

# Logic Design – Tutorial

## 03

# Binary Code and Binary Logic

| # | Student ID | Student Name | Grade<br>(10) |
|---|------------|--------------|---------------|
| - |            |              |               |

|       |   |
|-------|---|
| Q1    | Convert decimal 8,723 to both BCD and ASCII codes. For ASCII, an even parity bit is to be appended at the left. |
| Sol 1 | <p>8,723</p> <p>BCD:     1000_0111_0010_0011</p> <p>ASCII:   0_011_1000_011_0111_011_0010_011_0001</p>          |

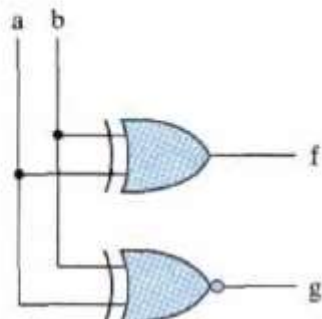
|       |  |
|-------|--|
| Q2    | Find the 9's complement of decimal 5,137 and express it in 2421 code. Show that the result is the 1's complement of the 2421 code                      |
| Sol 2 | <p>5,137 9s Comp:     4,862</p> <p>          2421 code:   0100_1110_1100_1000</p> <p>          1s comp:    1011_0001_0011_0111 same as (c) in 1.25</p> |

|       |   |
|-------|---|
| Q3    | What bit must be complemented to change an ASCII letter from capital to lowercase and vice versa? |
| Sol 3 | bit 6 from the right  |

|       |  |
|-------|--|
| Q4    | The state of a 12-bit register is 100010010111. What is its content if it represents<br>(a) three decimal digits in BCD?<br>(b) three decimal digits in the excess-3 code?<br>(c) three decimal digits in the 84-2-1 code?<br>(d) a binary number? |
| Sol 4 | (a) 897                      (b) 564                      (c) 871                      (d) 2,199   |

Q5

By means of a timing diagram similar to Fig. 1.5, show the signals of the outputs  $f$  and  $g$  in Fig. P1.36 as functions of the two inputs  $a$  and  $b$ . Use all four possible combinations of  $a$  and  $b$ .



Sol 5

