

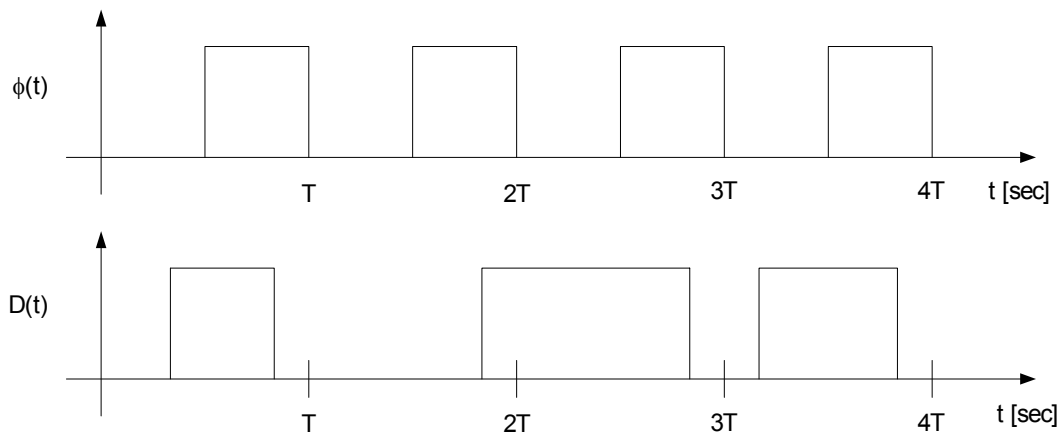
## CpE 213 HW 1 – Digital Logic Components and Address Decoding (80pts)

Due: Tuesday 9-16-03  
Show your work for full credit.

1. Convert the following binary numbers to decimal, octal and hexadecimal. (20pts)

- a) 1011 0010
- b) 1011 1010
- c) 1101 1110
- d) 1001 0101

2. a) The data signal  $D(t)$  shown below is applied to the input of a negative edge-triggered DQ flip-flop. Sketch the output  $Q(t)$  for the device. (Note that low-to-high and high-to-low delays are ignored and  $Q(t)$  is initially 0 at  $t=0$ ). (10pts)



b) Redo the previous problem for the case where  $D(t)$  is applied to the input of a positive edge-triggered DQFF. (10pts)

3. Suppose you are trying to hook up two  $4k \times 8$  ROMs, one  $1k \times 8$  ROM and one  $1 \times 8$  register to a microcontroller with 16 address lines ( $A_0$  through  $A_{15}$ ). (30 pts)

- a) Draw a circuit that uses the decoder method using one 74LS138 decoder.
- b) Find the address space for each chip.

4. Describe three main differences between microprocessors and microcontrollers. (10 pts)