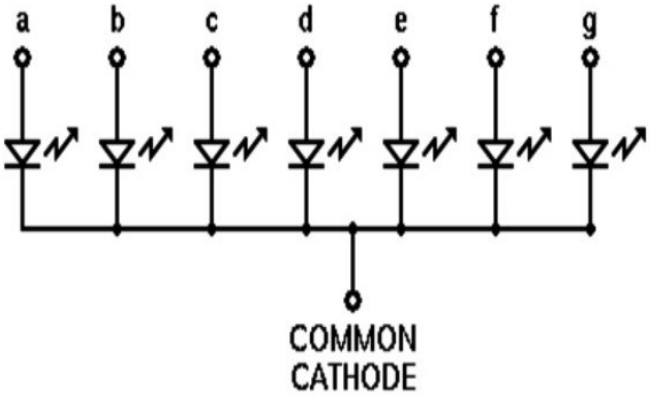


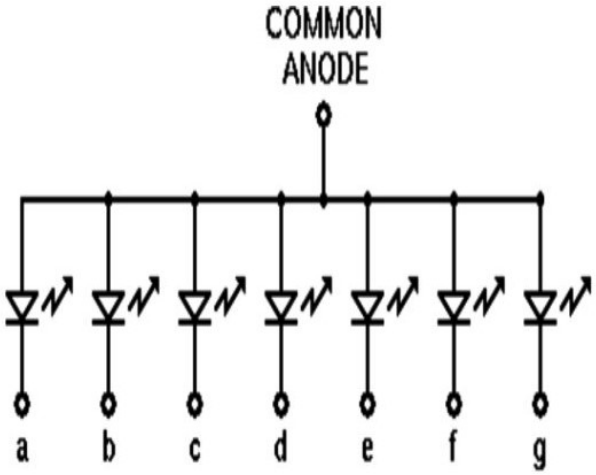
Pin Names	Description
A0–A3	BCD Inputs
$\overline{RBI}$	Ripple Blanking Input (Active LOW)
$\overline{LT}$	Lamp Test Input (Active LOW)
$\overline{BI/RBO}$	Blanking Input (Active LOW) or Ripple Blanking Output (Active LOW)
$\overline{a}$ –$\overline{g}$	*Segment Outputs (Active LOW)

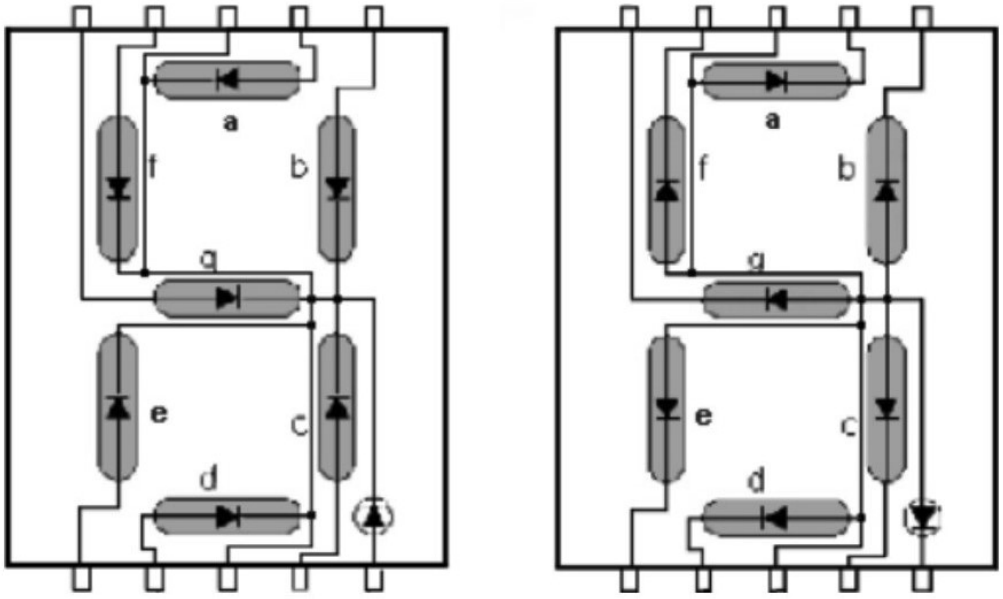
(BI) ′/ (RBO) ′ is wire-AND logic serving as blanking input (BI) ′ and/or ripple-blanking output (RBO) ′. The blanking out (BI) ′ must be open or held at a HIGH level when output functions 0 through 15 are desired, and ripple-blanking input (RBI) ′ must be open or at a HIGH level if blanking or a decimal 0 is not desired. X = input may be HIGH or LOW. When a LOW level is applied to the blanking input (forced condition) all segment outputs go to a HIGH level regardless of the state of any other input condition. When ripple-blanking input (RBI) ′ and inputs A0, A1, A2 and A3 are LOW level, with the lamp test input at HIGH level, all segment outputs go to a HIGH level and the ripple-blanking output (RBO) ′ goes to a LOW level (response condition). When the blanking input/ripple-blanking output.

(BI)′ / (RBO)’ is open or held at a HIGH level, and a LOW level is applied to lamp test input, all segment outputs go to a LOW level.

The **seven segment display** chip contains 7 LEDs, similar to the ones you have been using. The only difference is that they have been packaged into a single chip, and they have a different shape. The seven LEDs are not used individually; instead they are wired so their one end is common. If the anodes of the LEDs are wired together it is called “Common Anode” configuration and if the cathodes are connected together, it is known as “Common Cathode” configuration. Both the configurations are shown below.







Common Cathode Common Anode

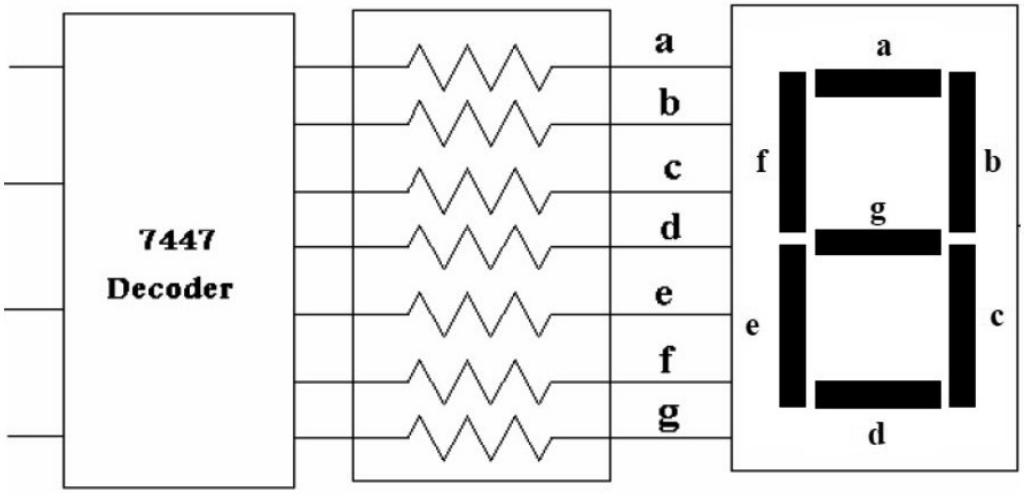
PROCEDURE:

1. Check the configuration of your 7-segment display using a Multi-meter. Find out its configuration and pin-assignment.

2. Create the truth table describing the function of a BCD to seven-segment decoder according to the configuration of your display. The lower case letters, a-g, represent the Segments on the display while the upper case letters A0-A3 represent the BCD input. Note that the output of the decoder is active-low.

Inputs				Outputs						
A3	A2	Al	AO	a	b	c	d	e	f	g

1. Design a circuit showing the proper connections of the decoder and the 7-segment display. Invert the outputs of the decoder in case of common cathode display. The output pins of 7447 are connected to the pins of seven segment display chip via resistances as shown below:



2. Implement the circuit on the trainer. Enter BCD numbers from 0 to 9 and see the corresponding decimal digit on the display.

Student Exercise:

Make K-maps for each of the output of the BCD to 7-segment decoder. Find out the minimal SOP for each output. Design the decoder using minimum number of gates.