



Question-1 (10 Points)

A. A combinational circuit is specified by the following three Boolean functions:

$$F_1 = \sum(0,3,4) \quad F_2 = \sum(1,2,7) \quad F_3 = \prod(0,1,2,4)$$

Implement the circuit with a **decoder** and **external OR gate**

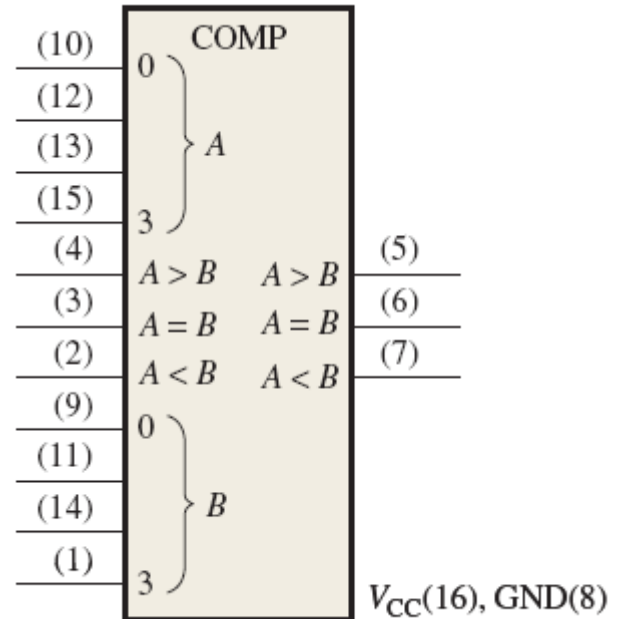
B. Implement the following Boolean function
 $F(A, B, C, D) = \sum(0,3,5,6,9,10,11)$ with 4×1
Multiplexer (Do not use 8×1 MUX)

- Design use 2×1 MUX — Extra Credit

Question-2 (10 Points)

A. Design a logic circuit that computes the function $f(x) = x^2 - x + 2$ for a **2-bit number x**

B. Design a **two 3-bit magnitude comparator**. Output F becomes **one** whenever the value of input **A** is **less than or equal** to the value of input **B** using 74HC85



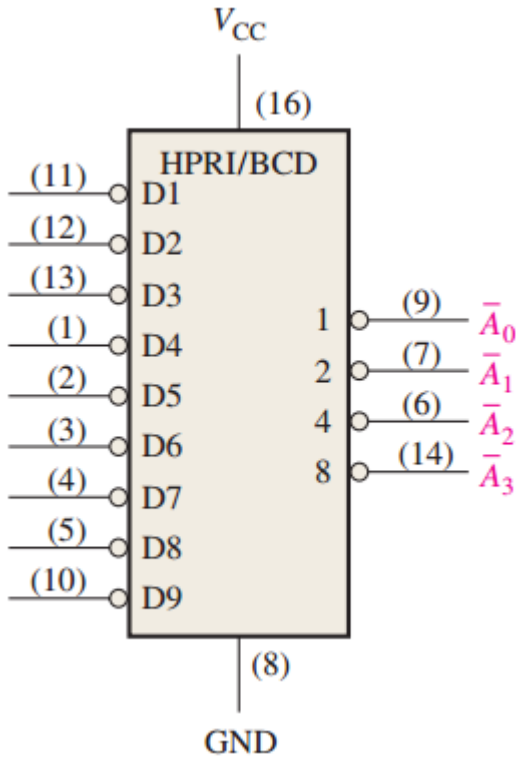
Question-3 (10 Points)

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

B. Design a two 2-bit adder circuit using **4-bit parallel adder**

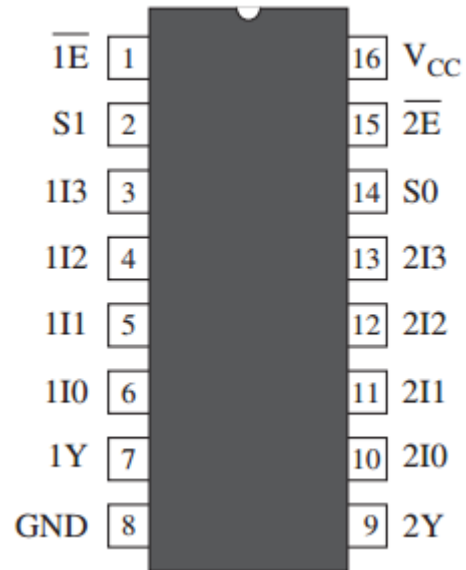
Question-4 (10 Points)

- A. The **74HC147** is a **priority encoder** with active-LOW inputs (0) for decimal digits 1 through 9 and active-LOW BCD outputs as indicated in the logic symbol in. A BCD zero output is represented when none of the inputs is active.



If LOW levels appear on pins, 1, 4, and 13 of the 74HC147, **indicate the state of the four outputs**. All other inputs are HIGH

- 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.



BEST WISHES