**Scenario**

You are an electrical technician in an electronics company working in the field of designing and building electronics systems and solutions. Your manager asked you to work on some customer's requests to select the proper integrated circuit and prepare initial design and build circuits using combinational logic for their needs. Your manager asked you firstly; interpret manufacturers’ data sheets to select appropriate combinational logic devices for specific purposes. Secondly, compare the characteristics of similar devices using different technologies. Thirdly, design, construct and test combinational circuits. Finally, use computer software packages to simulate these combinational logic circuits.

**Instructions:**

1. Work to be legible and succinct, with an adequate grasp of grammar, punctuation and spelling.
2. Ensure sketches & diagrams are clear, accurate and labeled.
3. True graphs, titled and axes labeled.
4. List sources where appropriate.

Customer needs:

1. It is required to **buffer** LEDs as indicators for door lock device the indicator must goes on when the door lock gives high (use switch to simulate the door lock device).
2. It is required to use **line driver** to interface the microcontroller Arduino Uno with 8 LED segment array unit.
3. It is required to use **2** selectors DIP switch to **select** one from **4 small 7 LEDs** to indicate the selected line is on (in a PBX device).
4. It is required to **decode** **BCD** output from a microcontroller to **7 segment (common anode)** unit.
5. It is required to **multiplex 4 inputs from DIP switch to one output only as the reverse of (PBX device).**

**Notes:**

* Use logic input from switches instead of microcontroller or computer parallel port.
* Your manager will choose 2 requests from customer needs to work on in the following tasks shown below.

**Tasks:**

1. Interpret manufacturers' data sheets to select appropriate combinational logic device for 2 of the customers' requests (Designs). Put your selection and datasheet interpretation into table (2) shown below for each purpose.

**Note**: Attach the Manufacturers’ data sheets used.

**Table (2)**

|  |  |
| --- | --- |
| IC number |  |
| Function |  |
| General description |  |
| Applications |  |
| Manufacturing Technology |  |
| Cost |  |
| Size |  |
| Packaging |  |
| Operating Voltage |  |
| Propagation delay |  |
| Availability |  |
| Fan out or (output and Input Currents) |  |
| Power Consumption |  |

**P1.1**

1. For the two designs you are developing if you have selected an IC manufactured with certain technology (i.e. TTL or CMOS), now you have to use table 1 again to compare the characteristics of similar devices using the other technology.

**P1.2**

1. Design, construct and test the two combinational logic circuits using the selected combinational ICs.

**P1.3**

1. Use computer software package to simulate the construction and testing of the previous two combinational logic circuits.

**P1.4**