Department of Computer Science
Forman Christian College
(A Chartered University)
Lahore

Digital Logic Design
COMP 206

DIGITAL LOGIC DESIGN
COMP 206
LAB 07- RUBRIX

DESCRIPTION	MARKS ALLOCATED
Attendance	5%
Proper handling of gate ICs, and other lab components.	10%
Hardware wired completely	20%
Hardware working properly	30%
Lab task 1	5%
Truth table complete	20%
End Problems (all four)	10%

Marks will be deducted in case if students have not completely and correctly filled the data tables.
Note that these marks are max in each category. We may assign less than the given percentage of marks in case students have not successfully completed all the requirements.
This lab is time constrained. Please note that you must finish your work and submitted duly filled handout to the lab engineer within given time.

LAB 07
BCD TO SEVEN-SEGMENT DECODER

Name

Roll Number:

Date:

Learning Objectives

By the end of this exercise you will be able to convert a Binary Coded Decimal (BCD) number to a decimal number which is displayed on a Seven Segment Display (SSD).

Equipment Required:

- 74 LS 47
- Variable Power Supply
- 330 Ohm Resistors
- Common Anode 7-segment display

Theory Overview

The conversion from one code to another is common in digital systems. Sometimes the output of a system is used as the input to the other system. A conversion circuit is necessary between two systems if each system uses different codes for the same information. In this experiment you will design and construct 3-combinational circuit converters.

A light emitting Diode (LED) is a PN junction diode. When the diode is forward biased, a current flows through the junction and the light is emitted.
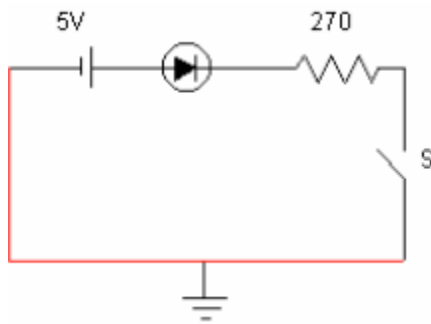
Figure 1

A seven segment LED display contains 7 LEDs. Each LED is called a segment and they are identified as (a, b, c, d, e, f, g) segments.

The display has 7 inputs each connected to an LED segment. All anodes of LEDs are tied together and joined to 5 volts (this type is called common anode type). A current limiting resistance network must be used at the inputs to protect the 7-segment from overloading. BCD inputs are converted into 7 segment inputs (a, b, c, d, e, f, g) by using a decoder.
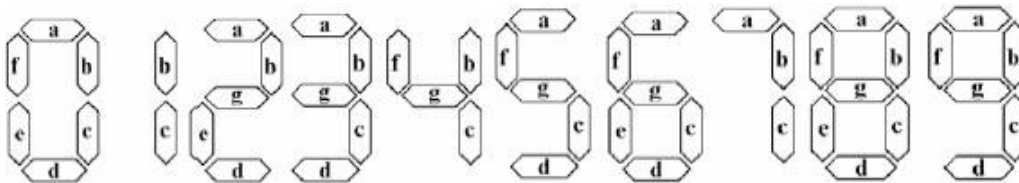

Figure 2

A decoder is a combinational circuit that converts binary information from n input lines to a maximum of 2 n output lines. The input to the decoder is a BCD code and the outputs of the systems are the seven segments a, b, c, d, e, f, and g. For further information and pin connections, consult the specification sheet for decoder and 7-segment units.

The 7447 BCD-to-seven segment decoder is used to drive a seven-segment LED display. The outputs, a- g, drive the corresponding segments on the seven-segment display according to the binary number present at the inputs A-D, D being the most significant bit of the number. Three additional inputs, LAMP TEST, BI/RBO, and RBI are provided. The blanking input/ripple-blanking output (BI/RBO) blanks (turns off) the display when set LOW. Otherwise, when BI/RBO is set high, the outputs drive the

display according to the inputs A-D. The ripple blanking input (RBI) must be HIGH if blanking of a decimal zero is not desired. This input is useful in blanking higher order zeroes when using several displays for a multi- digit decimal number. Finally, LAMP TEST selects (turns on) all the segments when set LOW. It is used to test the segments on the display.
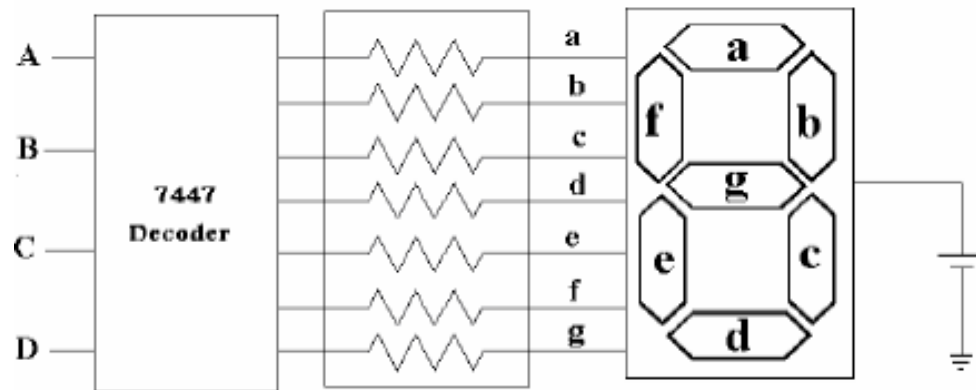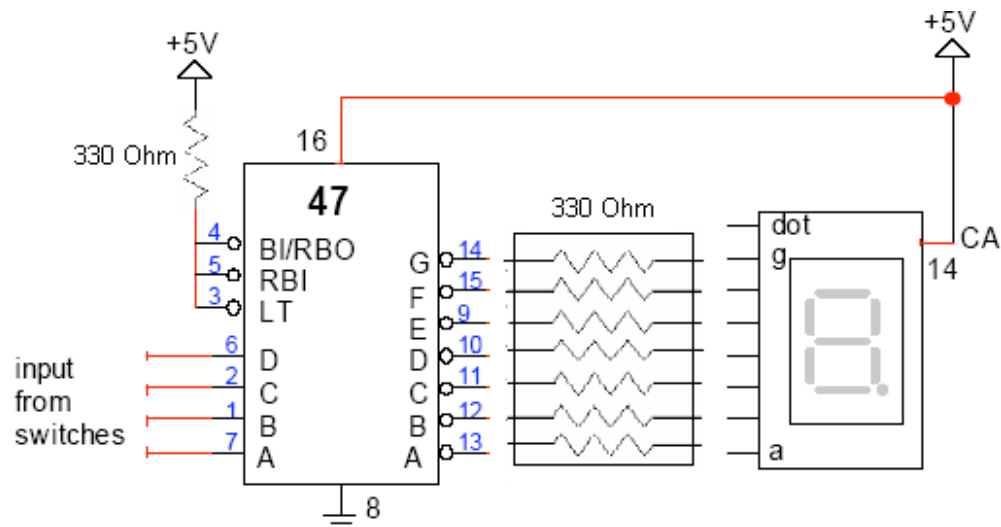

Figure 3

Lab Task1

Define truth table with the help of one example.

Fill in the following table with zeros and ones so that it should reflect the truth table for a BCD to 7- segment decoder.

Input				Output						
A	B	C	D	g	f	e	d	c	b	a

Lab Task2

Now wire the circuit on breadboard as shown in figure 4. Make sure that your circuit must show all BCD digits when inputs are connected to appropriate switches.

Question:

What happens when you apply an invalid input?

Helper Link: https://quickgrid.wordpress.com/2015/03/22/7-segment-decoder-implementation-truth-table-logisim-diagram/