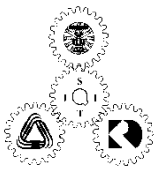


Sirindhorn International Institute of Technology

Thammasat University at Rangsit

School of Information, Computer and Communication Technology

ECS 371: Problem Set 1

Semester/Year: **1/2009**
Course Title: Digital Circuits
Instructor: Dr. Prapun Suksompong (prapun@siit.tu.ac.th)
Course Web Site: http://www.siit.tu.ac.th/prapun/ecs371/

Due date: June 25, 2009 (Thursday)

Please submit your homework to the instructor 3 minutes BEFORE your class starts.

Instructions

1. The questions are assigned from the following textbook:

   Thomas L. Floyd, *Digital Fundamentals*, 10th Edition, Pearson Education International (2009).

2. Only TWO of the problems will be graded. Of course, you do not know which problems will be selected; so you should work on all of them.
3. Late submission will not be accepted.
4. ***Write down all the steps*** that you have done to obtain your answers. You may not get full credit even when your answer is correct without showing how you get your answer.

Chapter 2

- 6, 9, 13, 19, 20, 22, 25, 28

6. Convert the following binary numbers to decimal:

(a) 1110 **(b)** 1010 **(c)** 11100 **(d)** 10000
(e) 10101 **(f)** 11101 **(g)** 10111 **(h)** 11111

9. How many bits are required to represent the following decimal numbers?

(a) 17 **(b)** 35 **(c)** 49 **(d)** 68
(e) 81 **(f)** 114 **(g)** 132 **(h)** 205

13. Convert each decimal number to binary using repeated division by 2:

(a) 15 **(b)** 21 **(c)** 28 **(d)** 34

(e) 40 **(f)** 59 **(g)** 65 **(h)** 73

19. What are two ways of representing zero in 1's complement form?

20. How is zero represented in 2's complement form?

22. Determine the 2's complement of each binary number using either method:

(a) 10 **(b)** 111 **(c)** 1001 **(d)** 1101

(e) 11100 **(f)** 10011 **(g)** 10110000 **(h)** 00111101

25. Express each decimal number as an 8-bit number in the 2's complement form:

(a) +12 **(b)** −68 **(c)** +101 **(d)** −125

28. Determine the decimal value of each signed binary number in the 2's complement form:

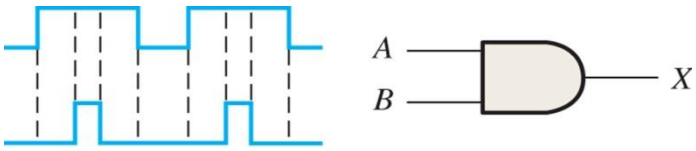
(a) 10011001 **(b)** 01110100 **(c)** 10111111

Chapter 3

- 6, 8, 16, 20, 23

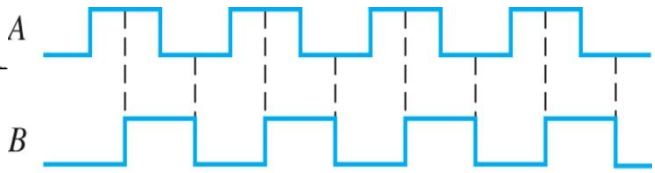
5. Determine the output, *X*, for a 2-input AND gate with the input waveforms shown in Figure 3–76. Show the proper relationship of output to inputs with a timing diagram.

FIGURE 3–76



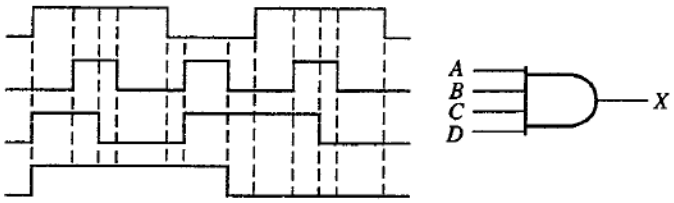
6. Repeat Problem 5 for the waveforms in Figure 3–77.

FIGURE 3–77



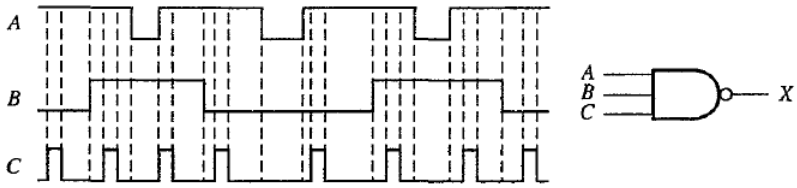
8. The input waveforms applied to a 4-input AND gate are as indicated in Figure 3–79. Show the output waveform in proper relation to the inputs with a timing diagram.

FIGURE 3–79



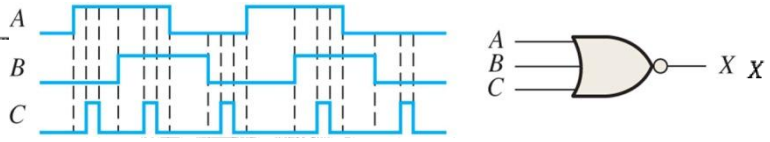
16. Determine the gate output for the input waveforms in Figure 3–82 and draw the timing diagram.

FIGURE 3–82



20. Determine the output waveform in Figure 3–85 and draw the timing diagram.

FIGURE 3–85



23. How does an exclusive-OR gate differ from an OR gate in its logical operation?