ENGR 120 LAB #5 – Digital Design

Objectives
1) Apply Logic design and implementation skills.
2) Proficiency in requirement analysis, logic design, implementation and testing processes.

Materials
5) Introduction to ECSE textbook
6) Course website: www.EngrCS.com
7) Instruments: Power Supply and Multimeter
8) Supplies:
    a) Proto Board (1 unit)
    b) Jumper Wires (as needed)
    c) Assorted LED Colors (3 units)
    d) 1 KΩ resistor (as needed)
    e) 74LS00 through 74LS32 (as required by the design)

Notice: Ground and Vcc pin #s vary among the ICs so double check your schematic and design before powering your design.

Procedure

1) Keep the same lab partner as from the previous lab.

2) Lab experiments
    a) Read through the lab prior to arriving in the lab. The labs provide background information or design that can be done prior to arriving in the lab. Good preparation can minimize the time spent in the lab room and lead to a more enjoyable lab!
    b) Perform each experiment listed in the lab.
    c) Record your results and/or observations for each experiment.

3) Report
   Reports must be created *individually*. All reports must be computer printed (Formulas and Diagrams may be hand drawn) and at minimum include:

    a) Header:

Your name
Lab #
Date
Team member names
Experiment #1:
…

    b) For each experiment:
        i.   Clear problem statement; specify items given (if any) and to be found
        ii. Document the resulting circuit design, tables, diagrams, calculations and other results
    c) For the report as a whole:
        i.   Lessons learned from the experiments
        ii. Content/format improvement suggestions and reasons for the suggestions
        iii. Estimated time spent on the lab (value is not graded – used to improve labs)

Experiment 1. Landing Priority Control Circuit

Design, implement and demonstrate a logic circuit that accepts inputs A, B and C. An input value of "1" indicates a plane is requesting permission to land on the corresponding runway. For example, if A=1 then there is a plane requesting landing permission for runway A. It is given that a plane requesting permission for runway A has the highest priority while a plane seeking permission to land on runway C has the lowest priority.

Circuit outputs are LandA, LandB and LandC where the value "1" means the corresponding plane has permission to land. For example, if LandB=1 then a plane requesting landing permission for runway B has the right to land. Although, you may have landing requests for more than one runway, only one plane may be granted the permission to land.

For this experiment, generate the input using switches and simulate the output using LEDs. Additionally, System Diagram, Truth Table, Output Function and Schematics are a required part of this experiment.