Nile High Institute For Engineering and Technology
Department: Communication
Level: 200
Type: 1st term

Course-Title: Digital & Logic Circuit
Course-Code: ELE 221
Date: 24 / 12 / 2017
Total Marks: 50 Points
Time allowed: 2 hour(s)

Question-1 (20 Points)

A. A combinational circuit is specified by the following three Boolean functions:
$F_1 = \sum(0,3,4)$ $F_2 = \sum(1,2,7)$ $F_3 = \prod(0,1,2,4)$
Implement the circuit with a **decoder** and **external OR** gate

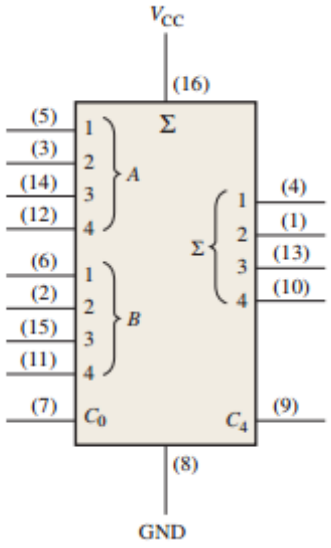
B. Implement the following Boolean function $F(A,B,C,D) = \sum(0,3,5,6,9,10,11)$ with $\mathbf{4 \times 1}$ Multiplexer (Do not use 8×1 MUX)

C. **Design** a **4-bit binary parallel adder** using only **half adder and full adder**

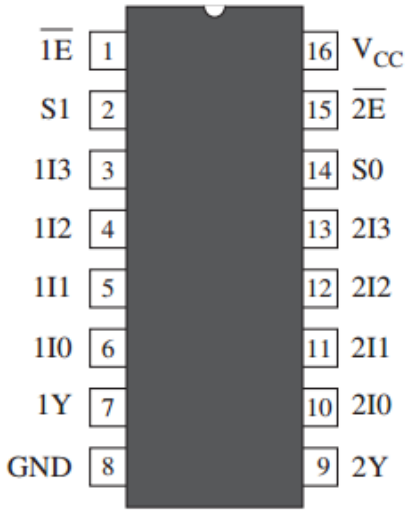
D. Design a logic circuit that computes the function $\boldsymbol{f(x) = x^2 - x + 2}$ for a 2-bit number x

Question-2 (10 Points)

A. Show how two **74HC283** adders can be connected to form an **8-bit parallel adder**.



B. Use The **74HC153 dual four-input data selector/multiplexer** and any other logic necessary to **multiplex 8 data lines** onto a single data-output line.

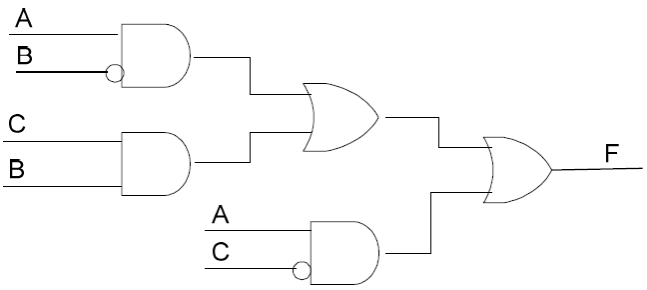


Question-3 (20 Points)

A. Design a digital circuit that can **output the maximum number** between two 4-bit numbers A and B
Hint: $\boldsymbol{output = max\,(A,B)}$

B. Use Karnaugh map to obtain minimized SOP for the following function
Hint: **d**: do not care
$\boldsymbol{F(A,B,C) = \sum(1,3,5,7)}$ $\boldsymbol{d(A,B,C) = \sum(4,6)}$

C. Implement the function **F** represented by the logic diagram shown next by using **decoder**



*****BEST WISHES*****

Instructor: Dr. Mostafa Elhosseini